Recommendation quality, transparency, and website quality for trust-building in recommendation agents

Mehrbakhsh Nilashi [a,c,*], Dietmar Jannach [b], Othman bin Ibrahim [a], Mohammad Dalvi Esfahani [a], Hossein Ahmadi [a]

[a] Faculty of Computing, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia
[b] TU Dortmund, 44221 Dortmund, Germany
[c] Department of Computer Engineering, Lahijan Branch, Islamic Azad University, Lahijan, Iran

ABSTRACT

Trust is a main success factor for automated recommendation agents on e-commerce sites. Various aspects can contribute to the development of trust toward such an agent, including perceptions about the usefulness of the recommendations, the transparency of the recommendation process, and the general quality of the website. These factors have been analyzed in isolation in the literature though. We propose and evaluate a new trust model that integrates these factors, and allows us to assess their relative importance for trust-building. We conducted empirical studies in the context of two popular e-commerce websites. The findings suggest that transparency is equally important to consumers for building trust as recommendation quality, and that general we site quality contributes to the development of trust. The findings indicate that focusing on recommendation quality may be insufficient and higher levels of adoption of the recommendations can be achieved when several trust-building factors are considered.

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1. Introduction

Automated recommendations have become a ubiquitous part of our online user experience and many modern e-commerce providers employ recommendation agents on their websites. The task of such agents is to point consumers to additional items of interest in the catalog, either based on their current activity or based on their long term preference profile. Several works in the literature show that recommendation agents have a measurable impact on the consumers' purchase behavior and can also improve their decision-making processes (Aksoy et al., 2006; Gomez-Uribe and Hunt, 2015; Häubl and Murray, 2006; Häubl and Trifts, 2000; Xiao and Benbasat, 2007).

Several studies in real-world environments provide evidence that recommendation agents can drive the short-term behavior of their customers (Dias et al., 2008; Garcin et al., 2014; Jannach and Hegelich, 2009; Zanker et al., 2006). Providers are typically interested in the long-term success of their websites and the embedded recommendation agents though. Whether consumers adopt the recommendations in the long run depends on their trust in the recommendation agent (Grabner-Kräuter and Kaluscha, 2003), which can be developed by repeated positive experiences.

A key prerequisite for such positive experiences and, consequently, trust is that the recommendation agent is continuously able to generate useful recommendations that help the consumers make better decisions or find better suited items in the catalog. Improving the quality of the recommendations in different dimensions is therefore a major focus in the academic literature on recommender systems (Jannach et al., 2012). In addition to the capability of an agent to select presumably relevant items for a consumer, the perceived transparency of the recommendation process is often considered a key factor for the establishment of trust toward the recommendation agent (Gedikli et al., 2014; Sinha and Swearingen, 2002; Tintarev and Masthoff, 2007b). Transparency means that the recommendation agent is capable of conveying to the user – for example with the help of system-generated explanations – why certain items were recommended.

Looking beyond trust-related aspects of recommendation agents, the topic of trust in e-commerce has been extensively discussed in the research literature, and trust is often considered as a key enabler for the success of e-commerce in general (Adamopoulou and Symeonidis, 2014; Gefen, 2000; Grabner-Kräuter and Kaluscha, 2003; Jarvenpaa et al., 1999; Moody et al., 2014). In the e-commerce settings considered in this paper, the online shop is often the only way in which a company communicates with its customers (Chang and Chen, 2008), and one common assumption in this stream of research is that Internet users at least

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* Corresponding author.
  E-mail address: nilashidotnet@hotmail.com (M. Nilashi).

partially rely on website attributes like information quality, interaction quality, or performance to judge the trustworthiness of the site. Since recommendation agents are typically part of the web shop, we can conjecture that such website quality attributes may also affect to what extent consumers trust the embedded agent. Overall, a number of aspects can contribute to the development of trust toward a recommendation agent (Wang and Benbasat, 2008). A number of previous studies focused on the understanding of individual components of trust-establishment. Pu and Chen (2006, 2007) and Zanker (2012), for example, focus mainly on the role of explanations as a mechanism for trust development. Komiak and Benbasat (2006) on the other hand found that personalization positively affects the trust toward the agent.

Continuing these lines of research on trust-promoting factors, the goal of our work is to investigate and quantify the relative importance of the different factors. Our general research question is: What is the relative importance of general website quality, recommendation quality, and transparency as trust-building factors for recommendation agents in e-commerce?

To answer this question, we developed a layered trust model that considers the following: recommendation quality, transparency of the recommendation process, and general website quality. The trust-promoting factors recommendation quality and website quality are furthermore decomposed into components in the layered model, which allows us to obtain a better understanding of the role of their constituent factors. Since from a provider's perspective trust is not the ultimate variable of interest, our trust model, unlike for example the one proposed in (Wang and Benbasat, 2008), includes the analysis of the impact of trust on the user's behavioral intentions, which is in our case their intention to adopt the recommendations made by an agent.

Overall, the novelty of our model lies in its comprehensive nature, layered design that allows us to assess the relative importance of the factors, and the consideration of website quality as a trust-building factor, which has not been investigated in combination with the other aspects. In contrast to previous works (Baier and Stüber, 2010; Pu and Chen, 2006; Wang and Benbasat, 2008), which base their empirical evaluations on websites that were only created for the purpose of the studies, we conducted our analyses with two real e-commerce websites.

As a practical outcome, our findings should help the providers of recommendation services make better-informed decisions about which aspects they should put particular focus on when trying to improve the adoption of the recommendation agent.

2. Theoretical background

Our proposed trust model combines existing insights related to general trust-promoting factors in e-commerce as well as specific trust-building factors for recommendation agents.

2.1. Trust in e-commerce systems and the WebQual model

We first briefly review the literature on the general role of trust in e-commerce settings and elaborate on the WebQual model, which serves as a basis for the development of the website quality aspect of our integrated trust model.

2.1.1. The role of trust in e-commerce

The question of which factors help to promote the consumers' trust toward online stores or e-commerce websites has been extensively covered in the fields of information systems (IS), marketing, and e-commerce. One frequently cited definition of trust in various contexts is the "willingness to be vulnerable," proposed by Mayer et al. (1995). Chopra and Wallace (2003) define trust in the

e-commerce environment as the willingness to rely on a specific other, based on the confidence that one's trust will lead to positive outcomes. For Lim et al. (2006), consumer trust in online shopping is defined as the willingness of a consumer to be exposed to the possibility of loss during an Internet shopping transaction. This trust is based on the expectation that the merchant will engage in generally-acceptable practices, and will be able to deliver the promised products or services.[1]

As the definitions indicate, consumer trust is a precursor of behavioral intentions (Gefen et al., 2003; Pu et al., 2011), referred to as "trusting intentions" (McKnight et al., 1998). Different empirical studies have shown that trust in an e-commerce website can help to increase the customers' intention to purchase products from it (Corbitt et al., 2003).

A number of trust-promoting factors and their impact on consumer behavior intentions have been explored, including for example, the perceived level of privacy and security (Pavlou and Chellappa, 2001), organizational reputation, relative advantage and perceived risk (de Ruyter et al., 2001). The relation between the perceived size and perceived reputation of an Internet store and its impact on trust was discussed in Jarvenpaa et al. (1999). Karimov et al. (2011) focused on establishing trust. Their review provides ample support that website design is important for developing trust in unfamiliar online vendors and emphasizes the potential value of recommendation agents.

The effects of visitors' experiences with a user interface on trust formation have also been investigated (Koufaris and Hampton-Sosa (2002). In their work, a trust model was established and evaluated which showed that usefulness and perceived ease of use of the website are positively associated with consumer trust in the online company and the customers' intentions to purchase and intentions to return. The role of a website's appeal and usability on trust was further explored (Hampton-Sosa and Koufaris, 2005). And finally, a model was proposed that included a familiarity and trust aspect of e-commerce adoption (Gefen et al., 2003). The related analysis showed that purchase intentions of repeated buyers were influenced by the customer's trust in the e-vendor and the perceived usefulness of the website.

2.1.2. The WebQual model

Since the importance of website quality is a general trust-promoting factor, a methodology is needed to measure it. We rely on the WebQual model (Barnes and Vidgen, 2002, 2003), which was s designed to evaluate and operationalize this measurement. WebQual numerically captures the quality of a website but is based on subjective quality impressions. So it is suitable for our research, which is also based on subjective quality perceptions.

With WebQual, the quality of a website can be expressed in terms of numerical quality indicators in different dimensions with the help of a questionnaire. The relevant dimensions are related: (1) information quality as a core area of IS research; (2) interaction and service quality from marketing, e-commerce, and IS service quality research; and (3) usability aspects from the field of Human Computer Interaction. The three major dimensions of e-commerce website quality according to the WebQual 4.0 model are usability, information quality, and service interaction quality.

For each of the dimensions, Barnes and Vidgen (2002) propose a number of questionnaire items (e.g., "I find the site easy to navigate" for the usability dimension). In our work, we adopt the quality factors and the related questionnaire items of the established WebQual model to assess the perceived quality of the website. In our case, we are not interested in the absolute

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[1] A detailed review of the characteristics of digital trust, the factors that influence trust, and approaches to trust modeling and management can be found in Yan and Holtmanns (2007).