Evaluation of Reasearch Articles

Assignment 3

Sai Sandeep Chikkala
Blekinge Institute of technology
Saca14@student.bth.se
930617-5051

***Abstract*— This paper comprises the comparison of two research articles in the context of their contribution, analysis and results, research approaches. Efficiency of Test Driven Development in industrial setting in terms of quality is the research domain for the two selected articles.**

I. INTRODUCTION

Test Driven Development is referred as a coding approach where a test code is written beforehand then a minimal amount of code is written to make the test pass. Efficiency of the TDD approach in terms of the productivity, quality in industrial setting is debated topic. The chosen research articles deal with the context mentioned above.

1. Realizing quality improvements through test driven development: results and experiences of four industrial teams [1].
2. The Effectiveness of test driven development: an industrial case study [2].

II. PROBLEM DOMAIN AND SCOPE

The problem domain is same for the both articles i.e. Measuring Effectiveness of TDD approach.

Scope for Article 1:

Authors performed research in industrial context. The projects that are under study in this research are all related to the software industry. They only measured the effectiveness of TDD in terms of quality (defect density) and productivity (Development time).

Scope for Article 2:

The research is performed in industrial context. The projects under study are related to telecommunication software. They measured the efficiency of TDD in terms of quality, productivity, maintainability.

III. MOTIVATION FOR CHOOSING THESE ARTICLES

TDD is perceived in many ways but majorly it is seen as defect reduction technique. There are claims made in research that adopting TDD for a particular context of development, enhances the quality of product. But there are also few studies contradicting these claims about TDD. So, it is important to study the effects of adopting TDD in industrial contexts. Moreover I have chosen these articles in which case study is performed because, trough case studies we can have the effects of TDD in real application i.e. in industry viewpoint.

IV. BASE FOR AUTHORS RESEARCH

A. Article 1:

The motivation for conducting this study is mentioned aptly. Also the references being cited by the article are the current state of art empirical knowledge in the area of research i.e. TDD efficiency. The selection of case study for the research is justified as there is only little empirical evidence on the area in industrial context. The research process is discussed elaborately. Four case studies are conducted in the research and the context in which each case study is performed is explained clearly. However, few specifics regarding the project that is compared (i.e. non TDD projects) are missing , like there is no mention if both the projects are distributed or not in the first case study (i.e. IBM). The process of how TDD being implemented is mentioned clearly i.e. in Microsoft they have used kind of hybrid TDD. Team composition has been well specified (Experience, domain familiarity, team location etc.). The selection of defect density as measure for quality is not well motivated.

The data collection method is mentioned and the values for the variables are provided. Based on the values obtained from data collection, authors compare the projects. The results are well motivated by the data analysis. Possible threats to validity are mentioned. Conclusions made are consistent with the research work.

B. Article 2:

There is clear motivation for performing the study and choosing case study as research method. The references mentioned in the related work are almost same as that of article 1 and are solid base for research. For a case study it is very important to mention the context of the study. The context of the study mentioned for this study is very elegant and elaborate. All aspects are described in detail i.e. regarding the project characteristics, team composition, industrial setting (i.e. regarding the development process). Also the project team characteristics and the project

characteristics are well specified. Good justification for the chosen metrics of quality, productivity, maintenance is provided. The implementation of TDD for the project is mentioned in detail. They have collected the data from the repositories and the values are mentioned in the article.

Comparison of the values, lead to the results. Threat to validity are mentioned very well. Also, survey with the developers is conducted to support the obtained results. Although it would only provide subjective measures, they have not found other feasible instruments to validate the results. Conclusion are in consistence with the research work.

V. SOLUTIONS AND CONTRIBUTIONS

Article 1:

The solution to the research objective in the study is that the projects which adopted TDD practices are seen to have relatively low defect density by 40% to 60%. And the productivity which is measured in terms of development time is decreased relatively by 15%. These solutions are motivated from the analysis and synthesis of the data collected for the metrics.
The solution obtained agrees with the existing researches. This study contributes towards strengthening the argument that TDD adoption will relatively increase the quality of product.

Article 2:

The solution in this article is that TDD has improved the external quality and quality in use. Also it is observed that the productivity has dropped relatively. The main advantage by following TDD is perceived to be the ease of maintenance. The results are clearly justified by the analyses and are also in agreement with the other related work in the field. The study also contributes towards strengthening the existing empirical research in the area and also contributes towards the advantages of using TDD in context of telecommunication software.

Strengths and Weakness

Article 1:

Strengths:

- More case studies are performed which will provide more support to the existing empirical research in the field.
- Case studies are also performed in different contexts and each context is mentioned in detail..
- Scope of research is specified clearly i.e. authors mentioned that the results are applicable only within the specified context.
- Various Threats to validity are discussed.
- Varying context for the projects are described.

Weakness:

- The details of the other project which is following non TDD approach is not detailed in specific. For example in IBM case study it is not mentioned whether other project is also distributed or not.
- The compared projects are varying in size and also there is no mention of requirement change for any of the compared projects. These factors may have influence on the results.
- There is no monitoring for implementation TDD practice i.e. it is not guaranteed that developers stick to TDD all the time.
- It is mentioned that in Microsoft case studies a hybrid TDD approach is followed and also being assisted by some other tools (static analysis tool, fault injection tools etc.). But it is not clear if these tools are also used in other non TDD project. There can be a chance that the improved quality could also be attributed to the tools usage.
- No clear mention of the development process being followed in these projects.
- The results are not validated by any other means.

Article 2:

Strengths:

- Very well description of case study and its context in terms of project and project teams.
- All measures are taken to ensure that only comparable projects are considered for the study.
- Extensive discussion of Threats to validity.
- Very well defined scope of research and mentioned that the results are valid in specific to context.
- Good justification given for choosing the metrics for quality.
- They also did surveys which supported the results and served as validation.
- Mentioned the development process in which TDD is applied.

Weakness:

- Scope of research is narrow and could not be generalized for other software projects except telecommunication projects.
- Small sample size would not facilitate to derive inferential statistics.

References

[1] N. Nagappan, E. M. Maximilien, T. Bhat, and L. Williams, "Realizing Quality Improvement Through Test Driven Development: Results and Experiences of Four Industrial Teams," *Empir. Softw Engg*, vol. 13, no. 3, pp. 289–302, Jun. 2008.

[2] T. Dogša and D. Batič, "The effectiveness of test-driven development: an industrial case study," *Softw. Qual. J.*, vol. 19, no. 4, pp. 643–661, Dec. 2011.