Chapter 34
A Novel Fuzzy Integrated Customer Needs Prioritization Software Tool for Effective Design of Online Shopping Websites

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ABSTRACT

Albeit, online shopping has grown much recently, users' rate of satisfaction has declined due to the ineffective design of online shopping websites. Thus, the companies involved are craving for well-designed websites. Effective website design involves decision making and thus this paper considers Quality Function Deployment (QFD) as it is a strong decision-making tool. However, QFD uses crisp scoring approach that generates uncertainty and vagueness resulting in impreciseness and inconsistency in results. The issue can be addressed using fuzzy integration. QFD involves prioritization of Customer Needs (CNs) and Technical Requirements (TRs). However, the paper focuses on only CNs prioritization. Also, the existing software's lack the indispensable fuzzy support feature to handle the uncertainty and vagueness. Thus, the paper presents a novel fuzzy integrated customer needs prioritization software tool. The tool is built using Visual Basic Dot Net (VB.Net) and MS-Access. A real-life example is presented to demonstrate the viability of the software tool.

INTRODUCTION

The popularization and rapid development of the Internet has made online shopping emerged as hot area amongst customers with more number of customers now opting for online shopping (Kuo & Chen, 2011). As a result, there has been explosive growth in the use of online shopping. Although online shopping has become a growing new trend, the satisfaction rate of users has descended due to poor design of websites (Kuo, 2006). The website design has come out as major driving force behind the success of online shopping websites (Sharma & Khandait, 2015). A well-designed website helps strengthen the firm's brand equity, while a badly designed website can diminish the established brand equity. Moreover, an effective web design increases perceived trust of customers (Johnson & Griffith, 2002). Thus, businesses engrossed in online shopping are paying serious attention to effective design of shopping websites. Effective website design involves decision making at several stages of the process. This paper considers Quality Function Deployment (QFD) approach as it greatly assists designers and engineers in efficiently carrying out design decisions. QFD provides a way to translate conceptual requirements into items that are workable, measurable and capable of design enhancement resulting in better design, shorter product development cycles, better product quality and lower costs (Lin, Tsai, Cheng & Chang, 2004). In QFD, an effective prioritization leads to better results and hence to successful design and development. Two of the main areas, which call for prioritization in QFD, are Customer Needs (CNs) and Technical Requirements (TRs). However, this paper only considers CNs prioritization.

In QFD, the design team has to create, improvise, innovate or improve a product by integrating the CNs into a product. As it is not possible to go by all CNs because of the time, money and efforts constraints, the design team needs to make trade-offs while picking the CNs on the basis of order of their raw weights and ranking to achieve more customer satisfaction (Sharma & Rawani, 2007). Also, the conventional QFD uses linguistic expressions e.g. 'weak', 'average' and 'strong' generating ambiguity. Computing these ambiguities is a key issue. These linguistic terms are then scaled into crisp values (e.g. 1-3) for the ranking of each alternative. This crisp assessment poses difficulty in coping with uncertainty among design team members (Masud & Dean, 1993). Although the quality can be greatly improved through a QFD, the conventional crisp scoring approach has a major drawback. A wrong conclusion can be easily produced since the fuzzy nature of linguistic relationship terms from evaluation members is ignored (Lin, Tsai, Cheng & Chang, 2004). The issue can be resolved by handling the uncertainty and vagueness involved in the process. This can be accomplished using fuzzy integration with QFD. The fuzzy concepts have been successfully applied in decision making problems. (Pattnaik, 2015) has applied decision making approach to fuzzy linear programming problems with post optimal analysis. (Singh, Chauhan & Singh, 2015) presented an application in tourism industry using multi criteria futuristic fuzzy decision hierarchy in swot analysis. (Rabbani, Mamaghani, Farshbaf-Geranmayeh & Mirzayi, 2016) presented a novel mixed integer programming formulation for selecting the best renewable energies to invest, using a fuzzy goal programming approach. The fuzzy set theory is a useful tool for solving problems where the descriptions of objects are subjective, vague and imprecise.

The available softwares' may overcome the issue of prioritization of CNs but they strongly lack the much-needed fuzzy support to handle the uncertainty and vagueness and affinity support to generate CNs from the collected Customer Voices (CVs) (Sharma & Khandait, 2016). This generates a pressing need for a customized software tool to serve the purpose. To this end, the paper aims to develop a novel fuzzy integrated customer needs prioritization software tool for effective design of online shopping websites. The most integral part of QFD is House of Quality (HOQ). Over the years several HOQs have

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