



**UNIVERSITI PUTRA MALAYSIA**

***GREEN CONSTRUCTION AND AJZEN'S THEORY OF PLANNED  
BEHAVIOR: ASSESSING THE MOTIVATION***

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**GREEN CONSTRUCTION AND AJZEN'S THEORY OF PLANNED BEHAVIOR:**

**ASSESSING THE MOTIVATION**

**UPM**

By

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## ABSTRACT

Construction industry plays a significant role in economic contribution, somehow there also give significant impact to the environment. What did the construction give to the environment is the pollution that comes from various source such as Carbon Dioxide (CO<sup>2</sup>) gas emission, depletion of natural resources and depletion of ozone layer. Hence, green construction has been promoted in order to save the environment from any consequence of construction. However, it still fails at some point where there only few numbers of contractor that applying green construction in their project. This study will help to overcome the problem by identify the failure to keep the green construction being used in terms of Theory of Planned Behaviour (TPB), and finally will develop a framework to uplift the barriers. From this study, questionnaire survey will be used as a method to identify and collect all the data. Scope of study will be limit to G7 contractor at Wilayah Persekutuan area and those data will be use as material to complete the finding. The total number of questionnaire need to be distributed has been calculated and there will be 230 set of questionnaires will be distributed through e-mail and mail and expected to receive back at least 32 number of set of questionnaires. The data then will be analysed according to the Ajzen's theory and from that, the most potential barrier to implement green construction in contractor in Malaysia will be identify.

## ABSTRAK

Industri pembinaan memainkan peranan penting dalam sumbangan ekonomi, walau bagaimana pun masih ada memberi kesan yang besar kepada alam sekitar. Kesan pembinaan kepada alam sekitar adalah pencemaran yang datang dari pelbagai sumber seperti Karbon Dioksida (CO<sub>2</sub>) gas, pengurangan sumber semula jadi dan penipisan lapisan ozon. Oleh itu, pembinaan hijau telah diperkenalkan untuk menyelamatkan alam sekitar daripada sebarang akibat daripada pembinaan. Walau bagaimanapun, ia masih gagal pada satu ketika di mana terdapat hanya beberapa bilangan kontraktor yang menggunakan pembinaan hijau dalam projek mereka. Kajian ini akan membantu untuk mengatasi masalah ini dengan mengenal pasti kegagalan untuk memastikan pembinaan hijau terus digunakan dari segi Teori Tingkahlaku Dirancang (TPB), dan akhirnya akan membangunkan satu rangka kerja untuk menyelesaikan halangan. Dari kajian ini, soal selidik akan digunakan sebagai kaedah untuk mengenal pasti dan mengumpul semua data. Skop kajian akan menjadi had kepada kontraktor G7 di kawasan Lembah Klang dan data tersebut akan digunakan sebagai bahan untuk melengkapkan dapatan. Jumlah soal selidik perlu diedarkan telah dikira dan akan ada 230 set soal selidik akan diedarkan melalui e-mel dan mel dan dijangka menerima balik jumlah sekurang-kurangnya 32 set soal selidik. Data akan dianalisis mengikut teori Ajzen dan itu, halangan yang paling berpotensi untuk melaksanakan pembinaan hijau kontraktor di Malaysia akan mengenal pasti.

## TABLE OF CONTENTS

## TABLE OF CONTENTS

<b>APPROVAL FORM</b>	<b>II</b>
<b>DECLARATION FORM</b>	<b>III</b>
<b>ACKNOWLEDGEMENT</b>	<b>IV</b>
<b>ABSTRACT</b>	<b>V</b>
<b>ABSTRAK</b>	<b>VI</b>
<b>TABLE OF CONTENTS</b>	<b>VII</b>
<b>LIST OF FIGURES</b>	<b>X</b>
<b>1 INTRODUCTION</b>	<b>1</b>
1.1 Background of study	1
1.2 Problem statement	2
1.3 Research objectives and questions	3
1.4 Scope of work and limitations	3
1.5 Chapter summary	4
<b>2 LITERATURE REVIEW</b>	<b>5</b>
2.0 Introduction	5
2.1 Construction	5
2.2 Carbon Footprint	6
2.3 Green Construction	6
2.4 Theory of Planned Behaviour (TPB)	9
2.5 Chapter summary	11
<b>3 METHODOLOGY</b>	<b>12</b>
3.0 Introduction	12
3.1 Research Methodology	12
3.2 Research Design	13
3.3 Research Strategy	13
3.4 Questionnaire Development	14
3.5 Population Target	14
3.6 Data Analysis Method	15
3.7 Chapter Summary	18

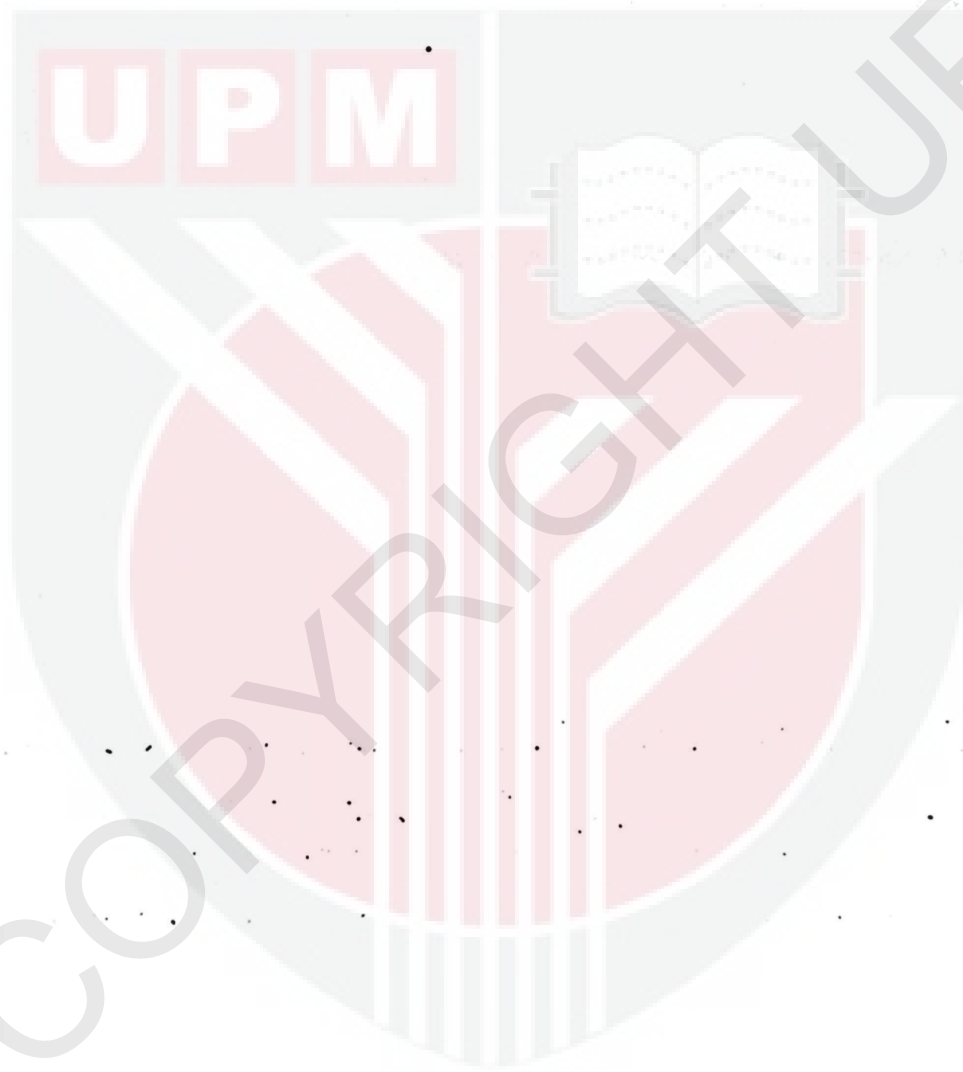
<b>4</b>	<b>RESULTS AND DISCUSSIONS</b>	<b>19</b>
4.0	Introduction	19
4.1	Pilot Survey	19
4.2	Descriptive Analysis	20
4.2.1	Characteristic of the sample	20
4.2.2	Section A - Behavioral Beliefs of the contractor towards Green Construction	22
4.2.3	Section B – Normative Beliefs of the contractor towards Green Construction	23
4.2.4	Section C – Control Beliefs of the contractor towards Green Construction	24
4.2.5	Section D – Problem to implement Green Construction	25
4.3	Reliability Test	28
4.4	Correlation Test	30
4.4.1	1 <sup>st</sup> Level Correlation Test	32
4.4.2	2 <sup>nd</sup> Level Correlation Test	33
4.4.3	3 <sup>rd</sup> Level Correlation Test	37
4.4.4	4 <sup>th</sup> Level Correlation Test	40
4.4.5	5 <sup>th</sup> Correlation test	42
4.5	Model Development	43
4.6	Discussion	44
4.6.1	Connection to the Theory of Planned Behaviour (TPB)	44
4.6.2	Assessing the TPB of contractor in Green Construction in Malaysia	45
4.6.3	Obstacles and barrier for Green Construction to be implement in Malaysia	46
4.6.4	Solution for Green Construction to be applied in Malaysia	46
4.7	Findings	47
4.8	Chapter summary	47
<b>5</b>	<b>CONCLUSIONS AND RECOMMENDATIONS</b>	<b>48</b>
5.0	Introduction	48
5.1	Conclusions	48
5.1.1	Assess TPB of contractor in green construction in Malaysia	48
5.1.2	Obstacles of contractor to apply green construction in Malaysia	49
5.1.3	Framework development for uplifting the barrier to implement green construction in Malaysia	49

5.3	Recommendations	50
6	REFERENCES	51
7	APPENDICES	56



## LIST OF FIGURES

Figure 2.1: Malaysia GDP from construction (Malaysia GDP from construction)	6
Figure 2.2: Policies and key practice related to environmental concerns in Malaysia (Bohari, 2015)	9
Figure 3.1: Framework of study	13
Figure 4.1: Cronbach's alpha of pilot study	20
Figure 4.2: Model Development	44



<b>Table 3.1 Analysis description</b>	<b>17</b>
<b>Table 4.1: Characteristic of sample</b>	<b>21</b>
<b>Table 4.2: Percentage of behavioral beliefs</b>	<b>23</b>
<b>Table 4.3: Percentage of normative beliefs</b>	<b>24</b>
<b>Table 4.4: Percentage of control beliefs</b>	<b>25</b>
<b>Table 4.5: Percentage of problem</b>	<b>27</b>
<b>Table 4.6: Cronbach's Alpha value description</b>	<b>29</b>
<b>Table 4.7: <math>\alpha</math> value for behavioral belief section</b>	<b>29</b>
<b>Table 4.8: <math>\alpha</math> value for normative belief section</b>	<b>30</b>
<b>Table 4.9: <math>\alpha</math> value for control belief section</b>	<b>30</b>
<b>Table 4.10: <math>\alpha</math> value for problem section</b>	<b>30</b>
<b>Table 4.11: 1st correlation test</b>	<b>33</b>
<b>Table 4.12: Correlation between NB5</b>	<b>34</b>
<b>Table 4.13: Correlation between CB4</b>	<b>36</b>
<b>Table 4.14: Correlation between CB1</b>	<b>38</b>
<b>Table 4.15: Correlation between CB3</b>	<b>39</b>
<b>Table 4.16: Correlation between CB6</b>	<b>41</b>
<b>Table 4.17: Correlation between NB3</b>	<b>42</b>
<b>Table 4.18: Correlation between NB5</b>	<b>43</b>

# CHAPTER 1

## INTRODUCTION

What will be discuss in this chapter are the general review of the study and the earlier part regarding to the study. It consists of background of study, problem statement, research objective, scope and limitation of the study.

### 1.1 Background of study

Construction sector is one of the most important part in economic contribution. This is because every construction will lead to development either in urban nor rural area. Various reviews have affirmed that around half of the interest in gross fixed capital formation is orchestrated by the development area in most creating nations. It assumes a huge part in making work openings and producing new salary hotspots for both talented and untalented individuals of the general public. This infers the development division is exceedingly incorporated with different sector in the economy through both in reverse and forward linkages and emphatically connected with numerous financial exercises. Henceforth the construction industry is frequently considered as a motor of financial development particularly in creating economies. The business can initiate and effectively devour privately delivered material and labor in the development and support of structures and frameworks to propel neighborhood work and enhance monetary proficiency (Khan, 2014). Somehow, improvement of the manufactured environment is anticipated to devastate regular living spaces and untamed life on more than 70% of the world's surface by 2032, and creating nations represent 23% of worldwide development exercises.

In Malaysia, the populace expanded to 28.3 million in 2010 from 23.3 million in 2000, making more interest for building and infrastructure advancement (Mohamad Bohari et al., 2015) . Hence, applying green construction method among the contractors is needed in order to fight back what construction has did to nature. The expression "green" is connected with various ideas, for example, "energy-efficient" and "sustainable" which share the point of making naturally cordial items and administrations. The Environmental Impact Assessment (EIA) process was additionally presented as a proactive device in the venture arranging and endorsement procedure to screen natural effects and as a method for relief. To assess the barrier for contractor to implement Green Construction, new method will be used which called as Theory of Planned Behaviour (TPB).

In TPB, there will be three different type of beliefs which are, normative beliefs, control beliefs, and behavioural beliefs. From those three types of beliefs, at the end, the barriers to implement Green Construction will be identify.

## **1.2 Problem statement**

Construction in Malaysia knowing as the main contribution to the economic growth. Somehow, construction in Malaysia currently lead to problematic issue towards environment. The construction industry additionally represents 33% of worldwide carbon dioxide outflows due to non-renewable vitality use, but somehow it needed (Ofori, 2015). Hence, the only way to overcome the problem is by make sure all the contractor applying green construction itself. Unfortunately, green construction is failing in Malaysia and there are few factors that causing failing happen. Thus, TPB will be introduced to discover and solve the problem.

### **1.3 Research objectives and questions**

The main objective of this study is to determine the barrier for Green Construction to be implement in Malaysia. To achieve this purpose, several research objectives and research questions are developed as below.

Research objectives are:

1. To assess TPB of contractor in Green Construction in Malaysia.
2. To determine the obstacles of contractor in green construction in Malaysia.
3. To develop framework for uplifting the barrier to implement green construction for contractor in Malaysia.

Research questions are:

1. What are the barriers among the contractors to implement green construction in Malaysia?
2. How can the barriers be uplifted in Malaysia?

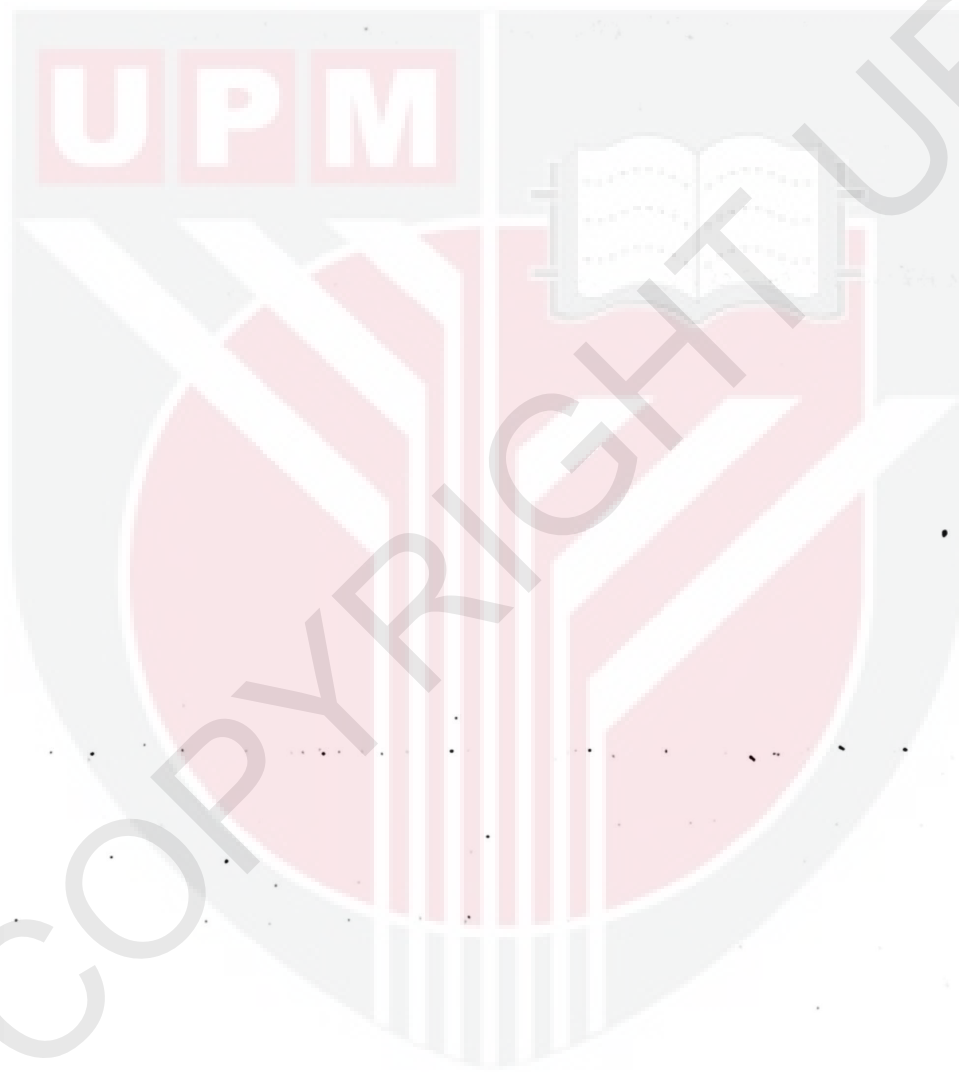
### **1.4 Scope of work and limitations**

The scopes and limitations of study are:

- i. The research will be cover for all the contractor with grade G7 only and for only at Wilayah Persekutuan area. From the CIDB web, characteristic of research will only cover for contractor in Building Construction Works (B04) sub category under category of Building Construction.
- ii. This research will only use Theory of Planned Behaviour (TPB) only in order to identify the most potential barriers. Hence, no other element will be included in this research.

## **1.5 Chapter summary**

In this chapter, there will be 3 main objective that need to be achieved in this research which are, to assess TPB of contractor in Green Construction in Malaysia, to determine the obstacles of contractor in green construction in Malaysia, and to develop framework for uplifting the barrier to implement green construction for contractor in Malaysia. The research also have scope and limitation where only discover among G7 contractor at Wilayah Persekutuan area and will only use TPB as the research tools.



## CHAPTER 2

### LITERATURE REVIEW

#### 2.0 Introduction

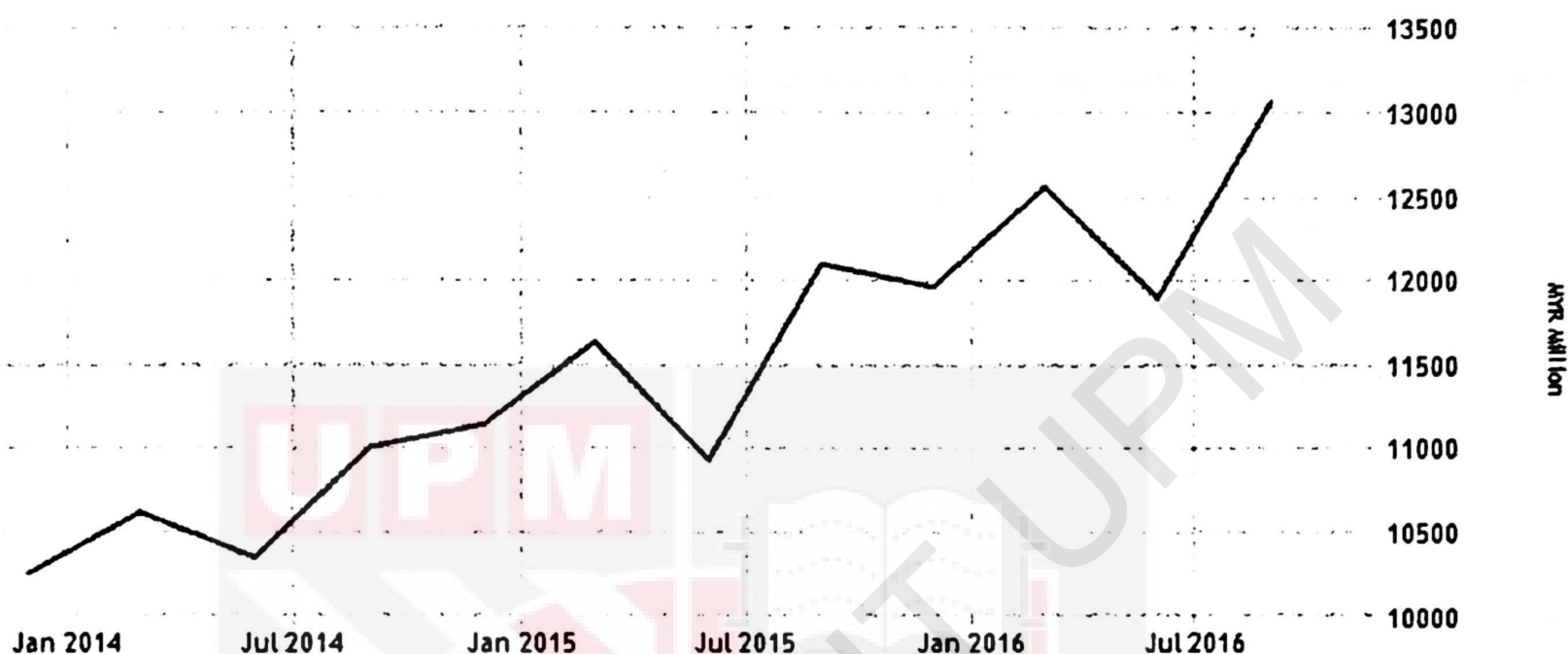
This section will describe overview of study regarding to assess the barrier among the contractor to implement green construction in terms of TPB.

#### 2.1 Construction

Without a key, there will be no entry. Without a great development in a country, there will be no source of economical income. Various reviews have affirmed that around half of the interest in gross fixed capital development is organized by the construction segment in most forward nations. It assumes a huge part in making work openings and producing new wage hotspots for both gifted and untalented individuals of the general public. Hence the variety in development segment and its exercises have extraordinary effect on all parts of human life. The construction part is an essential and beneficial sector of the Malaysian economy. As a developing country Malaysia has understood the vital part of the construction division in financial development as well as in enhancing the personal satisfaction and expectations for everyday comforts of Malaysian individuals. Throughout the most recent two decades it has been contributing between 3 to 5 percent of the total economy GDP. The development blast in Malaysia started in mid 1990s, soon after the dispatch of Vision 2020 (Mohamad Bohari et al., 2015). It can be said that Gross domestic product From Construction in Malaysia expanded to 13062 MYR Million in the second from last quarter of 2016 from 11899 MYR Million in the second quarter of 2016. Gross domestic product From Construction in Malaysia arrived at the average of 9573.19 MYR Million from 2010

until 2016, achieving a record-breaking high of 13062.00 MYR Million in the second from last quarter of 2016 and a record low of 6464.00 MYR Million in the primary quarter of 2010 (Tradingeconomics.com, 2017)

MALAYSIA GDP FROM CONSTRUCTION



**Figure 2.1: Malaysia GDP from construction (Malaysia GDP from construction)**

## 2.2 Carbon Footprint

Carbon impression is the sum of Greenhouse Gasses (GHG) outflows brought on straightforwardly and indirectly by a man, association, occasion or item (Rahman, 2010). The essential GHG in the climate are water vapor, carbon dioxide, methane, nitrous oxide and ozone (Iea.org, 2017). Malaysia is positioned 30th on the planet for nations that has the biggest measure of carbon discharge (Nationmaster.com, 2017). Construction industry alone contributes 24% of the nation's sum of carbon dioxide (Iea.org, 2017).

## 2.3 Green Construction

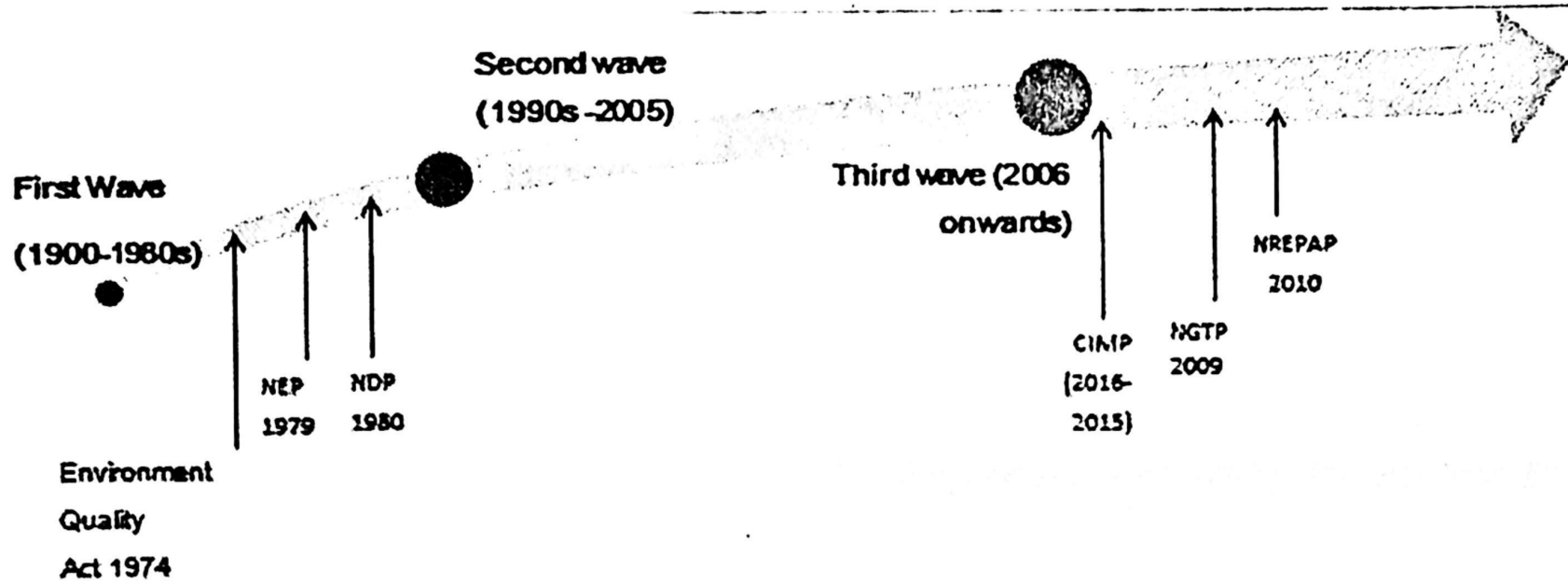
Construction sector give incalculable of advantages to society and country, it job have critical effect to ecological harm through contamination, high vitality

utilization, soil disintegration, loss of wild land and negative effect to human's wellbeing. As the negative effect of environment and worldwide because of the development activities turn out to be most noticeably bad, another option and methods for construction should be set up in minimizing and tackle these issues. Due to this matter, green construction is acquainted with the world and picking up its energy these days (Sahat, 2012). As we know, construction give out the most contribution in economic sector, somehow this issue need to take seriously as to be a developing country, we shouldn't neglect the importance of environment to us. Construction are by a wide margin the best makers of unsafe gasses, for example, CO<sub>2</sub> and this eco-impression can just increment with the vast populace development anticipated to happen by 2050. Construction aggregate vitality and asset utilization and carbon outflow raise a developing mindfulness in regards to this industry (Rostami, 2012). Therefore, green construction need to be implement in all contractor in Malaysia in order to secure the environment from all gas emission and depletion of natural resources. Without realizing, Malaysian has taken an action regarding to greening the construction in Malaysia. Malaysia's recorded ways to deal with natural issues can be separated into three waves. The primary wave (1900–1980s) was the aftereffect of a promise to secure nature and control contamination levels at the initially United Nations Conference on the Human Environment in 1973 (the Stockholm Conference) (Akademika, 2012). The second (1990–2005) and the third wave (2006-onward) of ways to deal with natural security in Malaysia are described by an emphasis on sustainability. The ideas of sustainability what's more, adjusted advancement was initially begat in the Brundtland Report which highlighted the requirement for feasible improvement (Development, 2017) . Some of people may not realize what is ecological footprint and just only small number of people know what ecological

footprint is meaning exactly. Ecological footprint can be defined as the effect of human activities measured as far as the zone of naturally beneficial land and water required to create the good consume and to acclimatize the squanders produced (Development, 2017) . All the more essentially, it is the measure of nature important to create the goods and ventures important to bolster a specific way of life (Wwf.panda.org, 2017) . In terms of construction, there are six different type of bio productive areas that used to contribute each country economy (Bastianoni et al., 2012) :

- Cropland for the cultivation of food, animal feed, fibre, oil crops, and rubber;
- Grazing land for producing meat, hides, wool, and milk;
- Forests for harvesting timber, fuelwood, and wood fibre for paper;
- Fisheries for catching fish;
- Built-up areas, ecologically unproductive, used for accommodating infrastructure for housing, transportation, and industrial production;
- Energy land to sequester CO<sub>2</sub> emitted from energy and fossil fuels consumption.

Those points given are the significant role of nature towards living organism and it's very important for us to keep it present and not make it depleted.



**Figure 2.2: Policies and key practice related to environmental concerns in Malaysia (Bohari, 2015)**

## 2.4 Theory of Planned Behaviour (TPB)

TPB papers are biologically motivated. They aspire to address problems in biology through a theoretical approach. Perhaps the effect of one biological phenomenon on another is of interest, and a study might be framed in terms of exploring the relationship conceptually and mathematically. A project might seek to understand a new aspect of an important model in an established area of theory, or to extend a theoretical framework to accommodate additional biological phenomena or more general assumptions.

Each TPB paper incorporates its own distinctive mixture of these elements, and TPB offers authors considerable flexibility in organizing their manuscripts. Authors adopt a variety of styles of mathematical writing, with the goal of keeping papers clear, readable, and biologically grounded—for example, writing in a formal theorem–proof style (Huillet and Möhle, 2013; Steinrücken et al., 2013b), presenting derivations in a less formal but still mathematical narrative (Huang et al., 2013; Schraiber et al., 2013), or placing proofs or other math tangential to the biology in appendices (Cohen, 2013; Van Cleve and Lehmann, 2013). Irrespective of the scientific, structural, and stylistic choices that authors make, the core features of sound

motivation from a biological perspective, significant mathematical contribution, and successful interpretation in relation to advancing biology represent the hallmark of the most distinguished TPB work.

In order to discover what was the barrier to implement the green construction among the contractors in Malaysia, Theory of Planned Behaviour (TPB) will be used in order to assess the motivation of contractor in Malaysia. TPB predicts an individual's intention to engage in a behaviour at a specific time and place. It posits that individual behaviour is driven by behaviour intentions, where behaviour intentions are a function of three determinants: an individual's attitude toward behaviour, subjective norms, and perceived behavioural control (Kuhl, 1985).

There are few paper that shows this theory has lead to a successful research. First paper that using TPB as model of the research is paper wrote by Bierman. In this paper, the author did the research regarding on intention to stop smoking by using the Theory of Planned Behaviour and self exempting Beliefs. In this paper, he found that perceived behavioural control was the most significant predictor among the other predictor (Bierman, 2012). Other paper that wrote using TPB model is paper wrote by Mateja. This paper is doing research regarding on how to discover the effectiveness of road safety educational program for pre-drivers about DUI. In this study, the author found that Normative Belief has been the predictor that cause the effectiveness of road safety getting failure (Markl, 2016). Next, in this paper wrote by Wu, which doing research regarding behavioural intention toward urban eco-land performance assessment models using TPB tests. In this study, although using only behavioural intention, indirectly TPB be used as the model of research. The findings of Wu study are behavioural belief and behavioural attitudes become the main factor for eco-land performance to be excel (Wu, et al.,2015). Final paper that using TPB model as their

research is by Zhou which doing study about an extension theory of planned behaviour to predict pedestrians violating crossing behaviour using structural equation modelling. In this study, the finding is behavioural belief become the most significant problem (Zhou, et al., 2016).

From those three-paper stated above, it shows that TPB is one of the most efficient method in order to discover why and what is the most potential barrier to implement green construction among contractor in Malaysia.

## **2.5 Chapter summary**

Construction is one of the most important industry that needed in every country. Somehow, contractor didn't take note any environmental issue that happen regarding to old construction method. Thus green construction being exposed to the contractor in order for them to use as method in construction. Somehow, it still fail. From that, TPB was introduced in order to assess in contractor in Malaysia on why green construction still fail in Malaysia and what is the most potential barrier to implement green construction in Malaysia.

## CHAPTER 3

### METHODOLOGY

#### 3.0 Introduction

In this section, there are few things will be discovered to fulfil and overview on completing this study. On the research methodology, it will be explaining on which method that will be using in this study. Next, research design which will brief about framework that will be used in this study. In research strategy, overall explaining about on data of the framework and section in questionnaire.

#### 3.1 Research Methodology

A research will be conducted based on questionnaire development. The questionnaire will be developed in order to examine and study the potential beliefs that led to the barrier in green construction. Based from the questionnaire, various type of people with different type of beliefs will be discovered and it's an effective way to identify the problem correctly.

The method of analysis that will be used is by using questionnaire development that will be used to survey among the relevant respondent that doing construction work in the marked area. After getting all the relevant answer from those contractor companies, the data will be analysed by using TPB method, hence the main problematic issue among the contractor to implement green construction will be identified.

### 3.2 Research Design

In order to make sure this study success, a framework has been constructed to run this study. This method has been developed to make sure the effectiveness on understanding about the potential barrier among the contractors in Malaysia to implement green construction method. Next figure will show the framework that has been develop to study and solve the related issue in this study.

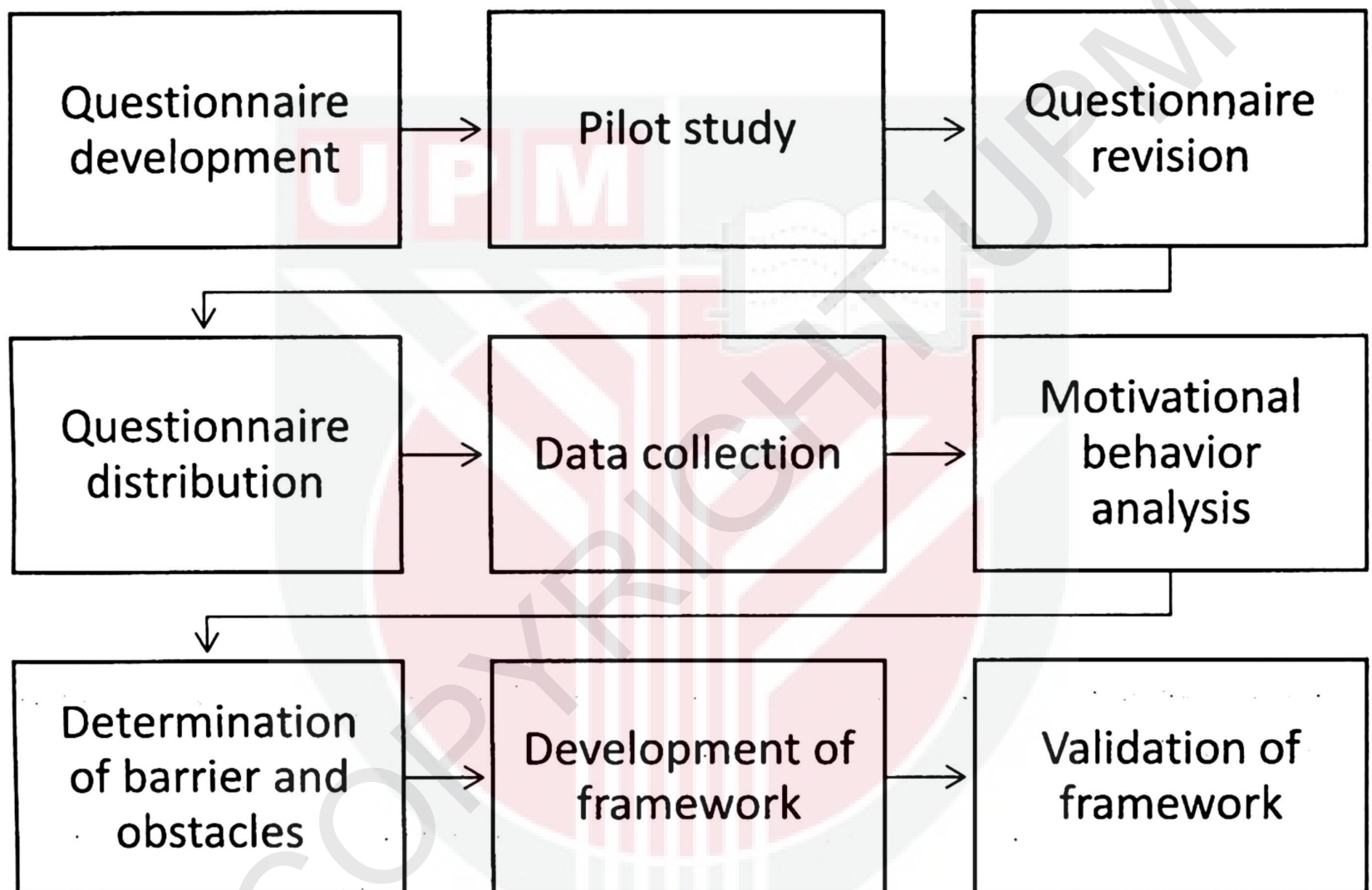


Figure 3.1: Framework of study

### 3.3 Research Strategy

In this study, method will be used is questionnaire survey type. Hence, the first thing to do is doing the pilot study. Pilot study will be conducted as to make sure the question that will be develop is acceptable and easily for the respondent to answer it. The pilot study will be conducted with two different person which is high rank person from CIDB and questionnaire expertise from Universiti Putra Malaysia (UPM). Those two-

different people will lead to developing a good and strong questionnaire to excel in this study.

### **3.4 Questionnaire Development**

In questionnaire development, the questionnaire will be developed in 4 different parts and each part consist of their own significant value that will lead to success this study.

Those parts are

- Part A: Background information
- Part B: Question on Behavioural beliefs
- Part C: Question on Normative Beliefs
- Part D: Question on Control Beliefs

Each question will be construct based on different type of beliefs and be measured on different scale from 1-5 on each section. After researcher get feedback about the questionnaire, the answered questionnaire will be analysed by using Statistical Package Social Science (SPSS). After the question has been develop, it will be finalized by responsible person before distribute it to the respondent. The responsible person should be an expertise person in construction field which is person from CIDB. This is to ensure that the questionnaire that has been develop is acceptable and able to use for this study by considering factors of relevant in Malaysia.

### **3.5 Population Target**

Regarding to this study, the questionnaire will be distributed among the contractor in targeted area. We are targeting the contractors at Wilayah Persekutuan area that having a total of 1499 number of contractor were at Wilayah Persekutuan.

Based from total number of contractor in Wilayah Persekutuan, sample size was calculated in order to know how much questionnaire to be distributed and how much expected the questionnaire will get in return. The calculation process will be stated below

- Confidence level : 90%
- Margin of error : 14.39%
- Population size : 1499
- Sample size : 32
- Response distribution : 50%
- Questionnaire distribution : 230

From the data stated above, with the confidence level of 90% and margin of error of 14.39%, from the total number of contractors in Wilayah Persekutuan, 1499, sample size that should be return is 32 number of respondent. In order to get back total number of 32 sets of questionnaires, with the response distribution of 50%, total number of questionnaire that need to be distribute among the contractors are 230 sets (Raosoft.com, 2017).

Scope and limitation for choosing the contractor we specify it to the contractor that holding grade 7 (G7) contractor that having more than 10 million values of work under category of building construction with sub category of B04 – Building Construction Works. We choosing G7 contractor company is because to make sure it gives a big impact to other grade of contractor company.

### **3.6 Data Analysis Method**

Based from the result that will be obtained, specific analysis need to be done in order to find the most potential barrier and answer all the objective. The most suitable

software that should be use to analyse data regarding questionnaire is by using Statistical Package of Social Science (SPSS). SPSS will be used in order to analyze by enter the data and will give out result and also those graphs needed in the result (Field, 2009, Discovering statistics using SPSS). From the SPSS, there are many type of analysis that can be run in order to complete the research. Somehow, each analysis need to consider of their own assumption in order to choose it. For this research, test that will be used are, Relative Importance Index, Descriptive Statistics, Cronbach's Alpha, Kendall's Tau-b, and Spearman's Rank order correlation. The uses of these test described at Table 3.1.

**Table 3.1 Analysis description**

Type of analysis	Description of analysis
1. Relative Importance Index (RII)	RII helps in finding the commitment a specific variable makes to the forecast of a basis variable both without anyone else's input and in mix with other indicator factors. (Somiah, M. K., 2015)
2. Descriptive statistics	Descriptive statistics is the term given to the investigation of information that portrays, appear or abridge information genuinely. (Statistics.laerd.com, 2017)
3. Cronbach's Alpha	Cronbach's alpha is a measure of interior consistency, that is, the manner by which firmly related an arrangement of things are as a gathering. (Statistics.laerd.com, 2017)
4. Kendall's Tau-b	Kendall's tau-b ( $\tau_b$ ) correlation coefficient (Kendall's tau-b, for short) is a nonparametric measure of the quality and direction of affiliation that exists between two factors measured on no less than an ordinal scale. (Statistics.laerd.com, 2017)
5. Spearman's Rank order	The Spearman rank-order correlation coefficient (Spearman's connection, for

	<p>short) is a nonparametric measure of the quality and course of affiliation that exists between two factors measured on no less than an ordinal scale. (Statistics.laerd.com, 2017)</p>
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### **3.7 Chapter Summary**

We can conclude that in methodology chapter, the TPB will be assess through questionnaire distribution among contractor in G7 classes at Wilayah Persekutuan. Those questionnaires then will be analyse using SPSS software through 5 different analysis which are Relative Importance Index, Descriptive Statistics, Cronbach's Alpha, Kendall's Tau-b, and Spearman's Rank order.

## CHAPTER 4

### RESULTS AND DISCUSSIONS

#### 4.0 Introduction

The outcome from analyses data are introduced in four different section. In first section will be discuss on pilot survey data. In this pilot survey data, result of reliability will be discuss for the reliability of the question. After that, in the next section topic, will be discussed is data analysis. In data analysis, thing will be explained are response rate, demographic data, and correlation test. Those data will be explained with aid from list of figures regarding analysis that have been done. Development of model will be the third section. Here, a model will be built up based on the result of analysis. Last section that will be discussed in this chapter is discussion and finding. In this section, overall of this chapter will be discuss there to make it shorter and easy to understand.

#### 4.1 Pilot Survey

Pilot survey is very important when doing questionnaire type of survey. This survey and test will be run in a small number of respondent and more likely being known as pre-study. The reason of pilot study being conducted is because it grants preparatory testing of the theories that prompts testing more exact theories in the primary review. It might lead changing a few speculations, dropping a few, or growing new theories (Woken, 2007).

In this research, pilot study being conducted among the high authority person in civil engineering field which come from Construction Industry Development Board (CIDB). From the questionnaire that they have answered, we run analysis based on their data. Analysis that we used is Reliability Test from SPSS. This test being

conducted in order to check the reliability of the question that provided in the questionnaire set.

Reliability test need us to check first on Reliability Statistics table in figure 4.1. From that table, much information we able to obtain. First and foremost, we check the Cronbach's Alpha value. If the value of the Cronbach's Alpha is more than .7, it will be considered as high internal consistency (Cronbach's alpha). From our result, it shows that our Cronbach's Alpha value is .893 which mean this questionnaire is reliable.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.893	.893	23

Figure 4.1: Cronbach's alpha of pilot study

## 4.2 Descriptive Analysis

### 4.2.1 Characteristic of the sample

From the sample, the respondent of this questionnaire is majority has education level in degree. From 32 number of respondent, 23 of the respondent has degree level of education which give out 71.9%. A number of 5 respondent has education at diploma level which is 15.6% followed by 3 respondents in Master holder 9.4% and 1 respondent in PhD holder 3.1%. From the position of the respondent, approximately 37.5% of the respondent is Engineer in their company, 31.3% work as Project Manager, 12.5% position as Project Engineer, and Project Executives and Director share between themselves, 9.4% each. Most of the respondents was in building construction which give out 81.3% and remaining 18.8% of the respondent doing developer project type. For the company business category, most of respondents in

main contractor business company with 96.9% and only 3.1% in sub-contractor business category. Majority of the respondents has working in construction industry for 10 – 20 years which give out 12.5%, followed by less than 5 years and 11 – 20 years share same percentage of 21.9%, more than 30 years with 15.6% and end with 12.5% value of respondents have experience 21 – 30 years in construction industry.

**Table 4.1: Characteristic of sample**

Charachteristic of the sample	Frequency N= 32	Percent
<b>Education level</b>		
Degree	23	71.9
Diploma	5	15.6
Master	3	9.4
PHD	1	3.1
<b>Position</b>		
Director	3	9.4
Engineer	12	37.5
Project Engineer	4	12.5
Project Executives	3	9.4
Project Manager	10	31.3
<b>Company project type</b>		
Building construction	26	81.3
Developer	6	18.8
<b>Company bussiness category</b>		
Contractor	31	96.9
Sub-Contractor	1	3.1

Charachteristic of the sample	Frequency N= 32	Percent
<b>Year's in construction industry</b>		
less than 5	7	21.9
6 to 10	9	28.1
11 to 20	7	21.9
21 to 30	4	12.5
more than 30	5	15.6

#### 4.2.2 Section A - Behavioral Beliefs of the contractor towards Green Construction

I understand very well about green construction (BB1), I would like to use green construction in my industry (BB2), Green construction is very costly to use (BB3), I think Malaysia still don't have any expertise in green construction (BB4), I think Malaysia still lack in green construction technology (BB5) variable has total sample of (N = 32) are summarized in table 4.3. In general, for first variable, BB1, most of the respondent agree with variable BB1 with contribution of 65.7%. Next, for the second variable which is BB2, a value of 71.9% agree with the second variable. Third variable which is BB3 contribute only 59.4% agree with this variable. On fourth variable which is BB4, 71.9% agree that BB4 is the reason of barrier to apply GC. Last but not least, on BB5, only 68.8% agree that BB5 is the factor of the barrier to implement GC.

**Table 4.2: Percentage of behavioral beliefs**

Type of beliefs	Frequency	Percent
I understand very well about green construction (BB1)	21	31.3
I would like to use green construction in my industry (BB2)	23	34.4
Green construction is very costly to use (BB3)	19	15.6
I think Malaysia still don't have any expertise in green construction (BB4)	23	40.6
I think Malaysia still lack in green construction technology (BB5)	22	43.8

#### **4.2.3 Section B – Normative Beliefs of the contractor towards Green Construction**

In section B, there are 5 variables which are, I have seen many contractors practicing green construction (NB1), My company will apply green construction (NB2), I want my company to applying green construction before others (NB3), Client will love project using green construction (NB4), Client have reliability on us to applying green construction (NB5). Those variables are related to total sample (N = 32) and can refer to table 4.4. For the NB1, only 6.3% agree that they have seen many GC widely use. Next, NB2 give out total of 59.4% from respondent that agree that their company will apply GC. NB3 state that 78.1% of respondent agree that they want their company to apply GC before others. While NB4 state only 65.6 % answer agree that client will love if contractor use GC in industry. Lastly, for NB5, give the lowest percentage of agree which is 50.1%.

**Table 4.3: Percentage of normative beliefs**

Type of beliefs	Frequency	Percent
I have seen many contractors practicing green construction (NB1)	2	6.3
My company will apply green construction (NB2)	19	59.4
I want my company to applying green construction before others (NB3)	25	78.1
Client will love project using green construction (NB4)	21	65.6
Client have reliability on us to applying green construction (NB5)	16	50.1

#### **4.2.4 Section C – Control Beliefs of the contractor towards Green Construction**

Section C will explain the agree percentage of respondent based on 6 different variables. Those 6 variables are, I think Malaysia need a law to force contractor applying green construction (CB1), I need to be rewarded if applying green construction in Malaysia (CB2), I would like to attend seminar to increase my knowledge in green construction (CB3), I want a good project team that will lead to successful green construction (CB4), I would like to know in detail time frame for construction using green construction (CB5), and I would like government to change government policies and give incentives to those who applying green construction (CB6). The percentage of agree from each respondent will be state. For CB1, 78.2% of respondent has choose agree with Malaysia need a law to force contractor applying GC. Next, about 80.2% agree answer has been chosen by the respondent that contractor itself need to be rewarded if GC applied. Meanwhile, CB 3 state that 78.2% of agree answer has been choose that contractor want to attend seminar to increase knowledge about GC. CB4 give out result that 87.5% choose agree compare to

disagree which contractor want company to create good project team. CB5 state that 75% has choose agree that contractor want time frame if GC is being applied in industry. Last but not least, CB6 has a number of 87.4% choose agree to government need to change policies and give incentive for those who applying GC.

**Table 4.4: Percentage of control beliefs**

Type of beliefs	Frequency	Percent
I think Malaysia need a law to force contractor applying green construction (CB1)	25	78.2
I need to be rewarded if applying green construction in Malaysia (CB2)	26	81.2
I would like to attend seminar to increase my knowledge in green construction (CB3)	25	78.2
I want a good project team that will lead to successful green construction (CB4)	28	87.5
I would like to know in detail time frame for construction using green construction (CB5)	24	75
I would like government to change government policies and give incentives to those who applying green construction (CB6)	27	84.4

#### **4.2.5 Section D – Problem to implement Green Construction**

In this section, there are 7 different problem that give big impact for implementation of GC in Malaysia. Those problems are, Green construction requires new skills and new knowledge, as well as new attitudes and new mindsets (PBLM1), For a construction industry that is still adapting to greener solutions, finding green building expertise is not always an easy task (PBLM2), Implementation of green construction requires new technologies which will cause the increase in project cost and lead to

more complicated methods (PBLM3), As a developing country, the need to raise the basic living standards of those in developing countries must be the priority, compared to the needs like green construction (PBLM4), Lack of paradigm shift in environmental issues and poor public awareness about green building for all Malaysians, especially those in the construction industry has led to low demand (PBLM5), Poor roles and low investments from the government especially in incorporating incentive instruments such as; structural incentives, subsidy and rebate program, tax incentive scheme, etc. (PBLM6), and A local manufacturer and supplier do not have the necessary specified green materials; it may not be an option to secure the materials from non-local suppliers without risking the loss of certification. Thus, causing the delay in the project (PBLM7). From the descriptive statistics, PBLM1 show that 84.4% of agree answer has been chosen by respondent to show that to apply GC, knowledge, mindset and skills needed. PBLM2 show that 75.1% of agree answer has been chosen by respondent to show that contractor has problem in finding expertise in GC. PBLM3 show that 62.5% choose agree instead of disagree regarding cost and complicated if GC being applied. PBLM4 show that only 53.2% of agree has been choose said that lifestyle is more important compare to new method of construction. PBLM5 give out 56.3% of agree has been choose which most of the contractor and public lack in knowledge of GC which cause no demand in GC in Malaysia. PBLM6 state that 53.1% of agree answer has been chose regarding low investment from government such as subsidy and rebate in GC. Last but not least, PBLM7 state that only 56.2% agree has been choose related to no expertise in manufacturing that will cause delay in completion of project. Overview of PBLM can be seen at Table 4.5.

**Table 4.5: Percentage of problem**

Type of problem	Frequency	Percent
Green construction requires new skills and new knowledge, as well as new attitudes and new mindsets (PBLM1)	27	84.4
For a construction industry that is still adapting to greener solutions, finding green building expertise is not always an easy task (PBLM2)	24	75.1
Implementation of green construction requires new technologies which will cause the increase in project cost and lead to more complicated methods (PBLM3)	20	62.5
As a developing country, the need to raise the basic living standards of those in developing countries must be the priority, compared to the needs like green construction (PBLM4)	17	53.2
Lack of paradigm shift in environmental issues and poor public awareness about green building for all Malaysians, especially those in the construction industry has led to low demand (PBLM5)	18	56.3
Poor roles and low investments from the government especially in incorporating incentive instruments such as; structural incentives, subsidy and rebate program, tax incentive scheme, etc (PBLM6)	17	53.1

Type of problem	Frequency	Percent
A local manufacturer and supplier do not have the necessary specified green materials; it may not be an option to secure the materials from non-local suppliers without risking the loss of certification. Thus, causing the delay in the project (PBLM7)	18	56.2

### 4.3 Reliability Test

Reliability test is one of the important test because from this test, the researcher able to know the internal consistency which is commonly known as reliability. When the researcher proceeds with multiple Likert question in questionnaire, reliability test is needed in order to check whether each question on the questionnaire rely on each other or not. To measure the value of reliability, the researcher has to take out the value for Cronbach Alpha's. Each value of Cronbach's Alpha ( $\alpha$ ) has its own definition and can see in figure 4.7. If the  $\alpha$  value more than 0.9, the question can be considered as excellent. If  $\alpha$  value is in between on 0.8 to 0.9, the question can be said as good. Next, if  $\alpha$  value is between 0.8 and 0.7, the reliability of the question will be unacceptable. While if  $\alpha$  value is in between of 0.7 and 0.6, it shows that the question on questionnaire can be questionable. If the value of  $\alpha$  is between of 0.6 and 0.5, the question considered as poor and lastly if the value of  $\alpha$  is below than 0.5, then the questionnaire is not acceptable which mean researcher need to reconstruct the questionnaire.

**Table 4.6: Cronbach's Alpha value description**

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

For this questionnaire, the  $\alpha$  value has been checked. In the first section which is behavioural belief section, the value of  $\alpha$  is .631 which will be in zone of questionable. For the second section of the questionnaire which is normative belief, the value of  $\alpha$  is .681 which is can be questionable. For the third section which is the control belief section, the value of  $\alpha$  is .948 which is in excellent level. For last section, which is the problem section, the value of  $\alpha$  is .845 which be defined as good. For the whole 4 sections, the value of  $\alpha$  is .858 which indicate that the question is good and rely each other.

**Table 4.7:  $\alpha$  value for behavioral belief section****Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.631	.646	5

**Table 4.8:  $\alpha$  value for normative belief section**

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.681	.656	5

**Table 4.9:  $\alpha$  value for control belief section**

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.948	.949	6

**Table 4.10:  $\alpha$  value for problem section**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.845	7

#### 4.4 Correlation Test

Based from the result of questionnaire, suitable test need to determine in order to know which test is suitable for this type of questionnaire. Since this questionnaire is build up with scale type Likert, this questionnaire can be categorized as nonparametric measure and the direction between the question is in the ordinal scale. Based from those two assumptions, the only suitable test that meet those two assumptions is Spearman's Rank Order Correlation and also Kendall's Tau-b.

For the Spearman's Rank Order Correlation test, there are two assumption that need to be considered to run this test. Which is the first one, to run the test, the variables that want to be tested must be in either ordinal, interval, or ratio scale. Since researcher questionnaire is in ordinal scale for all variables, so assumption number 1 passed. The second assumption which is the variable need to be in monotonic relationship. However, when monotonic test being run, no monotonic relationship showed. Although no monotonic relationship detected, Spearman's correlation is not very sensitive with the outlier. Although no monotonic relationship detected, the test still can be run to obtain a good correlation. For the result of the test, there are few things need to be check in order to get a good result. The first one is the researcher need to check is the correlation coefficient or typically noted as Greek letter rho ( $\rho$ ). The value of correlation in this test should give value between -1 to +1. However, the relation can be identified strong when the value of correlation is approaching -1 or +1. A positive correlation coefficient shows a positive connection between the two factors (the bigger A, the bigger B) while a negative correlation coefficient communicates a negative relationship (the bigger A, the littler B). A correlation coefficient of 0 demonstrates that no connection between the factors exists by any stretch of the imagination. However, connections are restricted to straight connections between factors (Statistics.laerd.com, 2017).

Second test that researcher used is Kendall's Tau-b correlation. This correlation test also has two assumption that need to be meet in order to run the test. Those two assumptions are the same as Spearman's correlation and although the second assumption is not meet, researcher still can run the test to get a good correlation. For the result of the test, the researcher need to check few things which is Kendall's Tau

correlation known as  $r_s$ . Basically, Kendall's Tau correlation need a same method to read the result with Spearman's correlation (Statistics.laerd.com, 2017).

#### 4.4.1 1<sup>st</sup> Level Correlation Test

For the first level of test, researcher want to identify among those 7 problems that have been provided in the questionnaire, which problem is the most correlate with remaining variables that researcher have which come from behavioral beliefs, normative beliefs, and control beliefs.

A Spearman's rank-order correlation has been run to determine the relationship between PBLM and BB, NB and CB amongst 32 respondents. There was a strong, positive correlation between PBLM5 and NB5 ( $r_s = .302$ ,  $p = .049$ ), PBLM6 and NB5 ( $r_s = .313$ ,  $p = .041$ ), PBLM7 and NB5 ( $r_s = .320$ ,  $p = .040$ ) and PBLM7 and CB4 ( $r_s = .333$ ,  $p = .038$ ).

Kendall's tau-b correlation test was run to determine the relationship between PBLM and BB, NB and CB amongst 32 respondents. There was strong positive relationship between PBLM5 and NB5 ( $\tau_b = .354$ ,  $p = .047$ ), PBLM6 and NB5 ( $\tau_b = .364$ ,  $p = .041$ ), PBLM7 and NB5 ( $\tau_b = .360$ ,  $p = .043$ ) and PBLM7 and CB4 ( $\tau_b = .355$ ,  $p = .046$ ).

Those result that have been obtained shown that among 7 problems that researcher propose in the questionnaire, only 3 problems are most related to variables which are PBLM5, PBLM6 and also PBLM7.

**Table 4.11: 1st correlation test**

			PBLM 5	PBLM 6	PBLM 7
Kendall's Tau-b	NB5	Correlation coefficient	0.302	0.313	0.32
		Sig. (2-tailed)	0.049	0.041	0.04
		N	32	32	32
Spearman's rho	CB4	Correlation coefficient	0.354	0.364	0.36
		Sig. (2-tailed)	0.047	0.041	0.043
		N	32	32	32

#### 4.4.2 2<sup>nd</sup> Level Correlation Test

2<sup>nd</sup> correlation test conducted by the researcher in order to know the root factor for the problem. Same type of test being used in order to find the root factor in researcher research which is Spearman's and Kendall's tau-b correlation test.

For the Spearman's 2<sup>nd</sup> correlation test, the test was conducted between two factors that come from CB4 and NB5 with the remaining variables amongst 32 respondents.

There was a strong, positive correlation between NB5 with CB1 ( $r_s = .641$ ,  $p = .000$ ), NB5 with CB2 ( $r_s = .585$ ,  $p = .000$ ), NB5 with CB3 ( $r_s = .506$ ,  $p = .003$ ), NB5 with BB2 ( $r_s = .455$ ,  $p = .009$ ), and NB5 with BB4 ( $r_s = .385$ ,  $p = .029$ ). There also a strong, positive correlation between CB4 and CB3 ( $r_s = .747$ ,  $p = .000$ ), CB4 and CB1 ( $r_s = .742$ ,  $p = .000$ ), CB4 and CB5 ( $r_s = .731$ ,  $p = .000$ ), CB4 and BB2 ( $r_s = .680$ ,  $p = .000$ ) and CB4 and CB6 ( $r_s = .675$ ,  $p = .000$ ).

To make the correlation stronger, a Kendall's tau-b correlation was run to determine the relationship between NB5 and CB4 with remaining variables amongst 32 respondents. There was a strong, positive correlation between NB5 with CB1 ( $\tau_b = .561$ ,  $p = .000$ ), NB5 with CB2 ( $\tau_b = .504$ ,  $p = .001$ ), NB5 with CB3 ( $\tau_b = .446$ ,  $p = .004$ ), and NB5 with BB4 ( $\tau_b = .327$ ,  $p = .031$ ). There also a strong, positive correlation

between CB4 and CB3 ( $\tau_b = .706, p = .000$ ), CB4 and CB1 ( $\tau_b = .700, p = .000$ ), CB4 and CB5 ( $\tau_b = .696, p = .000$ ), and CB4 and CB6 ( $\tau_b = .658, p = .000$ ).

From Kendall's tau-b and Spearman's test that had been done, the variables that correlate and overlap between CB4 and NB5 being choose as the most related to CB4 and NB5. Variables that most correlated for CB4 and NB5 is CB1 and CB3.

**Table 4.12: Correlation between NB5**

		NB5	
Kendall's Tau-b	CB1	Correlation coefficient	0.561
		Sig. (2-tailed)	0
		N	32
	CB2	Correlation coefficient	0.504
		Sig. (2-tailed)	0.001
		N	32
	CB3	Correlation coefficient	0.446
		Sig. (2-tailed)	0.004
		N	32
	BB2	Correlation coefficient	0.4
		Sig. (2-tailed)	0.009
		N	32
BB4	Correlation coefficient	0.327	
	Sig. (2-tailed)	0.031	
	N	32	

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Spearman's rho	CB1	Correlation coefficient	0.641
		Sig. (2-tailed)	0
		N	32
	CB2	Correlation coefficient	0.585
		Sig. (2-tailed)	0
		N	32
	CB3	Correlation coefficient	0.506
		Sig. (2-tailed)	0.003
		N	32
	BB2	Correlation coefficient	0.455
		Sig. (2-tailed)	0.009
		N	32
	BB4	Correlation coefficient	0.385
		Sig. (2-tailed)	0.029
		N	32

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**Table 4.13: Correlation between CB4**

		CB4
Kendall's Tau-b	Correlation coefficient	0.706
	Sig. (2-tailed)	0
	N	32
	Correlation coefficient	0.7
	Sig. (2-tailed)	0
	N	32
	Correlation coefficient	0.696
	Sig. (2-tailed)	0
	N	32
	Correlation coefficient	0.642
	Sig. (2-tailed)	0
	N	32
Spearman's rho	Correlation coefficient	0.658
	Sig. (2-tailed)	0
	N	32
	Correlation coefficient	0.747
	Sig. (2-tailed)	0
	N	32
	Correlation coefficient	0.742
	Sig. (2-tailed)	0
	N	32
	Correlation coefficient	0.731
	Sig. (2-tailed)	0
	N	32
Correlation coefficient	0.68	
Sig. (2-tailed)	0	
N	32	
Correlation coefficient	0.675	
Sig. (2-tailed)	0	
N	32	

#### 4.4.3 3<sup>rd</sup> Level Correlation Test

3<sup>rd</sup> test run by researcher in order to get the root of those 3 problems that found most correlated in this research. 3<sup>rd</sup> test being conducted between CB1 and CB3 with remaining variables that not related.

For the Spearman's 3<sup>rd</sup> correlation test, the test was conducted between CB1 and CB3 with the remaining variables amongst 32 respondents. There was a strong, positive correlation between CB1 and CB2 ( $r_s = .840$ ,  $p = .000$ ), CB1 and CB6 ( $r_s = .733$ ,  $p = .000$ ), CB1 and NB3 ( $r_s = .731$ ,  $p = .000$ ), CB1 and BB2 ( $r_s = .569$ ,  $p = .001$ ), and CB1 and NB2 ( $r_s = .557$ ,  $p = .001$ ). Next, the researcher does the correlation test between CB3 and the remaining variable using spearman's correlation test among 32 respondents. There was a strong, positive correlation between CB3 and CB6 ( $r_s = .742$ ,  $p = .000$ ), CB3 and BB2 ( $r_s = .578$ ,  $p = .001$ ), CB3 and CB2 ( $r_s = .539$ ,  $p = .001$ ), CB3 and NB4 ( $r_s = .548$ ,  $p = .001$ ), and CB3 with CB5 ( $r_s = .493$ ,  $p = .001$ ).

To make the correlation stronger, a Kendall's tau-b correlation was run to determine the relationship between CB1 and NB1 with the remaining variables among 32 respondents. There was a strong, positive correlation between CB1 and CB2 ( $\tau_b = .803$ ,  $p = .000$ ), CB1 and CB6 ( $\tau_b = .683$ ,  $p = .000$ ), CB1 and NB3 ( $\tau_b = .678$ ,  $p = .000$ ), CB1 and BB2 ( $\tau_b = .505$ ,  $p = .001$ ), and CB1 and NB2 ( $\tau_b = .511$ ,  $p = .001$ ). Next, the researcher does the correlation of the remaining variables with CB3 for all 32 number of respondents. There was a strong, positive correlation between CB3 and CB6 ( $\tau_b = .690$ ,  $p = .000$ ), CB3 and BB2 ( $\tau_b = .536$ ,  $p = .001$ ), CB3 and CB2 ( $\tau_b = .509$ ,  $p = .001$ ), CB3 and NB4 ( $\tau_b = .492$ ,  $p = .002$ ), and CB3 and CB5 ( $\tau_b = .493$ ,  $p = .002$ ).

**Table 4.14: Correlation between CB1**

		CB1	
Kendall's Tau- b	CB2	Correlation coefficient	0.803
		Sig. (2-tailed)	0
		N	32
	CB6	Correlation coefficient	0.683
		Sig. (2-tailed)	0.001
		N	32
	NB3	Correlation coefficient	0.678
		Sig. (2-tailed)	0.004
		N	32
	BB2	Correlation coefficient	0.505
		Sig. (2-tailed)	0.001
		N	32
	NB2	Correlation coefficient	0.511
		Sig. (2-tailed)	0.001
		N	32
Spearman's rho	CB2	Correlation coefficient	0.84
		Sig. (2-tailed)	0
		N	32
	CB6	Correlation coefficient	0.733
		Sig. (2-tailed)	0
		N	32
	NB3	Correlation coefficient	0.731
		Sig. (2-tailed)	0.003
		N	32
	BB2	Correlation coefficient	0.569
		Sig. (2-tailed)	0.001
		N	32
	NB2	Correlation coefficient	0.577
		Sig. (2-tailed)	0.001
		N	32

**Table 4.15: Correlation between CB3**

		CB3	
Kendall's Tau- b	CB6	Correlation coefficient	0.69
		Sig. (2-tailed)	0
		N	32
	BB2	Correlation coefficient	0.536
		Sig. (2-tailed)	0.001
		N	32
	CB2	Correlation coefficient	0.509
		Sig. (2-tailed)	0.002
		N	32
	NB4	Correlation coefficient	0.492
		Sig. (2-tailed)	0.002
		N	32
	CB5	Correlation coefficient	0.493
		Sig. (2-tailed)	0.002
		N	32
Spearman's rho	CB6	Correlation coefficient	0.742
		Sig. (2-tailed)	0
		N	32
	BB2	Correlation coefficient	0.578
		Sig. (2-tailed)	0.001
		N	32
	CB2	Correlation coefficient	0.539
		Sig. (2-tailed)	0.001
		N	32
	NB4	Correlation coefficient	0.548
		Sig. (2-tailed)	0.001
		N	32
	CB5	Correlation coefficient	0.533
		Sig. (2-tailed)	0.002
		N	32

#### 4.4.4 4<sup>th</sup> Level Correlation Test

To find the root factor, the researcher decided to keep doing correlation test until the researcher find the root factor for three main problem. In order to find the root factor, researcher do again spearman's and kendall's tau-b correlation test. The test being conducted for 3 different factor which is CB5, CB6 and NB3.

For the Spearman's 4<sup>th</sup> correlation test, the test was conducted between CB5, CB6 and NB3 with the remaining variables amongst 32 respondents. There was a strong, positive correlation between CB5 and NB1 ( $r_s = -.455$ ,  $p = .009$ ). For the CB6 variables, there also strong relationship between CB6 and BB4 ( $r_s = .363$ ,  $p = .041$ ), CB6 and NB1 ( $r_s = -.508$ ,  $p = .003$ ), and CB6 and NB4 ( $r_s = .378$ ,  $p = .033$ ). Next, for NB3, there also strong relationship between NB3 and BB3 ( $r_s = -.370$ ,  $p = .037$ ), NB3 and BB5 ( $r_s = .415$ ,  $p = .018$ ), and NB3 and NB2 ( $r_s = .698$ ,  $p = .000$ ).

Kendall's tau-b correlation test also being run in order to check the similarity for this test. CB5, CB6 and NB3 has been test with the remaining variable same with spearman's correlation test. There was a strong, positive correlation between CB5 and NB1 ( $\tau_b = -.403$   $p = .011$ ). Next, for CB6 variables, there also strong positive correlation between CB6 and BB4 ( $\tau_b = .336$   $p = .036$ ), CB6 and NB1 ( $\tau_b = -.454$   $p = .005$ ), and CB6 and NB4 ( $\tau_b = .348$   $p = .029$ ). Last but not least, NB3 also show strong, positive relationship between NB3 and BB3 ( $\tau_b = -.314$   $p = .043$ ), NB3 and BB5 ( $\tau_b = .345$   $p = .029$ ), and NB3 and NB2 ( $\tau_b = .630$   $p = .000$ ).

**Table 4.16: Correlation between CB6**

		CB6	
Kendall's Tau-b	BB4	Correlation coefficient	0.336
		Sig. (2-tailed)	0.036
		N	32
	NB1	Correlation coefficient	-0.454
		Sig. (2-tailed)	0.005
		N	32
	NB4	Correlation coefficient	0.348
		Sig. (2-tailed)	0.029
		N	32
Spearman's rho	BB4	Correlation coefficient	0.363
		Sig. (2-tailed)	0.041
		N	32
	NB1	Correlation coefficient	-0.508
		Sig. (2-tailed)	0.003
		N	32
	NB4	Correlation coefficient	0.378
		Sig. (2-tailed)	0.033
		N	32

**Table 4.17: Correlation between NB3**

		NB3	
Kendall's Tau-b	BB3	Correlation coefficient	-0.314
		Sig. (2-tailed)	0.043
		N	32
	BB5	Correlation coefficient	0.345
		Sig. (2-tailed)	0.029
		N	32
	NB2	Correlation coefficient	0.63
		Sig. (2-tailed)	0
		N	32
Spearman's rho	BB3	Correlation coefficient	-0.37
		Sig. (2-tailed)	0.037
		N	32
	BB5	Correlation coefficient	0.415
		Sig. (2-tailed)	0.018
		N	32
	NB2	Correlation coefficient	0.698
		Sig. (2-tailed)	0
		N	32

#### 4.4.5 5<sup>th</sup> Correlation test

Final test has been done by researcher in order to determine the correlation value between two big factor which is NB5 and CB4. This test has been done by using spearman's and kendall's tau-b correlation test for 32 number of respondent.

For spearman's correlation test, there are strong, positive correlation between CB4 and NB5 ( $r_s = .481$ ,  $p = .002$ ).

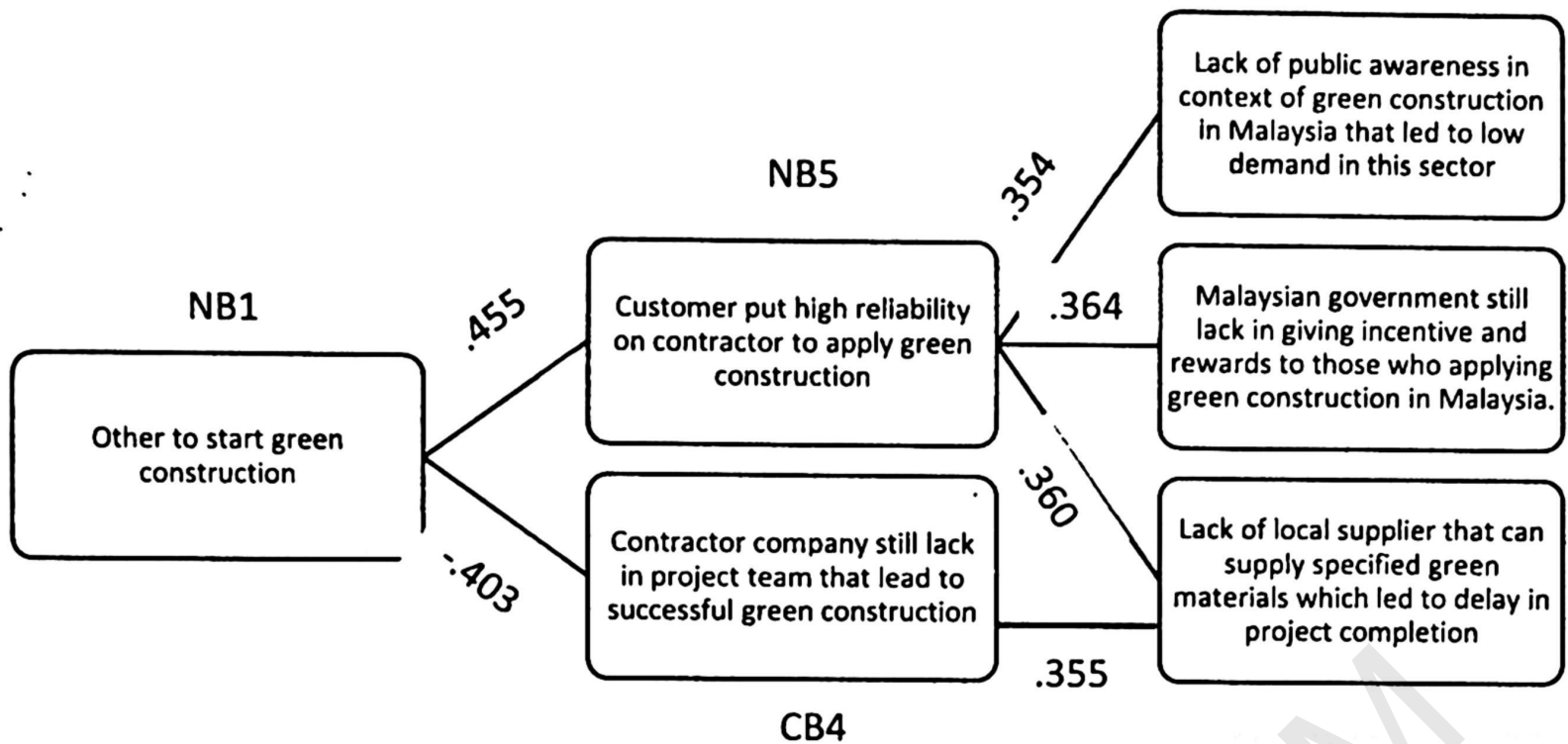
Meanwhile, for kendall's tau-b, there also a strong, positive correlation between CB4 and NB5 ( $\tau_b = .556$   $p = .001$ )

**Table 4.18: Correlation between NB5**

		NB5	
Kendall's Tau-b	CB4	Correlation coefficient	-0.403
		Sig. (2-tailed)	0.011
		N	32
Spearman's rho	CB4	Correlation coefficient	-0.455
		Sig. (2-tailed)	0.009
		N	32

#### 4.5 Model Development

Regarding to 3<sup>rd</sup> objective of this research, a model need to be develop in order to uplift the barrier and obstacle to implement Green Construction in Malaysia. From the 1<sup>st</sup> test, we obtain 3 problems among 7 problems that most significant and related to each other which is PBLM5, PBLM6 and PBLM7. These 3 problems are the most correlated with two of the variables that come from NB5 and CB4. To find the root factor, correlation test again being run but the researcher only take factor that overlap the most. So, from the 2<sup>nd</sup> test between NB5 and CB4, researcher obtain that CB1 and CB3 are the most correlated and overlap. Next, from the 3<sup>rd</sup> test, researcher found that CB5, NB6 and NB3 has been the factor. To make this research more accurate, the researcher run for 4<sup>th</sup> time between CB5, CB6 and NB3 with remaining variables. Root factor obtained in this stage of test where NB1 found to be the root factor of these 3 problems. Figure below show the framework that has been proposed.



**Figure 4.2: Model Development**

## 4.6 Discussion

### 4.6.1 Connection to the Theory of Planned Behaviour (TPB)

In this study, the researcher has set up three different objectives which has been set as a path for researcher to complete this study regarding to assessing the motivation of contractor in Green Construction by using theory of planned behaviour. The researcher known that construction in Malaysia has shown significantly improvement in terms of Growth Domestic Product (GDP) from year 2014 until early 2017 (Tradingeconomics.com, 2017). Construction also give large amount of contribution in growth rate which it gives 4.4%. Although the number looks like small, but researcher notice that construction is needed and it will never stop as every day, there will be a lot of construction happening. Somehow, most of construction industry in Malaysia didn't notice about how important of Green Construction in Malaysia. Green Construction is very needed for now and future since its method will based on sustainable method and reduce the usage of natural resources in construction industry.

The researcher found that some of paper mention the barrier for Green Construction to be implement in Malaysia come from lack of awareness and expertise, lack of guidelines, high cost, and insufficient knowledge (Mohamad Bohari et al., 2015). According to another paper, the potential barrier that they found to implement green is due to lack of knowledge, high capital upfront cost and also understanding towards Green Construction (Sahat, 2012). However, in this study researcher will identify which are the most potential behaviour by assessing the motivation of contractor using Theory of Planned Behaviour (TPB). Basically, TPB begun as the Theory of Reasoned Action in 1980 to anticipate a person's expectation to participate in a conduct at a particular time and place. The hypothesis was planned to clarify all practices over which individuals can strive control. The key segment to this model is behavioural expectation; behavioural goals are impacted by the demeanour about the probability that the conduct will have the normal result and the subjective assessment of the dangers and advantages of that result (inter. TPB). There will be three different type of beliefs that will be the factor for the researcher to find the most potential barrier to implement Green Construction.

#### **4.6.2 Assessing the TPB of contractor in Green Construction in Malaysia**

To assess the motivation of contractor in term of TPB, researcher has construct a questionnaire. This questionnaire originally divides by four different parts which are part A is about background information, second part is about Behavioural Beliefs of contractor towards Green Construction implementation, third part is about Normative Beliefs of contractor toward Green Construction implementation and the final part is about Control Beliefs of contractor towards Green Construction in Malaysia. There also additional section in this questionnaire regarding Problem that led to

implementation of green construction. The questionnaire distributed among contractor under building construction in G7.

#### **4.6.3 Obstacles and barrier for Green Construction to be implement in Malaysia**

From the analysis that have been done, researcher found that there are three obstacles that lead to Green Construction cannot be apply in Malaysia. Researcher do the analysis towards answered questionnaire by using SPSS software. From the SPSS software, researcher did use correlation test in order to know the obstacles. Kendall's Tau-b and Spearman's Rank Order correlation test had been chosen. From both of correlation test, researcher found that low demand from public (PBLM5), lack of incentive and rewards from government (PBLM6) and lack of local supplier that can supplied specified green material which led to delay in project completion (PBLM7). All those three problems found out by do a correlation test with all variables and found that those three problems most related with NB5 and CB4

#### **4.6.4 Solution for Green Construction to be applied in Malaysia**

As for the solution, researcher found that the root of TPB in this study is come from Normative Beliefs (NB1). To solve Green Construction implementation issue in Malaysia, society, government, high authority agency, need together enforcing contractor to implement Green Construction in Malaysia. From assessing the motivation of each contractor, they will implement green construction in industry, but if only there are social pressure that force them to use Green Construction as new method. Green Construction issue is not a small matter that society, government and authority look as, but it's about today and future generation that will affect if there is no action been taken by those who involved.

## **4.7 Findings**

From the research that researcher has done, researcher found that there is way to solve the issue regarding implementation of Green Construction in Malaysia. From the analysis, researcher found that to solve this problem, social pressure is needed. Social pressure here means that society, authority or other contractor itself need to motivate or enforcing the contractor to use Green Construction. Using Green Construction is very important and give many advantage compare to old construction method that contractor using for now. When social pressure being implement to all the contractor, it will lead them to use Green Construction anyhow. Although high starting capital is needed, but it can save many things such as natural resources, help earth from being destruct, and save in terms of time and cost in future. Hence, when social pressure being applied, problem regarding implementation of Green Construction will be solved.

## **4.8 Chapter summary**

The conclusion of this chapter, those 5 test has been run in order to find a suitable model to uplift the barrier. All the analysis being run with SPSS software analysis by taking part all the assumption of each test. A model developed from the result of the study which show that NB1 is the most potential barrier to implement green construction. If the NB1 can be solved, 3 main problems that shows at model will be solved indirectly.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.0 Introduction

In this chapter, researcher will make a conclusion based on this study. Few recommendations also will be stated in order to help improvise future generation that will do study regarding this topic in future.

#### 5.1 Conclusions

For the conclusion, there are three main objectives for this study. First objective is to assess TPB of contractor in green construction in Malaysia. Second objective is to determine the obstacles of contractor in green construction in Malaysia and the third objective is to develop framework for uplifting the barrier to implement green construction for contractor in Malaysia. All those objective that stated above need to be achieved in order to complete this study.

##### 5.1.1 Assess TPB of contractor in green construction in Malaysia

In this study, researcher need to do this study by assess TPB of contractor in green construction in Malaysia. In TPB context, there are three different type of beliefs which are behavioural belief, normative belief and control belief. In order to achieve first objective, researcher assess the TPB among contractor through method of questionnaire. A set of questionnaires has been prepared by researcher which consist four different part which are part A consist of information background of the respondent, part B consist of behavioural beliefs which have five different questions, part C consist of normative beliefs which have five different questions, and part D

consist of control belief which have six different type of questions. From that, TPB will be assess among the contractor in green construction in Malaysia.

### **5.1.2 Obstacles of contractor to apply green construction in Malaysia**

In second objective, obstacles among contractor need to be discover in green construction problem in Malaysia. All the obstacles have been discovered through analysis that has been used. Analysis that been used in this study is by SPSS software. Questionnaire that have been collected then will analyse. The result from the analysis, the most potential obstacles and barrier for contractor to implement green construction in Malaysia is coming from normative belief one (NB1) which is contractor want other contractor to use first green construction. From that we know that contractor want green construction being used as method of construction, but somehow, they still lack in knowledge to apply green construction. Contractor need a social pressure in order for them to apply green construction, as an example, if other contractor or society give pressure to them to apply green construction, they will apply green construction method in their construction industry.

### **5.1.3 Framework development for uplifting the barrier to implement green construction in Malaysia**

In last objective, a framework need to be develop in order to uplift the barrier to implement green construction in Malaysia. A framework has been developed by taking all the result of analysis from questionnaire from the respondent. As discuss above, NB1 is the main barrier for green construction to be implement in Malaysia. From the framework that has been developed, that barrier if solved, three problems to implement green construction in Malaysia will be solved eventually. Those three problems are contractor still lack of public awareness in context of green construction in Malaysia that led to low demand in this sector, second problem is Malaysian government still

lack in giving incentive and rewards to those who applying green construction in Malaysia, and the final problem is lack of local supplier that can supply specified green materials which led to delay in project completion. Those three problems are the crucial among other problems in Malaysia to implement green construction. Somehow, if the root barrier can be solved, those three problems also will be solved and the problems of implementation of green construction among contractors in Malaysia will be solved.

### **5.3 Recommendations**

In this section, few recommendations will be given throughout this study. These recommendation is needed for future generation in order for them to make as guidelines for their future study.

- Set of questionnaires need to be sent throughout various type of method such as email, letter, and also person meeting. If the questionnaire being sent through one method only, number of target respondent will not be achieved.
- A deeper study about SPSS software needed in order for easily understand uses and significant for each analysis that has been provided.
- Follow the timeline that has been prepared during early stage for this study in order to make project completed on time.

All three recommendations that have been stated above is needed for future generation when doing research regarding this discipline. These recommendations given will help them to improve and produce a good research.

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## APPENDICES

APPENDIX 1: Questionnaire

APPENDIX 2: Validation of the Research Model Development

APPENDIX 3: Turnitin form



# Biography

## 1. Education level

Mark only one oval.

- PMR
- SPM
- STPM
- Certificate
- Diploma
- Degree
- Master
- PHD

## 2. Position

Mark only one oval.

- Engineer
- Project Engineer
- Project Manager
- Project Executives
- Director

## 3. Company project type

Mark only one oval.

- Developer..
- Road construction
- Building construction

## 4. Company business category

Mark only one oval.

- Contractor
- Sub - Contractor

**5. Your year's of experience in construction industry***Mark only one oval.*

- <5
- 6 - 10
- 11 - 20
- 21 - 30
- >30

**Section B****BEHAVIORAL BELIEFS****6. I understand very well about green construction***Mark only one oval.*

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

**7. I would like to use green construction in my industry***Mark only one oval.*

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

**8. Green construction is very costly to use***Mark only one oval.*

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

**9. I think Malaysia still don't have any expertise in green construction***Mark only one oval.*

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

**10. I think Malaysia still lack in green construction technology***Mark only one oval.*

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

**Section C****NORMATIVE BELIEFS**

11. I have seen many contractors practicing green construction

Mark only one oval.

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

12. My company will apply green construction

Mark only one oval.

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

13. I want my company to applying green construction before others

Mark only one oval.

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

14. Client will love project using green construction

Mark only one oval.

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

15. Client have reliability on us to applying green construction

Mark only one oval.

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

## Section D

### CONTROL BELIEFS

16. I think Malaysia need a law to force contractor applying green construction

Mark only one oval.

	1	2	3	4	5	
strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

17. I need to be rewarded if applying green construction in Malaysia

Mark only one oval.

1      2      3      4      5

strongly disagree                  strongly agree

18. I would like to attend seminar to increase my knowledge in green construction

Mark only one oval.

1      2      3      4      5

strongly disagree                  strongly agree

19. I want a good project team that will lead to successful green construction

Mark only one oval.

1      2      3      4      5

strongly disagree                  strongly agree

20. I would like to know in detail time frame for construction using green construction

Mark only one oval.

1      2      3      4      5

strongly disagree                  strongly agree

21. I would like government to change government policies and give incentives to those who applying green construction

Mark only one oval.

1      2      3      4      5

strongly disagree                  strongly agree

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