

UNIVERSITI TEKNOLOGI MARA

**ESTABLISHMENT OF COST-BENEFIT
ANALYSIS (CBA) SUSTAINABLE
INDICATORS FOR INDUSTRIALISED
BUILDING SYSTEM (IBS) PROJECTS:
BEST PRACTICE**

SITI NUR ATIKAH BINTI ABD RASHID

MSc

September 2021

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student : Siti Nur Atikah Binti Abd Rashid

Student I.D. No. : 2017637206

Programme : Master of Science (Green Architecture) – AP763

Faculty : Faculty of Architecture, Planning and Surveying

Thesis Title : Establishment of Cost-Benefit Analysis (CBA)
Sustainable Indicators for Industrialised Building
System (IBS) Projects: Best Practice

Signature of Student :

Date : September 2021

ABSTRACT

Sustainable development implicates satisfying the demands of the current population without endangering the capability of future population to meet their own needs. Many approaches were introduced to sustainable development which aimed to overcome the emergence of environmental issues in construction such as toxic generation, dust generation, and abundant construction waste. One of the sustainable approaches to help in minimising this problem, in construction is by using the Industrialised Building System (IBS) method. This method offers benefits such as reducing construction waste, lessening the construction time, minimising energy and water usage, decreasing the number of workers many and more. Regardless of the plethora of benefits, the adoption of IBS in Malaysia is still low mainly because of the cost itself. Hence, to promote the project's viability via IBS, ideally, the benefits from adopting the method should be more reliable if they are presented in tangible (monetary) and intangible (non-monetary) value rather than descriptive, as this will subsequently contribute to gaining more interest for practitioners to choose IBS method, then increase the adoption of IBS in Malaysia. Relatively, there is a little attempt of studies in the measure of intangible or non-monetary criteria related to the benefit of IBS which critically requires a uniform indicator to standardise the measurement of intangible cost for IBS project. Therefore, cost-benefit analysis (CBA) can be used in order to identify the soft issues or intangible issues and elicit more transparency in IBS project. The study is aimed to establish the best practice incorporating sustainable indicators of CBA for IBS projects. The objectives of this study are to identify the indicators of CBA for IBS projects, to determine the rank of the CBA indicators for the viability of IBS toward sustainability, and to establish the best practice incorporating sustainable indicators of Cost-Benefit Analysis (SICBA) for IBS buildings. A quantitative approach is used in this study by using a questionnaire survey as the main instrument. The purposive sampling method is utilised to distribute the questionnaire to the respondents, comprises 30 suppliers of the IBS precast concrete system in Selangor and Kuala Lumpur. The survey has revealed that there are 31 indicators (11 monetary and 20 non-monetary) which can be emphasised as gaining the interest of the construction practitioner to adopt IBS. The top five most high rank in monetary indicators are the initial cost, compliance cost, operating cost, return of investment (ROI) and capital revenue income. It was also found that time, production, schedule, efficiency and buildability are the top five most high rank of the non-monetary benefits of IBS. This research proposed that the CBA model is one of many effective decision-making approaches to increase the adoption of IBS and its suitability towards sustainability in construction. It is hoped the result provides better guidance for the practitioners, such as government, developers, contractors and others to be aware of the crucial benefits of IBS, which is not only measured through tangible value but to also consider the non-tangible factors.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my MSc and for the good health that was necessary to complete this long and challenging journey. My sincere gratitude to my supervisor Sr Dr Natasha binti Khalil and co-supervisor, Associate Professor Sr Dr Haryati binti Mohd Isa for the continuous support of my MSc study and related research, for their patience, motivation, and immense knowledge. Their guidance helped me in all the time of research and writing of this thesis. I could not have imagined having better advisors for my MSc study.

My appreciation goes to the Universiti Teknologi MARA (UiTM) Seri Iskandar Campus for providing me with all the necessary facilities for the research. Special thanks to my colleagues and friends who helped me to complete this journey.

I take this opportunity to express gratitude to both of my parents and parents in law and also my family for the unceasing encouragement, support and attention. I am also grateful to my husband who supported me through this venture.

Last but not the least, my sincere thank you to one and all, who directly or indirectly, have lent their hand in this journey.

TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF SYMBOLS	xii
LIST OF ABBREVIATIONS	xiii
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Problem Statement	4
1.3 Research Questions	7
1.4 Research Aim and Objectives	7
1.5 Methodology	7
1.5.1 Phase 1: Preliminary Stage	9
1.5.2 Phase 2: Main Survey Stage	9
1.5.3 Phase 3: Establishment of Best Practice, Summary, Conclusions and Recommendations	9
1.6 Scope and Limitation of Study	10
1.7 Significance of the Study	11
1.8 Structure of the Thesis Chapters	11
CHAPTER TWO: LITERATURE REVIEW	13
2.1 Introduction	13
2.2 Overview of IBS	13
2.2.1 Definition of IBS	14
2.2.2 IBS Major System	14