

**SPATIAL FACTORS CONTRIBUTING TO THE TIME  
MANAGEMENT OF CONSTRUCTION WORKERS AT  
CONSTRUCTION SITES**

Keeniyagamalage Sangeetha Udamali De Silva

(189596B)

Degree of Master of Science in Project Management

Department of Building Economics

University of Moratuwa

Sri Lanka

December 2021

**SPATIAL FACTORS CONTRIBUTING TO THE TIME  
MANAGEMENT OF CONSTRUCTION WORKERS AT  
CONSTRUCTION SITES**

Keeniyagamalage Sangeetha Udamali De Silva

(189596B)

Thesis/Dissertation submitted in partial fulfillment of the requirements  
for the degree Master of Science in Project Management

Department of Building Economics

University of Moratuwa

Sri Lanka

December 2021

## DECLARATION

I declare that this is my own work and this thesis 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 University of Moratuwa the non-exclusive right to reproduce and distribute my thesis/dissertation, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

.....

K.S.U De Silva

.....

Date

The above candidate has carried out research for the Master's thesis under my supervision.

.....

Ch. QS Prof. (Mrs.) B.A.K.S. Perera

Dissertation Supervisor

.....

Date

# **Spatial Factors Contributing the Time Management of Construction Workers at Construction Sites**

## **ABSTRACT**

Inefficient time management of construction workers at construction sites often leads to waste of money, unnecessary disputes and quality reductions of the project. Even though, many researchers try to find roots to these time losses and management strategies to overcome these construction delays, attention paid for spatial factors in construction sites and their contribution for efficient time management within construction sites is at a minimal level. Further, the construction sites tend to have robust spaces which are changing day by day with complex needs of clients. Therefore, this research is aimed at investigating the management of spatial factors contributing to time management of construction workers at site. Qualitative research approach was occupied for the study. Semi-structured interviews and case studies were selected as the data collection methods to attain the aim of the study. The empirical data collected from sixteen interviews were verified through three case studies and analyzed with the use of manual content analysis. Further, this allowed for data triangulation which helped to develop a comprehensive understanding of the phenomena. Spatial factors which contribute effective time management of construction workers at site, the way they contribute and strategies to manage those spatial factors were identified through literature review and interviews. How those strategies influence on effective time management of construction workers were solely identified through the interviews and then all these findings were verified via case studies. Findings implied the importance of introducing the concept of spatial management to the construction industry. Implementation of regulations, increasing awareness and implementing more studies in this field can be a solution for construction delays as it increases the efficiency of construction workers. Spatial factor management related studies are hardly found in any context. This study can be used as a benchmark study for further in-depth research studies in the area.

**Key Words:** *Spatial factors, Time management, Construction workers, Construction sites*

# DEDICATION

## **TO MY PARENTS**

*For raising me to believe that any dream is possible...*

## **TO MY HUSBAND**

*For encouraging me to follow any dream I wish...*

## **ACKNOWLEDGEMENT**

This research study embraces dedication and assistance received from many people, who contributed in plentiful ways to ensure the success of the final output.

First and foremost, I pay my heartiest gratitude to my thesis supervisor, Ch.QS.Prof. (Mrs.) B.A.K.S. Perera for her valuable guidance, advice and encouragement given to me at all times to make this research a success. I am indebted to my supervisor for steering me in the right direction throughout the process.

I would also like to acknowledge the Head of the department, Ch. QS. Suranga Jayasena, former Head of the department, Prof. (Mrs.) Yasangika Sandanayake, Programed Director Ch.QS Indunil Seneviratne and all the staff members of the Department of Building Economics, University of Moratuwa for the immense assistance and guidance during the course of this research and throughout the my academic career. My sincere gratitude is also extended towards all the members of non-academic staff of the Department of Building Economics for their support.

Furthermore, I express my indebtedness to all the experts who were involved in interview series, sharing their valuable knowledge and experience. Without their passionate participation and input, the study could not have been successfully conducted. I would like to thank my beloved parents, my family, my friends and all my well-wishers for supporting me in countless ways throughout this dissertation and my life.

De Silva K.S.U

September 2021

## TABLE OF CONTENTS

Declaration .....	i
Abstract .....	ii
Dedication .....	iii
Acknowledgement.....	iv
List of figures .....	ix
List of tables .....	x
List of appendices.....	xi
1. Introduction.....	1
1.1. Background.....	1
1.2. Research problem .....	3
1.3. Aim and Objectives .....	4
1.4. Methodology.....	4
1.4.1. Literature Review .....	4
1.4.2. Case study survey .....	5
1.5. Chapter Breakdown .....	6
1.5.1. Chapter 1: Introduction.....	6
1.5.2. Chapter 2: Literature Review.....	6
1.5.3. Chapter 3: Methodology .....	6
1.5.4. Chapter 4: Findings and Analysis.....	6
1.5.5. Chapter 5: Conclusions and Recommendations .....	6
2. Literature survey .....	7
2.1. Introduction.....	7
2.2. What are the spatial factors?.....	7
2.3. Different Spatial Factors.....	8
2.4. Influence of spatial factors on human behavior.....	11

2.5.	Influence of spatial factors on time management .....	16
2.6.	Importance of Time Management in Construction Industry .....	21
2.7.	Importance of Time Management of Construction Workers.....	22
2.8.	How Spatial Factors Can Influence Workers in a Construction Site.....	23
2.9.	How to Manage Spatial Factors at Construction Sites .....	27
2.10.	Theoretical Framework .....	31
2.11.	Why Spatial Factor Management is Important for Construction workers to Achieve Better Time Management at construction sites.....	33
2.12.	Summary .....	34
3.	Research methodology .....	35
3.1.	Introduction.....	35
3.2.	Research Approach .....	35
3.2.1.	Available Research Approaches .....	35
3.2.2.	Selected Research Approach .....	36
3.3.	Research Strategy .....	37
3.3.1.	Available research strategies .....	37
3.3.2.	Selected Research Strategies .....	37
3.4.	Research Methods.....	38
3.4.1.	Available Research Methods .....	38
3.4.2.	Selected Research Methods .....	38
3.5.	Data Analyzing Techniques.....	39
3.5.1.	Manual Content Analysis.....	40
3.6.	Research Process.....	40
3.7.	Summary.....	41
4.	Findings and analysis .....	42
4.1.	Introduction.....	42



4.2.	Findings and analysis of the interviews.....	42
4.2.1.	Objectives of the Interviews .....	43
4.2.2.	Profile of Interviewees.....	43
4.2.3.	Identifying Spatial Factors that Can Influence Time Management of Construction Workers at Site. ....	45
4.2.4.	How spatial factors influence time management of construction workers at site .....	49
4.2.5.	Management strategies to manage the spatial factors which influence time management of construction workers at site and how those management strategies can improve time management of construction workers at site.....	53
4.3.	Findings and Analysis of Case Studies.....	60
4.3.1.	Objectives of the Case Study .....	60
4.3.2.	Case Study Selection Criteria .....	60
4.3.3.	Brief Background Details of the Case Studies.....	60
4.3.4.	Details of Case Study Interviewees .....	61
4.4.	Case Study Observations .....	61
4.4.1.	Spatial factors that can influence time management of construction workers at site. ....	61
4.4.2.	How spatial factors influence time management of construction workers at site .....	66
4.4.3.	Spatial factor management strategies and how these strategies can improve time management of construction workers.....	70
4.5.	Pattern Matching for the Research Study .....	77
4.5.1.	Spatial factors that can influence time management of construction workers at site. ....	77
4.5.2.	How spatial factors influence time management of construction workers at site. ....	80

4.5.3.	Spatial factor management strategies and how they influence time management of construction workers at site. ....	83
4.6.	Summary .....	85
5.	Conclusion and recommendations .....	86
5.1.	Introduction.....	86
5.2.	Overview of Objectives Achieved in the Study.....	86
5.2.1.	Objective 1- Identify the concept of spatial management .....	86
5.2.2.	Objective 2- Identify the spatial factors, which affects for effective time management in Construction sites. ....	86
5.2.3.	Objective 3- Identify the consequences of these factors to construction projects .....	87
5.2.4.	Objective 4- Propose strategies to manage the spatial factors, and investigate how the strategies can improve time management of construction workers at site. ....	87
5.3.	Recommendations.....	88
5.4.	Contribution .....	89
5.5.	Limitations .....	89
5.6.	Further Research .....	90
References	.....	91
Appendix A:	Semi-structured interview guideline.....	110
Appendix B:	Expert interview guideline.....	117

## LIST OF FIGURES

Figure 2. 1; Theoretical framework.....	32
Figure 3. 1; Research process.....	40

## **LIST OF TABLES**

Table 2. 1; Different spatial factors introduced by past researchers.....	8
Table 2. 2; Influence of spatial factors on human behavior.....	12
Table 2. 3; Influence of spatial factors on time management.....	17
Table 2. 4; Spatial factor management strategies.....	27
Table 3. 1; Available research approaches.....	36
Table 4. 1; Details of interviewees.....	44
Table 4. 2; Spatial factors which influence time management of construction workers at site.....	45
Table 4. 3; How spatial factors influence on time management of construction workers at site.....	49
Table 4. 4; Spatial factor management strategies and how they can improve time management of construction workers at site.....	53
Table 4. 5; Brief background details of the case studies.....	60
Table 4. 6; Details of case study interviewees.....	61
Table 4. 7; Spatial factors that can influence time management of construction workers at site.....	62
Table 4. 8; How spatial factors influence time management of construction workers at site.....	67
Table 4. 9; Spatial factor management strategies and how these strategies can improve time management of construction workers.....	71

## **LIST OF APPENDICES**

Appendix A: Semi-Structured Interview Guideline.....	110
Appendix B: Expert Interview Guideline (Case Studies) .....	117