LABOUR PRODUCTIVITY IN BUILDING CONSTRUCTION INDUSTRY

UNIVERSITY OF MORATUWA, SRI LANK.

PDHD Gunawardana

(08/8875)



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

University of Moratuwa

102495

Department of Civil Engineering

624°11″ 69:005-8(043)

TH

University of Moratuwa

Sri Lanka

102495

February, 2011

102495

Declaration

I certify that this dissertation does not incorporate, without acknowledgement, any material previously submitted for a degree or diploma in any university and to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text.

Signature of Candidate: Date:/

P.D.H.D Gunawardana

Department of Civil Engineering, University of Moratuwa.

I certify that the above declaration is true and correct to the best of my knowledge

Signature of Supervi

Dr. Rangika Halwatura, WWW.lib.mrt.ac.lk Department of Civil Engineering, University of Moratuwa.

Abstract

The concept of construction productivity began in the early 20th century with a series of time and motion studies to improve bricklaying operations. However, it still remains an interesting and a dominant issue in the construction industry, promising cost-savings, timely delivery and efficient usage of resources. Productivity is directly linked to motivation, and motivation is, in turn dependent on productivity. Suitable motivation is, therefore, a contributor to maximizing workers' productivity. The low motivation of construction workers has contributed significantly to the declining productivity that cannot be determined in the construction industry. The study seeks to unravel the factors that affect construction workers' motivation and the corresponding effect of the identified motivational factors on workers' performance and overall productivity. Fifty six factors which usually affect on motivation and productivity were obtained from preliminary survey and review of literature.

Purposive sampling was comployed to select the select the select the select of contractors due to the engagement of large number of workers as well as the volume of works undertaken. The sample size was determined from the research publications and 278 were selected as a representative sample, become on statistical theory of sampling.

A total of 278 questionnaires were administered for the survey. To the above sample out of which 264 responses were obtained representing 94.96% response rate. The survey revealed that, among the top ten critical factors (i.e. medical care, supervision, canteen facilities, on time payments, over time had great effect on motivation as well as impact on productivity. More so communication, love and belongingness, job security, accommodations, were among the critical factors. Considering the research findings, motivational recommendations were made to enhance productivity of workers.

Acknowledgement

My profound gratitude goes to the Director Civil Engineer, Air Commodore Ajith Abesekara for the guidance and help given me throughout this programme especially in hard times. I further appreciate the immerse efforts guide lines supervision with encouragement from my supervisors, Dr. Rangika Halwatura and without whom this work would not have materialized. Gratitude also goes to Dr. Asoka Perera and Dr. Lesly Ekanayaka for their inputs and directions. I also thank my loving wife Mrs. Dilini Buddhika for the support and love she have shown towards my education career to date.

Further wish to express appreciation for the workers as well as the project managers who are working at VV Karunarathna Construction company, Arsiri Construction company, Maga Construction company and Sierra Construction company for their immerse support through this study to gather relevant information's.

University of Moratuwa, Sri Lanka.

Finally, I cannot forgete the call the staff of Civils Engineering Department of the University of Moratuwa for their immense support extended for me in all ways.

Hasitha Gunawardana

Table of Contents

ict wled	lgement	i ii
er 1		
.1	Background	12
.2	·	
.3	Problem Statement	15
.4	Justification of Study	16
.5	Aim and Objectives	18
.6	Research Methods and Design	19
.7	Scope and Limitation	20
.8	Organization of Chapters	20
.9	Chapter Summary	21
er 2 .1	Taken Anna's a	22
.2	Factors Affecting Productivity	23
.2.1	The Role of Management	26
.2.2	Work Environment	27
.2.3		
.2.4	The Role of Foremen	28
2.3	Motivation in the Construction Industry and Its Effect on Productivity.	30
2.3.1	Maslow's Hierarchy of Needs Theory	32
2.3.2	Alderfer's Need Modified Theory	35
2.4	Case Study for Tool time Investigations in Canada	36
2.4.1		
2.4.2		
2.4.3	Ten week Testing Model	39
2.4.4		
2.4.5	•	
2.4.6	-	
2.4.7		
2.4.8	•	
2.4.9		
	er 1 .1 .2 .3 .4 .5 .6 .7 .8 .9 er 2 .1 .2.2 .2.3 .2.4 .3 .3.1 .3.2 .4.4 .4.1 .4.4.2 .4.4.3 .4.4.5 .4.4.5 .4.4.5	are 1 INTRODUCTION

2.4.10	Multi-Project Management	44
2.4.1	Predicting Changes	45
2.4.12	2 Motivation Model	45
2.4.13	3 Visualization Centre	46
2.5	Chapter Summary	46
Chapter 3	RESEARCH METHODS AND DESIGN	48
3.1	Introduction	48
3.2	Survey	
3.3	Design of questionnaire	
3.3.1	Sampling Technique and sample sizing	50
3.3.2	Administering of Questionnaires	51
3.3.3	Data analysis tools	52
3.3.3.	1 Index	52
3.3.3.	2 Correlation analysis	53
3.4	Chapter Summary	54
Chapter 4	FINDINGS AND DATA ANALYSIS	
4.1	Introduction	
4.2	Survey Findings	55
4.3	Demographic Variables Theses & Dissertations	55
4.4	Factors affecting motivation and productivity	
4.5	Analysis of Top Ten factors: Severity Index with the Workers Trad	
4.6	Group Demographic variables	
	Motivational strategy	
4.7	Herzberg's Dual Factor Theory	
4.8	Alderfer Need Modified Theory	
4.9	Chapter Summary	
CHAPTEI 5.1	R 5 RESEARCH CONCLUSION AND RECOMMENDATION Introduction	
5.2	Summary of findings	77
5.3	Conclusion	79
5.4	Recommendation	80
References	s	82
Appendix-		
Appendix-		
Appendix-	, -	

List of Figures

Figure 2-1 Needs and Expectations of people at work (Mullins, 2005)	.31
Figure 2-2 Maslow's hierarchy of need model (Mullins, 2005, Bloisi et al, 2003)	.34
Figure 2-3 Tool time investigation for form work	.36
Figure 2-4 Tool time investigation for Slab work	36
Figure 2-5 Tool time investigation for Scaffolding work	37
Figure 3-1 Number of questionnaires distributed	
Figure 4-1 Number of sent, received and responsive questionnaires	55
Figure 4-2 Respondents	56
Figure 4-3 Age Level of respondents	56
Figure 4-4 Educational Level of respondents	
Figure 4-5 Skill Level of respondents	57
Figure 4-6 Years of experience of respondents	57
Figure 4-7 Job type of respondents	57
Figure 4-8 Severity Index variations with the Trade of Workers (Medical Facilities	s)
	61
Figure 4-9 Severity Index variations with the Workers Age Group (Medical	
Facilities)	
Figure 4-10 Severity Index variations with the Trade of Workers (Supervision)	
Figure 4-11 Severity Index variations with the Workers Age Group (Supervision)	63
Figure 4-12 Severity Index variations with the Trade of Workers (On-time paymen	
Electronic Theses & Dissertations	64
Figure 4-13 Severity Index variations with the Workers Age Group (On-time	
payment)	
Figure 4-14 Severity Index variations with the Trade of Workers (Overtime)	
Figure 4-15 Severity Index variations with the Workers Age Group (Overtime)	
Figure 4-16 Severity Index variations with the Trade of Workers (Canteen Facilities)	
	66
Figure 4-17 Severity Index variations with the Workers Age Group (Canteen	
Facilities)	
Figure 4-18 Severity Index variations with the Trade of Workers (Social Activities	
	68
Figure 4-19 Severity Index variations with the Workers Age Group (Social Activit	•
Figure 4-20 Severity Index variations with the Trade of Workers (Job security)	
Figure 4-21 Severity Index variations with the Workers Age Group (Job security)	
Figure 4-22 Severity Index variations with the Trade of Workers (Accommodation	
Figure 4.22 Severity Index varieties with the Westers Age Crown	/0
Figure 4-23 Severity Index variations with the Workers Age Group	70
(Accommodation)	
Figure 4-24 Severity Index variations with the Trade of Workers (Communication	•
Figure 4-25 Severity Index variations with the Workers Age Group (Communication)	,
	/ 1

Figure 4-26 Severity Index variations with the Trade of Workers (Love and	
pelongingness)	72
Figure 4-27 Severity Index variations with the Workers Age Group (Love and	
pelongingness)	72



List of Tables

Table 1-1 Main Economic Indicator	14
Table 4-1 Top Ten Factors affecting on labour productivity (F.I Factors)	58
Table 4-2 Top Ten Factors affecting on labour productivity (I.I Factors)	59
Table 4-3 Top Ten Factors affecting on labour productivity (S.I Factors)	59
Table 4-4 Top Ten Motivational Factors affecting on labour productivity	73
Table 4-5 Classification of established factors under Herzberg's Dual factor Theorem	ry
	75
Table 4-6 Classification of established factors under Alderfer's Need modified	
Theory	76
Table 5-1 Top Ten Motivational Factors affecting on labour productivity	



ABBREVIATIONS AND ACRONYMS

Total Quality Management	(TQM)
Total Quality Control	(TQC)
International Organization for Standardization	(ISO)
Gross domestic product	(GDP)
Construction Monitoring and Visualization Center	(CMVC)

