Chapter 69

Integration between Mathematical Programming and Fuzzy Logic to Optimize Consumers Behavior

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ABSTRACT

The concept of utility is used as a decision tool for consumers to choose a commodity. Analyzing consumer behavior is complicated due to the qualitative nature of the utility. Hence, this paper investigates a quantitative method to evaluate the utility of consumers. The methodology is based on linguistic expressions of fuzzy logic. Initially, the authors identify different parameters being effective on utility of a consumer. Then, using fuzzy linguistic expressions the quantitative value of utility are determined. Also some statistical analyses are set to investigate the effective parameters on the utility. Consequently, the optimization is done applying mathematical nonlinear programming. Some analysis is performed as sensitivity study. A case study is conducted to verify the applicability and effectiveness of the proposed methodology.

INTRODUCTION

Goods pricing is an essential and emerging topic in the era of economy. Myriad researchers have devoted considerable attention to developing and testing methods of goods pricing. Nevertheless, in addition; there are still certain shortcomings as the challenges to be overcome. Chang and Yuan (2009) encompassed several unexplored concepts that have attracted research attention in other disciplines lately, such as collaborative prototyping, prospect theory, ERG theory, and maintenance from design, economic, psychological, and software engineering respectively. Their study presented a collaborative pricing system for goods bundles and investigates the impact of three advantages:

1. Provided a Markov-based collaborative process that could generate several prototypes via trial and error in pricing process,
2. Attempted the dual optimality of maximum consumer utility and maximum producer profit, and
3. Offered an appropriate goods service bundle by interacting with consumer by discovering the actual needs (Levy et al., 2009).

The model of online customer behavior examines the impacts of the three types of emotions (pleasure, arousal, and dominance) on perceptions of site atmospherics (informativeness, effectiveness, and entertainment) (Ozcelik, 2009). In Mazaheri et al. (2011), the associations of site atmospherics on site attitudes, site involvement, service attitudes, and purchase intentions were investigated. The model was compared between Canadian and Chinese customers cultural value dimensions. The findings supported the model and revealed several non-invariant paths between the groups. Particularly, the impact of pleasure (dominance) on the other behavioral variables was higher for Canadian (Chinese) compared to Chinese (Canadian) customers. Moreover, the impacts of low (high) task relevant cues were stronger for Chinese (Canadian) customers compared to their Canadian (Chinese) counterparts. Discussion centers on the theoretical and practical implications of the findings (Mora et al., 2009).

Developing interpersonal bonds between employees and customers in selling contexts can increase sales and positive perceptions of the employees and the store. Recent studies have found that mimicking the verbal and nonverbal behavior of strangers enhanced their liking for the individual who mimicked them, and influenced helping behavior (Parkash Bansal and Nagadevara, 2010). An experiment was carried out in a retail setting where four sales clerks were instructed to mimic, or not, some of the verbal expressions and nonverbal behavior of the customers. On their way out, these customers were asked to evaluate

the sales clerks and the store. Results showed that mimicry was associated with a higher sales rate, greater compliance to the sales clerk's suggestion during the selling process, and more positive evaluations of both the sales clerks and the store. It was found that these evaluations mediate the relationship between mimicry and customers' behavior. Experiment 2 confirmed the behavioral effect of mimicry when a baseline condition was introduced (Jacob et al., 2011).

Pit Ting Tan and Freathy (2011) examined who patronizes Traditional Chinese Medicine (TCM) halls in Singapore and for what purpose. A quantitative study of 400 respondents identified that TCMs were used primarily for the improvement of health and wellbeing rather than the treatment of more serious medical conditions. While the patronage of TCM stores was not restricted to the Chinese population, traditional Mom-and-Pop outlets have come under increasing pressure from new market entrants. When choosing a TCM outlet, customers considered price and quality to be important factors while trust in the store keeper was also identified as a key determinant of store choice.

Consumers face considerable frustration when purchasing structurally and/or semantically complex high-involvement products online. Reliance on computer-mediated communications for their information needs may result in functional and emotional frustration from information overload and lack of personal trust. Grant et al. (2010) proposed a responsive real-time information system as a proxy for a perceptive sales representative who assesses customer needs based on information exchanges and then offers appropriate responses. By tracking and analyzing a consumer's online activity, vendors can offer information relevant to the consumer's real-time needs, facilitating their purchase process. In essence, this is a real-time value co-creation process based on the consumer offering cues to vendors through their key strokes and mouse click activity. This allows for differentiated information offerings for inexperienced and

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