A model to measure the perceived quality of service in e-government

Guillaume Gronier, Mathieu Lambert
Public Research Centre Henri Tudor, Luxembourg-Kirchberg, Luxembourg.
guillaume.gronier@tudor.lu
mathieu.lambert@tudor.lu

Abstract: In this paper, we propose to study the perceived quality of e-services, attempting to combine the approaches from the quality of services and from theories of the technological acceptance and digital trust. So, our proposed model integrates these various dimensions from a review of literature. From this review, we extracted the most relevant criteria to measure the perceived quality. Furthermore, each of these three facets (quality, acceptance, digital trust) is positioned towards three main elements which compose the interaction between the citizen and the e-service: service, interface and user.
The model proposed in this paper is the first step of a methodology to guarantee the best quality of the service in e-government websites, with the aim to encourage their appropriation. A second step will be intended to validate the model, from a statistical analysis, as well as by conversations and focus groups with an e-citizen's panel.

Keywords: perceived quality; e-services; e-government; acceptance; trust; usability.

1. Introduction

The deployment of efficient on-line administrative services (administrative e-services) is an important stake for many public organizations all around the world (Lu, Bai & Zhang, 2007). For a few years, it has been possible for numerous administrative procedures to be performed remotely over the Internet. The benefits can be considerable for governments that want to increase their efficiency to complete processes as well as for citizens that can interact with public administrations more easily and comfortably. For example, e-services enable people with disabilities and people living in rural areas to improve their living conditions by enhancing access to information and services.
Based on the increase of information and communication technologies, the Commission of European Communities (2006) proposed a broad development plan for e-government whose multiple objectives were set for 2010. One of these goals directly affects users. Thus, the report notes that "all citizens, including socially disadvantaged groups, become major beneficiaries of eGovernment, and European public administrations deliver public information and services that are more easily accessible and increasingly trusted by the public, through innovative use of ICT, increasing awareness of the benefits of eGovernment and improved skills and support for all users".
Therefore, since both governments and citizens have a shared interest in e-services, it is important to ensure that the services provided meet the needs of citizens with maximum efficiency and satisfaction. In other words, the issue of e-services appropriation seems fundamental. By appropriation, we mean "the process by which people incorporate advanced technologies into their (work) practices" (DeSanctis & Poole, 1994). It is the reason why many authors, in different research fields, are interested in the quality of e-government services.
In this paper, we propose to study the perceived quality of e-services, combining quality of service approaches and the theories of technological acceptance and digital trust. So, we present a model which integrates these various dimensions from a wide review of literature.

2. How to measure the perceived quality of e-service?

The perceived quality joins together several concepts from management science, social and human science and computer science. We believe these concepts can be articulated around 3 paradigms associated with the interface quality (Law, Hvannberg and Cockton, 2008). This is not to focus solely on the quality of service, often considered as the panel of services offered to users. It is also to take into account 1. trust of the site with which the user interacts; 2. acceptance of the service. Thus, we propose in the next section to describe more precisely each of these paradigms.

2.1 the paradigms of e-services appropriation

2.1.1 The quality of service

The quality of service is an important element in marketing and customer satisfaction. Applied to e-government, quality guarantees that citizens can find the online services they need and will use them with great satisfaction and efficiency.

Many models to measure the quality of service are offered. The first model, SERVQUAL (Parasuraman, Zeithaml and Berry, 1985), relies on a framework of analysis of five dimensions: tangibles, responsiveness, reliability, assurance and empathy. Sometimes adapted to online services to take account of the user interface (van Riel, Semeijn and Janssen, 2003), the model SERVQUAL has largely been revised to better reflect the quality of e-services. The model E-S-Qual (Boshoff, 2007; Parasuraman, Zeithami and Malhotra, 2005) includes dimensions related to technical performance (system availability, speed) or to interface usability, from the standard ISO 9241-11 (efficiency). Other models also include usability as a necessary dimension to ensure the quality of e-services, like Webqual (Barnes and Vidgen, 2002), eQual (Barnes and Vidgen, 2006) or QES (Fassnacht and Koese, 2006).
The models of quality e-services do not measure user satisfaction or interface usability with e-government sites. Several authors underline that usability is too often neglected in the design and evaluation of e-services (Corradini, Polzonetti, Re and Tesei, 2008).

2.1.3 Digital trust
Trust is a central element in the perceived quality of e-services. McKnight, Choudhury et Kacmar (2002) showed that consumers' trust in service influenced intentions of electronic transactions. The trust depends on a combination of factors such as degree of usability, application of standards, reputation, or a user's past experience with e-services.
The concept of digital trust, adapted to Gambetta's definition (1999), can be trust in interactions that take place in an environment where human actors and/or technological elements are involved. It is the case for the e-services.

2.1.4 Acceptance
Acceptance refers to the attitude and intention to implement a usage behavior about a technology. First modeled by Davis, Bagozzi et Warshaw (1989) with the Theory Acceptance Model (TAM), model of technology acceptance has been enriched by other factors to better meet the needs of end users (Wu, Chen & Lin, 2007). Therefore, acceptance is influenced by the trust of e-services and perceived usefulness. Horst, Kuttschreuter and Gutteling (2007) thus propose a model that incorporates the dimensions of the technological acceptance and trust for the adoption of e-government services. Their model is based on perception, trust and risk attributed to e-services and e-government.

3. A proposed model of perceived quality

3.1 An integrative approach
We can pinpoint three approaches: one centered on the service (quality of the information, privacy, reliability, etc.), and another centered on the user (acceptance, trust, etc.), and the third centered on the interface (usability, accessibility, etc.).
On one hand, the approach centered on the service has already been the subject of many studies and developments of models (Barnes & Vidgen, 2006). But as pointed out by some authors (Halaris, Magoutas, Papadomichelaki, & Mentzas, 2007), these models do not take enough into account the elements that facilitate acceptance and trust in on-line services, or the usability of the human-computer interface. On the other hand, research that deals with the acceptance or trust in e-services does not integrate quality criteria (Horst, Kuttschreuter, & Gutteling, 2007).
Consequently, we propose to study the perceived quality of e-services, combining quality of service approaches with theories of technological acceptance and digital trust. Each of these three facets (quality, acceptance, digital trust) is positioned towards the three main elements which compose the interaction between the citizen and the e-service: service, interface and user.

3.1.1 Quality of service
Identified in the model SERVQUAL (Parasurama, Zeithaml and Berry, 1988), the user's needs play an important motivational role in the interaction that citizen service, and influences the perceived usefulness of the service.
Interface usability is defined as the "Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11). It refers more generally to ergonomics e-services and ease of use. It influences satisfaction and the perceived ease of use. The accessibility, link to the usability, especially to information and communication technologies, is very important. Jaeger (2004) underlines that an information technology system is accessible to people with disabilities if it can be used in a variety of ways that do not depend on a single sense or ability. Thus, accessibility includes compatibility with the

range of assistive technologies that people might use. An important effort must be deployed to ensure usability and accessibility. Bertot and Jaeger (2006) underline that electronic public services still lack a user-centric approach.
Concerning e-services, service offers, identical or complementary administrative services available over the counter, directly influence the perceived usefulness of the expected service. They link with the personal needs.

3.1.2 Digital trust
Concerning the user, the perceived risk is "commonly thought of as felt uncertainty regarding possible negative consequences of using a product or service" (Featherman and Pavlou, 2003). The perceived risk enters the information systems adoption decision when circumstances of the decision create feelings of uncertainty, discomfort and/or anxiety, conflict aroused in the consumer, concern, psychological discomfort, making the consumer feel uncertain, pain due to anxiety, and cognitive dissonance. It will be an important part of digital trust, and will influence the e-service appropriation. The impact of the privacy was studied by Bélanger, Hiller and Smith (2002). The authors have shown that privacy had a vital role in trade over the Internet, and represented an important role in the trust accorded to the online service. Privacy issues on the Internet include 'spam', usage tracking and data collection, choice, and the sharing of information with third parties.
Concerning the interface, it was been show that information security management requires standards. This has been illustrated by existing standards that are aimed at promoting information security. An argument that is found in literature is that standards serve as a guideline to organizations in establishing an information security policy and in incorporating it in their strategy (Höne and Eloff, 2002). Standards and security have an impact on the perceived risk, the privacy and the e-service reputation.
Concerning the e-services, reputation is often considered to be an element which influences trust of the website (Bélanger, Hiller and Smith, 2002). It influences the expected service and the perceived risk.

3.1.3 Acceptance
Concerning the user, acceptance is characterized by satisfaction, appropriation and expected service. Satisfaction, which is one of the elements of usability, is a central component of the acceptance of a technology. The Australian Government organizes a regular national survey on user satisfaction with e-services. A 2008 report shows an "overall satisfaction with an outcome when dealing with government is high. The majority (87%) of people are satisfied, a rating consistent with previous studies". Appropriation is understood as the cognitive mechanisms, organizational and social factors that lead the user to adopt an e-service through a spontaneous response and routine. In other words, there is a mechanism for acceptance to be stabilized. As shown Verdegem and Verleye (2009), appropriation and satisfaction are both linked. The expected service influences the user's expectations for the e-service. These expectations will be influenced by service offers, reputation and personal needs.
Concerning interface, we borrow from the model TAM the factors of perceived usefulness and perceived ease of use (David, Bagozzi and Warshaw, 1989). These factors have a direct impact on the appropriation of technologies and satisfaction. The perceived usefulness is the degree to which a person believes that using a system will meet their personal needs. The perceived usefulness depends on the services offered and the usability of the online service. It in turn affects the appropriation of this service.
Concerning e-services, the past experiences will influence reputation and perceived usefulness. They are all repetitions of interaction (Riegelsberger, Sasse and McCarthy, 2005) between the user and e-services, also contribute to the trust between citizen and service online. They also give the user an indication of the usefulness (perceived) of the service offered.

3.2 In summary
For each element that composes our model grid, we can identify one or more criteria that will allow us to analyze the perceived quality of e-services. Each criterion in turn influences one or several other criteria. These relationships are symbolized by arrows, shown in Figure 1.

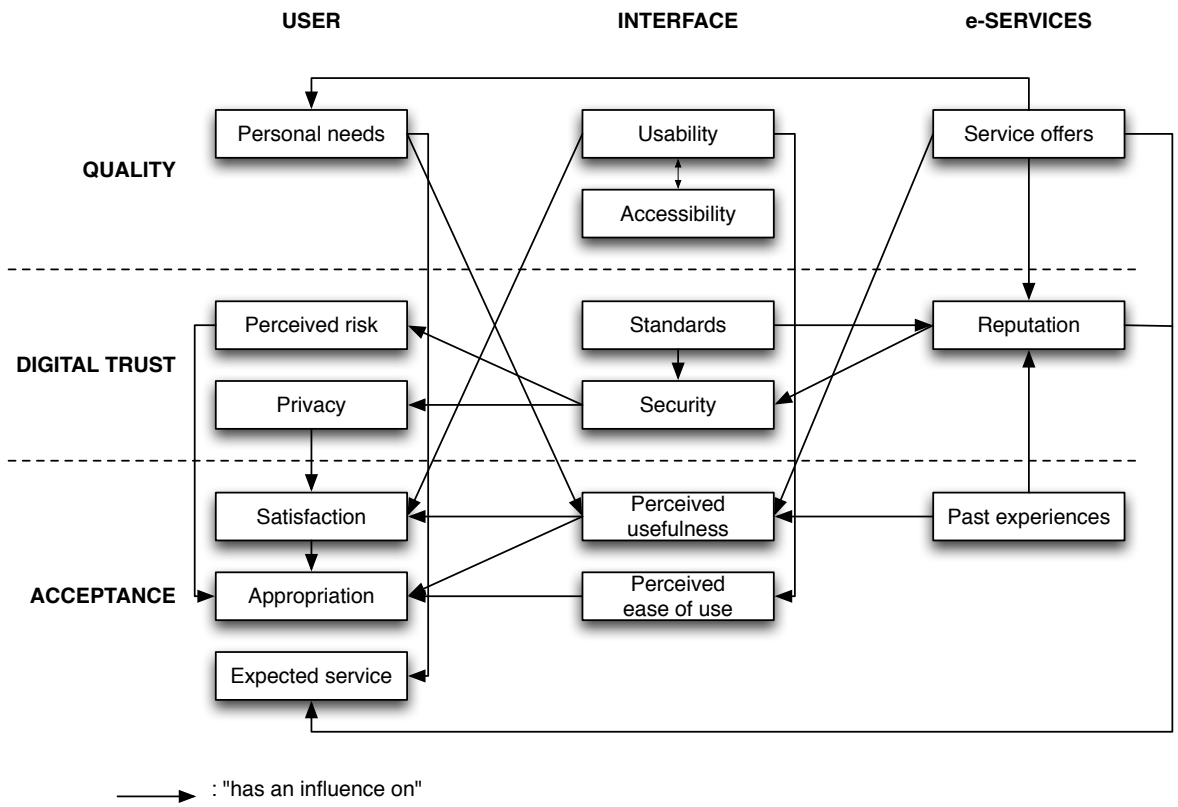

Figure 1: presentation of the model to measure the perceived quality of e-services.

3.3 Perspective for a methodology of validation

After defining this model, our objective is to validate it with a two-step method.

The first step is to design a questionnaire that will take all factors contributing to the perceived quality of e-Services. This questionnaire will gauge respondents' perceptions toward services we have previously identified. The analysis of this questionnaire will be used to identify two user profiles: users who perceived quality to be very high; users who perceived quality to be very low.

The second step of our methodology is to define criteria to improve the quality of e-Service to enhance its perceived quality. This will be conducted using focus groups and user testing to gather the specific interaction of the two groups of users with the system.

The results of this methodology will allow us to propose recommendations for online services Luxembourg government, and more broadly European.

4. Conclusion

Starting from a need identified through a strategic program conducted by the Public Research Center Henri Tudor, the research described in this communication is to define a framework for analysis of the perceived quality of e-Services. Proposed as a model, covering 15 factors that help measure the quality perceived by users of an e-service, our research builds on a review of the literature from the fields of psychology, ergonomics, computer science, management sciences and social sciences. The validation of this model is the next objective of this research, identifying the weight of the influences that various factors bind to each other using an appropriate statistical treatment.

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