Chapter 2

Review of Literature

2.1 INTRODUCTION

This chapter presents an overview of the related literature on the aspects of knowledge transfer effectiveness with reference to the GSD project outcome and Software Process Improvement (SPI). The research on offshore/onsite teams KT effectiveness on SPI in GSD project is very limited. As discussed in Chapter 1, SPI research in GSD projects addresses the significance of KT aspects for the success of GSD project outcome. In this thesis, various approaches have been reported that aim at evaluating the GSD teams’ KT effectiveness aspects relating to GSD project outcome and SPI, and hence providing the answer for the research questions (RQ-1 and RQ-2). This chapter also gives overall structure theoretical framework that is used in this thesis.

In this research the literature has been reviewed based on the following areas as given below:

(a) Software Process Improvement in GSD Projects driven by knowledge, team, technology, and organization factors of GSD teams.
(b) Knowledge transfer effectiveness in the context of GSD project outcome.
(c) Significance of fuzzy DEMATEL and FMCDM.
(d) Hybrid approach based on fuzzy DEMATEL, TOPSIS, and ELECTRE approaches to evaluate the GSD team KT effectiveness from the perspective of GSD project outcome.

2.2 RESEARCH ON SOFTWARE PROCESS IMPROVEMENT IN GSD PROJECTS

Software process improvement plays an important role in helping project teams in software development organizations. Moreover, earlier studies (Sangaiah and Thangavelu 2013; Al-salti and Hackney 2011; Mohamed et al. 2009; Nidhra et al. 2013; Aziatiet al. 2014; Kumar and Ganesh 2009) have addressed the characteristics
of knowledge and significance of knowledge transfer in IS outsourcing success. Moreover, earlier researchers (Syed-Ikhsan and Rowland 2004; Kang et al. 2010; Susanty et al. 2012) have integrated the advantages of individual and organizational knowledge for effectiveness of knowledge transfer. In addition, the significance of SECI (Socialization, Externalization, Combination, and Internalization) in knowledge management theory is acknowledged in a substantial measure of available literature.

Drawing upon the existing literature (Sangaiah and Thangavelu 2013; Karim et al. 2012; Hoegl and Gemuenden 2001; Hoegl et al. 2003; Zeng and Wang 2011) team characteristics measured via four indicators: Meta cognition, cohesion, mutual support, and interpersonal communication. The focus of this research is on the influence of knowledge codification process at the offshore/onsite team level on the knowledge transfer effectiveness in GSD project context. Here effectiveness of knowledge transfer refers to the degree of fulfillment on the expectations of GSD teams in the context of GSD project outcome. A number of studies (Aziati et al. 2014; Sangaiah and Thangavelu 2013; Beulen et al. 2011; Hoegl et al. 2004) have investigated the significance of team performance in the context of effective knowledge transfer to assure the success of a project. In the above context, this thesis has related that the quality of teamwork is likely to increase the knowledge transfer effectiveness of teams and to improve the software process in GSD projects.

Previous studies (Susanty et al. 2012; Sangaiah and Thangavelu 2012) have addressed the impact of Information and Communication Technologies (ICT) in knowledge management with respect to sharing, exchanging disseminating knowledge and technologies. In addition, related research works (Syed-Ikhsan and Rowland 2004; Duan et al. 2010; Linder and Wald 2011) have examined the support and the essential role of ICT in software development process. Drawing upon the previous literatures (Oshri et al. 2008; Hsu et al. 2012) technology factors for KT effectiveness of GSD teams’ characteristics have used with two indicators for measurement: ICT infrastructure and ICT tools. Hence this research has given insight into the relationship between ICT and knowledge transfer effectiveness of GSD teams’ for ensuring successful outcome of projects goals and process improvement.
According to the earlier studies (Syed-Ikhsan and Rowland 2004; Lin 2007; Sangaiah and Thangavelu 2014; Wong 2005) organizational elements are central aspects for making effective knowledge transfer. In this thesis, organization context refers to the way GSD teams’ in an organization will be addressed in terms of communication flow for enhancing the effective KT and Process improvement in GSD project settings. This implies on focusing organizational structure characteristics for GSD teams in order to perform knowledge related task addressed in this research.

Earlier research (King and Malhotra 2000) has defined the impact of outsourcing strategy into three dimensions: short-term operational impacts, midterm tactical benefits and long-term strategic impacts. This thesis explores the influence of offshore/on-site teams’ KT effectiveness on the basis of tactical (Efficiencies, cost savings, productivity, and service levels) as well as operational benefits (performance, control, and risk sharing) towards process improvement of the GSD project from the service provider perspective into three dimensions: product success, successful collaboration, and personal satisfaction.

The focus of thesis addresses all the three levels in terms of knowledge transfer effectiveness to improve the software process in GSD projects. Based on the above, this research investigated the offshore/on-site team knowledge transfer effectiveness to improve the software process in GSD projects.

The SPI dimensions as described in chapter 1 and Fig.1.1 (PSP, TSP, and CMM) investigated under GSD team knowledge transfer effectiveness with reference to GSD project outcome.

2.3 RESEARCH ON FUZZY MULTI CRITERIA DECISION MAKING APPROACHES

The previous study (Sangaiah and Thangavelu (2013)) has defined fuzzy multi-criteria decision making (FMCDM) approach as a powerful tool for decision makers that has been widely used for selecting, evaluating and ranking problems according to their weights of a finite set of criteria (usually conflicting criteria). Recently, FMCDM has been adopted in selection, evaluation, ranking in the solutions of prediction or forecasting (Chang and Wang 2009). In addition, a number of studies
Chang and Wang (2009; Hu and Liao 2011; Büyüközkan, and Ruan 2008; Kuo and Liang 2012) have exploited FMCDM for the evaluation of multiple attributes and especially dealing with uncertainty and vagueness within the decision making process by the use of fuzzy set theory.

Chang and Wang (2009) present FMCDM for measuring the possibility of successful knowledge management implementation in Taiwan semiconductor Engineering Corporation. Moreover, Hu and Liao (2011) have applied FMCDM to find critical criteria for evaluating electronic service quality of internet banking in Taiwan domestic banks. In addition, earlier study Buyukozkan and Ruan (2008) have utilized FMCDM for measuring the performance of the software development projects. Consequently, previous studies of Kuo and Liang (2012) proposed FMCDM for evaluating the performances of intercity public transport system. Based on this literature studies, this thesis extends the FMCDM framework to effectively assess the GSD teams’ KT effectiveness dimensions, underlying the influential factors and their impacts on the success of GSD project outcome under fuzzy environment which is summarized in Chapter 5.

Chapter 3 deals with the evaluation of GSD teams’ KT effectiveness, SPI and GSD project outcome with the help of conventional statistical methodologies. However, statistical methods have limitations in dealing with people’s uncertainty and subjectivity vagueness to determine the KT effectiveness factors of GSD project outcome. To overcome the above limitations, this research proposes a framework based on FMCDM approaches to assist the organizations in classifying the key KT effectiveness factors (refer chapter 4 and Figure 4.1) affecting GSD project outcome. It also shows that the predicted GSD project outcome values are obtained to facilitate an organization in the determination of the impact of GSD teams’ KT effectiveness towards the success of GSD project outcome otherwise initiate actions to improve the software process.
2.4 RESEARCH GAPS FROM LITERATURE STUDIES

Based on the extensive literature review, the following summary is given:

- Codification effects on factors affecting knowledge transfer effectiveness of GSD teams’ have not been investigated adequately despite their importance in software process improvement.
- Integrated organizational elements and knowledge characteristics under PSP and TSP for the effectiveness of KT perceived by GSD teams for process improvement in GSD projects.
- Offshore/on-site team knowledge transfer effectiveness has been a key predictor for improving software process with respect to GSD project outcome/success in the software service outsourcing context.
- Recently, there has been an interest to use hybridization of fuzzy multi-criteria decision making (FMCDM) approaches. Accordingly, this thesis have been integrated various FMCDM approaches (e.g. Fuzzy DEMATEL-FMCDM and Fuzzy DEMATEL-TOPSIS-ELECTRE).

The following gaps have been focused in this research:

(1) Knowledge transfer effectiveness of GSD teams has not been investigated adequately in the existing literature.
(2) Limited literature exists in SPI for addressing PSP, TSP of GSD teams to improve the process in GSD projects.
(3) Group decision making under fuzzy environment for evaluating KT effectiveness in GSD projects has a very limited place in literature.

2.5 SUMMARY

Chapter 2 provides an overview of existing literature on GSD teams’ KT effectiveness dimensions in the context of SPI and outcome/success of GSD projects. This research has also identified and addressed the research gaps found in the literature. The GSD teams’ KT effectiveness factors may significantly impact towards the SPI and success/outcome of GSD projects as shown in Figure. 2.1.
Figure 2.1: The GSD teams' KT effectiveness Dimensions: Significant Impact towards SPI and GSD project outcome.

Research on these potential factors is collectively identified through existing studies and has been elaborated in section 2.1 to section 2.5.