ORIGINAL ARTICLE

Customer satisfaction with electronic public services: An 18 years of systematic literature review

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Abstract

Given the increase in technology-based services in the public sector, such as the use of web-based or mobile applications, understanding the levels of customer satisfaction with electronic public services is important for academics and practitioners. Thus, this paper presents an up-to-date systematic literature review (SLR) of customer satisfaction with electronic public services. The authors classified and analysed 129 relevant articles on customer satisfaction in the context of electronic public services published from 2005 to 2022 in numerous Scopus and Google Scholar journals. Afterwards, this present research analysed papers based on their year of publication, the countries where the study was conducted, service types and the antecedents (psychological, technological, social, and behavioural) and consequences of customer satisfaction, including the mediators between antecedents and consequences. Based on the SLR, this paper outlines directions for future research related to a conceptual framework highlighting promising research areas linked to the antecedents and consequences of customer satisfaction with electronic public services, as well as the theories and methodologies.

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1 Introduction

Customer satisfaction is a key construct in the marketing literature (Dash et al., 2021; Yi & Nataraajan, 2018; Zhao et al., 2020). The previous literature mentions that customer satisfaction is a combined response after a person obtains or consumes a product or service in a certain period (Dash et al., 2021; Giese & Cote, 2000; Oliver, 2010). Additionally, the measures of customer satisfaction are context related, meaning that the measurement is highly dependent on the product or service consumed (Dash et al., 2021; McColl-Kennedy & Schneider, 2000). Customer satisfaction has been studied in different settings, including public services (Rhee & Rha, 2009; Zhang et al., 2022), which is in the context of marketing (Butler & Collins, 1995; Laing, 2003).

Research on marketing concepts, particularly customer satisfaction, are potentially applied when public service satisfaction is decreasing (Bouzas-Lorenzo, 2010; Wu, 2021). Traditionally, before the rise of new public management, the discussion of marketing elements in public services was very limited (Caruana et al., 1998; Walsh, 1994). As managerialism has grown in recent years, marketing is considered important for public services, and some marketing practices have been applied to the public sector (Bouzas-Lorenzo, 2010; Caruana et al., 1998; Walsh, 1994). Recently, academics and practitioners have applied marketing concepts to public sector organizations (Arca et al., 2017; Cervera et al., 2001; Kotler & Lee, 2007a). Compared to the public sector, marketing concept such as customer satisfaction is more often viewed as being related to the private sector (Eid et al., 2019; Kotler & Lee, 2007b). However, public sector organizations seeking excellent performance need to achieve customer satisfaction with their services (Eid et al., 2019; Kim, 2020). Public services that succeed in fulfilling customers' wants and needs will have a lower budget allocation for promotion because satisfied customers may become "evangelists" for such service (Cervera et al., 2001; Kotler & Lee, 2007a). In addition, customer satisfaction benefits public services regarding future support for funding needs, enhancing operational efficiencies, and improving performance evaluations (Kotler & Lee, 2007a; Walker et al., 2011).

Due to the rapid development of information and communication technology infrastructures and the diffusion of internet connectivity, organizations have introduced a large number of technology-based services for their customers, including electronic services provided by public sector organizations (Hung et al., 2020; Khan et al., 2021; Kumar et al., 2020). While many scholars in recent years have studied customer satisfaction with electronic public services, the numbers of systematic literature review are still limited. Addressing the gap, therefore, it is convincing to critically assess the extent of literature and to clarify what we already know and what we need to know regarding the determinants of customer satisfaction with electronic public services. Through systematic literature review, this study aims to offer a comprehensive analysis of the current state literature regarding customer satisfaction with electronic public services. Additionally, this paper potentially generates deeper researchable topics for further investigation.

2 Research method

Systematic literature review aims to comprehensively identify, assess, and synthesize all relevant studies that satisfy pre-established criteria based on an explicit method to answer particular questions (Antman et al., 1992; Klassen et al., 1998). SLR study should follow a replicable, scientific and transparent process, and it should also minimize bias in the coverage of the field (Cook et al., 1997; Nightingale, 2009). This study applied the approach of conducting an SLR suggested by Tranfield et al. (2003). To present a comprehensive report on the extant literature, the following four research questions were addressed:

1) What similarities and differences are evident in the literature on customer satisfaction with electronic public services over time and across regions, research methods, and types of electronic public services?
2) What theories/concepts/models are adopted by studies on customer satisfaction with electronic public services?
3) What are the antecedents and consequences of customer satisfaction with electronic public services?
4) What knowledge gaps are evident within the extant literature on customer satisfaction with electronic public services?

2.1 Initial search

Scopus databases were used to ensure extensive coverage of the social scientific journals (Hati et al., 2021). We selected Scopus because in the field of social science, its database is better in terms of journal coverage and the number of documents retrieved (Aksnes & Sivertsen, 2019; Hati et al., 2021). The authors also searched for publications from Google Scholar using Search Direct in Publish or Perish, excluding citations and patents. Google Scholar is known for its rich repository of journals (Zarezadeh et al., 2022). The time span for the article search was until July 9, 2022.

The keywords used for data collection were "satisfaction", "e-government", "government website", "government app", "government e-service" "electronic public service", "public e-service", "public service website", and "public service app". We used several combinations of these keywords, including (1) satisfaction and e-government, (2) satisfaction and "government website", (3) satisfaction and "government app", (4) satisfaction and "government e-service", (5) satisfaction and "online government" (6) satisfaction and "electronic public service", (7) satisfaction and "public e-service", (8) satisfaction and "public service website", (9) satisfaction and "public service app", and (10) satisfaction and "online public service". The initial search resulted in a total of 5741 papers (see Table 1).

Table 1 Initial search results

Search keywords	Search results	
	Scopus	Google Scholar
satisfaction and e-government	774	990
satisfaction and "government website."	76	980
satisfaction and "government app."	1	125
satisfaction and "government e-service."	13	435
satisfaction and "online government"	6	980
satisfaction and "electronic public service."	11	280
satisfaction and "public e-service."	16	469
satisfaction and "public service website."	2	79
satisfaction and "public service app."	0	9
satisfaction and "online public service."	15	480
Total	914	4827
Grand total	5741	

2.2 Filtering

Since many papers appeared in more than one category, eliminating these duplications left us with 4474 documents. Among these were journal articles (1752), conference papers (996), book chapters (256), reviews (54), notes (2), conference reviews (10), books (164), short surveys (1), and miscellaneous such as preprints, university repository, and undefined (1239). All the non-article papers were excluded, resulting in 1752 papers left. We only included journal articles, as these have more credibility than other forms of content due to the peer review process. According to (Hati et al., 2021), the peer review process for journal articles submitted by scholars and the articles are assessed by experts in the field before publication. We limited the papers to peer reviewed journal articles only, leaving us with 1641 papers. The results were then further limited to English language articles only, resulting in 1589 documents. We follow the review protocol which includes formulating preliminary inclusion and exclusion search criteria to identify relevant studies and reading, analysing and critically evaluating each paper (Budgen & Brereton, 2006; Marikyan et al., 2019). Finally, based on exclusion criteria in Table 2, we screened for papers that specifically discussed antecedents and outcomes of electronic public service recipients' satisfaction (e.g., client satisfaction, citizen satisfaction, or customer satisfaction) in depth, which generated 214 documents. The articles that did not discuss public service recipients' satisfaction with electronic public service (e.g., e-government service or public e-service) or discussed satisfaction in different contexts were eliminated; for example, the public service employee satisfaction with e-government (Janita & Miranda, 2018).

Each article identified in the literature search was given an initial classification according to the type of electronic public service mentioned in the text (e.g., general, tax, health). Later, each article was read in detail for further verification and

Table 2 Exclusion criteria

No	Criteria
1	The articles do not discuss e-government service or electronic public service
2	The articles do not discuss satisfaction from the client/citizen/customer perspective
3	The articles focus on public service/government employee satisfaction or the satisfaction of the business partners of government organizations
4	The articles do not analyse primary data
5	The articles do not discuss antecedents and outcomes of client/citizen/customer satisfaction

more specific classification of themes/categories within each electronic public service. After we read through the abstracts and content of the articles, we had a final sample of 129 articles.

Our systematic literature review method is shown in Fig. 1.

3 Analysis

This stage features the year of publication of the papers, the countries where the study was conducted, the types of electronic public services, the research methods employed, theories, and the antecedents and consequences of customer satisfaction with electronic public services (Ain et al., 2019; Hoehle et al., 2012).

3.1 General features of the literature

Articles on topics related to antecedents and/or outcomes of customer satisfaction with electronic public service (e-government service) published in Scopus and Google Scholar databases have appeared since 2005 and that the number of articles published has fluctuated, with 2021 having the highest number, i.e., 27 articles (See Fig. 2).

Meanwhile, research on antecedents/outcomes of customer satisfaction with electronic public services is shown by region in Fig. 3. This figure shows that previous studies were majorly conducted in Middle Eastern and Asian countries. In addition, out of 129 studies, three studies conducted cross-country research.

While most studies on customer satisfaction with electronic public services mainly focus on e-government services, some studies have been conducted on specific services such as taxation (Akram et al., 2019), education (Alkraiji & Ameen, 2021), social media (Porumbescu, 2016), contact tracing app (Al-Soni & Abu-Shanab, 2021), health (Irani et al., 2014), labour (Noor et al., 2011b), police (Wang & Teo, 2020), and smartcard (Venkatesh et al., 2012).

Figure 4 shows the types of electronic public services platform in the 129 studies. It shows that public service website is the type of service that has often been investigated in previous studies. Meanwhile, little research focuses on customer satisfaction with other platforms such as government mobile applications and social media.
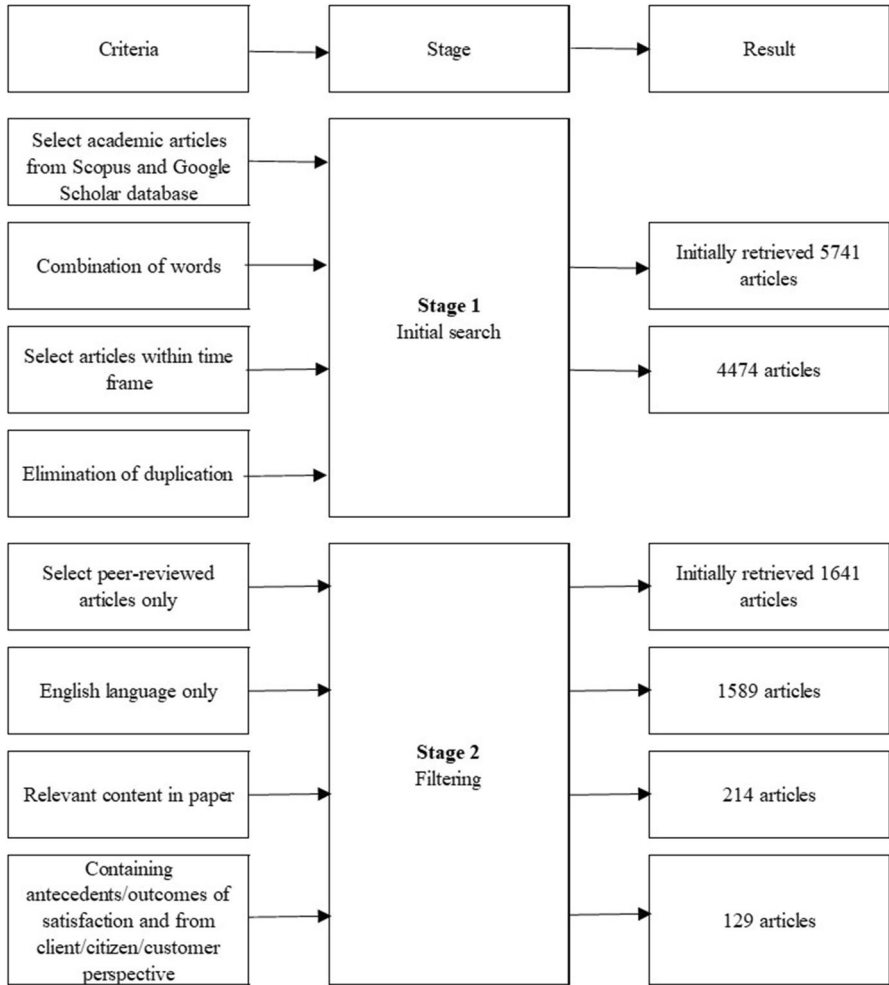
Fig. 1 Literature review process

3.2 Research methods and theories/Concepts employed

Table 3 features the research methods and theories/concepts applied in the 129 reviewed articles. Research methods cover the research approach, data collection method, sample size for analysis, data analysis technique, and sampling technique. The dominant approach used in research on customer satisfaction with electronic public services was quantitative, comprising 126 articles. The most widely used method to collect the data in these quantitative research articles was survey. Two studies used mixed methods in which data were obtained through quantitative surveys and qualitative interviews The reviewed articles used different data analysis techniques. Structural equation modelling (SEM) or partial least square structural
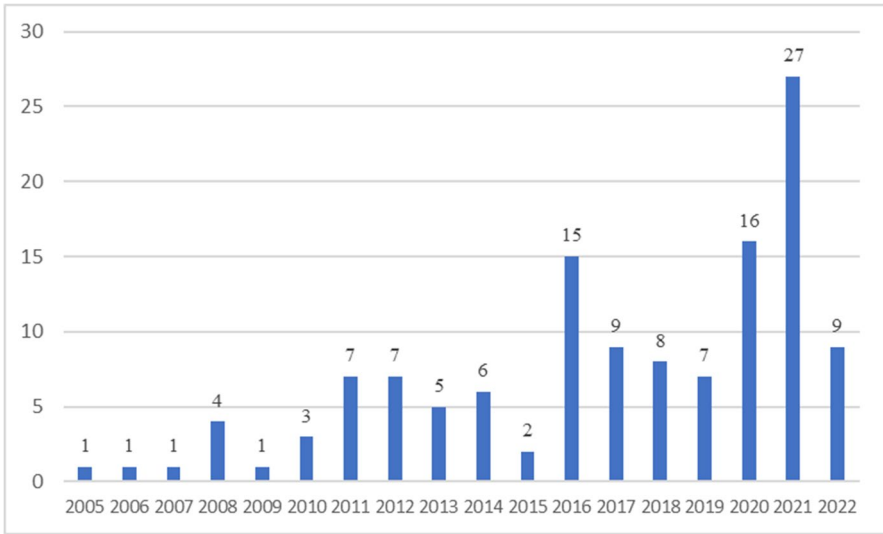
Fig. 2 Number of academic articles on electronic public service satisfaction by year

modelling (PLS-SEM) was the most widely used technique, with the total of 76 studies. Different regression techniques were also frequently used in the reviewed articles, with the total of 39 studies. The reviewed articles also applied other sampling techniques and sample sizes for analysis, as detailed in Table 3. As indicated in Table 3, 27 articles did not clearly mention which sampling technique was used, but the random and convenient sampling techniques were the most widely used. In 79 out of 129 reviewed articles, the sample size for analysis were between 200 and 1000 respondents.

Table 3 informs theories, models and concepts mentioned in the 129 reviewed articles. Several reviewed articles integrate more than one theory, model, and
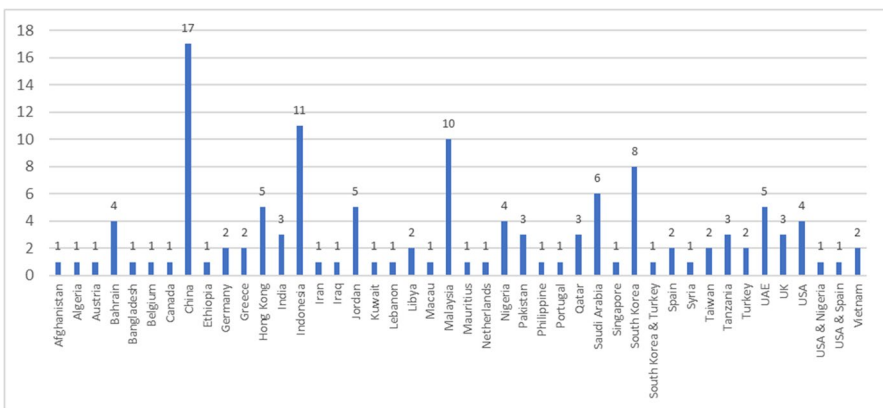
Fig. 3 Number of studies by country
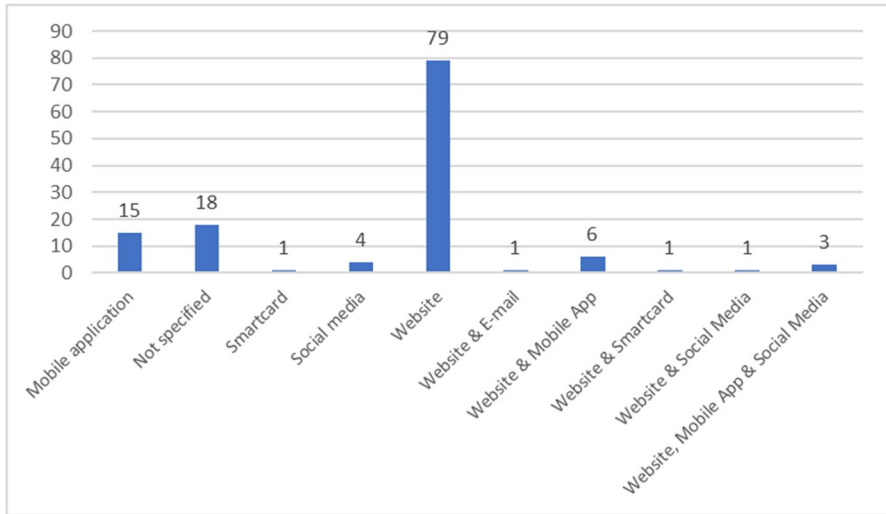
Fig. 4 Types of electronic public service platforms

concept to develop a research framework or research hypothesis. The theories, models, and concepts appeared in more than one article are shown in Fig. 5. Besides the satisfaction concept explained in 54 papers, the information system (IS) success model (DeLone & McLean, 1992, 2003) is the most commonly used theory in the reviewed articles, found in 38 papers. The concept of service quality is also frequently mentioned in the reviewed articles, found in 24 papers. Agency theory, channel choice, cultural theories, empowerment theory, engagement, self-determination theory, and involvement are among the theories and concepts found in the reviewed articles.

4 Antecedents of Customer Satisfaction with Electronic Public Services

Previous studies on customer satisfaction with electronic public services identify 126 potential antecedents of customer satisfaction with electronic public services, which we categorized into four groups to facilitate analysis and comparison: psychological, technological, social, and behavioural factors (Yan et al., 2021). The grouping of antecedents is detailed in Table 4. In this present study, we consider that there are 36 psychological factors (i.e., trust, awareness), 69 technological factors (i.e., information quality, service quality, system quality, usability), 15 social factors (i.e., virtual community engagement), and 6 behavioural factors (i.e., use). These numbers show that the dominant antecedents of customer satisfaction with electronic public services are technological and psychological factors, while social and behavioural factors are less frequently mentioned.

Table 3 Research methods and theories/Concepts in the reviewed articles

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
1	Alfahadi (2021)	Quantitative	Survey	465	Descriptive	Not specified	• Expectation Confirmation Theory	• Perceived usefulness • Quality of service • Confirmation	• Customer interaction • Adoption of e-government service
2	Alkraiji and Ameen (2021)	Quantitative	Survey	780	SEM	Sampling criteria	• Citizen loyalty • E-government service quality • Trust • Citizen satisfaction	• Service quality • Trust in government • Trust in e-government	• Citizen loyalty
3	Hassan and Abu-Shanab (2020)	Quantitative	Survey	275	PLS-SEM	Multiple channels	• Technology Acceptance Model • Information System Success Model	• Behavioural intention • System quality • Service quality • Information quality	Not specified
4	Sachan et al. (2018)	Quantitative	Survey	197	SEM	Purposive	• Technology Acceptance Model	• Perceived usefulness • Perceived ease of use • Perceived e-government service delivery system	Not specified
5	Tsohou et al. (2013)	Quantitative	Survey	2785	Data envelope analysis	Sampling estimation	• e-government evaluation	• e-service cost • e-service benefit • e-service risk • e-service opportunity	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
6	Allam et al. (2021)	Quantitative	Survey	350	Regression	Not specified	• Technology Acceptance Model • Trust	• Use of e-government	Not specified
7	Nour et al. 2021	Quantitative	Survey	100	Regression	Lemeshow formula	• Service quality • Trust • Satisfaction • Loyalty	• Trust in government • Trust in e-government • Service quality	• Loyalty
8	Saleh et al. (2021)	Quantitative	Survey	385	SEM	Not specified	• Unified Theory of Acceptance and Use of Technology	• Performance expectancy • Effort expectancy • Citizen centricity • System flexibility • acilitating conditions	• Tangibles • Reliability • Responsiveness • Assurance • Empathy
9	Abdulkareem and Ramli (2021b)	Quantitative	Survey	369	PLS-SEM	Calculation	• Public value theory • Information system success model	• Information quality • System quality • Service quality • Actual use	• Public value of e-government
10	Abdulkareem and Ramli (2021a)	Quantitative	Survey	369	PLS-SEM	Calculation	• Public value theory • Information system success model	• Information quality • System quality • Service quality • Actual use	• Public value of e-government
11	Abdulkareem et al. (2022)	Quantitative	Survey	369	PLS-SEM	Purposive	• Information system success model	• Quality of e-government	• e-participation

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
12	Al Athmay et al. (2016)	Quantitative	Survey	1800	SEM	Random	• Information system success model • Unified Theory of Acceptance and Use of Technology	• Social influence • Quality system • Information quality • Perceived effectiveness	• Intention to use
13	Alawneh et al. (2013)	Quantitative	Survey	206	Regression	Systematic random	• Expectation confirmation theory	• Security and privacy • Trust • Accessibility • Quality of public services • Awareness of public services	Not specified
14	Albalushi et al. (2020)	Quantitative	Survey	185	PLS-SEM	Convenience	• Webqual	• Perceived website quality • Perceived service quality	Not specified
15	Ali and Al Kabbi (2018)	Quantitative	Survey	100	Regression	Snowball	• Satisfaction • Information system success model	• Perceived quality • Public expectation • Government image	• Public trust
16	Alkraiji (2020a)	Quantitative	Survey	780	SEM	Sampling criteria	• Information system success model • Trust	• Perceived usefulness • Trust in e-government	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
17	Alkraiji (2020b)	Quantitative	Survey	780	SEM	Systematic	• Information system success model • Technology acceptance model	• Perceived usefulness • Perceived ease of use • Perceived system quality • Perceived information quality	Not specified
18	Al-ma'Aitah (2019)	Quantitative	Survey	386	PLS-SEM	Convenience	• Social Customer Relationship Management • Trust • Service Quality • Satisfaction	• Social Customer Relationship Management • Citizen trust • E-service quality	Not specified
19	Alqaralleh et al. (2020)	Quantitative	Survey	380	Regression	Purposive	• Technology acceptance model • Trust • Diffusion of Innovation	• Trust in mobile technology • Trust in government • Perceived ease of use • Perceived usefulness • Quality of service • Compatibility	• Intention to use

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
20	Al-Sulami and Hashim (2018)	Quantitative	Survey	159	PLS-SEM	Random	• Information system success model • Trust	• Information quality • System quality • Service quality • Use/Intention to use	• Net benefits
21	Abudaqa et al. (2019)	Quantitative	Survey	275	Regression	Convenience	• Satisfaction	• Service usefulness • Information awareness	Not specified
22	Andriani et al. (2017)	Quantitative	Survey	394	SEM	Proportional random	• Unified Theory of Acceptance and Use of Technology • Information system success model	• Information quality • System quality • Service quality	• Behavioural intention
23	Samsuri et al. (2022)	Quantitative	Survey	215	PLS-SEM	Convenience	• Technology acceptance model • Theory of reasoned action • Information system success model	• Design • Performance • Security • Quality	• Continuance usage
24	Belanche et al. (2012)	Quantitative	Survey	378	SEM	Sampling criteria	• Trust	• Perceived ease of use • Perceived security	• Citizen trust

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
25	Malik et al. (2016)	Quantitative	Survey	200	Regression	Purposive	• Expectation confirmation theory	• Security and privacy • Trust • Accessibility • Awareness of e-services • Quality of e-services • Computer anxiety • Customer expectation	Not specified
26	Perlman et al. (2020)	Quantitative	Survey	3000	Regression	Stratified	• Agency theory • Stewardship theory	• Openness to technology • Familiarity with government app • Trust • Skills in using the app • Socioeconomic status	Not specified
27	Baharon et al. (2017)	Quantitative	Survey	111	PLS-Path Modelling	Convenience	• Technology acceptance model • Service quality	• Perceived ease of use • Citizen trust • Content quality • Service quality	Not specified
28	Byun and Finnie (2011)	Quantitative	Survey	60	SEM	Not specified	• Usability	• Perceived usability	• Intention to revisit

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
29	Prokop and Tepe (2021)	Quantitative	Survey	1234	Generalized least square	Representative	• Digital public service encounters • Satisfaction	• Stigmatizing public service • Service failure • Explaining and apologizing	Not specified
30	Reddick et al. (2020)	Quantitative	Survey	3000	Regression	Stratified	• Channel choice	• Socio-demographics • Technological capacity • View of government	Not specified
31	Tjen et al. (2019)	Quantitative	Survey	933	SEM	Sampling criteria	• Information system success model	• Information quality • System quality • Service quality • Perceived usefulness	• Intention to revisit
32	Wang and Teo (2020)	Quantitative	Survey	286	PLS-SEM	Random	• Information system success model • Service Quality	• Online service quality • Information quality • System quality	• Perceived value
33	Chan et al. (2020)	Quantitative	Survey	3065	PLS-SEM	Not specified	• Service quality	• Perceived service quality	Not specified
34	Chen et al. (2015)	Quantitative	Survey	234	PLS-SEM	Purposive	• Information system success model	• Information quality • System quality • Service quality	• Perceived net benefit

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
35	Chung et al. (2007)	Quantitative	Survey	217	SEM	Not specified	• Service quality	• Service value	• Behavioural intention
36	Yap et al. (2020)	Quantitative	Survey	1000	PLS Path Modeling	Convenience	• Engagement • Value	• Perceived value • Virtual community engagement	• Continuous use intention • Extended use intention
37	Lai and Pires (2010)	Quantitative	Survey	464	Regression	Sampling criteria	• Technology acceptance model • Satisfaction	• Information quality • Social influence • System quality • Perceived effectiveness	• Intention to reuse
37	Goh et al. (2012)	Quantitative	Survey	102	Correlation	Sampling criteria	• E-service quality	• Efficiency • System availability • eliability • Responsiveness • Privacy • Contact • Ease of use • Site design • Information	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
39	Idoughi and Abdelhakim (2018)	Quantitative	Survey	1453	SEM	Not specified	• Information system success model	• Delivery system quality • Information quality • Service quality • Digital skill • Access means • Service awareness • Perceived usefulness • Trust	Not specified
40	Sugandini et al. (2018)	Quantitative	Survey	148	SEM	Convenience	• Loyalty • Satisfaction • Trust • Service quality	• Experience • Reputation	• Trust
41	Sorongan and Hidayati (2020)	Quantitative	Survey	150	PLS-SEM	Not specified	• Information system success model	• Information quality • Service quality • System quality	• Net benefits
42	Bin Musa et al., (2019)	Quantitative	Survey	248	Regression	Not specified	• Model of Citizens' Adoption and Use of E-Government	• Use of e-government	Not specified
43	Welch et al. (2005)	Quantitative	Survey	806	Regression	Random	• Trust • Satisfaction	• Government website use	• Citizen trust in government

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
44	Titiani et al. (2020)	Quantitative	Survey	109	PLS-SEM	Random	• Satisfaction	• Usability quality • Information quality • Service interaction quality	Not specified
45	Fan and Yang (2015)	Quantitative	Survey	309	PLS-SEM	Sampling criteria	• Information system success model	• Information quality • System quality • Service quality	• Intention to use • Net benefits
46	Altaany and Alsoudani (2014)	Quantitative	Survey	95	Correlation	Representative	• Satisfaction	• Trust • Content • Accuracy • Format • Ease of use • Timeliness • Security • Cost of technology	Not specified
47	Morgeson et al. (2011)	Quantitative	Survey	778	SEM	Random	• Trust	• E-government • Expectations	• Confidence in agency • Trust in government

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
48	Rodrigues et al. (2016)	Quantitative	Survey	380	Regression	Stratified	• Unified Theory of Acceptance and Use of Technology	• Confidentiality and trust • Facilitating conditions • Attitude towards using technology • Performance expectation • Effort expectation	• E-government adoption
49	Porumbescu (2017)	Quantitative	Survey	1100	Regression	Representative	• Transparency • Performance	• Computer-mediated transparency	• Perception of public sector performance
50	Gemoets et al. (2011)	Quantitative	Survey	366	SEM	Representative	• Information system success model	• System quality • Information quality	• E-government success • E-government system usage
51	Udo et al. (2012)	Quantitative	Survey	389	PLS-SEM	Not specified	• Theory of planned behaviour • Information system success model • Technology acceptance model • Cultural theories	• Computer skills • Perceived ease of use • Perceived usefulness • Information system quality	• Behavioural intention
52	Lee (2021)	Quantitative	Survey	3068	Regression	Proportional stratified	• Trust • Satisfaction	• Frequency of use	• Trust

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
53	Mandari and Koloseni (2021)	Quantitative	Survey	374	SEM	Chain-referral	• Expectation-confirmation theory	• Perceived usefulness • Confirmation	• Continuance intention • Continuance usage behaviour
54	Park and Samijadi (2021)	Quantitative	Survey	263	Regression	Convenience	• Satisfaction • Behavioural intention	• Depth of information • Amount of information • Accessibility • Ease of use • Transparency • Security features • Technical support/feedback • Real-time service provision • Design construction • Publicity	Not specified
55	Harfouche (2010)	Quantitative	Survey	330	PLS-SEM	Not specified	• Public e-service divide • Information system success model	• Public e-service divide	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
46	Mbaidin (2021)	Quantitative	Survey	380	Regression	Random	• Satisfaction	• E-government resources • Access to information • E-government system quality	Not specified
57	Osman et al. (2014)	Quantitative	Survey	2785	SEM	Representative	• Costs, Opportunities, Benefits, Risks Analysis	• Cost • Benefit • Risk • Opportunity	Not specified
58	Islam et al. (2021)	Quantitative	Survey	370	PLS-SEM	Convenience	• UTAUT • Continuance usage intention	• Performance expectancy • Effort expectancy • Social influence • Facilitating conditions	• Continuance intention
59	Al-Ammary et al. (2017)	Quantitative	Survey	2139	PLS-SEM	Cluster	• Satisfaction	• Perceived quality • Customer expectation	• Government image • Trust • Complaint • Participation
60	Sichone and Mbamba (2021)	Quantitative	Survey	412	SEM	Convenience	• Information system success model	• One stop service • Security • Interactive service quality	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
61	Alalwan (2013)	Quantitative	Survey	392	PLS-SEM	Random	• Involvement • Continuance Intention • Satisfaction	Not specified	• Involvement • Continuance Intention
62	Carlos Pinho and Macedo (2008)	Quantitative	Survey	351	SEM	Convenience	• Service quality • Satisfaction	• Convenience • Service quality	• Intention
63	Sausi et al. (2021)	Mixed methods	Survey, Open-ended question	442	Regression	Convenience	• Information system success model • Trust	• System quality • Service quality • Information quality • Trust in system • Perceived usefulness	Not specified
64	Al-Yafi et al. (2016)	Quantitative	Survey	458	SEM	Convenient	• Service quality • Satisfaction	• Cost • Risk • Opportunity • Benefit	Not specified
65	Ogunsola and Tiamiyu (2021)	Quantitative	Survey	888	Regression	Representative	• Socio-technical interaction networks theory	Not specified	• Use of e-government
66	Rouibah et al. (2018)	Qualitative	Interview	81	Interpretive	Not specified	• Information system success model	Not specified	• Use • Continuous use
67	Jun et al. (2014)	Quantitative	Survey	949	Regression	Stratified	Transparency Capacity Usage patterns	• Frequency of use • Information • Problem	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
68	Gupta et al. (2016)	Quantitative	Survey	350	Regression	Quota	• UTAUT • Trust • Satisfaction	Not specified	• Adoption
69	Lee et al. (2022)	Quantitative	Survey	899	SEM	Sampling criteria	• DEWEM scale • Social perception	• Competence	Not specified
70	Lee et al. (2008)	Quantitative	Survey	88	Regression	Not specified	• Website evaluation	• Clarity of job sequence • Display speed • Convenience to life • Adequacy of description • Job productivity	• Intention to use
71	Li (2021)	Quantitative	Survey	129	PLS-SEM	Random	• Satisfaction • Technology acceptance model • Task-technology fit model	• Disconfirmation • Perceived usefulness • Perceived ease of use	• Behavioral intention
72	Li and Xue (2021)	Quantitative	Survey	1867	SEM	Convenient	• Trust • Information system success model • Information system continuance model	• Post-use trust of e-government	• Continuous use intention
73	Li and Shang (2020)	Quantitative	Survey	1650	PLS-SEM	Random	• Service quality • Service value • IS continuance model	• Perception of service quality • Perception of overall service value	• Intention to continue to use

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
74	Ali et al. (2017)	Quantitative	Survey	188	Regression	Convenient	• Service quality • Satisfaction • Intention to use • Trust	• Responsiveness • Empathy • Reliability • Trust	• Re-use intention
75	Alruwaie et al. (2020)	Quantitative	Survey	471	SEM	Random	• Social Cognitive Theory • Expectation Confirmation Theory • Information system success model • Service quality	• Self-efficacy • Personal outcome expectation	• Continuance intention
76	Al-Zahrani (2020)	Quantitative	Survey	211	SEM	Random	• Information system success model • Technology acceptance model	• System quality • Information quality • Service quality • Perceived risk	• E-government usage • E-government effectiveness
77	Qasem and Zolait (2016)	Quantitative	Survey	631	Regression	Random	• Technology acceptance model • Unified theory of use and acceptance of technology • Theory of reasoned action • Diffusion of Innovation • Service quality	• Efficiency • Trust • Reliability • Citizen support	• Behavioural intention

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
78	Anwar et al. (2016)	Quantitative	Survey	180	Regression	Purposive	• Satisfaction • Service availability • Website design • Service quality • Digital divide • Trust and security	• Multiple channels • Citizen-centric features • Para lingual support • Process performance • Website content • Access divide • Skills divide • Awareness • Information security • Transaction security	Not specified
79	Magoutas and Mentzas (2010)	Quantitative	Survey	26	Z-test	Not specified	• Semantic adaptive framework	• Service quality	Not specified
80	Manolitzas and Yannacopoulos (2013)	Quantitative	Survey	730	Regression	Not specified	• Multicriteria Satisfaction Analysis	• Personnel • Service • Image	Not specified
81	Mensah and Luo (2021)	Quantitative	Survey	411	PLS-SEM	Convenience	• Technology acceptance model	• Perceived usefulness • Perceived ease of use • Citizen trust • Content quality • Service quality	• Intention to recommend

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
82	Mishra and Geleta (2020)	Quantitative	Survey	123	SEM	Random	• Service delivery • Satisfaction	• Perceived service delivery • e-government	Not specified
83	Morgeson (2011)	Quantitative	Survey	2324	SEM	Not specified	• Market-centred theories	• Organization • Personalisation • Navigation • Reliability	• Retention • Word-of-mouth
84	Akram et al. (2019)	Quantitative	Survey	409	SEM	Representative	• Information system continuance model • Information system success model	• Perceived functional benefit • Confirmation of expectation	• Continuance intention
85	Valaei and Baroto (2017)	Quantitative	Survey	362	PLS-SEM	Not specified	• Expectation confirmation theory • Satisfaction • Continuance intention	• Information quality	• Continuance intention
86	Nguyen et al. (2020)	Quantitative	Survey	1107	Regression	Not specified	• Satisfaction • Service quality	• Efficiency • Trust • Reliability • Citizen support • Convenience • Transparency	Not specified
87	Noori (2022)	Quantitative	Survey	190	SEM	Not specified	• Service quality • Loyalty • Satisfaction	• E-service quality	• User loyalty
88	Noor et al. (2011b)	Quantitative	Survey	250	SEM	Accidental	• Satisfaction	• Utility • Efficiency • Customization	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
89	Thao et al. (2021)	Quantitative	Survey	190	SEM	Not specified	• Service quality	• Privacy and security • Trust • Accessibility • Awareness of online public services • Quality of online public services	Not specified
90	Hujran et al. (2013)	Quantitative	Survey	375	Regression	Convenient	• Technology acceptance model	• Responsiveness • Reliability • Empathy	• Intention to use e-government service
91	Park et al. (2016)	Quantitative	Survey	356	Regression	Not specified	• Value • Satisfaction • Loyalty • Intention	• Utilitarian value • Hedonic value • Social value • Alternative attractiveness	• Loyalty • Intention to patronage
92	Noor et al. (2011a)	Quantitative	Survey	491	SEM	Random	• Satisfaction • Information system success model	• System quality • Information quality • Security	• Usage • Benefits
93	Porumbescu (2016)	Quantitative	Survey	1100	Regression	Representative	• Trust • Satisfaction	• Evaluation of quality of life	• Trust in government
94	Obaid and Ahmad (2021)	Quantitative	Survey	268	PLS-SEM	Not specified	• Satisfaction • Information system success model	• Information quality • System quality • Service quality	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
95	Kumar et al., (2020)	Quantitative	Survey	378	SEM	Convenient	• Service quality • Value • Satisfaction • Adoption intention	• Efficiency • Reliability • Citizen support • Socio-functional value • Economic value	• E-government adoption intention
96	Reddick and Turner (2012)	Quantitative	Survey	6743	Regression	Representative	• Satisfaction • Public service value	Not specified	• Satisfaction with channel choice
97	Reddick and Zheng (2017)	Quantitative	Survey	300	Regression	Stratified	• Citizen-initiated contacts • Satisfaction • Trust	Not specified	• Future use
98	Rey-Moreno et al., (2018)	Quantitative	Survey	2479	Regression	Stratified	• Satisfaction	Not specified	Not specified
99	Donie et al. (2019)	Quantitative	Survey	100	Regression	Purposive	• Service quality	• Usability • Information quality • Interaction service quality	Not specified
100	Kim and Lee (2012)	Quantitative	Survey	1076	SEM	Sampling criteria	• Participation • Satisfaction	Not specified	• E-participants' development • Assessment of government transparency

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
101	Ziaee Azimi and Saidi-Mehrabad (2016)	Quantitative	Survey	420	Descriptive	Cluster	• Satisfaction	• Staff performance • Trust and confidence • Easy access to office • Providing sufficient notification • Basic amenity • System facility • Environmental facility • Time and cost	Not specified
102	Shuib et al. (2019)	Quantitative	Survey	801	PLS-SEM	Purposive	• Satisfaction	• E-government adoption	• E-government adoption
103	Skordoulis et al. (2017)	Quantitative	Survey	220	Correlation	Random	• Service quality • Satisfaction	• Content • Navigation • Appearance • E-services	Not specified
104	Ramdan et al. (2014)	Quantitative	Survey	119	SEM	Sampling criteria	• Information system success model	• Islamic information quality • System quality • Service quality • Use	• Perceived net benefits

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
105	Al-Soni and Abu-Shanab (2021)	Quantitative	Survey	550	Regression	Random	• Unified theory of use and acceptance of technology • Information system success model	• Performance expectancy • Effort expectancy • Information quality • System quality • Technical experience • Perceived privacy risk • Trust	Not specified
106	Horan and Abhichandani (2006)	Quantitative	Survey	401	SEM	Random	• Satisfaction	• Utility • Reliability • Efficiency • Customization • Flexibility	Not specified
107	Cheng et al. (2021)	Quantitative	Survey	366	PLS-SEM	Convenient	• Satisfaction • Intention to use	• Credibility • Usability	• Intention to use
108	Teo et al., (2008)	Quantitative	Survey	214	PLS-SEM	Sampling criteria	• Information system success model	• Information quality • System quality • Service quality	• Intention to continue using
109	Venkatesh et al. (2016)	Quantitative	Survey	4430	Regression	Not specified	• Uncertainty Reduction Theory • Satisfaction	• Use of e-government	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
110	Veeramootoo et al. (2018)	Quantitative	Survey	645	SEM	Convenience	• Expectancy confirmation theory • Information system success model	• Information quality • System quality • Service quality • Confirmation	• Habit • Continuance usage intention
111	Venkatesh et al. (2012)	Quantitative	Survey	2465	Conjoint analysis	Purposive	• Service • Satisfaction • Behavioural Intention	• Use	Not specified
112	Venkatesh et al. (2011)	Quantitative	Survey	3159	PLS-SEM	Sampling frame	• Expectation confirmation theory • Information system continuance • unifieded theory of acceptance and use of technology • Technology acceptance model	• Perceived usefulness • Effort expectancy • Social influence • Facilitating conditions • Trust • Disconfirmation	• Attitude
113	Verdegem and Verleye (2009)	Mixed methods	Survey, Interview	1651	SEM	Representative	• Acceptance model • Satisfaction	• Infrastructure • Availability • Awareness • Cost • Technical aspects • Customer friendliness • Security/privacy • Content • Usability	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
114	Chan et al. (2022)	Quantitative	Survey	267	SEM	Snowball	• Service quality • Information success model • Stimulus–organism-response model	• Perceived service quality • Perceived brand image	• Loyalty • electronic word-of-mouth
115	Guo et al. (2022)	Quantitative	Survey	366	SEM	Sampling criteria	• Satisfaction • Self-determination theory	• Visual appeal • Perceived complexity • Personalization • Information quality	Not specified
116	Wang et al. (2021)	Quantitative	Survey	207	PLS-SEM	Random	• Uses and gratification theory	• Process gratification Content gratification	Not specified
117	Ebbers et al. (2016)	Quantitative	Survey	779	Regression	Random	• Digital skill	• Digital skill	Not specified
118	Weerakkody et al. (2016)	Quantitative	Survey	1518	SEM	Not specified	• Information system success model	• System quality • Information quality • Cost • Trust	Not specified
119	Widiyanto et al. (2016)	Quantitative	Survey	150	Descriptive	Convenience	• Information quality	• Intrinsic quality • Contextual quality • Representational quality • Accessibility quality	Not specified

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
120	Wirtz and Kurtz (2016)	Quantitative	Survey	717	Regression	Not specified	• Satisfaction • Technology acceptance model	• Social media integration • Full online service • Downloadable forms • Search function • Perceived ease of use	Not specified
121	Jiang and Ji (2014)	Quantitative	Survey	630	SEM	Random	• Technology acceptance model • Information system success model • Satisfaction	• Information quality • Design and function • Reliability • Security and privacy • Responsiveness • Perceived usefulness	• Continuance intention
122	Xiong et al. (2022)	Quantitative	Survey	335	SEM	Random	• Information system continuance • Perceived quality • Perceived value • Self-regulation framework • Information system success model • Technology acceptance model	• System quality • Information quality • Service quality • Perceived usefulness • Perceived ease of use • Perceived interactivity	• Trust • Continuance intention

Table 3 (continued)

No	Authors	Approach	Data Collection	The sample size for analysis	Data analysis techniques	Sampling techniques	Theories/Concept	Antecedent	Outcome
123	Li et al. (2020)	Quantitative	Survey	303	PLS-SEM	Random	• Satisfaction • Trust • Information system continuance	• Control • Playfulness • Connectedness • Responsiveness	• Trust • Continuance intention
124	Yang (2017)	Quantitative	Survey	605	Regression	Not specified	• Intention to use • Awareness • Satisfaction	Not specified	• Adoption of e-government service
125	Zhu and Alamsyah (2022)	Quantitative	Survey	358	PLS-SEM	Sampling criteria	• Empowerment theory • Socio-material perspective • Satisfaction	• Psychological empowerment • Social empowerment • Political empowerment	Not specified
126	Wang and Liao (2008)	Quantitative	Survey	119	SEM	Sampling criteria	• Information system success model	• Information quality • System quality • Service quality • Use	Perceived net benefit
127	Irani et al., (2014)	Quantitative	Survey	500	Descriptive	Random	• Satisfaction • COBRA framework	• Cost • Opportunity • Benefit • Risk	Not specified
128	Shouran (2021)	Quantitative	Survey	554	PLS-SEM	Random	• Technology acceptance model • Diffusion of Innovation • Satisfaction	• Intention to use e-government • e-Readiness	Not specified
129	Lu et al. (2012)	Quantitative	Survey	136	PLS-SEM	Not specified	• Satisfaction	• Perceived fit • Perceived value	Not specified
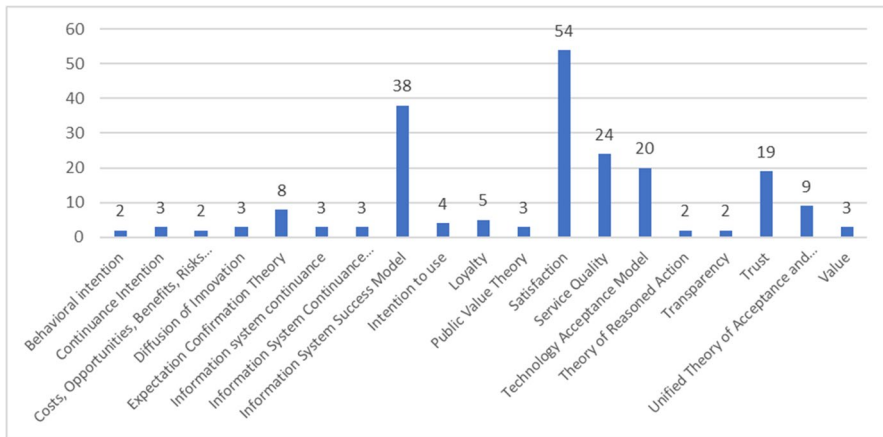
Fig. 5 Theory/concept applied in more than one reviewed article

The following section informs some of the antecedents that have often been investigated. Due to the numbers of antecedents mentioned in previous studies, we prioritize those being discussed most frequently.

4.1 Antecedents – psychological factors

The identified psychological factors are experiences and cognitive processes at the individual level, including thoughts, feelings and beliefs that influence customer behaviour (Upton, 2013; Yan et al., 2021). The most commonly used psychological factors in previous research are trust and awareness.

4.1.1 Trust

Trust is a crucial concept in the marketing literature because it directly affects the close relationship between service providers and customers (Alkraiji, 2020a; Sirdeshmukh et al., 2002). It particularly applies in electronic service situations, where the absence of face-to-face interaction can lead to uncertainty and risk (Al-Hujran et al., 2015; Alkraiji, 2020a; Warkentin et al., 2002). In the context of electronic public services, trust is a widely studied antecedent of customer satisfaction (Alkraiji, 2020a). Customer trust, which is the belief that electronic public services will act responsibly when customers visit or make transactions on a service website (Teo et al., 2008; Weerakkody et al., 2016), is important. Trust refers to the belief that the trustee will act cooperatively to meet the trustor's expectations without exploiting the trustor's weaknesses (Chan et al., 2010; Pavlou & Fygenson, 2006). Customer trust can be defined as a set of beliefs held by electronic service consumers regarding specific characteristics of electronic service providers and the possible behaviour of electronic service providers in the future (Alawneh et al., 2013; Coulter & Coulter, 2002). Trust in electronic

Table 4 The antecedents of customer satisfaction with electronic public services

Factor	Antecedents	
Psychology	Alternative attractiveness	Familiarity with government app
	Attitude towards using technology	Hedonic value
	Awareness	Image
	Benefit	Openness to technology
	Competence	Opportunity
	Computer anxiety	Perceived value
	Confirmation	Psychological empowerment
	Control	Reputation
	Convenience	Risk
	Cost	Self-efficacy
	Credibility	Service value
	Disconfirmation	Skill
	Economic value	Social value
	Empathy	Socio-functional value
	e-Readiness	Stigmatizing public service
	Evaluation of quality of life	Trust
	Expectations	Utilitarian value
	Experience	View of government
Technology	Access	Perceived effectiveness
	Accessibility	Perceived e-government service
	Accuracy	delivery system
	Adequacy of description	Perceived fit
	Appearance	Perceived service delivery
	System availability	Perceived usability
	Basic amenity	Performance
	Citizen centric features	Personalization
	Clarity of job sequence	Playfulness
	Compatibility	Privacy
	Contact	Problem
	Content	Process gratification
	Contextual quality	Process performance
	Customer friendliness	Providing sufficient notification
	Customization	Public e-service divide
	Design	Real-time service provision
	Display speed	Reliability
	Downloadable forms	Representational quality
	Ease of use	Responsiveness
	Efficiency	Search function
	E-government	Security
	Environmental facility	Service
	E-services	Service failure
	Facilitating conditions	Service quality
	System flexibility	System facility
	Format	System quality
	Full online service	Technical aspects
	Information quality	Technical experience
	Infrastructure	Technical support/feedback
	Intrinsic quality	Technological capacity
	Job productivity	Timeliness
	Multiple channels	Transparency
	Navigation	Usefulness
	One stop service	Utility
	Perceived complexity	Visual appeal

Table 4 (continued)

Factor	Antecedents	
Social	Connectedness	Social empowerment
	Explaining and apologizing	Social influence
	Perceived interactivity	Social media integration
	Organization	Sociodemographic
	Personnel	Socioeconomic status
	Political empowerment	Staff performance
	Publicity	Virtual community engagement
	Social Customer Relationship Management	
Behaviour	Behavioural intention	Government website use
	E-government adoption	Intention to use
	Frequency of use	Use

public services means that customers trust the competence of service providers to securely provide electronic public services (Carter & Bélanger, 2005; Idoughi & Abdelhakim, 2018).

The previous literature states that trust positively impacts customer satisfaction with electronic public services (Alawneh et al., 2013; Alkraiji, 2020a; Al-ma'Aitah, 2019; Idoughi & Abdelhakim, 2018; Kumar et al., 2020; Weerakkody et al., 2016). Research on customer satisfaction with electronic public services also examines trust as a mediating variable that links antecedents to customer satisfaction (Alkraiji, 2020a; Al-ma'Aitah, 2019; Idoughi & Abdelhakim, 2018; Weerakkody et al., 2016). Most studies indicate a significant effect of trust on customer satisfaction. Nonetheless, in other studies, the effect is not significant (Alawneh et al., 2013; Kumar et al., 2020).

4.1.2 Awareness

Awareness is an important factor that leads customers to adopt and use electronic public services (Alawneh et al., 2013). Customers need to know and be aware of the benefits of electronic public services; otherwise, customers will be sceptical to use such services (Alawneh et al., 2013). Customers need to be aware of the availability of electronic public services that satisfy their needs (Anwar et al., 2016). If customers do not have information about the availability of electronic public services, they will not use them, even if such services are of value to them (Anwar et al., 2016; Verdegem & Verleye, 2009). The amount of information that customers have about the available electronic public services and their benefits is essential for customers to adopt them (Alawneh et al., 2013; Pikkarainen et al., 2004). Customer awareness of electronic public services can be defined as customer perceptions of the benefits and information of available electronic services, particularly their level of awareness. (Alawneh et al., 2013; Khan et al., 2012). Previous studies find evidence of the positive effect of awareness of electronic public services on customer satisfaction (Abudaqa et al., 2019; Alawneh et al., 2013; Anwar et al., 2016; Idoughi & Abdelhakim, 2018).

4.2 Antecedents – technological factors

Perceptions, attitudes and interactions between humans and technology are the focus of the technological factors (Yan et al., 2021). The dominant technological factors in research on customer satisfaction with electronic public services are information quality, service quality, system quality, and usefulness.

4.2.1 Information quality

Information quality is a customer's assessment of the performance of an information system in providing information based on the customer's experience using the system (Veeramootoo et al., 2018). Information quality is an objective and subjective perspective of the information consumed by customers (Veeramootoo et al., 2018). Measures of information include relevance, reliability, timeliness, clarity, accuracy, and currency (Gemoets et al., 2011). Information quality can be defined as an electronic public service system's ability to provide customers with new, accurate, clear, and easy-to-understand information (Al Athmay et al., 2016). Previous studies have shown the effect of information quality on customer satisfaction with electronic public services (Al Athmay et al., 2016; Alkraiji, 2020b; Gemoets et al., 2011; Veeramootoo et al., 2018; Weerakkody et al., 2016). However, several studies have found that there is no significant effect of information quality on customer satisfaction with electronic public services (Alkraiji, 2020b; Sorongan & Hidayati, 2020; Veeramootoo et al., 2018).

4.2.2 Service quality

Service quality is a determinant of customer satisfaction in the literature on marketing and consumer behaviour (Veeramootoo et al., 2018). Service quality can be defined as the extent to which the services provided satisfy customer needs and expectations (Al-ma'Aitah, 2019; Li & Shang, 2020), and it is an assessment of the overall service over a long period (Chan et al., 2020). Service quality is customers' perception of the quality of services provided through public service websites (Alawneh et al., 2013). Previous studies have mentioned the effect of service quality on customer satisfaction with electronic public services (Alawneh et al., 2013; Al-ma'Aitah, 2019; Chan et al., 2020; Li & Shang, 2020; Obaid & Ahmad, 2021; Sorongan & Hidayati, 2020; Veeramootoo et al., 2018).

4.2.3 System quality

System quality is the ability of an electronic public service system to provide customers with accurate, reliable, relevant, and easy-to-understand information (Al Athmay et al., 2016). It also includes usability, availability, and adaptability (DeLone & McLean, 2003; Veeramootoo et al., 2018). System quality is perceived through customers' interaction with the system when completing their tasks (Weerakkody et al., 2016). The system quality of electronic public services can increase customers' confidence in using such services (Gemoets et al., 2011). System quality

is measured by ease of use, user friendliness, ease of learning, useful features and functions, response time, the convenience of on-site and remote access, and system accuracy (Gemoets et al., 2011), as well as security during and after use (Xiong et al., 2022). Previous studies have shown that there was effect of system quality on customer satisfaction with electronic public services (Al Athmay et al., 2016; Alkraiji, 2020b; Gemoets et al., 2011; Obaid & Ahmad, 2021; Sorongan & Hidayati, 2020; Veeramootoo et al., 2018; Weerakkody et al., 2016; Xiong et al., 2022). However, one reviewed article found no significant effect of system quality on customer satisfaction with electronic public services (Noor et al., 2011a).

4.2.4 Usefulness

Usefulness (or perceived usefulness) is the extent to which individuals believe that using technology will improve performance in completing their tasks (Alkraiji, 2020a; Davis, 1989; Sachan et al., 2018). The usefulness of electronic public services in terms of costs and benefits is an essential consideration for customers (Idoughi & Abdelhakim, 2018). In general, the usefulness of service is measured by the extent to which the service operates and satisfies customer needs (Abudaqa et al., 2019). Previous studies find supporting evidence on the effect of usefulness on customer satisfaction with electronic public services (Abudaqa et al., 2019; Alkraiji, 2020a, b; Idoughi & Abdelhakim, 2018; Mensah & Luo, 2021; Sachan et al., 2018).

4.3 Antecedents – social factors

Social factors are related to interpersonal relationships and social structures and processes that impact an individual (Upton, 2013; Yan et al., 2021). In the previous literature, social factors that are antecedents of customer satisfaction with electronic public services include virtual community engagement and social influence.

4.3.1 Virtual community engagement

One previous study discussed virtual community engagement as a social factor that affects customer satisfaction with electronic public services (Yap et al., 2020). Due to its interactive capability, virtual community engagement drives citizens' satisfaction, which in turn, affects their continuous and extended use intentions (Yap et al., 2020). Virtual communities can be defined as word-of-mouth networks consisting of different individuals who share information with each other (Yap et al., 2020). The study found that virtual community engagement relates positively with citizen satisfaction.

4.3.2 Social influence

Social influence is the level at which individuals feel that the people who are important to them believe that they must use an electronic public service system (Al Athmay et al., 2016; Islam et al., 2021). Social influence shows interpersonal relationships in

the use of technology (Al Athmay et al., 2016; Islam et al., 2021). Social influence is an important aspect of technological assessment that affects customer satisfaction with electronic public services (Al Athmay et al., 2016; Islam et al., 2021). Previous studies have discussed how customers are satisfied with electronic public services (Al Athmay et al., 2016; Islam et al., 2021).

4.4 Antecedents – behavioural factors

Behavioural factors are expressed in behaviour or involved behaviour (Yan et al., 2021). Previous studies on customer satisfaction with electronic public services mentioned use as a behavioural factor.

4.4.1 Use

One behavioural factor that affects customer satisfaction with electronic public services is use. Use is the stage where the customer has the intention to use services and gain access to available electronic public services (Verdegem & Verleye, 2009). Customer satisfaction can be measured during or after use (Verdegem & Verleye, 2009). The use of electronic services helps customers meet their information needs, and using services more frequently will lead to increased customer satisfaction (Venkatesh et al., 2012). Previous studies mentioned the effect of service use by customers on customer satisfaction with electronic public services (Bin Musa et al., 2019; Venkatesh et al., 2012, 2016).

5 Role of mediators and moderators

Table 3 shows the 15 constructs with mediating roles examined in the reviewed articles. Most importantly, intention to use also functions as an antecedent of different factors. The 15 constructs are adoption of e-government service, continuous use intention, overall satisfaction with government, intention to use, confidence in agency, e-government system usage, continuance intention, involvement, e-government usage, retention, loyalty, usage, e-participants' development, and habit. Unfortunately, in the reviewed articles, the discussion regarding mediators is rare to be found.

Referring to Table 3, there are five moderating constructs namely access to information and communication technology (ICT) (Abdulkareem & Ramli, 2021a, 2021b), perceived risk (Akram et al., 2019), different government Facebook page (Valaei & Baroto, 2017), as well as gender and age (Rey-Moreno et al., 2018). However, the discussion in the reviewed article regarding moderators falls to be exhaustive.

6 Consequences of customer satisfaction

Table 5 shows 40 consequences of customer satisfaction with electronic public services which were examined by 72 articles out of the 129 reviewed articles. We conclude that customer satisfaction can affect the subsequent use of electronic public

Table 5 Consequences of customer satisfaction with electronic public service

Consequences	Number of articles	Consequences	Number of articles
Adoption	6	Intention	1
Assessment of government transparency	1	Intention to patronage	1
Assurance	1	Intention to recommend	1
Attitude	1	Intention to revisit	1
Behavioural intention	5	Intention to use	8
Benefits	1	Involvement	1
Complaint	1	Loyalty	5
Confidence in agency	1	Participation	1
Continuance intention	11	Perceived net benefits	7
Continuous use	7	Perceived value	1
Customer interaction	1	Perception of public sector performance	1
E-government effectiveness	1	Public value of e-government	2
E-government success	1	Reliability	1
electronic word-of-mouth	1	Responsiveness	1
Empathy	1	Retention	1
E-participants' development	1	Satisfaction with channel choice	1
e-participation	1	Tangibles	1
Future use	1	Trust	10
Government image	1	Use	5
Habit	1	Word-of-mouth	1

services. Of these 40 constructs, continuance intention, intention to use, and trust are frequently examined. Marketing-related constructs such as word of mouth and image are not widely discussed in the reviewed articles. Future research should consider studying more marketing constructs as consequences of customer satisfaction with electronic public services.

7 Research gaps and future research agenda

The SLR on the antecedents and consequences of customer satisfaction with electronic public services indicates that the previous literature has research gaps in explaining the antecedents, consequences, mediators, and moderators of customer satisfaction. This study offers the abovementioned topics for recommendations for further research, especially on the antecedents of customer satisfaction with electronic public services.

7.1 Framework development

Table 3 presents previous studies on customer satisfaction with electronic public services and identifies further research directions to enhance the literature. Three of the antecedents of customer satisfaction, system quality, service quality, and information quality, were studied by many researchers in more than 25 articles. Meanwhile, other antecedents were mentioned in less than 5 articles. The reason is that the information system success model is often used in previous studies. The relationship between customer satisfaction and system quality, service quality, and information quality are part of the information system success model (DeLone & McLean, 1992, 2003). For further research, this study recommends other researchers to investigate the effect of customer satisfaction with electronic public services of other antecedents that have rarely been examined.

7.1.1 Antecedents of customer satisfaction

Based on the SLR, the following are proposed antecedents for further research regarding psychological, technological, social, and behavioural factors.

Psychological Factors Trust is a dominant psychological factor in research on customer satisfaction with electronic public services. However, previous studies (Alawneh et al., 2013; Kumar et al., 2020) claimed that there is no significant effect of trust on customer satisfaction with electronic public services. Therefore, this study recommends further investigation to clarify the claims. Psychological factors that were rarely discussed in previous studies need to be further examined, such as service value, attitude, and expectations. In addition, technological developments in the field of electronic public services, such as services using conversational agents and social media, need to be examined to determine whether the enjoyment of using these services affects customer satisfaction.

Technological factors As indicated in Table 4, technological factors were the most frequently examined in the reviewed articles, with a total of 69 constructs. Out of the 69 constructs, there are two under researched constructs, accuracy and full online service. Customers accessing an electronic public service might have reduced satisfaction if the service is not accurate and/or the online service is not complete. This study recommends conducting more research on electronic public service accuracy and full online service, as well as their influence on customer satisfaction with electronic public services.

Social factors Table 4 indicates that social influence is one of the factors influencing customer satisfaction with electronic public services. 4 out of 129 reviewed articles examined the effect of social influence, but the discussion was limited. This research recommends studying how social influence affects specific groups of customers, such as elderly customers. It is assumed that elderly customers are not fond of using electronic services. The social influences of the same age groups in different

settings, such as religious and family gatherings, are expected to encourage elderly customers to use more electronic public services.

In previous studies, the discussion about the influence of social factors on customer satisfaction with electronic public services is still limited. However, with the increasing use of social media as part of electronic public services, this study recommends further research that examines whether relationships with public service providers through social media do affect customer satisfaction.

Behavioural factors Previous studies that discuss behavioural factors that affect customer satisfaction with electronic public services are still limited. This study recommends further research that examines whether behavioural factors, such as the purpose and frequency of use, influence customer satisfaction with electronic public services. The purpose of using electronic public services can be divided into obtaining information and making transactions to obtain certain documents. Meanwhile, the frequency of use can be differentiated based on electronic public services that are routinely used, services that can be used at any time based on need, services that are required once a year, such as tax payments, and services that are rarely used.

8 Conclusion, limitations and further research

This paper provides a comprehensive analysis for the topic of customer satisfaction with electronic public services through a systematic literature review of 129 articles based on previous studies. This paper classified the articles based on the year of publication, the country in which the study was conducted, theories and models, research methods, the types of electronic public services, and the factors (antecedents, mediators, consequences) used in the study. After conducting the evaluation, a discussion of customer satisfaction with electronic public services is presented, as well as recommendations for further research.

This systematic literature review has several limitations. First, the articles were collected from only two databases, Scopus and Google Scholar (using Publish or Perish software). Nonetheless, research on customer satisfaction with electronic public services may also be published in other outlets. Second, articles were searched using specific keywords related to customer satisfaction with e-government service, electronic public services, and public e-service, while research on customer satisfaction may use other keywords. Third, the articles selected were published only in journals, while research on customer satisfaction with electronic public services may be in the form of a paper presented at a conference or a chapter in a book. Nevertheless, we hope that the SLR and related research agenda documented in this paper provide a useful overview of the current state of the literature and directions for future research.

A further increase in research related to customer satisfaction with electronic public services with different methods, theories, antecedents, consequences, mediators, and moderators based on the previous literature could be expected with the following recommendations:

– Methods

Future research could adopt data collection methods using big data technologies and analytics, which are not widely used in public sector marketing research. Such methods mine and analyse different types of data created by public service customers. For example, research could collect data on public sentiments taken from social media posts indicating customer satisfaction or dissatisfaction with electronic public services.

– Theories

Future research could apply different theories explaining customer satisfaction with digital public services, such as the service dominant logic, social exchange theory, Kano model, emotional support, sociobiological theory, market signal theory, multi-attribute theory, and other potential theories that have been examined in the e-commerce setting. Applying theories from e-commerce research is expected to enrich future e-government research.

– Antecedents

Future research could examine different antecedents of customer satisfaction with digital services in public sector marketing, such as perceived enjoyment, the need for human interaction, online reviews, and value co-creation behaviours. These antecedents have been examined in the e-commerce setting. It is assumed that the same antecedents might influence customer satisfaction with digital public services.

– Consequences

The consequences of customer satisfaction with digital services, such as complaints and word of mouth, could be further discussed in future public sector marketing research. Additionally, different consequences of customer satisfaction based on e-commerce research, such as intention to co-create value with service provider, commitment, and involvement, could be examined in the e-government setting.

– Mediators

Antecedents with mediating roles in influencing customer satisfaction with digital services in the previous literature, such as perceived value (emotional value, economic value, social value, and service value), could be further examined in future public sector marketing research. In addition, potential mediators examined in the e-commerce setting could be investigated, such as online convenience, accuracy, credibility, and communication competence.

– Moderators

Potential moderators interacting with the antecedents of digital consumer satisfaction could be examined in future public marketing research, such as frequency of usage, service types, and social media usage. These moderators are expected to interact with antecedents and influence customer satisfaction. For example, the routine usage of digital public services might have a different effect on customer satisfaction than non-routine usage. Customers using different types of electronic public services might have different experiences, which in turn will affect their satisfaction. Additionally, different levels of social media usage might affect customer satisfaction, such that customers who use social media more frequently might have more information on e-government services, which in turn will affect their satisfaction.

Declarations

Conflicts of interest All authors declare that they have no conflicts of interests.

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