Chapter 7

Conclusion

This chapter gives an overview of the findings and the results derived from this research and discussion on its contribution. First, the empirical investigation that explores the significant of KT aspects in GSD projects was explored. As a result, an assessment framework has been formulated which integrates (i) factors that influence the KT aspects on SPI relating to the outcome of GSD projects and (ii) hypothesis suggesting the relationship between KT aspects of GSD teams’ contribute towards the outcome of GSD projects, as presented in chapter 3. The earlier research findings on knowledge transfer effectiveness of organizational performance have been carefully studied. The main feature of this research is the focus on integrating codification effects on the factors affecting knowledge transfer perspective with prior research in knowledge transfer and organizational performance, particularly on the effectiveness of GSD teams’ knowledge transfer relating to SPI and GSD project outcome. In this process, this thesis has integrated a set of measures on knowledge, team, organization, and technology context of GSD project initiative research.

The conclusions of the research are as given below:

- The earlier research findings on knowledge transfer effectiveness in the context of software process improvement and organizational performance have been carefully studied. The main feature of this research is the focus on integration of the codification effects on the factors affecting knowledge transfer perspective with prior research in knowledge transfer and organizational performance,
particularly focusing on the effectiveness of GSD teams’ knowledge transfer in the relation to the outcomes of the GSD projects.

- In the context of SPI in the GSD project, this research presents an integrated framework for evaluation of the knowledge transfer effectiveness through analysis of PSP and TSP of GSD teams with reference to GSD project outcome which combines two approaches: (i) fuzzy DEMATEL and (ii) FMCDM.

- Similarly, in the predicted outcome obtained by fuzzy DEMATEL-FMCDM approach, the value exceeds 76% which specifies that the effectiveness of knowledge transfer factors of GSD teams reveal key determinant on SPI and GSD project outcomes.

- In the context of SPI and GSD projects research phenomenon, this research presents an integrated framework for evaluation of the KT effectiveness with reference to GSD project outcome which integrates three approaches: (i) fuzzy DEMATEL and (ii) TOPSIS and (iii) ELECTRE. It is a clear indication that GSD teams’ KT effectiveness reveals the key determinants of SPI and GSD outcome, while their relationship and measures across the fuzzy MCDM approaches are discussed.

The following section provides a summary of the results obtained from this research.

7.1 Summary of Fuzzy DEMATEL Results

Thirty Five KT effectiveness factors have been characterized and analyzed in the context of software process improvement, according to relation \((r_i - c_i)\) and prominence \((r_i + c_i)\), as shown in Chapter 5 and Table 5.4. The results reveal the degree of relation and their directions of interactive influence:

- **Criteria with high relation and high prominence**: This category encompasses gathering of information and experience among teams \((C_{11})\), sharing the knowledge and experience among the team members \((C_{12})\), participation in helping each other \((C_{15})\), team participation and communication relationship \((C_{14})\), and team member’s ability to provide to assistance in solving problems \((C_{18})\) which are the driving KT effectiveness factors influencing other factors for software project improvement in GSD projects.
• **Criteria with high relation and low prominence**: This category comprises explicit and standard communications pattern for knowledge transfer effectiveness (C₃₂), tools and technology to facilitate knowledge transfer within the teams (C₃₄), knowledge incentives directed towards business process and project outcome (C₅₁), understanding the process with respect to knowledge transfer effectiveness on project outcome (C₃₂), goals and responsibilities of teams on business process (C₅₄). The influence of above criteria is small compared to the other factors, and have the degree of impact is low.

• **Criteria with low relation and high prominence**: This category includes assessment of teams knowledge transfer effectiveness on project outcome (C₆₅), specialty and knowledge creation ability of teams (C₄₁), tools and technology to facilitate knowledge transfer within the teams (C₃₄), explicit and standard communications pattern for knowledge transfer effectiveness (C₃₂) which are characterized as result factors. These have a significant impact on other factors, and thus cannot be directly improved.

• **Criteria with low relation and low prominence**: This category encompasses understanding standard communication pattern on knowledge transfer effectiveness (C₅₃), knowledge transfer benefits on mediating role of project outcome (C₆₁), project functionality towards clients business process (C₆₂), evaluating the project quality with respect to the service (C₆₃) and project performance on expected functionality (C₆₄). These factors are influenced by the remaining factors. Thus the degree of impact is extremely low, showing that these factors are relatively independent.

In summary, the above-mentioned DEMATEL result analyses the relation with and degrees of influence on KT effectiveness factors. Likewise, this result reveals that KT factors are the core dimensions impacting on the other dimensions and that they are the significant factors for achieving software process improvement in GSD projects.

### 7.2 Summary of FMCDM Results

In the FMCDM approach, relative importance weights are considered. The factors are represented through triangular fuzzy numbers and linguistic variables as
shown in Table 4.2. The expert decision group involved consists of 35 members of Inowits organization. They were asked to indicate their perception of the importance weights of the 35 KT effectiveness criteria under the considered 4 dimensions independently. The FMCDM results are presented in Table 5.6 and Table 5.7 respectively which shows that weights and ranking of the KT factors $C_{12} > C_{51} > C_{11} > C_{22} > C_{26}$ these factors are the highest ranking as denoted in [.] among 35 factors.

Likewise, the hybrid DEMATEL and FMCDM weights $(W_j * Q_j)$, calculated for the ranking of the KT factors $C_{11} > C_{12} > C_{51} > C_{16} > C_{18}$, are the most significant factors as shown in Table 5.7. Moreover, the predicted $P_{outcome}$ values also show the effectiveness of KT factors towards software process improvement as 0.7608 as shown in Table 5.7. Thus, $P_{outcome}$ values exceed 0.76, which specifies that effective KT factors reveal key determinants on GSD project outcome.

7.3 Summary of Fuzzy ELECTRE Results

In this research, the ELECTRE approach has been integrated with the hybrid DEMATEL-TOPSIS method with TFN’s for considering the DM’s behavior. One of the key characteristic of the DEMATEL-TOPSIS-ELECTRE approach is its capability to handle uncertainty and subjective vagueness in the decision making process as presented in this research. Validation of the results of our proposed approach (DEMATEL-TOPSIS-ELECTRE) has been done to facilitate the effectiveness of KT factors as discussed in Chapter 6. Subsequently the hybrid DEMATEL and TOPSIS-ELECTRE results shown the ranking of KT factors $F_{10} > F_{14} > F_{13} > F_{1} > F_{12}$ are most significant factors.