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The role of Security, Design and Content factors on customer trust in mobile commerce

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ABSTRACT

Building customer trust is a complex process that involves business and technology practices. Gaining customer trust in mobile commerce is a particular daunting task and plays a major influence on a customer's decision making behavior. A trusted website can provide mobile commerce with powerful competitive advantages. Various factors influence the complex process of engendering customer trust in mobile commerce websites. Evaluating those factors is important in decision making of selecting appropriate online shopping website. This study focuses on Security, Design and Content factors that influence the customers' trust in mobile commerce websites. The objectives of this paper are to reveal the real importance level of trust factors on customers' trust and decision making in selecting the appropriate trusted website. To achieve the objectives of this study, Analytic Network Process (ANP) from the Multi-Criteria Decision Making (MCDM) approaches and fuzzy logic from Artificial Intelligence (AI) approaches are used. By considering interrelationships among the trust factors, ANP is employed for selecting the appropriate website for mobile commerce. Then, using fuzzy set theory, a Fuzzy Inferences System (FIS) is developed for revealing the real importance level of factors. The outcome of the proposed decision-making system helps shopping websites managers and service providers to ascertain the trust level of their websites and adequately allow them to improve the website quality.

1. Introduction

Trust in online environment has been found as an important research topic as it plays a significant role in decision making for online transactions (Pavlou, 2003; Gefen et al., 2003; Corbit et al., 2003). It is a foundation of commerce where carrying on commerce with suppliers involves customers in a high uncertain situation that can effect on their decision in making transaction (Gefen and Heart, 2006). For vendors in online business, the conception of providing trust in online business to guarantee customer confidence, that leads to loyalty and long-term relationships between them, has been acknowledged, researched and practiced (Jarvenpaa et al., 2000).

Nowadays, mobile commerce has obtained consideration because of its potential to address the success of electronic commerce (Barnes, 2002; Büyüközkan, 2009; Chong et al., 2012; de Reuver et al., 2009; Deitel et al., 2002; Kourouthanassis and Giaglis, 2012). Accretion of consumers daily in using mobile phones to engage in business activities has caused that providing trust for users in the mobile commerce become equally important in relation to the other online business. Despite the popularity and potentials of mobile commerce, real mobile commerce activities in many developing countries remain low due to the users concern about trust issues (Chong et al., 2011). One of the main reasons for low intention is uncertainty that leads to lack of trust that has been challenged and surveyed by the network capabilities (Siau and Shen, 2003) and interface design (Lee and Benbasat, 2003). Gaining customer trust in mobile commerce; which uses wireless devices to conduct business transactions over the web-based e-commerce system is a particularly daunting task because of its unique features (Kim and Prabhakar, 2000). Such these factors make constraints for customers when making business transactions and consequently put mobile vendors in an unfavorable position. For that reason many companies are creating mobile programs, applications and websites with useful facilities to be more suitable and user friendly for mobile devices.

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In the face of the exclusive advantages of mobile services, solving trust issues is a main concern in the mobile commerce implementation. From the vendors' side, providing trust for customers is complex process and its achievement is relatively difficult. One of the main and important steps for gaining customer trust and attracting them to mobile commerce is providing trust in mobile software and websites for making transaction. Trust over the mobile platforms is more critical due to the open nature of wireless networks. This was a challenge among researchers to conduct models, framework and studies about mobile commerce, trust in mobile commerce and customer issues in this type of business technology (Siau et al., 2001; Siau and Shen, 2003). Siau and Shen (2003) and Van der Heijden et al. (2003) highlighted that an electronic commerce websites with a greater level of trust usually gains tractions with a higher retention rate of consumer and higher degree of purchase intentions. Those are results based on the high level of trust which eliminates the perceived risk as well as uncertainty which generally smoothes transactions. Koufaris and Hampton-Sosa (2004) stated that one of the key elements for gaining initial trust is understanding customer perception about electronic commerce websites.

Providing initial trust in well-designed websites leads to gaining trust from mobile customers. A variety of mobile topics in prior studies have been examined that include the impact of interface design for building trust in mobile commerce (Lee and Benbasat, 2003; Siau et al., 2003) and factors distressing the mobile commerce implementation (Yang, 2005). In design, esthetics elements take account of color, photographs, layout and font style. In gaining trust, Karvonen (2000) highlighted visual esthetics or website's design esthetics should be applied in making relationship with consumer. Tractinsky (2004) viewed that design esthetics impinge on superficial effectiveness and effortlessness of website application.

1.1. The objectives and contributions

Determining the most significant factors of customer' trust in mobile commerce and revealing the real importance level of them are crucial tasks. This assists firms to focus on quality factors and elements with the highest weight to determine the appropriate and best policy for improving websites with high quality and effectiveness for mobile commerce. In this respect, in this study, evaluating the relative importance of effective factors for evaluating the mobile commerce websites is taken into account as a multiple-criteria decision-making problem. The questions that have been raised for this study are: (a) What are the important factors that affect customer trust in mobile commerce website? (b) What Multi-Criteria Decision-Making (MCDM) model is suitable to weight and prioritize the factors in selecting appropriate website for mobile commerce form experts' viewpoint? and (c) How to reveal the real level of importance of trust factors of mobile commerce website from the customers' perceptions?

To answer these questions, after investigating possible factors influencing customer trust in mobile commerce website, two effective methods, ANP from the MCDM approaches and fuzzy logic from Artificial Intelligence (AI) approaches, were used in decision making of selecting the appropriates website for mobile commerce, ranking and revealing the real importance level of factors that influence the customers' trust in mobile commerce websites. Analytic Network Process (ANP) is a powerful Multiple Criteria Decision Making (MCDM) method for solving multiple-criteria decision-making problems (Yang and Chang, 2012). In ANP, preferences can be specified by decision maker in the form of natural expression judgment to quantify the importance of each factor (Saaty, 1980). This indicates that human judgment (customers and sellers) on the importance of criteria (e.g. Security, Design, Content) or alternatives (e.g. websites) is always imprecise and subjective. ANP method is adopted in order to determine the relative importance of the trust factors by considering interdependencies strength among them and used to identify how the critical factors are weighted and prioritized by the experts. Therefore, whilst the other multi-criteria methods such as Analytical Hierarchy Process (AHP) structures the problem as a hierarchy, the ANP structures it as a network where the goal, criteria (and where applicable sub-criteria) and alternatives are nodes on the network. In this manner, ANP allows for feedback connections and loops within and between nodes to illustrate interdependence. The ANP builds upon the pairwise comparisons of the AHP where criteria are pairwise compared with respect to each alternative, and includes a further set of comparisons where alternatives are compared with respect to each criterion.

Fuzzy logic has been developed to handle mathematically the vagueness of human linguistics and thinking. In addition, fuzzy logic and fuzzy set is more appropriate in human linguistic reasoning with imprecise concepts in relation to the crisp approaches. And, linguistic terms are more suitable than numerical values in assessing qualitative information, which is usually related to the human perceptions, opinions and tastes. Hence, for revealing the actual importance level of trust factors, it is more appropriate that the linguistic terms be considered for users to express their preferences, knowledge and personal judgments. From this perspective, we can define users' degrees of perception regarding trust to a particular mobile commerce website in a set of linguistic terms such as {Low Trust}, {Moderate Trust} or {High Trust}. The fuzzy rule-based model in this paper involves inference blocks that apply relevant fuzzy rules for depicting actual importance level of trust factors. In overall, in this study, we attempt to highlight the potential and significant factors that can help mobile commerce websites designers based on experts' viewpoint and customers' preferences. This study therefore offers an insight into mobile-commerce through the websites assist vendors to ascertain the customer trust level for their websites based on the user's perceptions, and adequately allow them to improve the website quality if needed.

Therefore, the main objectives of this research are:

i. Revealing the real level of effectiveness of explored factors on trust based on customers' perceptions.
ii. Developing an ANP-fuzzy logic based model for multi-criteria decision-making in selecting appropriate website for mobile commerce based on experts' viewpoint and ranking the effective trust factors.
iii. Dealing with uncertain and vague decision process and uncovering the hidden relationship between factors that influence on customers' trust in the mobile commerce websites.

In addition, the main contributions in this study are summarized as following:

I. This study incorporates complex multi-criteria decision-making problem in evaluating of trust in mobile commerce websites that rarely have been explored and touched in the prior researches. In addition, literature review is conducted and then factor analysis is used to construct a hierarchical structure for trust, which includes 12 sub-factors along with three main factors, Content, Security, and Design. According to the identified criteria and sub-criteria and by considering interrelationships among them, ANP is employed for determining critical factors influence the customers' trust and selecting the appropriate website.
II. The clustering method is performed for clustering the customers' preferences (obtained by surveys) for discovering the