

APPLICABILITY OF AGILE PROJECT MANAGEMENT FOR CONSTRUCTION PROJECTS

P.M.W.P.Kumara

128265x

Degree of Master of Business Administration in Project Management

Department of Civil Engineering

University of Moratuwa

Sri Lanka

April 2017

APPLICABILITY OF AGILE PROJECT MANAGEMENT FOR CONSTRUCTION PROJECTS

P.M.W.P.Kumara

128265x

Dissertation submitted in partial fulfillment of the requirements for the
Degree of Master of Business Administration in Project Management

Department of Civil Engineering

University of Moratuwa
Sri Lanka

April 2017

DECLARATION OF THE CANDIDATE AND SUPERVISOR

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also, I hereby grant to the University of Moratuwa the non-exclusive right to reproduce and distribute my thesis/dissertation, in whole or in part in print, electronic or another medium. I retain the right to use this content in whole or part in future works (such as articles or books).

P.M.W.P.Kumara
(128265X)

Date:

The above candidate has carried out research for the Masters/MPhil/Ph.D. thesis/
Dissertation under my supervision.

Prof. Asoka Perera

Date:

Senior Lecturer,

Department of Civil Engineering

University of Moratuwa.

ABSTRACT

Project management is today a current and highly discussed area. Projects within the construction industry are managed has not changed significantly during the last decades. The construction industry, the number of different actors and the way that projects are procured today has however changed. This has led to a gap between the managerial view on how construction projects should be conducted today and how they actually are executed. This is reason enough to question this conservative industry and look into what possibilities there might be in the future. Using agile methodologies have numerous advantages over the classical methods used in project management in construction projects. However, their characteristics make them appropriate to be applied to projects in other areas.

Project management in the information systems industry has had a poor record of delivering value and has consequently seized upon the recent evolution of agile project management. The meaning of the agile project management, from whence it originated and whether it has further applicability, are not widely understood. The construction industry also might benefit from the adoption of agile project management. A literature review has established that agile project management does indeed offer significant improvements and that the construction industry might also potentially benefit. In order to resolve to an agile theory, the underlying rationales for agile have been explored, leading to the identification of further promising research. The agile methodologies are suited for projects with high complexity and uncertainty. It is also suitable to work in agile ways when a project has unclear specifications, changing situations, complex project goals and results needs to be achieved continually or early in the project process.

In order to this study is focused on establishing the possibility of applying the scrum method in construction project management. The compatible scrum framework is identified for construction projects as a result of the literature review. A case study is conducted by following the model outputs, and then reviews the possibility of establishing the scrum roles, meetings and artifacts. An expertise review is referred to validate and generalize the case study output to construction project management. Even though the case study highlighted the positive possibilities to establish scrum methods in construction project management, the expertise review is not positively resulted.

Keywords: Construction Project Management, Agile Project Management, Scrum Method

ACKNOWLEDGEMENTS

Many have helped me in making this research a success. Guidance and assistance given by my research supervisor Prof Asoka Perera are highly appreciated and I am extremely grateful for the support given by him during the research and academic period. I would like to express my gratitude to all the lecturers, the academic and non-academic staff of the University of Moratuwa who helped me in numerous ways during the academic period.

I would especially like to thank Mr. Shanaka de Silva, vice president-professional development of PMI Colombo chapter who opened my thought in this research area.

I am thankful to the team members of DRR unit of UN-Habitat Sri Lanka, Architect Chamara Liyanage, Team members of Balangoda municipal council and the team of Sam Dam Construction for the greatest support to implement the basic concept of scrum management to the Dorawela oya Project which I selected as my case study for this research.

Finally, I would like to thank my family members and friends for their patience, encouragement, and assistance in making this research a reality.

Thank You.

P.M.W.P.Kumara.

TABLE OF CONTENTS

DECLARATION OF THE CANDIDATE AND SUPERVISOR.....	i
ABSTRACT	ii
ACKNOWLEDGEMENTS	ii
LIST OF FIGURES	vii
LIST OF TABLES	viii
LIST OF ABBREVIATIONS	x
CHAPTER 1.BACKGROUND OF THE STUDY	1
1.1. Introduction	1
1.1.1. Construction industry	1
1.1.2. Agile project management	3
1.1.3. Scrum method	4
1.2. Objective	5
1.3. Methodology.....	5
CHAPTER 2.LITERATURE REVIEW	7
2.1. Introduction	7
2.2. Construction Industry	8
2.3. Construction Projects	9
2.3.1. Overview	9
2.3.2. Stakeholders in construction project	10
2.4. Problem in Construction Projects.....	11
2.5. Traditional/Waterfall Project Management.....	12
2.5.1. History.....	12
2.5.2. Traditional Project Management- Iron Triangle	13
2.5.3. Traditional/Waterfall Management-Theoretical Framework.....	14
2.6. Traditional Construction Project Management	14
2.7. Residential Construction	15

2.8.	Challenges for Traditional Construction Project Management.....	15
2.9.	Agile Project Management.....	17
2.10.	History of Agile Project management	18
2.11.	Agile over Traditional Project Management	21
2.12.	Scrum Method	23
2.12.1.	Scrum Overview	23
2.12.2.	Scrum framework.....	24
2.12.3.	Scrum Roles.	24
2.12.4.	Events.....	28
2.12.5.	Artifacts.....	33
2.12.6.	Progress Monitoring.....	35
CHAPTER 3.METHODOLOGY		39
3.1.	Introduction	39
3.1.2.	Research Philosophy	39
3.1.3.	Approach.....	40
3.1.4.	Choice	41
3.2.	Selection Of the Methodology	42
CHAPTER 4.MODEL DEVELOPMENT.....		43
4.1.	Traditional Scrum model.....	43
4.2.	Traditional Scrum model.....	43
4.2.1.	Scrum Roles	44
4.2.2.	Scrum Meetings	45
4.2.3.	Scrum Artifacts	48
4.2.4.	Scrum Phases	49
4.2.5.	Traditional Scrum model	50
4.3.	Scrum Model And Traditional Construction Management.....	50
4.4.	Proposed Scrum Model For Construction Project Management.....	52
CHAPTER 5.CASE STUDY		55
5.1.	Background	55
5.2.1.	Introduction.....	56

5.2.2.	Managerial Approach.....	58
5.2.3.	Cost of Element.....	65
5.2.4.	Set the time period	65
5.2.5.	Scrum framework.....	66
5.2.5.1.	Artifacts	66
5.2.5.2.	Roles	67
5.2.5.3.	Events	68
5.3.	Expert Review	69
5.3.1.	Introduction.....	69
5.3.2.	The Methodology for Expert Review	69
5.3.3.	Selection of Expert Review sample	70
5.3.4.	Data Analysis	71
5.3.4.1.	Introduction	71
5.3.4.2.	Raw Data	71
5.3.4.3.	Data Analysis	71
5.3.4.3.1.	Respondents Summary	71
5.3.4.3.2.	Awareness of Agile Project Management (APM).....	72
5.3.4.3.3.	Analysis on PM Practice In Construction Industry	73
5.3.4.3.4.	Participant responds on Project Documents.....	74
5.3.4.3.5.	Team members of construction project	76
5.3.4.3.6.	Participants responds about project meetings	77
5.3.4.3.7.	Comparison of Participant responds	79
5.4.	Summary of the chapter	80
CHAPTER 6: CONCLUSION AND RECOMMENDATION		81
6.1.	Introduction	81
6.2.	Conclusions and implications.....	81
6.3.	Recommendations and Limitations for future research	85
BIBLIOGRAPHY		87
APPENDIX A- QUESTIONNAIRE FOR EXPERT REVIEW		94
APPENDIX B: PHOTOGRAPHIC EVIDENCE OF CASE STUDY.....		100

LIST OF FIGURES

Figure 1: Iron/Golden Triangle	13
Figure 2: Model of Waterfall Management	14
Figure 3: Conceptual differences between TPM and APM.....	23
Figure 4: sample Sprint Burndown Chart	37
Figure 5: Sample of Product Burndown Chart	37
Figure 6: The Research Onion	39
Figure 7: Research Methodology	42
Figure 8: Typical Scrum Model	43
Figure 9: Scrum Flow	45
Figure 10: Traditional Scrum Model	50
Figure 11: Along the Dorawela Oya.....	56
Figure 12: The Master Plan.....	57
Figure 13: Respondent perceive on APM to the Construction Industry	72
Figure 14: Participants responds to possibility of prioritizing the client needs in construction industry	74

LIST OF TABLES

Table 1: Comparative chart – Traditional Vs. Agile.....	3
Table 2: Different Agile Management Models	21
Table 3: Differing views on Project Management from Traditional and Agile approaches.....	22
Table 4: Research Approach	40
Table 5: Research Choice	41
Table 6: Scrum Roles.....	44
Table 7: Scrum Meetings	46
Table 8: Scrum Artifacts	48
Table 9: Relationship of elements between scrum Model and traditional project management	50
Table 10: Scrum Phases vs Traditional Construction Management process	51
Table 11: Scrum Model for CPM	53
Table 12: Proposed Scrum model for CPM.....	54
Table 13: Elements of First phase.....	57
Table 14: Ranking the elements.....	59
Table 15: Prioritized List	60
Table 16: Summary of First Element Work Done	60
Table 17: Summary after implement of first Element	61
Table 18: New Prioritized List.....	61
Table 19: Summary after implement of Second, Third and Fourth Element.....	62
Table 20: Summary of third element	62
Table 21: Summary after implement of third element.....	63
Table 22: Summary of fourth element	63
Table 23: Summary after implement of fourth element.....	63
Table 24: Summary of fifth element.....	63

Table 25: Summary after implement of fifth element	64
Table 26: Summary of sixth element	64
Table 27: Summary after implement of sixth element.....	64
Table 28: The time flow of the project	66
Table 29: Relationship between Project Artifacts and Scrum Artifacts	67
Table 30: Scrum Role and Stakeholder Relationship	67
Table 31: Relationship with scrum Events and Project meeting	68
Table 32: The Respondents summary	71
Table 33: Respondents representing party	72
Table 34: Participant Responds on Project Scope and Client interest on Project Cost and Project time	73
Table 35: Participant responds about Present practice of project documents.....	75
Table 36: Participant perception about Project Documents behavior of APM.....	76
Table 37: Participant responds about the construction project team	76
Table 38: Participants responds of Project meetings	77
Table 39: Participants expectation about Project meetings	78
Table 40: APM aware participant responds on APM relevant descriptions	79

LIST OF ABBREVIATIONS

PM	-	Project Management
TPM	-	Traditional Project Management
APM	-	Agile Project Management
CPM	-	Construction Project Management
DRR	-	Disaster Risk Reduction
XP	-	Extreme Project
WBS	-	Work Breakdown Structure
PBS	-	Project Breakdown Structure
IT	-	Information Technology
GDP	-	Gross Domestic Products
US	-	United State
DOE	-	Department Of Energy
FDA	-	Food and Drug Administration
ROI	-	Return on Investment
STOMC	-	Senior Technical Officer Municipal Council
CONS	-	Consultant
CONT	-	Contractor