A fuzzy group quality function deployment model for e-CRM framework assessment in agile manufacturing

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1. Introduction

Agile enterprise refers to an enterprise that can quickly, easily and inexpensively reconfigure itself to exploit opportunities and react to unpredictable internal and external changes. Agility is perhaps the most significant and, at the same time, the most difficult attribute to attain (Miller & Berger, 2001, p. 16). Agility in manufacturing requires a thorough decision to design flexibility, robustness, and adaptability into the very nature of the manufacturing processes in an enterprise. However, changing manufacturing processes is not a trivial proposition and requires a need for understanding and support by the leadership at the top. This need is more vital in a “new production enterprise” where Internet and e-business technologies have injected “velocity” into the business activities and enabled companies to shift their manufacturing operations from the traditional factory integration philosophy to an electronic manufacturing philosophy.

The rapid growth of the Internet and the expansion of electronic commerce applications in manufacturing have given rise to electronic customer relationship management (e-CRM) which enhances the overall customer satisfaction. However, when confronted by the range of e-CRM methods, manufacturing companies struggle to identify the one most appropriate to their needs. This paper presents a novel structured approach to evaluate and select the best agile e-CRM framework in a rapidly changing manufacturing environment. The e-CRM frameworks are evaluated with respect to their customer and financial oriented features to achieve manufacturing agility. Initially, the e-CRM frameworks are prioritized according to their financial oriented characteristics using a fuzzy group real options analysis (ROA) model. Next, the e-CRM frameworks are ranked according to their customer oriented characteristics using a hybrid fuzzy group permutation and a four-phase fuzzy quality function deployment (QFD) model with respect to three main perspectives of agile manufacturing (i.e., strategic, operational and functional agilities). Finally, the best agile e-CRM framework is selected using a technique for order preference by similarity to the ideal solution (TOPSIS) model. We also present a case study to demonstrate the applicability of the proposed approach and exhibit the efficacy of the procedures and algorithms.