

Trust transfer in the continued usage of public e-services

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Trust transfer in the continued usage of public e-services



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ABSTRACT

We investigate how public administrations can influence citizens' continued usage of public e-services and focus on the role of different trust elements. We review prior literature and derive a model of trust transfer and continued usage. Our results show that trust in the public e-service mediates the influence of both trust in the public administration and trust in the Internet on continuance intentions. Trust was influenced by e-service quality and recommendations from public administrations and interpersonal sources. The relationship between interpersonal recommendations and trust in the e-service was non-significant; we found a strong moderating influence of time consciousness.

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1. Introduction

More government institutions today offer citizens online options to vote, file their taxes, and renew licenses, though recent exposés have eroded some consumer trust in public agencies' ability to offer such electronic services (e-services) securely. The United Kingdom's National Health Service unwillingly lost millions of digital medical records [15], while former Central Intelligence Agency employee Edward Snowden disclosed details of U.S. and British government institutions that willingly exchanged personally identifiable information. In addition, computer hacking, identity theft, fraud, and other Internet-related, prohibited activities are more prevalent than ever before, with an alarming one-fifth of reported data breaches in 2009 taking place in state and local government sectors [27]. These developments have fueled public concerns about online vulnerability and the trustworthiness of public e-services, leading citizens to reconsider their decisions to continue to share private information through e-services. Technology-enabled services increase the efficiency of public administrations [18,84], but only when citizens continue using them.

Particularly in such settings, trust is crucial to develop successful long-term relationships [9,64]. Trust, which is characterized by risk and uncertainty [77], alleviates negative perceptions of an exchange partner [97] and constitutes both beliefs and reliability intentions about a person, object, or entity [64,70]. Despite the variety in the referents toward which trust might be developed, extant studies linking trust to e-services merely consider overall trust in the e-service [38]. In contrast, e-services are complex, social-technological systems, comprised of multiple elements that could invoke distinct trust beliefs. For example, public e-services operate over the Internet and represent the virtual front office of a governmental organization; trust in each of these specific referents may influence the user's level of trust in the public e-service.

Because the consolidation of public e-services depends on their continued use by citizens [96], a more detailed consideration of trust factors at this advanced stage of e-government development is required. We address three main questions: (1) which trust elements are relevant in the provision of public e-service, and how do they interrelate? (2) What are the antecedents of such elements? and (3) How do they affect continuance intentions toward public e-services? By answering these questions, we hope to enable information managers to spend their limited budgets more effectively, such as by improving the elements that contribute most to retaining e-service users. In contrast with studies that seek to determine the role of trust in e-service

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adoption overall [37], we focus on the *continued* use of e-services, a topic that has received much less research attention than intentions to try an e-service but that involves very different individual, cognitive processes [14]. We also model how different trust referents relate, which previous studies have ignored. In turn, we make several contributions to extant literature.

First, we extend insights into trust transfer theory, which states that the trust transfer process is cognitive, such that one domain influences attitudes and perceptions in another domain [61,90]. We consider trust in the public e-service, in the public administration, and in the Internet. In addition to outlining the transfer from trust in the public administration and the Internet to trust in the public e-service, we investigate how trust in each referent may be influenced by the quality of the e-service and recommendations from interpersonal or institutional sources. We thus can delineate the trust-based effects on citizens' continuance intentions toward public e-service.

Second, this study extends continuance use literature [14,20] by integrating a relationship marketing perspective. Trust is essential to maintaining ongoing relationships and countering uncertain situations [9,64]; we include it as a key variable that determines citizens' continuance intentions toward public e-services. Building on the model proposed by Bhattacharjee [14], we define continuance intentions as a "user's intention to continue using an information system after its initial acceptance" (p. 352). We also acknowledge that perceived usefulness and satisfaction constitute primary drivers of continuance intentions [14,99]. By accounting for these variables and their high explanatory power, we ensure that any significant effect of the three trust variables in our study is robust.

Third, attitudes and intentions toward a product may be influenced by recommendations from others, defined as "communications directed at consumers about the ownership, usage, or characteristics of particular goods and services and/or their sellers" (p. 261) [102]. Most studies focus on a single recommending source at a time, such as interpersonal or consumer-to-consumer recommendations [55,102], but users could receive recommendations about public e-services from different sources, which may help them better assess the trustworthiness of different elements in the e-service system. We therefore specify whether these influences come from interpersonal or institutional sources and show that they do not have the same effects for every individual. Moreover, we find that time-conscious users experience a negative impact of interpersonal recommendations, but their effect is positive for people who are less concerned about time as a scarce resource.

In the next section, we review the concepts of trust in e-services, continuance intentions, and trust transfer theory. After we develop our research framework, we explain the data collection and measure validation processes. Finally, we discuss the results and their key implications for e-government managers.

2. Literature review

2.1. Trust in e-services

Trust is a complex concept described by researchers in various disciplines such as social psychology, economics, and marketing [29] and that provides a universally accepted basis for economic and social interactions [42,100]. It reflects the willingness of one party to be vulnerable to the actions of another, based on the expectation that this other party will perform a particular action, irrespective of monitoring or control structures [62].

In turn, trust is essential in public e-services for three main reasons. First, the inherent properties of services (i.e., heterogeneity, perishability, inseparability, and intangibility)

reduce the predictability of outcomes and thus increase transaction uncertainty [67]. Second, distant and impersonal channels, such as the Internet, mask the identity of an interacting party [16,77]. Such unobservability must be compensated for by a high level of trust in technology-driven delivery [42]. Third, the personal and sometimes delicate nature of the data in public e-service transactions (e.g., health information, income) requires citizens to rely on secure data management by public administrations. Asymmetric, multifaceted relationships between citizens and governmental agencies complicate this process; citizens rarely know what information is recorded and when or how it gets shared among different public agencies [11]. Building trust in the relationships between public administration and citizens thus seems essential as a means to overcome uncertainty and vulnerability perceptions [10].

Literature has outlined the relevance of trust to advance the development of e-government [100]. Perceived trustworthiness has been shown to influence intentions to use a wide variety of e-services such as tax filling [10,17,46], medical information systems [95,96,107] or e-voting [6]. However, the majority of studies linking trust to e-government have focused on citizens' *adoption* of public e-services, disregarding the relational value of trust as determinant of *continuance* intentions.

2.2. Continuance

Using well-established adoption models, such as the technology acceptance model (TAM) [26] and theory of planned behavior [2], prior literature has shown that trust influences the adoption of technologies [37,100]. Nevertheless, little research has sought to verify the role of trust during post-adoption stages empirically. Adoption mostly reflects previous beliefs and limited available information (e.g., attitude, facilitating conditions, compatibility) [2,26,82]. Trust gets created by new users through their assessments in relation to their expectations of the relationship and requires faith on the system, because of their lack of experience [37,57]. In contrast, continuance intentions result from users' personal experiences and long-term orientations [14]. Experienced users build trust in dynamic, ongoing interactions with technology, so that their trust evolves mostly from direct observation and improved understanding of system performance [57].

This differentiated perspective aligns with insights from relationship marketing literature, which concludes that trust helps maintain long-term relations [39,71], particularly in online settings such as e-commerce [9,64] or e-government [10]. Trust also enhances customer retention and loyalty [42,99], two variables conceptually similar to continuance intentions. Despite this theoretical rationale for considering trust in relation to continuance intentions toward new technologies, Bhattacharjee's model cites usefulness and satisfaction as the key determinants of continuance intentions; it ignores trust [14,20]. By integrating information services (IS) and relationship marketing research, we instead propose that trust constitutes an effective complement to the continuance intention framework [19].

2.3. Trust transfer

We acknowledge that people accept vulnerability toward distinct, specific agents and assign trust to different referents, whether people, objects, or processes [94]. For example, even though they are not moral agents, technological elements participate in regular social relationships and can be objects of trust [22]. Several studies also propose that trust can transfer among entities (see Table 1); trust transfer theory even provides a theoretical basis for some research. It occurs when a person develops trust in an entity because of her or his trust in a related entity [90]. The transmission depends on the person's assessment

Table 1
Summary of trust transfer approaches in prior literature.

Study	Conceptualization	Transfer mechanism	Dependent variable	Trust transferred from...
[29]	Relationship between trust in a supplier firm and its salesperson in industrial buying. Similar relationships in [86]	Trust transfer between embedded entities Salesperson's behavior is attributable to the supplier firm's culture, reward systems, and training programs (agency theory). Firm trust can be inferred from a salesperson's trustworthiness, because a salesperson is representative for the firm (transference in both directions).	Trust in the supplier firm	Trust in the supplier's salesperson
[54]	Online trust formation	Offline trust involves the relationship with the retailer. Customers infer the attributes of online operations from their previous offline experience with the retailer. Word of mouth and sanctioning power also build trust.	Trust in the supplier's salesperson Online trust in the retailer	Trust in the supplier firm - Offline trust in the retailer - Word-of-mouth - Expected sanctioning power
[79]	General trust in the community of sellers in an electronic marketplace (Amazon)	Trust transfer from contextually-related entities Trust transfer of intuitional structures affect trust in the community of sellers. Trust transference logic is based on the perceived association with the intermediary.	Trust in the community of sellers	- Trust in the intermediary managing the e-marketplace - Feedback mechanism - Escrow services - <i>Credit card guarantees</i> - <i>Generalized dispositional trust</i>
[40]	Trust in the business context or the industry (broad-scope) transferred to trust in a firm (narrow-scope)	Organization legitimacy granted by formal and informal rules in the social environment (institutional theory). The system encourages all companies in the industry to think and behave similarly. Customer trust in an organization is based on its belongingness to a trusted category.	Trust in a financial adviser	- System trust, governmental regulations and punishments - System trust, professional association rules and standards
[90]	Trust transfer from the context to an individual entity	Consumers' cognitive processes based on entities' similarity and proximity to known entity determine trust in the online vendor, jointly with common fate ("entitativity").	Trust in online vendor website	- <i>Existence of physical store</i> - Perceived similarity with a known website - Perceived business tie with a known website
[58]	Consumer trust in Internet shopping as a broad concept	The trustworthiness of Internet merchants and the Internet shopping medium are antecedents of trust in Internet shopping, because of process and transaction-based evidence.	Trust in Internet shopping	- <i>Internet merchants' ability</i> - Internet merchants' integrity - <i>Third-party certifications</i>
[59]	Initial trust emerges from diverse bases that operate simultaneously	Trust transfer from personal dispositions to other entities Psychological, social, economic, and information system foundations used to argue for a set of five trusting bases: personality, cognitive, calculative, institutional, and knowledge bases.	Trust in a national ID system	- <i>Personality: faith in humanity and trusting stance</i> - Cognitive, reputation - Calculative, cost/benefit - <i>Technology institutional: situational normality and structural assurance</i> - Organization institutional: situational normality and structural assurance
[81]	Trust as a result of the activation of some brain areas	Functional magnetic resonance imaging applied to understand gender differences in decisions to trust Internet offers. Website signals activate specific brain regions related to the evaluation of general trust (disposition to trust) and trust in the online offer (eBay electronic marketplace).	General trust and trust in online offer	No causal relationships. Evidence suggests that the activity in the insular cortex (brain area that encodes uncertainty and risk) relates to situational normality perceptions in both men and women.
[64] Measured and tested in [65,66]	Conceptual typology of trust constructs in hierarchical levels	From higher levels to all lower levels: personal disposition to trust [highest], institution-based trust, trusting beliefs (competence, benevolence, integrity, predictability), trusting intentions, trust-related behaviors [lowest]. E-vendor reputation and site quality intervene in transfer process.	Trust in online legal adviser (vendor)	- Disposition to trust - <i>Institutional: situational normality in the industry and legal and technological structural assurance</i> - E-vendor reputation - Site quality

Notes: Variables in italics represent non- or partially significant effects.

of the entities' similarity, proximity, or belongingness to a trusted referent [40,90]. In the relatively scarce stream of literature on trust transfer, Doney and Cannon [29] propose that trust moves between independent but related entities, such as firms and their salespeople; other authors propose typologies in which trust in an industry transfers to new firms operating in that sector [40,64].

Studies proposing trust transfer between embedded entities also cite a representation effect: Because one entity is a representative of the other, trust placed in that entity likely gets assigned to the other too. Such research also notes a contextual effect, such that trust in contextual factors establishes individual beliefs that the environment provides standards and punishments

that force related entities (e.g., retailers in the retail industry) to act appropriately. Finally, trust can transfer from personal dispositions to other entities, because personality offers a powerful basis for establishing perceptions of trust in other entities [81].

Because independent entities simultaneously participate in public e-service provision, trust might be attributed to different referents. Previous studies mainly use trust in the technology as their dependent variable [9,38] and ignore customers' potentially distinct evaluations of the characteristics of the public e-service, the governmental institutions backing it, and the enabling technology (i.e., the Internet) [16,18,103]. We extend these insights and build a theoretical framework of trust transfer and continued intentions to use public e-services.

3. Hypotheses development

Following trust transfer theory [86,90], we assert that trust in an entity that consists of different components is based on feelings toward the most salient component. Trust accumulates or dissipates on the basis of the effects of cumulative interactions with different components [57]. First, public administration is salient; it is the organization for which the e-service represents a virtual front office. Second, we consider the Internet, because public e-services are distributed over this medium, so it creates the environment in which service transactions occur.

3.1. Trust in public administration

Trust can shift from well-known targets, such as offline shopping channels, to less familiar targets, such as an online distribution channel [90]. When a website is clearly associated with a known brick-and-mortar store, trust in the retailer transfers to its website [54]. Accordingly, we anticipate that citizens assess a public e-service, as well as the public administration, as related objects of trust. They have many cues they can use to evaluate the trustworthiness of public administrations; over time, they develop well-defined beliefs about the public institution that manages the e-service, and these beliefs affect the credibility of its online channel. We thus propose trust transfer from general trust in public administration to trust in the public e-service it offers, and we hypothesize:

H1. Trust in the public administration positively influences trust in a public e-service.

3.2. Trust in the Internet

The Internet is a medium that enables e-government transactions; it can be characterized as a distant, impersonal channel [16], in which the absence of face-to-face interactions creates a lack of trust [77,103]. A lack of clarity about security, identity and authentication, confidentiality, and jurisdiction may cause users to perceive the Internet as more effective for gathering information than for completing transactions [72,94]. A reliable network also is necessary to guarantee reliable, trustworthy e-service performance [58]. Thus, trust in the Internet should act as an antecedent of trust in a public e-service [92], and we hypothesize:

H2. Trust in the Internet positively influences trust in a public e-service.

3.3. e-Service quality

Zeithaml et al. [106] define e-service quality as “the extent to which a website facilitates efficient and effective shopping, purchasing and delivery” (p. 11). They also argue that e-service

quality is reflected in elements such as efficiency, privacy, fulfillment, and system availability [76]. An e-service's quality elements provide important cues for shaping or adjusting people's ongoing ideas about the trustworthiness of a e-service system and processes [65]. For example, ease of navigation and transaction or privacy reassurances provided by quality seals might increase transparency and indicate e-service trustworthiness [23,32]. e-Service quality also implies situational normality and an investment by the other party that suggests a long-term commitment to the relationship [37] and an appreciation of user needs [32]. Citizens rarely gain insights into the back-office processes of government organizations, so a well-functioning public service at least could assure them of the good intentions of the organization or increase their expectations of a successful interaction. We expect e-service quality to enhance trust attributions to the public administration. Finally, flawless operations of a public e-service, as a component of the entire Internet network, instills faith in the Internet as a whole. We hypothesize that the quality of a public e-service is positively associated with citizens' perceptions of the trustworthiness of public administrations, the Internet, and the public e-service:

H3. Public e-service quality positively influences (a) trust in the public administration, (b) trust in the public e-service, and (c) trust in the Internet.

3.4. Recommendations from public administrations and interpersonal sources

When an online service has few observable quality and trust cues, information from personal or third-party sources shapes beliefs. Even if the user previously has assessed the trustworthiness of an e-service, this impression must be confirmed by additional social support or approval [68]. In the context of public e-services, two salient recommendation sources are communications by public administrations and interpersonal connections. Public administration recommendations are communication instruments targeted at citizens that focus on improving their knowledge and convenience perceptions about public e-services. They thus might increase trust in the public administration itself, in its e-service, and in the Internet as a whole. First, people should believe that if the institution undertakes the effort to inform them about e-service developments, it must be determined to make the technology succeed. This determination and openness of communication breeds trust [16]. Alternatively, public administration recommendations may operate like promotions: Trust in the administration gets reinforced through active communication of its strengths, using governmental campaigns, personalized mail, or spotless brick-and mortar locations [64].

Second, public administration recommendations help citizens assess e-service trustworthiness by educating them about e-services. Helpful information about key aspects of e-government services makes people more aware of the key evaluation elements. Recommendations fine-tuned to citizen's needs also prevent information under- or overload and help people define the trustworthiness of the technology more clearly. Government agencies also could enhance trust in the e-service directly, such as by advertising security measures or providing statistical information about how the e-service has improved the efficiency of other citizens' transactions [16].

Third, people may be hesitant to continue using e-services if they perceive uncertainty and vulnerability in the platform. This concern could be alleviated in several ways. Positive and supportive information from non-commercial sources suggests the service functions in the best interest of users, instead of representing an attempt to make money from them [50]. Such a

perception reinforces the sentiment that the supportive infrastructure is reliable and not susceptible to fraud. When public administrations cite the many citizens already using the technology, worries about privacy and security should fade, because people feel relatively more protected in a larger crowd [51]. Therefore, we propose:

H4. Recommendations from the public administration positively influence (a) trust in the public administration, (b) trust in the public e-service, and (c) trust in the Internet.

To minimize uncertainty, users of an e-service solicit opinions from related others [13]. Generally, interpersonal recommendations are informal, non-commercial, person-to-person information exchanges [43]; for e-services, they entail word-of-mouth influences from friends, colleagues, superiors, and other prior adopters known to the potential adopter [13], which may increase trust in the public administration, its e-service, or the Internet as a whole.

First, a public administration is a service organization, which is notoriously harder to assess in terms of trustworthiness than a manufacturing firm, due to its credence qualities [67]. Even after experiencing public services, citizens may be unsure about their evaluations. As social information processing theory notes, interpersonal channels of communications influence evaluations involving uncertainty [35]. When friends, family, or coworkers recommend a service organization's activity (e.g., e-service), it offers a cue that can confirm user's own beliefs about the overall organization (e.g., its trustworthiness) [33]. In other words, influential reference groups provide positive information about some portion of a larger entity, and the recipient generalizes this information to reinforce his or her judgment of the higher-order entity [91].

Second, research in e-services indicates the influence of peer recommenders in online settings [87]. Recommendations help users manage the overwhelming amount of information and create a better understanding of the key features of a service [56], which supports more careful, contrasted evaluations of an e-service prior to continuance decisions. Especially for difficult evaluations such as e-services, information about important others is valuable, because the recipient knows that peers are unlikely to expose him or her to any undue harm. If peers recommend an e-service, the user should put more trust in this technology.

Third, interpersonal recommendations can address uncertainty regarding the elements on which the public e-service depends. For example, Internet anxiety tends to diminish when peers provide instructions or demonstrate the workings of particular Internet applications or interesting content [94]. Following social information processing theory, we posit that positive information from related others about the public e-service acts as a representative indicator of the underlying technologies [35]. In summary, we hypothesize:

H5. Interpersonal recommendations positively influence (a) trust in the public administrations, (b) trust in the public e-service, and (c) trust in the Internet.

3.5. Trust in public e-service as an antecedent of continuance intentions

Finally, we posit that trust in e-services influences the continued use of the technology in post-adoption stages. Perceptions of vulnerability to opportunistic actions persist after adoption, because delicate information gets managed and stored over impersonal and distant lines of communication. Trust enhances behavioral continuance intentions by reducing uncertainty about the system and

related processes [70]. Studies in marketing also substantiate the positive relation between trust and loyalty, rather than a particular episode [85]. That is, trust constitutes an essential element of long-term relationships [71], and trust in an e-service reassures the user of the stable relationship with the service provider while also providing evidence that it is unlikely the system will break down or lose its value in the future [99]. It thus makes users want to continue using the service, rather than to engage in switching behavior and obtain the service through other means. We therefore hypothesize:

H6. Trust in a public e-service positively influences continuance intentions toward that public e-service.

3.6. Control variables

Previous research shows that intentions for continued usage relate to other psychological constructs, such as perceived usefulness and satisfaction [14,99]. Perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her performance" (p. 320) [26]; satisfaction is "a psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience" (p. 27) [75]. Following previous literature, and to increase the internal validity of our analysis, we consider perceived usefulness and satisfaction as control variables that should affect continuance intentions. Fig. 1 illustrates our proposed model.

4. Data collection

We obtained data from an online survey targeted at citizens who used an e-service for income tax returns in Spain. Every respondent had used the service at least once in the previous two years. The survey was announced through e-mail distribution lists and discussion forums of the national government's website related to tax issues. The resulting sample of users had sufficient knowledge about the e-service to respond to all the survey questions.

These respondents indicated their agreement with a set of statements (see the Appendix), using seven-point Likert scales, ranging from "totally disagree" to "totally agree". In Table 2, we compare the socio-demographic profile of the sample with that of Spanish users of transactional e-government services [47] and Spanish Internet users [80]; we find similar patterns across the three samples, with some slight differences that represent the specific profile of taxpayers (higher representation of middle-aged people, slightly higher representation of men [1]). After the removal of outliers, repeated responses, and incomplete questionnaires, we obtained 336 valid responses.

5. Measure validation

We developed a first version of the scales on the basis of an extensive review of online trust literature, which helped ensure content validity. Some scales required adaptations to fit our specific public e-service setting. We tested the face validity of the adapted measures using a variation of Zaichkowsky's [105] method: We asked a panel of 10 experts to classify each item as "clearly representative," "somewhat representative," or "not representative" of the focal construct. We retained items that produced a high level of consensus among the experts [60]. To prevent respondents from displaying consistency motifs in their answers and meaningfully separate the trust entities, several sections of the survey adopted divergent layouts.

Trust can be assessed by beliefs or intentions [63,70]. Consistent with previous e-government studies, we used measures based on

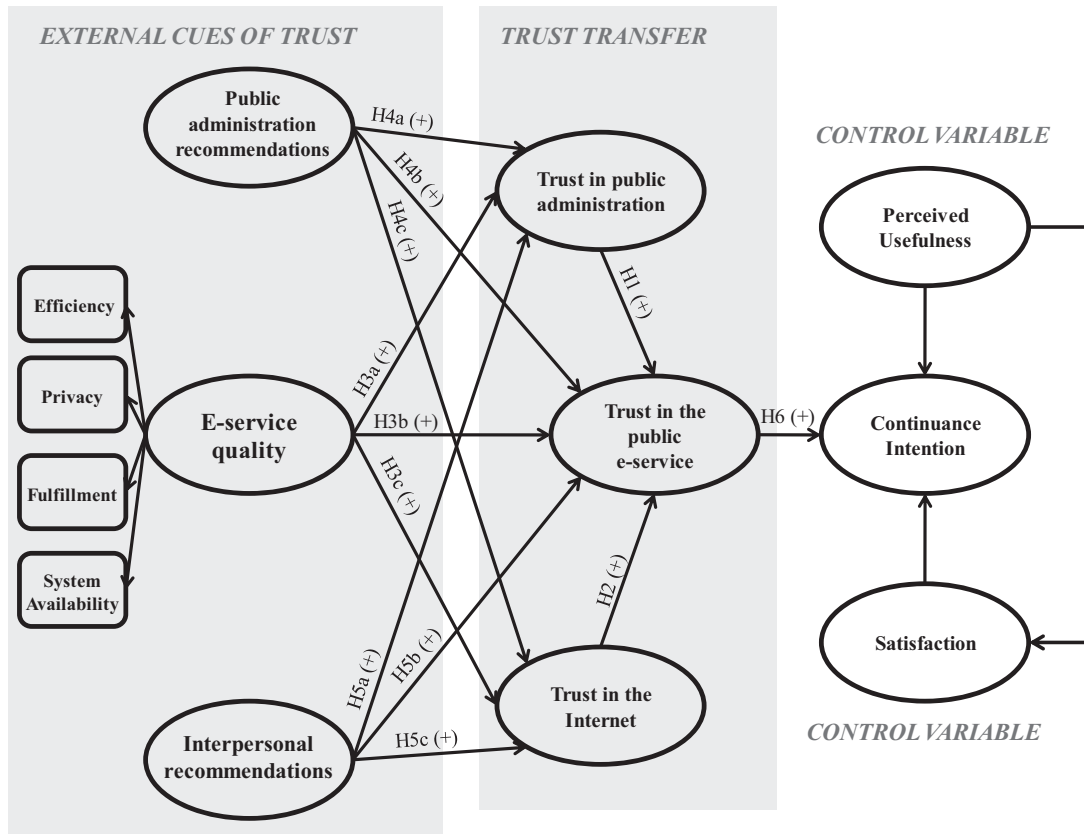


Fig. 1. Proposed model.

beliefs of overall trust [17,46]. This general conceptualization enables us to overcome the difficulty of asking citizens to assess specific properties of impersonal entities, such as benevolence. To assess e-service quality, we used the E-S-QUAL scale [76], adapted to mitigate its focus on e-commerce. Thus we employed three items for each of the four dimensions. Building on a dominant stream in e-service literature [24,31], we considered a four-dimensional, higher-order construct in which each E-S-QUAL subdimension was a single-order factor.

The validation process started with an initial exploratory analysis of reliability and dimensionality [5]. The Cronbach's alphas indicated the initial reliability of the scales, with a threshold value of 0.7 [25]. The item-to-total correlation exceeded

the minimum value of 0.3 in all cases [74]. To confirm the dimensional structure of the scales, we used confirmatory factor analysis and employed EQS 6.1 software using the robust maximum likelihood estimator, with Jöreskog and Sörbom's [49] criteria. The item SYS3 of the system availability dimension was removed, because its factor loading was lower than 0.5 [49]. We obtained acceptable levels of convergence, R-square values, and model fit ($\chi^2(df) = 1136.62 (494), p < 0.01$; Satorra-Bentler scaled $\chi^2(df) = 802.58 (494), p < 0.01$; non-normed fit index [NNFI] = 0.965; comparative fit index [CFI] = 0.971; incremental fit index [IFI] = 0.971; root mean squared error of approximation [RMSEA] = 0.044), with the exception of the χ^2 indicator, probably due to sample size—a commonly reported, acceptable limitation of structural equation modeling [8].

We used the composite reliability indicator to assess construct reliability [48] and obtained values greater than 0.65 (Table 3), in

Table 2 Demographics.

Key demographics	Survey respondents (%)	Users of e-government (%)	Internet population (%)
Age			
Below 25	9.2	17.2	26.2
25-34	29.2	28.1	25.2
35-49	40.8	37.9	30.4
50-64	18.4	15.5	14.2
Above 64	2.4	1.3	4.0
Gender			
Male	59.8	52.0	50.1
Female	40.2	48.0	49.9
Education			
Without formal education	0.6	–	4.1
Primary school	6.2	–	13.4
Secondary school	30.4	–	40.4
College/university	62.8	–	42.1

Table 3 Construct reliability and convergent validity.

Variable	CR	AVE
Efficiency	0.920	0.790
Privacy	0.960	0.888
Fulfillment	0.951	0.866
System availability	0.793	0.658
Public administration recommendations	0.911	0.774
Interpersonal recommendations	0.939	0.838
Trust in public administrations	0.930	0.815
Trust in the Internet	0.918	0.789
Trust in the public e-service	0.967	0.906
Continuanace intentions	0.921	0.797
Perceived usefulness	0.935	0.827
Satisfaction	0.938	0.834

Notes: CR= composite reliability, AVE= average variance extracted.

Table 4
Descriptive statistics and discriminant validity.

	Mean	S.D.	EFF	PRIV	FUL	SYS	PAR	PR	TPA	TI	TS	CI	PU	SAT
EFF	3.79	1.74	0.886											
PRIV	5.43	1.63	0.284	0.942										
FUL	5.23	1.62	0.336	0.898	0.930									
SYS	5.80	1.45	0.160	0.428	0.400	0.811								
PAR	4.51	1.73	0.376	0.272	0.316	0.200	0.880							
IR	4.11	1.63	0.300	0.294	0.323	0.199	0.324	0.916						
TPA	4.46	1.82	0.493	0.586	0.606	0.198	0.314	0.307	0.903					
TI	4.11	1.53	0.285	0.320	0.359	0.298	0.277	0.263	0.369	0.888				
TS	4.51	1.78	0.536	0.604	0.634	0.305	0.414	0.345	0.730	0.657	0.952			
CI	4.98	1.91	0.582	0.423	0.380	0.283	0.388	0.334	0.496	0.255	0.621	0.892		
PU	5.07	1.88	0.533	0.363	0.362	0.245	0.364	0.225	0.484	0.255	0.542	0.667	0.909	
SAT	4.30	2.00	0.762	0.385	0.398	0.199	0.448	0.325	0.552	0.266	0.632	0.836	0.656	0.913

Notes: Diagonal elements (bold figures) are the squared root of the AVE (the variance shared between the constructs and their measures). Off-diagonal elements are the correlations among constructs. EFF= efficiency, PRIV= privacy, FUL= fulfillment, SYS= system availability, PAR= public administrations recommendations, IR= interpersonal recommendations, TPA= trust in the public administration, TI= trust in the Internet, TS= trust in the public e-service, CI= continuance intentions, PU= perceived usefulness, and SAT= satisfaction.

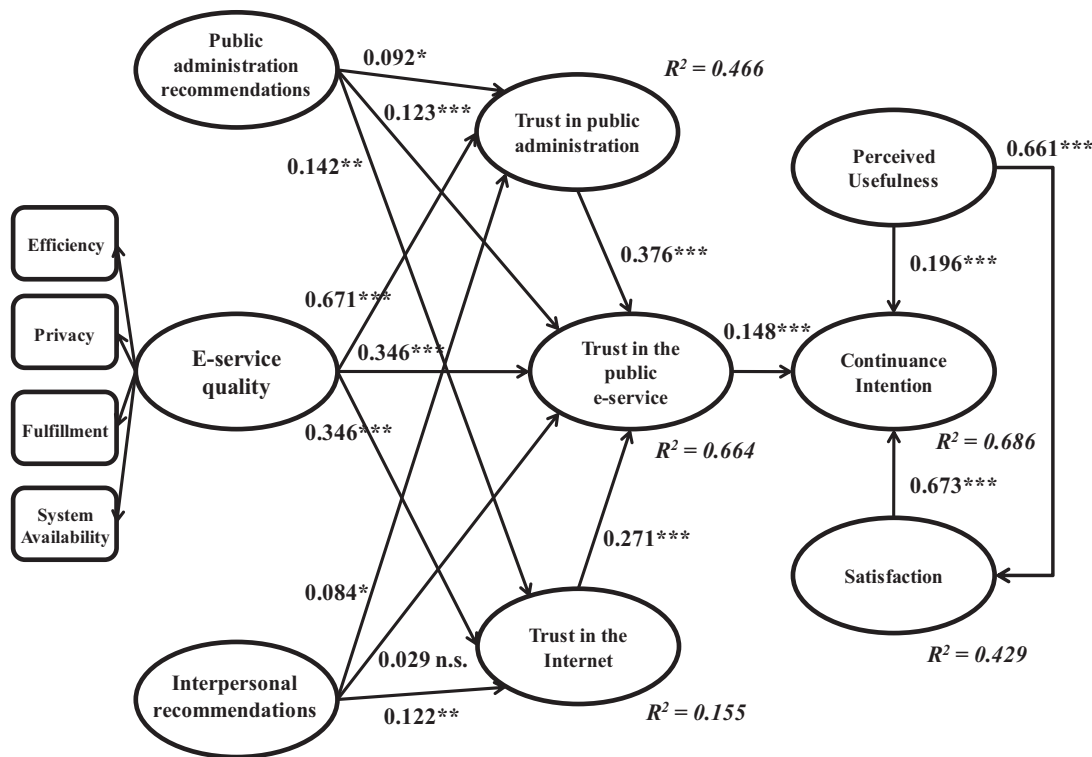
excess of recommended benchmarks [89]. To test for convergent validity, we confirmed that all factor loadings were significant (at 0.01) and exceeded 0.5 [89]. The average variance extracted (AVE) values were all greater than 0.5 (Table 4). Therefore, the items in each scale contain less than 50% error variance and converged on one construct [34].

Finally, to test discriminant validity, or whether each construct was distinct from other constructs not theoretically related to it, we followed Fornell and Larcker [34] and assessed whether the square root of the AVE indicators was greater than the correlations between the constructs. As Table 4 reveals, all pairs of constructs satisfied this criterion.

6. Results

6.1. Hypothesis tests

To test H1–H6, we tested the structural equation model in Fig. 2. The global fit indicators were acceptable ($\chi^2(df) = 1876.83 (543)$, $p < 0.01$; Satorra–Bentler scaled $\chi^2(df) = 1366.87 (543)$, $p < 0.01$; NNFI = 0.914; CFI = 0.921; IFI = 0.922; RMSEA = 0.063; normed $\chi^2 = 3.456$), though again with the χ^2 limitation. In interpreting the coefficients, we found support for our first two hypotheses: Trust in the public administration and trust in the Internet positively affected trust in the public e-service ($\beta = 0.376$, $p < 0.01$,



* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Fig. 2. Structural equation model: standardized solution.

Table 5
Rival models analysis.

Hypotheses		Basic model ^a Without control variables	Proposed model Full mediation; full trust transfer	Rival model I No mediation; no trust transfer	Rival model II Partial mediation, partial trust transfer
H1	Trust in public administration → Trust in public e-service Trust in public administration → Continuance intentions	0.377***	0.376***	–0.058 n.s.	0.376*** –0.062 n.s.
H2	Trust in the Internet → Trust in public e-service Trust in the Internet → Continuance intentions	0.269***	0.271***	–0.047 n.s.	0.272*** –0.056 n.s.
E-service quality					
H3a	→Trust in the public administration	0.672***	0.671***	0.780***	0.671***
H3b	→Trust in the public e-service	0.347***	0.346***	0.829***	0.346***
H3c	→Trust in the Internet	0.346***	0.346***	0.463***	0.346***
Public administration recommendations					
H4a	→Trust in the public administration	0.091 [†]	0.092 [†]	0.055 n.s.	0.092 [†]
H4b	→Trust in the public e-service	0.126***	0.123***	0.151***	0.376***
H4c	→Trust in the Internet	0.142**	0.142**	0.115 [†]	0.143**
Interpersonal recommendations					
H5a	→Trust public administration	0.084 [†]	0.084 [†]	0.049 n.s.	0.083 [†]
H5b	→Trust in the public e-service	0.031 n.s.	0.029 n.s.	0.054 n.s.	0.272***
H5c	→Trust in the Internet	0.122**	0.122**	0.088 n.s.	0.122**
H6	Trust in the public e-service → Continuance intentions	0.597***	0.148***	0.218***	0.226***
Control	Perceived usefulness → Satisfaction		0.655***	0.655***	0.655***
Control	Perceived usefulness → Continuance intentions		0.196***	0.200***	0.198***
Control	Satisfaction → Continuance intentions		0.673***	0.671***	0.669***
Model Fit					
	χ^2 (d.f.)	1160.92 (363)	1876.83 (543)	1935.54 (543)	1874.07 (541)
	$p < 0.001$		$p < 0.001$	$p < 0.001$	$p < 0.001$
	RMSEA	0.063	0.068	0.070	0.074
	90% Confidence interval RMSEA	(0.058, 0.069)	(0.063, 0.072)	(0.065, 0.074)	(0.070, 0.079)
	NNFI	0.935	0.914	0.909	0.913
	CFI	0.942	0.921	0.917	0.921
	IFI	0.942	0.922	0.918	0.922
	Normed χ^2 (Parsimony)	3.198	3.456	3.565	3.464
Akaike Information Criteria (AIC)	119.264	280.875	325.084	283.010	
R^2	Trust service	0.666	0.664	0.713	0.665
	Continuance intentions	0.356	0.686	0.695	0.688

Notes: n.s. no significant.

[†] $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

^a The basic model (proposed model without control variables) helps confirm that the effect of trust in the public e-service on continuance intentions (H6) was significant before we included the control variables.

and $\beta = 0.271$, $p < 0.01$, respectively). E-service quality related positively to trust in the public administration ($\beta = 0.671$, $p < 0.01$), trust in the public e-service ($\beta = 0.346$, $p < 0.01$), and trust in the Internet ($\beta = 0.346$, $p < 0.01$), in support of H3a–c. Also in support of H4a–c, our results showed that recommendations made by public administrations influenced formations of trust in public administrations ($\beta = 0.092$, $p < 0.10$), the public e-service ($\beta = 0.123$, $p < 0.01$), and the Internet ($\beta = 0.142$, $p < 0.05$). Although interpersonal recommendations affected trust in the public administration, the effect was weak ($\beta = 0.084$, $p < 0.10$), in support of H5a. We also found support for H5c, in that interpersonal recommendations positively related to trust in the Internet ($\beta = 0.122$, $p < 0.05$). However, we must reject H5b, because the effect of interpersonal recommendations on trust in the public e-service was not significant ($\beta = 0.029$). Finally, trust in the public e-service significantly related to continuance intentions ($\beta = 0.148$, $p < 0.01$), in support of H6. This effect was robust, in that we accounted for the effect of control variables. Both perceived usefulness ($\beta = 0.196$, $p < 0.01$) and satisfaction ($\beta = 0.673$, $p < 0.01$) exerted strong and significant effects on continuance intentions, in line with previous research [14]. If we had ignored these controls, the effect of trust in the public e-service would have appeared much greater ($\beta = 0.597$, $p < 0.001$, see *Basic*

model in Table 5). Although accounting for the effects of perceived usefulness and satisfaction weakened the trust-based influence on continuance intentions, we found that trust explained additional variance, beyond that offered by existing drivers. The explained variance of trust in the public e-service was high ($R^2 = 0.664$), and a comparable amount of variance could be explained in continuance intentions ($R^2 = 0.686$). Furthermore, trust in the public administration and trust in the Internet yielded R -square values of 0.466 and 0.155, respectively.

6.2. Rival models

It is possible that trust in the public e-service might mediate the link between the other trust referents (i.e., trust in the public administration and the Internet) and continuance intentions, or else other trust-based constructs could have a direct effect on our dependent variable. To confirm the mediating role of trust in the public e-service, we compared our proposed model with two rival models (Fig. 3). To focus on the trust transfer process, we excluded the drivers of the three trust constructs (but included perceived usefulness and satisfaction as determinants of continuance intentions). In rival model I, we assumed no mediation of trust in the public e-service, whereas rival model II represented partial

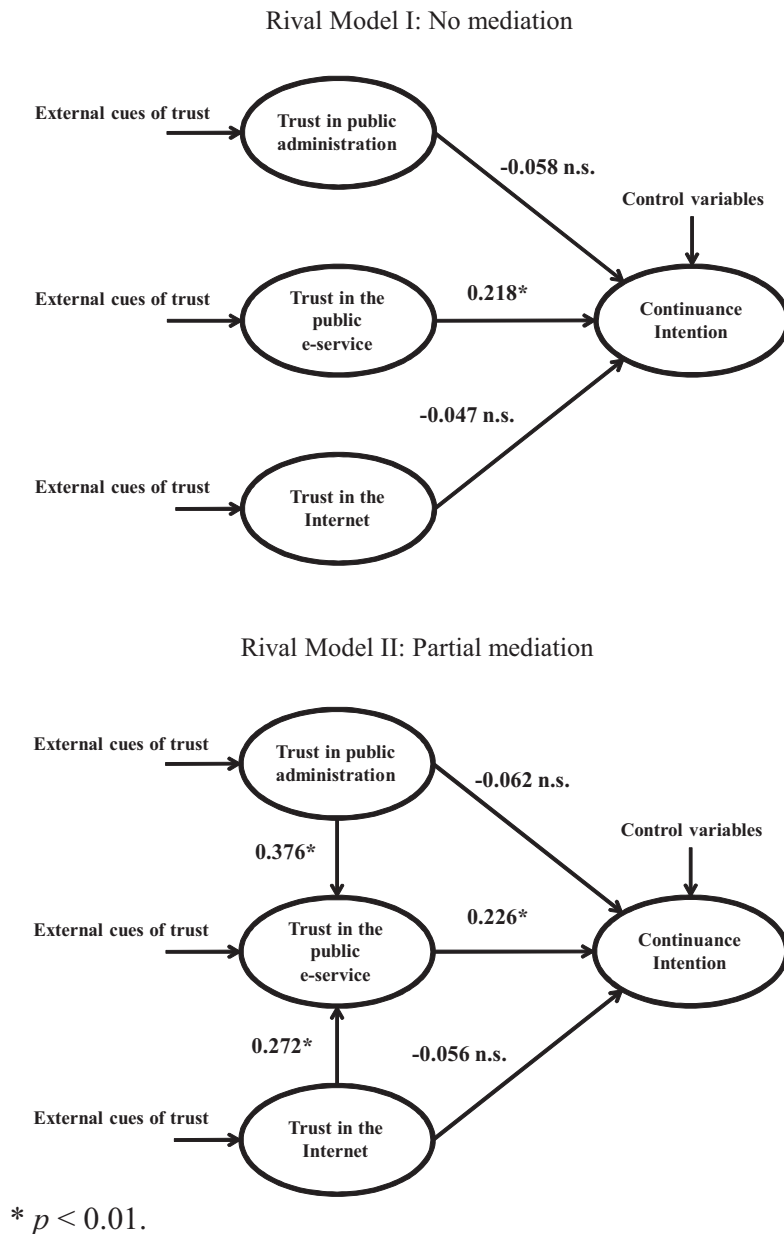


Fig. 3. Summary of rival model results: standardized solution.

mediation. Similar to Morgan and Hunt [71], we compared our proposed model with its rivals on the basis of (1) overall fit, as measured by the CFI indicator; (2) parsimony, measured by the ratio of the chi-square to the degrees of freedom; and (3) Akaike information criterion (AIC). We also compared the coefficient estimations to make any claims about mediation.

6.2.1. Rival model I: no mediation

Our proposed model displayed better fit measures than rival model I. The CFI indicator of the rival model (0.917) was lower than the CFI of the proposed model (0.921) and its ratio of χ^2 to degrees of freedom was slightly higher (3.565 versus 3.456). In addition, Akaike [3] recommends a model with lower AIC indicators over other models based on the same sample. On this criterion, our proposed model (AIC = 280.88) was preferable to rival model I (AIC = 325.08). With regard to the coefficients, only trust in the public e-service yielded a significant effect on continuance intentions ($\beta = 0.218$, $p < 0.01$), whereas the other trust constructs did not relate significantly to our dependent variable.

6.2.2. Rival model II: partial mediation

We introduced rival model II to test for partial mediation. Its overall fit (CFI = 0.921) and parsimony (normed chi-square = 3.464) were similar to the values achieved through our original model. The AIC was similar but better in our proposed model (AIC = 280.88) compared with rival model II (AIC = 283.01). As we show in Table 5, the effects of trust in the public administration and the Internet on trust in the public e-service were significant ($\beta = 0.376$, $p < 0.01$, and $\beta = 0.272$, $p < 0.01$, respectively), but these variables did not relate directly to continuance intentions. We therefore confirm a full mediating role of trust in the public e-service.

To reinforce this conclusion, we also tested for the significance of the mediation effects using a Sobel test [88], which assesses whether the influence of a variable on another, through the mediator, is significant, according to the significance of the indirect effect. Our results showed that both indirect effects were significant. The indirect effect of trust in the public administration on continuance intentions through trust in the e-service yielded a

Table 6
Summary of findings for formal tests of mediation.

Model	Goodness-of-fit	χ^2 difference	Additional path
M1 Baseline Model: Hypothesized paths (Fig. 1)	χ^2 (543) = 1876.83; $p < 0.001$	–	–
M2 M1 + E-service quality → Continuance intention	χ^2 (542) = 1876.81; $p < 0.001$	M2–M1: $\chi^2_{df=1} = .015$; $p > 0.90$	0.009 ($p > 0.1$)
M3 M1 + Public administration recommendations → Continuance intention	χ^2 (542) = 1875.01; $p < 0.001$	M3–M1: $\chi^2_{df=1} = 1.817$; $p > 0.17$	–0.012 ($p > 0.1$)
M4 M1 + Interpersonal recommendations → Continuance intention	χ^2 (542) = 1874.31; $p < 0.001$	M4–M1: $\chi^2_{df=1} = 2.519$; $p > 0.11$	0.059 ($p > 0.1$)
M5 M1 + Trust in the public administration → Continuance intention	χ^2 (542) = 1875.66; $p < 0.001$	M5–M1: $\chi^2_{df=1} = 1.166$; $p > 0.28$	–0.058 ($p > 0.1$)
M6 M1 + Trust in the Internet → Continuance intention	χ^2 (542) = 1875.51; $p < 0.001$	M6–M1: $\chi^2_{df=1} = 1.321$; $p > 0.25$	–0.050 ($p > 0.1$)

z-score of 6.77 ($p < 0.01$); for trust in the Internet, the z-score was 4.70 ($p < 0.01$). We conducted additional tests to check if other direct effects on continuance intentions, not specified in the model, might be significant [7]. The first row of Table 6 shows the goodness-of-fit for the proposed model, which provides the baseline for χ^2 difference tests. In M2 we assessed whether a direct path from e-service quality to continuance intentions existed. Then because M2 is nested in M1, we performed a χ^2 difference test with one degree of freedom to determine whether trust in the public e-service fully or partially mediated the effect of e-service quality on continuance intentions [55]. In M2, the path was not significant, nor was the χ^2 difference ($\chi^2_{df=1} = 0.015$, $p > 0.90$). We therefore concluded that trust in the public e-service fully mediated the effect of e-service quality on continuance intentions. Across M3–M6, we found no significant χ^2 differences, so trust in the public e-service fully mediated between its antecedents and continuance intentions.

7. Post hoc analysis: Moderating effect of time consciousness

After observing the model results, we tried to understand why we were unable to find an effect of interpersonal recommendations on trust in the public e-service (H5b), even as we uncovered support for the hypothesized effects of interpersonal recommendations on trust in public administrations and the Internet. Perhaps public administrations and the Internet are more common topics of conversation, because people share experiences with these entities. Recommendations by others thus may seem more valuable in assessing their trustworthiness. Public e-services instead are a less likely topic of general conversations, and recommendations received by a citizen may represent the opinion of a small group of people only, without significantly enhancing trust in the public e-service. Furthermore, public administrations and the Internet have various facets. For example, opinions of an institution depend strongly on the person or department with whom the citizen interacts [57]. Likewise, the Internet serves many purposes (e.g., information retrieval, administration, gaming), and a user may be unable to form a complete view of Internet trustworthiness. Recommendations by others may facilitate such assessments. In contrast, an e-service is readily observable, and citizens may use much of its functionality, so recommendations by others add little value beyond the person's observations.

Ultimately, the question is whether the lack of significant effect of interpersonal recommendations on trust in the public e-service always occurs or holds only for certain situations or individuals. Consider, for example, people who are time-pressed and have little time to engage in an evaluation before using a

public e-service. In modern society, time is an increasingly scarce resource, and many people believe that employing time efficiently is essential to improving their quality of life [28]. Yet people also differ in their awareness of how they spend their time, or their time consciousness, defined as “a person's disposition to consider time a scarce resource and plan its use carefully” (p. 34) [53]. Time-conscious persons are unlikely to collect or use recommendations to assess an e-service, because other cues, such as e-service quality, can be accessed more quickly. Time-conscious citizens also may more readily appreciate the e-service's benefits, such as faster, always available service. They therefore might evaluate e-service trustworthiness without taking others' recommendations into account.

We performed a multisample analysis to assess this potential moderating role of time consciousness on the relationship between interpersonal recommendations and trust in the public e-service. Respondents answered a question about their time consciousness, related to their concerns about efficiency in using time. On the basis of their answers, we divided the total sample into two groups at the arithmetic mean of the moderating variable [36]. Around this mean we eliminated cases within a half standard deviation. The first group represented 118 citizens with low time consciousness, and the second group included 105 citizens with high time consciousness. Next, we calculated two models: a base model in which the structural path was freely estimated and an alternative model with a fixed path. A significant χ^2 change in comparing the two models would indicate a significant moderation effect. As we show in Table 7, trust in the e-service was enhanced by interpersonal recommendations when time efficiency concerns were less important. For citizens with high time consciousness, interpersonal recommendations related *negatively* to trust in the public e-service. The non-significant effect in our base model thus features both positive and negative effects, according to individual time consciousness. We return to this issue in Section 8.

8. Discussion

Trust is a key issue in today's technology-driven society. Based on an extensive literature review, our work addresses the challenging matter of trust creation for a continued use of public e-services. We propose and empirically substantiate a trust transfer process, by which trust in public administrations and in the Internet relate to trust in the public e-service. Additional antecedents include e-service quality and recommendations from both public administrations and interpersonal sources.

As our first important contribution, we show that trust can be decomposed according to its different referents. Three elements that

Table 7
Moderating effect of time consciousness.

Path	Group	<i>n</i>	Non-standardized β	$\Delta\chi^2/df$	<i>p</i> -Value
Interpersonal recommendations → Trust in the public e-service	Low time consciousness	105	0.195 [†]	6.573	0.010
	High time consciousness	118	–0.105 [†]		

[†] $p \leq 0.01$.

determine an e-service transaction (provider, service, and underlying technology) are interrelated; we conclude in particular that trust in the public e-service mediates between trust in the public administration and continuance intentions, as well as between trust in the Internet and continuance intentions. That is, trust transfers to the e-service from two elements: provider characteristics and technology characteristics. The transfer effect of trust in the Internet is smaller than that of trust in the public administration, which suggests that the delivery channel is relatively less important than which entity provides the service when citizens evaluate e-service trustworthiness. In line with previous findings in e-government [12], Internet-savvy users do not automatically develop a high level of trust in a public e-service; they must trust public administrations before they will do so. These findings add to both technology adoption and continued use literature, which rarely decompose trust [38,46]. Furthermore, our findings correspond to conclusions from trust transfer studies that include contextually related entities and suggest that people apply analogy rule-based processing, in which presumptions about the related entities guide behavior [57]. Prior work focuses specifically on the early stages of the relationship [57]; we include extended relationships. Although trust seems important for both new and more advanced users of technology, additional studies also could compare the effects of trust between these two groups. Beldad et al. [12] report that the direct effect of trust in governmental organizations on intentions to disclose personal information is stronger for inexperienced than for experienced e-government users; we also find a mediated effect through trust in the e-service among experienced users. Research thus is needed to clarify if the trust transfer process differs for adoption versus continuance decisions.

We advance continuance intention literature by including trust in an existing framework [14], which describes an individual-level process that goes beyond the decision to engage in an initial technology trial. Previous studies on continuance intentions note the leading role of satisfaction and usefulness but fail to achieve consensus with regard to other relevant antecedents [19,20]. Controlling for perceived usefulness and satisfaction, we find a significant, positive effect of trust in the e-service on users' continuance intentions, an influence almost on par with that of perceived usefulness. This finding is remarkable, considering the dominant role of perceived usefulness in prior continuance intentions literature [14,19]. Although we confirm satisfaction and usefulness as key drivers of continuance intentions [14], our integrative model also indicates that the findings of relationship marketing literature, linking trust to loyalty [42], can be applied to continuance usage frameworks.

With a rival model analysis, we also confirm the importance of the transfer process in optimizing continuance intentions, because we found no direct effects of trust in the public administration or the Internet on continuance intentions. Apparently, assessments of trust in the public e-service are the most proximal to individual intentions to keep using the e-service. Trust in the public e-service also might result from other cues though. For example, website attributes could help citizens establish e-service quality perceptions that exert important effects on their trust in the public e-service. E-service quality also affects trust in the Internet and the public administration. That is, e-service quality likely is an important driver of different trust entities. Extending literature that confirms the positive effects of quality on trust in the online store [30], technology trustworthiness [22], and trust in the vendor [73], we show how quality *simultaneously* affects three different, related entities of trust.

Finally, we consider influences by relevant others and reveal that e-government service recommendations by public administrations and interpersonal sources offer important antecedents of individual trust in a public e-service, the underlying technology, and the service

provider. Because public e-services are not a popular conversation topic, citizens who receive interpersonal recommendations may regard the endorsements as representative of a small or irrelevant user group. Interpersonal sources relate positively to trust in the public e-service for citizens with low time consciousness; the effect instead is negative for citizens who are more concerned about time efficiency. Possibly, in a continuance context, more time-conscious people economize their cognitive effort in belief formation [53], because they already have first-hand experience with the public e-service to assess its trustworthiness and determine their course of action [83]. This makes others' recommendations less useful to shape beliefs and may apparently even introduce a negative influence. As our dataset does not allow to further explore the conceptual reason for this effect, future research may try to further explore this unexpected negative impact of interpersonal recommendations for time conscious individuals. This finding likely would differ in an adoption context, in which personal recommendations help people who consider time a scarce resource save time, by granting them an initial assessment of the public e-service's trustworthiness. Further research should verify this reasoning, though our current findings already add to IS literature that regards subjective norms as an operationalization of social influences. We still need to establish how recommendations affect beliefs in different, interrelated entities in an electronic service system.

8.1. Managerial implications

Providing public services is a public administration's duty. The use of online channels to perform this task could increase efficiency and convenience, but effective e-government still requires careful management of all elements in the socio-technological system. In particular, public administrations must realize that their organization's image affects trust in public e-services. A governmental agency needs great transparency in its communications with citizens, strong employee skills, and high overall service levels to ensure an image as a trustworthy organization. Governments could design strategies to explicate how public administrations work; they might invite citizens or the media to their offices and provide insights in the structure of their operations, what information is stored, and which employees are responsible for each task. Such tactics could alleviate concerns about impersonal contacts in e-service transactions. In addition, though marketing campaigns may convince citizens of an organization's good intentions and determination, transparency is best facilitated by stimulating face-to-face interactions. Employees should reach out to citizens and engage in positive word of mouth.

Trust in the Internet drives trust in the e-service and thus continuance intentions. Public managers therefore should take care that the public e-service environment is sheltered from security threats, by creating easily recognizable government websites, displaying a clear privacy statement, using government domain names (e.g., .gov), collaborating with respectable technology partners, and signaling reliability with testimonials, FAQ pages, or contact pages [103]. Citizens also should feel safer in an online environment when government organizations engage in active dialogue with them. The mere presence and responsiveness of governments on modern media may help citizens realize the convenience of modern technology, with fewer concerns about privacy or security threats. Such strategies would also benefit the trustworthiness of the organization and are highly recommended. Governmental organizations should also start marketing campaigns and educational programs to advise citizens about online protections [78].

Finally, offering an online service that works flawlessly, has secure data processing, fulfills citizens' needs, and is always available is a precondition of trust. Public services have a wide

range of users; an easy, intuitive design with complete information can minimize user errors and maximize trust [101]. Other website elements enhance communication richness, such as interactive live chats, pictures of the person in charge of the office, or “behind-the-scenes” videos. Other reliability cues might include giving users increased control over the service or establishing customizable account settings for saving and sharing personal data. Communication must stress the real benefits of e-government, focusing on its efficiency and reliability rather than forcing citizens to move online. A mandate may work among time-conscious citizens, but it is ill-advised, considering the likely diversity of a target citizenry.

8.2. Limitations and further research

As is every study, ours is bound by certain limitations that also provide fertile grounds for further research. First, we included the most salient antecedents of trust in e-services, but additional drivers might be identified. In particular, there could be more entities toward which trust can be developed. It also would be interesting to consider other external variables that may affect citizens’ trust in public e-services, including previous experiences with comparable e-services or the user’s own individual characteristics [65]. Managers could adopt group-specific actions to create trust, if they can understand how personal traits and experience affect trust creation and transfer in ongoing relations.

Second, our analyses are based on a sample of users of Spanish public e-services, comparable to online users in Europe. Still, generalizing these results to other countries requires caution, because of the different governmental structures and political systems in other countries. In addition, cultural values and social norms guide people’s beliefs and behaviors [44], so people from different countries likely build trust perceptions differently [4]. In Hofstede’s [44] taxonomy for example, higher power distance cultures tend to obey governmental regulations and procedures [4]. Spain’s power distance rating is 2% higher than the world average, so our sample may be representative of the relevance of trust transfer in e-government evaluations. However, people in cultures characterized by a higher uncertainty avoidance are more concerned about risks and desire higher levels of trust [4], and here, Spain’s level of uncertainty avoidance is 22% higher than the world average [45]. Thus, Spanish citizens may be more sensitive to public e-services’ trust perceptions. Further research is needed to compare the results of the trust transfer model across countries and cultures [69].

9. Conclusion

In modern society, where services have become increasingly electronic in nature, trust influences users’ intentions to continue using e-services. Our research has clarified which trust elements participate in citizens’ assessments of the public e-service system, their interrelations, and how they influence continued usage intentions. We found a trust transfer process, by which trust in public administrations and trust in the Internet relate to trust in the public e-service. Feelings of trust also created by interpersonal and public administration recommendations, and e-service quality. We encourage researchers to continue advancing the understanding of citizens’ relation with complex social-technological systems.

Acknowledgements

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Appendix A. Research Constructs and Items

E-S-QUAL

a. *Efficiency* (adapted from Parasuraman et al. [76])

This e-service

EFF1. ...makes it easy to find what I need.

EFF2. ...is well organized.

EFF3. ...is simple to use.

b. *Privacy* (adapted from Parasuraman et al. [76], Kim et al. [52])

PRIV1. I feel my privacy is protected on this website.

PRIV2. This e-service does not share my personal information with other sites.

PRIV3. This e-service protects my information against other uses.

c. *Fulfillment* (adapted from Parasuraman et al. [76])

This e-service

FUL1. ...is truthful about its offerings.

FUL2. ...delivers results as promised.

FUL3. ... works according to my orders.

FUL4. ...makes accurate promises about transactions.

d. *System availability* (adapted from Parasuraman et al. [76], Taylor and Todd [93])

SYS1. This e-service launches and runs right away.

SYS2. This e-service is available whenever I need it.

SYS3. The e-services technology is compatible with the software I use.

Public administration recommendations (adapted from Bhattacharjee [13], Yoo et al. [104])

The public administration

PAR1. ...communicates its readiness for public e-services frequently.

PAR2. ...communicates a positive feeling about using public e-services.

PAR3. ...recommends the use of public e-services.

Interpersonal recommendations (adapted from Bhattacharjee [13], Taylor and Todd [93])

IR1. My family recommends the use of public e-services to me.

IR2. My colleagues recommend the use of public e-services to me.

IR3. My friends recommend the use of public e-services to me.

Trust in the public administration (adapted from Carter and Bélanger [17], Lee and Turban [58])

TPA1. I trust the public administration.

TPA2. The public administration is a reliable organization to carry out transactions.

TPA3. When making transactions the public administration is trustworthy.

Trust in the Internet (adapted from Lee and Turban [58], Connolly and Bannister [21])

TI1. I trust the Internet.

TI2. The Internet is a reliable mean to carry out transactions.

TI3. When making transactions the Internet is trustworthy.

Trust in the public e-service (adapted from Lee and Turban [58], Wu and Chen [103], Hung et al. [46])

TS1. I trust this e-service.

TS2. This e-service is a reliable mean to carry out transactions.

TS3. When making transactions this e-service is trustworthy.

Continuance intention (adapted from Bhattacharjee [14], Chiu and Wang [25])

When I need it again

CI1. ...I intend to continue using this e-service rather than discontinue its use.

CI2. ...my intentions are to continue using this e-service than use any alternative means.

CI3. ...I prefer to use this e-service again.

Perceived usefulness (adapted from Taylor and Todd [93], Bhattacharjee [14])

Using this e-service

PU1. ...is useful for me.

PU3. ...is advantageous for me.

PU2. ...improves my performance.

Satisfaction (adapted from Van Dolen et al. [98], Guinalíu [41])

SAT1. Overall, I am satisfied with this e-service.

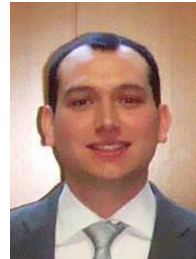
SAT2. I think using this e-service was a good decision.

SAT3. My experience with this e-service was satisfactory.

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