Chapter 6

Limitations and Future work

6.1 Limitation and Threats to Validity

This research work aimed at creating a risk management framework for distributed agile projects which can be used by the practitioners for managing the risks in DAD projects effectively. The work involved a qualitative exploratory study followed by a quantitative descriptive research. Although, we have taken measures to ensure that the results of the study are reliable and dependable, but certain conditions while carrying the study have posed threats to the validity of the result. We will be discussing the limitations of the study in this chapter along with the steps taken by us to curb their impact.

6.1.1 Limitation of Qualitative Exploratory Study

The objective of carrying an extensive exploration (Yin, 2003) was to identify the risks in DAD projects was to eliminating biases and deriving dependable results from exploration. One of the major strength of this work lies in creation of a comprehensive set of risk factors in DAD projects. Identification of a suitable set of risk management methods corresponding to each risk factor further adds to the strength of the work. Further, the segregation of risk factors in organizational context through Leavitt’s model and later, according to the mention in earlier research literature made the findings relevant for the practitioners as well as researchers. However, as a part of the rigorous research process, researchers faced some insurmountable challenges. Following is a brief account of the limitations of this study that should be known to the developer and researcher fraternity for effective use of the findings.

First, while collecting data through in-depth interviews, it was difficult to take verbatim notes while having simultaneous discussions with the respondent. This might have influenced the correctness and completeness of the collected data. In order to reduce the effect, majority of interviews were face-to-face interaction and only one was telephonic. Moreover, the transcripts of the interviews were sent to the respective respondents after the interview, to ensure that the
responses have been understood and interpreted correctly. In order to achieve construct validity, we got the questionnaire used for in-depth interviews validated from ten experts who had managed distributed agile projects.

Second, the practitioners were not willing to handover the project documents for analysis as they were bounded by confidentiality constraints. Since, this was a threat to the internal validity of our work; we took special efforts to convince the respondents for providing the documents. Still, out of 28 projects, the work documents of 18 projects were not handed over to us. In such cases, we had to view them at the respondent’s location in limited time and had to hold simultaneous discussion on the project specific risks with the project team members.

Third, although we aimed at collecting the risks related to distributed agile development environment, we did come across certain risks which are inherent to the software development and management process. In order to distinguish between the DAD-specific risks and others, we explicitly asked the respondents to specify the software development methodology that cause a particular risk. This helped us in stating the DAD-specific risks explicitly.

Fourth, collection and analysis of huge amount of qualitative data had an inherent complexity, which could have led to incorrect or incomplete results. We tried to minimize the effect of this weakness by considering separate views of both researchers and then studying the extent of similarity between the views. No major differences emerged and minor differences were settled after due deliberations (Guion, Diel & McDonald, 2002).

Fifth, time and budget constraints restricted the scope of data collection for the study to India. This may have an impact on the extent of generalization and hence the external validity (Maxwell, 1992). We tried to reduce the impact by collecting data from 13 organizations operating in 4 different cities within India and one city in Australia. As the data was collected using two different approaches and iterative comparison of response contents led to the emergence of the repetitive patterns (Glaser, 1965) indicating saturation of categories and inadequacy of further addition of inputs (Saumure & Given, 2008), a substantial level of generalization could be achieved.
Hence, considering certain limitations in this exploratory work, efforts have been taken for minimizing the effect and enhancing the reliability and dependability of results.

### 6.1.2 Limitations of Quantitative Descriptive Research

We identified significant number of important risk factors (Eighty One) and the corresponding risk management methods to control by conducting an extensive exploration. This was followed by a quantitative study which aimed at identifying most important risk factors which impact DAD projects and the most suitable risk management methods for each of the risk identified. This involved collecting quantitative data for ranking data for risk factors and rating data for risk management through a self-administered questionnaire. This questionnaire was sent to 23 experts to check for its correctness and content quality. Based on the reviews, the questionnaire was improved. One of the major reviews was on the length of the questionnaire.

Since, the exploratory work was extensive; the initial findings of the study were comprehensive as it encompassed most of the significant risk factors which team members of DAD projects faced. As a result the questionnaire for the quantitative study formed was too long. Originally, the questionnaire was encompassing questions for both ranking of risk factors and rating data for risk management methods, which made the questionnaire too long (20 pages). It was suggested that due to the length of the questionnaire, the respondents may not be able to provide correct response or may even refuse to fill it. This will result in poor quality of data or even non-response which will lead to findings which are weak and unreliable. Hence, we divided the questionnaire in two parts and collected the quantitative data in two phases. We gathered quantitative data for ranking of risk factors in the first phase, while rating data for risk management methods was collected in the second phase. Part I and Part II of the self-administered questionnaire was now composed of 11 pages and 14 pages respectively.

Even though the questionnaire length was reduced, still it was not feasible to perform a completely online data collection due to large number of risks to be addressed. This affected the response rate and the time for collecting the data. Majority of responses was collected through face-to-face meetings. Extensive travel was involved for quantitative data collection within and outside the base location of the researchers. Some of the respondents who were located far from
our base location, especially respondents located outside India agreed to fill the questionnaire and send by e-mail. There was missing information in the questionnaire obtained through mail for which we had to contact the respondents again and get the missing data.

We faced resistance from the respondents for filling the questionnaire due to their time constraints. Moreover, since there were many respondents who had helped us during our exploratory study multiple times and also for validation of the questionnaire, they were finding it difficult to help again for quantitative data. Although, they could not, they directed us to other respondents who were ready to provide us data for risk factor ranking. This problem became even more severe when we started the second phase of the quantitative study for risk management methods. We collected data from those respondents who had filled the first part of the questionnaire as they were aware of the context of our study. As a result, the number of respondents who could help us for filling the second part of the questionnaire was not significant (19 respondents). Due to time constraints, we also had to stop the quantitative data collection and proceed with the analysis. This led to the data analysis results for rating of risk management methods, not being statistically significant. Although, we cannot generalize the findings related to risk management methods, but still they do give insights on the suitable methods which can be used by the practitioners.

Although, we had included a risk category namely, ‘Business Goals and Objectives’ in the quantitative descriptive study, and collected quantitative data for the risk factors included in it, but the findings were insignificant. These findings give insights about the risks occurring when development team is unaware about the real business goals of the client and the project being developed, which can be used by DAD teams.

Another concern which we encountered was regarding the analysis of project constraints which impact the risk factors of DAD projects. We asked the respondents to select one of the constraints which considered to be impacted most significantly, when a particular risk arises. Although, we obtained statistically significant findings for this data, but there are concerns which needs to be discussed. First of all, since all the constraints are interlinked, the respondents were finding it difficult to mark one of them. In cases where, the respondents could not select one of
the constraints, we allowed them to mark on two and then asked them to select the one which is comparatively more important. Although, we used this approach to obtain single project constraint being impacted by the risk, but it may lead to biased results since, we considered only one constraint which was most significant out of the multiple constraints being selected. Secondly, during quantitative data collection, we encountered some views from our respondents to consider other constraints like ‘Business Value’ and ‘Organizational Culture’ along with ‘Time’, ‘Cost’ and ‘Quality’. Since, we had completed 50% of the quantitative data collection when we received such inputs; we had to leave the analysis of those project constraints for future analysis and hence did not include them in our questionnaire.

6.1.3 Challenges Faced in Result Validation
The partial framework was sent for validation to three multi-national IT companies in order to check for its benefits and usage. It took significant efforts to convince the companies for doing validation of the partial framework as they were bounded by the restrictions laid in the contracts with the clients. There were certain standards which the teams were supposed to follow due to which they were unable to use our framework. In one of the companies, we convinced them by sending the framework and the consultant who was helping us for validation took special permissions from the concerned authorities for the same. In other cases, we had to make company visits multiple times to explain how the framework would be beneficial and can be validated.

6.2 Future Scope
Research on risks in DAD projects is in its nascent stage. Present study is an initiation of a comprehensive work in the discipline. Exploratory findings have unveiled many aspects like risk factors, their one possible categorization to facilitate organization’s preparation for risk management and respective risk management techniques. Further descriptive study helped us to identify of the most critical risk factors and the corresponding most frequently used risk management techniques.

As we identified the risks through exploration, we also searched for support from the existing literature. There were certain risk factors for which negligible support was available. In our study
we have identified such risk factors which are occurring in DAD projects, but yet have to be explored further. Future research studies can consider those risk factors and study them in details with respect to DAD project environment.

We identified the risk factors which arise when the team is unable to understand the business objectives and hence develop solutions which are unable to fulfill the real needs of the business. These risks were identified while conducting a pilot study for our quantitative descriptive study. Although, we included these risks and created a risk category ‘Business Goals and Objectives’, but it needs more exploration. Since, the findings of this study were statistically insignificant, it can be considered for further by the future researchers.

As discussed in the section above (section 6.1), we analyzed the impact of risk factors on project constraints namely, time, cost and quality. Due to time limitations, we could not included the analysis of other constraints like ‘Business Value’, ’Organizational Culture’ etc in our analysis. The impact of risks on these constraints in the distributed agile environment is an area which could be studies further.

For the discipline, the comprehensiveness of the study opens many new avenues in terms of validation of the findings in the same and other regions to strengthen generalization, deeper exploration of risk factors and their causes and formulation of more scientific and formal models to address the risks in DAD projects. Moreover, a rigorous analysis of in-practice risk management techniques for these risk factors can help in identification of solution dimensions, which can address the challenges posed by them. As we understand, the findings of study roll out a vast canvas to create knowledge that helps practicing professionals.