CHAPTER 7

CONCLUSION & FUTURE WORK

7.1. Conclusion

The presented thesis has discussed an integrated framework that is designed based on the potential principles of Agile manifestos, Lean Principle, Six Sigma and Scrum for enhancing the software development methodologies in IT industries. The second chapter of the thesis has significantly reviewed all the major literature published on Agile, Lean, Six Sigma, and Scrum used in project management, to understand the pattern of research technique adopted by various researchers to enhance the quality of software development methodologies. Although these approaches are expected to weave the technologies together to seamlessly manage the flow of the projects, a big trade-off has been observed between theory and practice in the use of these quality management tools. For the past 10 years, it was known that Six Sigma can ensure zero defects in production as well as product delivery.

In this regard, the contributions made by various stalwarts in project management like Marry Poppendieck and Tom Devane to understand the backbone of the theory. After studying various literatures, it was found that several authors have significantly worked on the analytical model for software quality assurance, which was hypothetically tested and based on qualitative techniques rather than quantitative techniques. However, the applicability of such research attempts is highly questionable, as the prior studies and its implemented framework has never been found to consider the real-time
constraints that affect the production as well as various uncertainties explored in the software development methodologies. Moreover, the adoption of superior quality standard like Six Sigma, has never seen to be implemented by any SMEs, leading to trade-off between theory and practice. It was also observed that although various authors have motivated readers to opt for Six Sigma principle in their literatures, in reality however, almost none of the SMEs was found to adopt such a principle.

Hence, if the adoption of such theories is not done on a large scale, their latent issues can neither be observed nor mitigated. However, it is quite an old fact, and is also reflected by our study. Moreover, the frequently used Agile manifestos are also found to be shrouded with various loopholes, that adversely affect the software quality assurance as well as the effectiveness of the software development methodologies. The third chapter of the thesis has discussed about the essentials of the quality standards used in the study. It was observed in the discussion that all the quality standard models have their own advantages as well as limitations that make the design process of the proposed study quite challenging.

The fourth chapter of the thesis has elaborately discussed about the research methodologies that were adopted to carry out the proposed study. This study was initiated after interacting with some selected participants to understand the problems, encountered by them in their organisation, which were related to quality assurance and software development methodologies. The main objective of the present thesis was to capture the real-time problems in IT industry and then create an efficient model to mitigate such problems. To enhance the effectiveness, the study has adopted the backbone of the strategic decision making theory and developed a mathematical model. The mathematical model was basically designed to showcase its predictive behavior that could assist the top authorities to understand the effectiveness of the development methodologies adopted by them.
Finally, the model was tested using two factors, namely convergence test and post-investigation stage. Convergence test was conducted to exhibit the effectiveness of the mathematical model, while post-investigation stage involved the capturing of the perception of a number of participants, to understand the levels of technical adoption and quality, from their viewpoint. The outcome of the study, discussed in the sixth chapter, suggested that the proposed system was quite cost effective and didn’t require much re-engineering to put it into practice and performed efficient predictive behavior, provided the inputs were precise. The outcome of the study, thereby, highlights an efficient framework for software development methods that were benchmarked by conventional models, with respect to cost and performance.

7.2. Recommendation of Further Work

Following are the tentative recommendations for further work:

**Extending the Applicability:** The proposed study has focused on designing a framework to ensure better software development methodologies for the IT industry. However, it is highly recommended that all the domains of the IT industry should be considered. The IT Industry is comprised of vendors, product development and selling, outsourcing, software and hardware, and many more. Consideration of the heterogeneous domain of the IT industry will provide more clarity on the applicability of the proposed model in other streams.

**Better Optimization:** The proposed model is designed using strategic decision making theories and Bayesian game theory. For the future study; attributes like human resources, skill gaps, talent gap, attrition rate etc. can be taken into consideration and discussed. If the model could be used for
evaluating the risk for adopted development strategies, it would also act as a tool to understand the optimisation extent of an employee. Usually, an organization appraises their employees based on past records (business per employee or profit per employee), on the other hand, there are no such techniques or algorithms to forecast their future performance. Hence, it is highly recommended that the proposed model could be enhanced to incorporate a model that can perform the same predictive behavior for the employee’s or the team’s performance, to assist in project scheduling as well as costing. Advanced optimization techniques could further be adopted for this purpose.

**Incorporating Intrinsic and Extrinsic Factors:** The proposed model has performed the modelling of cumulative real-time problems, such as volatility in requirements, changes in management, inefficiency of manager, skill gap, etc. Hence, it is recommended that the real-time constraints need to be further modelled under intrinsic and extrinsic factors. Intrinsic factors will comprise all the issues originating from the organization, while extrinsic factors include those originating from the customer. Distinguishing the internal and external factors will further help in efficient modelling and obtaining accurate outcomes.