Chapter 84
Intuitionistic Fuzzy Decision Making Towards Efficient Team Selection in Global Software Development

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ABSTRACT

For successful completion of any software project, an efficient team is needed. This task becomes more challenging when the project is to be completed under global software development umbrella. The manual selection of team members based on some expert judgment may lead to inappropriate selection. In reality, there are hundreds of employees in an organization and a single expert may be biased towards any member. Thus, there is a need to adopt methods which consider multiple selection criteria with multiple expert views for making appropriate selection. This article uses an intuitionistic fuzzy approach to handle uncertainty in the expert's decision in multicriteria group decision making process and ranking among the finite team members. An intuitionistic fuzzy Muirhead Mean (IFMM) is used to aggregate the intuitionistic criteria's. To gain confidence between criteria and expert score relationship, the Annova test is performed. The results are promising with p value as small as 0.02 and one-tail t-test score equals to 0.0000002.

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1. INTRODUCTION

Delivering right product within allocated time and budget is both critical and challenging in today's competitive time-to-deliver market. Successful software projects face number of challenges during development life time ranging from understanding stakeholder, changing requirements, software complexity, optimistic schedules, time to deliver pressure, situational factors, managing right skilled people required for each project's unique demands. Due to advancement in Information Technology (IT), there is a steep decline in internet access cost which has resulted in a shift from centralized development work culture to distributed development culture. As a result, organizations have realized the importance of virtual world networks which provide advantages like efficient time management, lower development cost, decline in travel costs, access to larger skilled team members for choosing right skilled people and closer proximity to market and customers (Lee-Kelley, 2006). This aspect of globalization is well captured and utilized by many organizations for software development and is broadly categorized as Global Software Development (GSD).

Global Software Development has numerous benefits in overcoming barriers of different time zones and of multi-site development at various geographical locations with reduction in overall cost of development (Binder,2009; Kern & Willcocks, 2000).The literature has reported several benefits associated with GSD adoption such as, greater availability of human resources and multi-skilled workforce, lower costs, shorter time-to-market cycles (separated Conchuir etal., 2009; Milewsk et al., 2008; Smite et al., 2010; Kommeren et al., 2007; Soora et al., 2008) to name few. This geographically collaborative effort makes adoption of GSD complex in itself and presents a number of challenges ranging from planning and managing of task allocation, coordination and inter-site communication, knowledge sharing, interpersonal relationships, individual technical experience skills, team roles and responsibilities, efficiency, trust among team members, to coordination and inter-site communication barriers in various project management issues (Avritzer et al., 2010; Casey et al., 2009; Garcıa-Crespo et al., 2010; Colomo-Palacios et al., 2012; Hernandez-Lopez et al., 2010a; Islam et al., 2009; Deshpande et al., 2012; Ebert, 2010). Research in past has shown that there is a need to address various challenges, issues and risks of adopting GSD (Keshlaf & Riddle, 2010).

Hence, this research aims at selection of software project team members across the globe having different configurations in terms of knowledge, skill, communication and management. Stevens (1998) have discussed how a good configured team has positive impact on team performance, productivity and success of software system. One of the challenging tasks in identification and selection of team members in global software engineering environment is to decide who among the people from the teams (separated geographically) are to be selected for developing a particular project under GSD umbrella. There exist hundreds of individuals in an organization with varied excellences and skills to support various dimensions of a particular project globally. But the reality is that, all individuals cannot be selected to represent the core team for a particular project. This process of identification and selection of core team members for GSD is in fact, a complex multi-criteria decision-making process. The foremost challenge here is to define the most appropriate target criterion for ranking individuals so that the best from the pool of people can be selected. If a single criterion is taken into consideration then it becomes easier to decide the ranking of a given individual, but if there are more than one criteria's, then the decision becomes far more difficult, because a wrong decision can result in extra cost to the organization and the impact of same can be manifolds.