

# IMPACT STUDY ON

---

ISO 14001 IMPLEMENTATION TO G7 CONTRACTORS WITH  
ANNUAL TURNOVER RM200 MILLION AND ABOVE

---

Impact Study On  
Iso 14001 Implementation To G7 Contractors With  
Annual Turnover RM200 Million And Above

©Construction Industry Development Board Malaysia 2018

All enquiries regarding this book should be forwarded to:

Chief Executive  
Construction Industry Development Board Malaysia  
Level 10, Menara Dato' Onn,  
Pusat Dagangan Dunia Putra,  
No 45, Jalan Tun Ismail,  
50480 Kuala Lumpur Malaysia.  
Tel : 603-4047 7000  
Fax : 603-4047 7070  
Email : [standard@cidb.gov.my](mailto:standard@cidb.gov.my)  
Website : [www.cidb.gov.my](http://www.cidb.gov.my)

No part of this publication may be reproduced or transmitted in any form or by any means, whether mechanical or electronic including photocopying and recording without the written consent of CIDB.

## TABLE OF CONTENTS

Chapter	Content	Page
	<b>Executive Summary</b>	1
<b>Chapter 1</b>	Introduction	3
<b>Chapter 2</b>	Definition of Annual Turnover, Profit and Revenue	7
<b>Chapter 3</b>	Literature Review	7
	3.1 About ISO 14001	8
	3.2 Process, Procedure and Cost of ISO 14001 Certification	9
	3.3 Factors of ISO 14001 Implementation	10
	3.4 Benefits of ISO 14001 Implementation	11
	3.5 Challenges of ISO 14001 Implementation	13
	3.6 Best Practices of ISO 14001 Implementation	13
	3.7 Currents Incentive Available	14
<b>Chapter 4</b>	Research Methodology	15
	4.1 Research Process	15
	4.2 Population and Sampling	16
	4.3 Purpose of Each Methodology	17
	4.4 Questionnaire Design	17
	4.4.1 Part A: Awareness on ISO 14001	17
	4.4.2 Part B: Factors of ISO 14001 Implementation	17
	4.4.3 Part C: Benefits of ISO 14001 Implementation	17
	4.4.4 Part D: Challenges of ISO 14001 Implementation	17
	4.4.5 Part E: Best Practices of ISO 14001 Implementation	17
	4.5 Reliability Test	18
<b>Chapter 5</b>	Data Analysis and Findings	19
	5.1 Secondary Data Statistics	19
	5.1.1 Number of Companies in Malaysia Certified ISO 14001	19
	5.1.2 Top Five Industrial Sectors Over the World for ISO 14001 Certificates	19
	5.1.3 Number of Establishments with ISO 14001 in Malaysia by Sector	19
	5.1.4 Number of Establishments with ISO 14001 in Malaysian Construction Industry	20
	5.1.5 Number of Establishment with ISO 14002 by Grade of Contractor in 2015	21
	5.1.6 Number of G7 Contractor Establishment with ISO 14001 by State	21
	5.1.7 Total of G7 Contractor and Number of Project Worth RM500 Million and Above	21
	5.1.8 Annual Turnover Set by Department of Statistics	22

5.2 Primary Data	22
5.2.1 Rate of Response	22
5.2.2 Background of Respondents	23
5.2.3 Awareness on ISO 14001	24
5.2.4 Factors of ISO 14001 Implementation	29
5.2.5 Benefits of ISO 14001 Implementation	29
5.2.6 Challenges of ISO 14001 Implementation	30
5.2.7 Best Practics of ISO 14001 Implementation	30
5.3 Interview Session with Gerbang Nusajaya Sdn. Bhd.	31
<b>Chapter 6</b> Conclusions and Recommendations	32
<b>Chapter 7</b> Strategic Plan of ISO 14001 Implementation	34
REFERENCES	36

## LISTS OF TABLE

Table	Title	Page
Table 1.1	CIDB Contractor Grades and Tendering Capacity	4
Table 1.2	Deliverables in the Study	5
Table 1.3	Number of G7 Active Contractors by State	6
Table 3.1	Strategic Principles for Each Stage by State	8
Table 3.2	Cost of ISO 14001 Implementation	9
Table 3.3	Factors of ISO 14001 Implementation	11
Table 3.4	Benefits of ISO 14001 Implementation	12
Table 3.5	Challenges of ISO 14001 Implementation	13
Table 3.6	Current Incentives Available Around the World	13
Table 4.1	Number of Sample of G7 Active Contractors by State	16
Table 4.2	Research Methodology and Purpose	16
Table 4.3	Description of Parts in Questionnaire	17
Table 4.4	Development of Questionnaire	18
Table 4.5	Indication of Cronbach's Alpha Value	18
Table 5.1	Number of Establishments with ISO 14001 Certificates by Sector	20
Table 5.2	Number of Establishments with ISO 14001 by Grade of Contractor in 2015	21
Table 5.3	Annual Turnover Set by Department of Statistics Malaysia (DOSM) for Construction Sector	22
Table 5.4	Rate of Response from Respondents	22
Table 5.5	Background of the Respondents	23

Table 5.6	Number of Company's Implementation of ISO 14001 with Range of Company's Annual Turnover	26
Table 5.7	Standardised Coefficients for Factors of ISO 14001 Implementation	27
Table 5.8	Cross Analysis between Implementation of ISO 14001, Annual Turnover and Types of Works	28
Table 5.9	Factors of ISO 14001 Implementation	29
Table 5.10	Benefits of ISO 14001 Implementation	29
Table 5.11	Challenges of ISO 14001 Implementation	30
Table 5.12	Best Practices of ISO 14001 Implementation	30
Table 7.1	Strategic Plan of ISO 14001 Implementation	34

## LIST OF FIGURES

Table	Title	Page
Figure 1.1	Four Strategic Thrusts in CITP	4
Figure 3.1	ISO 14001 Framework	8
Figure 3.2	Process of ISO 14001 Certification	9
Figure 3.3	Application Procedure for ISO 14001 Certification	9
Figure 3.4	Cost of ISO 14001 Implementation	10
Figure 4.1	Research Process	15
Figure 5.1	Total Number of Companies in Malaysia Certified ISO 14001	19
Figure 5.2	Top Five Industrial Sector Over the World Certified ISO 14001 in 2015	19
Figure 5.3	Number of Establishments with ISO 14001 Certificates by Sector	20
Figure 5.4	Number of Establishments with ISO 14001 in Malaysian Construction Industry	20
Figure 5.5	Number of G7 Contractors Certified with ISO 14001 by State	21
Figure 5.6	Number of G7 Contractors and Number of Projects	21
Figure 5.7	Background of the Respondents	23
Figure 5.8	Percentage of Respondents Heard about ISO 14001	24
Figure 5.9	Percentage of Respondents Knowledge on Purpose of ISO 14001 in Construction Company	24
Figure 5.10	Percentage of Respondents Awareness of the Process and Procedure in Implementing ISO 14001	24
Figure 5.11	Percentage of Company's Implementation ISO 14001	24
Figure 5.12	Percentage of Participation in ISO 14001 Trainings and Seminars	24
Figure 5.13	Percentage of Respondents Response on Relevance of ISO 14001 Enforcement to All Contractors	25
Figure 5.14	Percentage of Respondents Responses on Relevance to Make Compulsory with Annual Turnover of RM200 million and Above to Implement ISO 14001	25

Figure 5.15	Percentage of Range of Company's Annual Turnover	25
Figure 5.16	Percentage of Respondents Responses on Incentive Encouragement to Contractors to Implement ISO 14001	25
Figure 5.17	Percentage of Types of Works	26
Figure 5.18	Cross Analysis between Types of Works and the Implementation of ISO 14001	26
Figure 7.1	Towards Successful Implementation of ISO 14001	35

## **ABBREVIATION**

CIDB	-	Construction Industry Development Board
CITP	-	Construction Industry Transformation Programme
CREAM	-	Construction Research Institute of Malaysia
DOSM	-	Department of Standards Malaysia
DOS	-	Department of Statistics
GDP	-	Gross Domestic Product
ISO	-	International of Standardisation Organisation

# EXECUTIVE SUMMARY

## Introduction

This study is objectively to assess the effectiveness of ISO 14001 implementation to G7 contractors with annual turnover of RM200 million and above. This study aims to achieve these objectives:

1. To analyse the impact of ISO 14001 implementation to G7 contractors in Malaysia and
2. To explore the best practices of ISO 14001 implementation to G7 contractors in Malaysia.

The mixed methods of data collection (survey questionnaire, literature review, interview, CIDB database, Department of Statistics database etc.) and data analysis (descriptive statistics, multiple regression analysis and content analysis) were used in this study to achieve the research objective and research problems. The quantitative research method (survey questionnaire) was used in this study to gain opinion and real data from the respondents while the qualitative research methods (database, interview and literature review) was used to assess the previous data and support the data findings from the quantitative research.

## Survey Population and Sample Size

In this study, G7 contractor were selected as a sample since G7 contractors are classified the highest grade in CIDB registration and tend to receive mega projects. The sample size of 361 were selected based on stratified random sampling technique. Based on Krejcie & Morgan (1979), for population size of 6,000, the sufficient number of sampling would be 361. Since the active G7 contractors registered with CIDB is 5680, the sample of 361 is sufficient to portray the population. Majority of the respondents are from administration and engineer background. Five types of works for the company involved in this study are Building, Civil, Mechanical, Electrical and Other types of works and majority of the company in this study is Building types of works.

## Awareness Level on ISO 14001

The awareness level of ISO 14001 amongst G7 contractors are still low. From this study, it shows that only 44.6% of the respondents ever heard about ISO 14001, 34.1% of the respondents know the purpose of ISO 14001 implementation and only 27.1% are aware of the process and procedure of ISO 14001 implementation. Out of 361 respondents, only 23.5% implemented ISO 14001 in their respective companies and 24.1% of the respondents had join the training and seminar related to ISO 14001. From this data, it is proven that the awareness level of ISO 14001 understanding is still low in Malaysian construction industry.

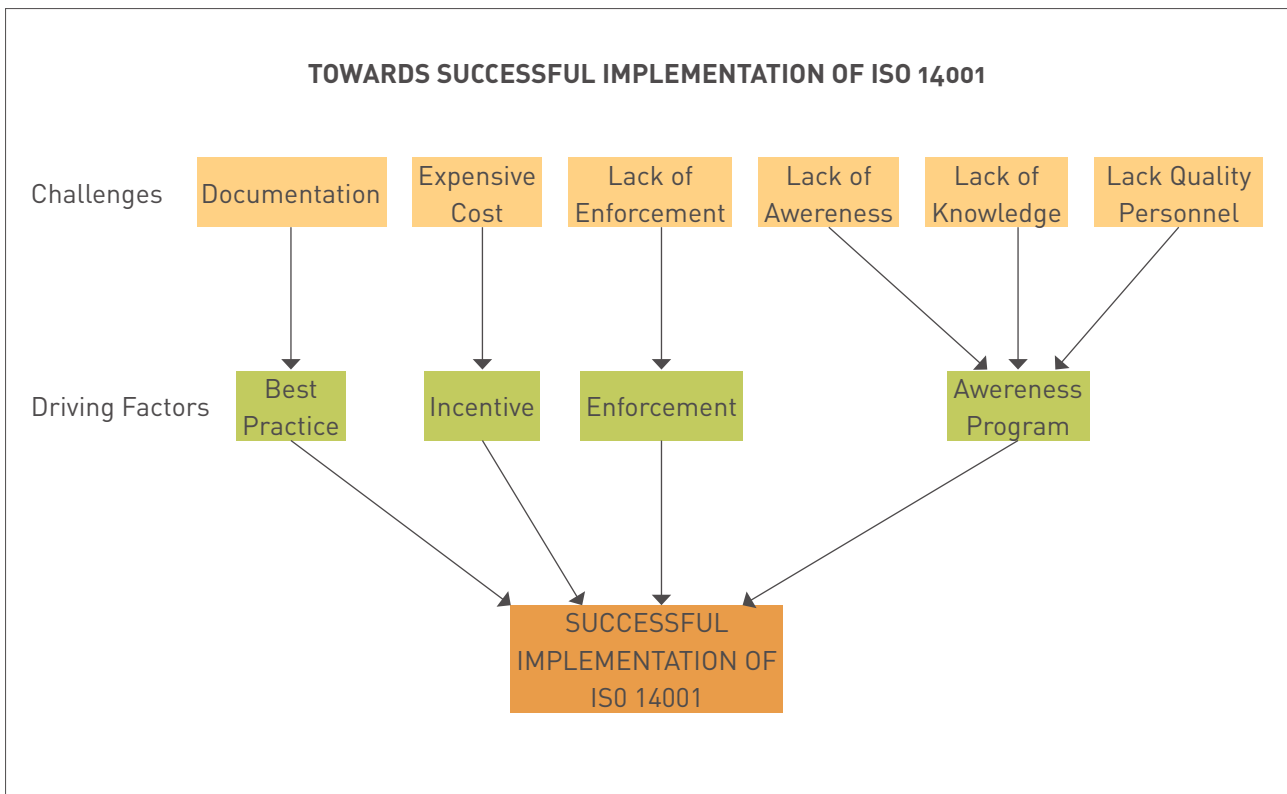
## Factors of ISO 14001 Implementation

From the survey questionnaire analysis, it is shown that the main factor of ISO 14001 implementation is to improve the company's image. Besides that, the top management commitment plays an important role towards the implementation of ISO 14001. The implemented companies also have high level of awareness to the environmental issues since most of the companies in this study have nature of work of building construction.

Contradictory to survey questionnaire analysis, the content analysis from the interview session with Gerbang Nusajaya Sdn. Bhd. mentioned that the factors of ISO 14001 implementation is because of the requirement from the client. There is requirement from the client that the award of the project will be made if the company is an ISO 14001 implementer.

## Challenges of ISO 14001 Implementation

The main challenge in the ISO 14001 implementation is it involves complicated documentation process. Besides that, the implementation cost is also the main challenge to the ISO 14001 implementation followed by scarcity of qualified personnel.



### **Towards the Successful Implementation of ISO 14001**

The success of ISO 14001 implementation can be achieved if the challenges of ISO 14001 can be resolved. From the data in this study, the challenges of ISO 14001 implementation would be resolved through four driving factors which are best practice, incentive, enforcement from the government or CIDB and awareness programmes.

### **Is it Worth to Enforce G7 Contractors to Implement ISO 14001?**

To answer the main objective in this study, we should relook at the findings in this study. From the survey questionnaire, 65.7% of the respondents agree the enforcement of ISO 14001 to the contractors regardless of grade of the contractors. Majority (93.6%) of the respondents agree that the enforcement should start from G7 contractors who have annual turnover of RM200 million and above. However, in this study, G7 contractors who have annual turnover of RM200 million and above is only about 16% and from that percentage, only 10.8% of the companies have indeed implemented ISO 14001 in their companies.

### **Conclusion and Recommendation**

As a conclusion, the implementation of ISO 14001 to G7 contractors with annual turnover of RM200 million and above should be reconsider since there are only a few companies whose annual turnover is RM200 million and above. Furthermore, not all G7 contractors are suitable to implement ISO 14001 because some of the companies' nature of work is Electrical and Mechanical.

Government, CIDB or related parties should be emphasizing on the awareness of ISO 14001 since most of the G7 contractors were not aware nor had the understanding on ISO 14001. The foundation of the successful implementation should focus on the distribution of information to all industry players before such enforcement could be made. The details of strategic plan is discussed in depth Chapter 6.



# CHAPTER 1: INTRODUCTION

Construction industry is one of the major sectors in Malaysia which contributes about 7.9% growth rate to the overall sector in Malaysia for the first quarter of 2016. Although the contribution figure is relatively small, the construction sector has the multiplier effect which is related to the other sector such as manufacturing, production and many more. Construction sector rose at a faster rate of 7.9% (Q4 2015:7.4%). Civil Engineering sustained its double-digit momentum by registering a growth of 17.5% (Q4 2015: 20.4%) and continued to support the construction sector. Moreover, Specialised Construction Activities strengthened to 8.9% (Q4 2015: 4.6%) which was contributed primarily by earthworks and piling projects (DOS, 2016).

The rapid growth of construction sector which seemingly is contributing to the worsen condition of our environment. Sustainable development requires a balance between economic growth, social expansion and environmental protection. One of the solution towards this issue is to implement EMS ISO 14001 in the construction sector.

Based on Jennifer Gray (2010), the construction industry is a major cause of pollution compound around 4% of particulate emissions, higher occurrences of water pollution than the other industry and frequent complaints of noise every year. However, the main areas of concern include air, water, noise and soil pollution.

Ofori and Chan (1998) mentioned that the impacts of construction activities on the environment involves:

- Competition for land with other activities such as agriculture
- Adverse effect on the plots of land which are developed, and their environment, such as changing their ecological characteristics
- Substantial consumption of both renewable and non-renewable resources
- Production of substantial volumes of wastes
- Consumption of large amounts of energy during the processing of materials, the construction process and in the use of construction items
- Contribution to air pollution from dust and substances, including some toxic ones,

which are released during the production and transportation of materials and in some construction operation

- Disruption of the lives of the people living in the vicinity of the project through traffic diversions, noise pollution and others.

In short, construction sites are exposed to a long list of potential hazards such as trench and scaffold collapses, slips, trip and falls (from heights), electric shocks, noise – to name a few - which could lead to fatality without proper control and implementation of certain rules & regulations. It is imperative that these rules and regulations of environmental protection to be imposed by the local statutory, government, and any other independent institutions.

Nonetheless, there is lack of study from previous researchers about the impact of ISO 14001 implementation in the construction industry. Therefore, this study is essential to measure the effectiveness of the ISO 14001 implementation to Malaysian contractors generally and G7 contractors specifically.

This study is expected to assist policy makers in making the relevant decisions with regards to a certain construction company's turnover upon the ruling of making ISO 14001 certification as compulsory. Besides that, this study will strengthen and motivate the implementation of ISO 14001 to all construction players. This study acts as a baseline to explore the impact of ISO 14001 implementation in Malaysia.

The reason G7 contractor is selected is because G7 contractor is the highest grade in the CIDB Contractor Grade and have no limit for tendering capacity. G7 contractors have the highest chance to be awarded mega projects. Table 1.1 shows the CIDB Contractor Grades and Tendering Capacity.

**Table 1.1**

*CIDB Contractor Grades and Tendering Capacity*

Grade	Paid-up Capital (RM)	Tendering Capacity (RM)
G1	5,000	< 200,000
G2	25,000	< 500,000
G3	50,000	< 1,200,000
G4	150,000	< 3,000,000
G5	200,000	< 5,000,000
G6	500,000	< 10,000,000
G7	750,000	No limit

Source: Construction Industry Development Board (CIDB)

Under Construction Industry Transformation Programme (CITP), there are four (4) thrusts and they are as follows:

- Thrust 1: Quality, Safety and Professionalism
- Thrust 2: Environment Sustainability
- Thrust 3: Productivity
- Thrust 4: Internationalism



**Figure 1.1**

*Four Strategic Thrusts in CITP*

The second strategic thrust is Environmental Sustainability and the purpose of this thrust is to develop Malaysia's infrastructure to a sustainable standard. Under this thrust, there are five (5) initiatives and they are as follows:

- E1: Drive innovation in sustainable construction
- E2: Drive compliance to environmental sustainability ratings and requirements
- E3: Focus on public projects to lead the charge on sustainable practices
- E4: Facilitate industry adoption of sustainable practices
- E5: Reduce irresponsible waste during construction

There are two (2) objectives and three (3) deliverables in this study, the objectives of which are as follows:

1. To analyse the impact of ISO 14001 implementation to G7 contractors in Malaysia
2. To explore the best practice of ISO 14001 implementation to G7 contractors in Malaysia

**Table 1.2***Deliverables in the Study*

Deliverable	Scope of Work	Method
Deliverable 1	<ol style="list-style-type: none"> <li>1. To study the process, procedure and cost to get ISO 14001 certification</li> <li>2. To collect, analyse and develop ISO 14001 certification statistics on G7 Malaysian contractor involving types of contractor, business, project scale and other related information</li> <li>3. To study the factors affecting contractor's participation in ISO 14001 certification</li> <li>4. To analyse category of contractors who would be affected by the enforcement of ISO 14001 certification</li> <li>5. To improvise the study with relevant recommendation from previous research</li> <li>6. To present every scope of work to CIDB</li> </ol>	<p>Department of Standards Malaysia Survey</p> <p>Survey</p> <p>Survey</p> <p>Presentation to CIDB</p> <p>Presentation to CIDB</p>
Deliverable 2	<ol style="list-style-type: none"> <li>1. To study the relevance of CITP's action plan for the proposed enforcement of ISO 14001 certification to G7 contractors with the minimum annual turnover</li> <li>2. To explore the positive aspect for the proposed establishment to any initiative in CITP and other government schemes</li> <li>3. To assess the impact of the regulatory stipulation of ISO 14001 to the contractors in detail covering certification and maintenance costs, willingness industry, industry players, government, economy, trade and others.</li> <li>4. To improvise the study with relevant recommendation from previous research</li> <li>5. To present every scope of work to CIDB</li> <li>6. To document the results of the study and report to be submitted to CIDB</li> </ol>	<p>Survey and interview</p> <p>Survey and interview</p> <p>Survey and interview</p> <p>Literature Review</p> <p>Presentation to CIDB</p> <p>Presentation to CIDB</p>
Deliverable 3	<ol style="list-style-type: none"> <li>1. To identify current trends regarding awareness of environmental management in Malaysia and foreign countries involving: <ul style="list-style-type: none"> <li>• Initiatives</li> <li>• Policy</li> <li>• Strategy</li> <li>• Benchmark</li> <li>• Incentives</li> <li>• Enforcement</li> <li>• Challenges in implementation</li> </ul> </li> <li>2. To develop the best practices of ISO 14001 in establishing the enforcement to the contractors which include: <ul style="list-style-type: none"> <li>• Analysis of the current scenario</li> <li>• Categories of contractors involved</li> <li>• Detailed Roadmap and Strategic Plan</li> <li>• Rational, applicable and systematic to ensure that the proposal is consistent with the relevant CITP and can be implemented properly and effectively in accordance with the roadmap set</li> </ul> </li> </ol>	<p>Interview</p> <p>Interview</p>

	3. To identify existing incentives and governance structures that contribute to the implementation of these recommendations	Literature Review
	4. To identify the needs of new incentives and accountable governance structure that contribute to the implementation of these recommendations	Survey, interview and workshop
	5. To present every scope of work to CIDB	Presentation to CIDB
	6. To document the results of the study and report to be submitted to CIDB	Presentation to CIDB

**Table 1.3**

*Number of G7 Active Contractors by State*

State	Number of G7 Contractors
Johor	432
Kedah	163
Kelantan	98
Melaka	126
Negeri Sembilan	106
Pahang	126
Perlis	23
Perak	172
Pulau Pinang	378
Sabah	385
Sarawak	469
Selangor	1450
Terengganu	189
Wilayah Persekutuan	1563
<b>Total</b>	<b>5680</b>

*Source: Construction Industry Development Board (CIDB)*

## CHAPTER 2: DEFINITION OF ANNUAL TURNOVER, PROFIT AND REVENUE

**Turnover** is the net sales generated by a business, while profit is the residual earnings of a business after all expenses have been charged against net sales. Thus, turnover and profit are essentially the beginning and ending points of the income statement - the top-line revenues and the bottom-line results.

There are some variations on the terms just described. Turnover can also refer to the amount of assets or liabilities that a business cycles through in comparison to the sales level that it generates. For example, a business that has inventory turnover of four must sell all of its on-hand inventory four times per year in order to generate its annual sales volume. This information is useful for determining how well a company is in managing its assets and liabilities. If a business can increase its turnover, it can theoretically generate a larger profit, since it can fund operations with less debt, thereby reducing interest costs. The annual turnover includes the sales from building construction, civil engineering and specialised construction activities within the index.

The “**profit**” term can refer to gross profit, rather than net profit. The calculation of gross profit does not include any selling, general, and administrative expenses, and so is less revealing than net profit.

However, when tracked on a trend line, it can give useful perspective on the ability of a company to maintain its price points and production costs over the long term. There is little relation between turnover and gross profit.

**Paid-up capital** is the amount of money a company has received from shareholders in exchange for shares of stock. **Paid-up capital** is only created when a company sells its shares on the primary market directly to investors.

**Paid-up capital** also called as paid-in capital, is a measure of how much money investors have pumped into the company since inception in return for equity.

According to Sapling, **paid-up capital** is the initial capital investment contributed to a new corporation by its founding shareholders. Any excess capital above the par value of the common stock is considered additional paid-up capital. **Paid-up capital** and additional paid-up capital can be found on the company’s balance sheet under “shareholder’s equity”. To calculate paid-up capital, a company must determine the par value of common stock and the number of shares issued to the founding shareholders.

## CHAPTER 3: LITERATURE REVIEW

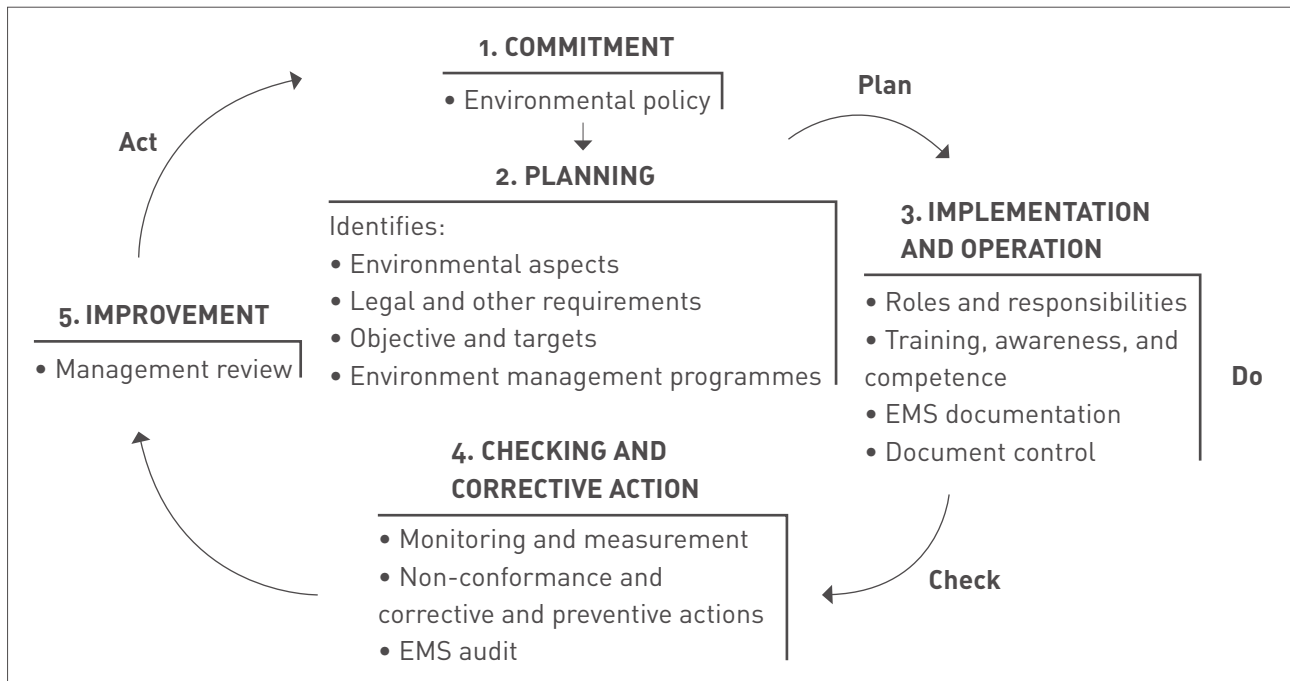
### 3.1 About ISO 14001

The definition of ISO 14001 as given by International Organisation for Standardisation (ISO) is an internationally agreed standard that sets out the requirements for an environmental management system. It helps organisations improve their environmental performance through more efficient use of resources and reduction of waste, gaining a competitive advantage and the trust of stakeholders. ISO 14001 can be applied to organisations of any size.

**Figure 3.1** shows the ISO 14001 framework which comprises 4 strategic principles which are Plan, Do, Check and Act (PDCA).

The action for each strategic principle as reviewed by Chan (2011) and Chen (2004) is as shown in Table 3.1

**Figure 3.1**  
ISO 14001 Framework



Source: Chan (2011)

**Table 3.1**  
Strategic Principle for Each Stage

Stage	Principle
Plan (P)	Prior to implementing ISO 14001, an initial review or gap analysis of the organisation's processes and products is recommended to assist in identifying all elements of the current operation and, if possible, future operations that may interact with the environment, termed 'environmental aspects'. These aspects can include both direct, such as those used during manufacturing and indirect, such as raw materials. This review assists the organisation in establishing their environmental objectives, goals and targets, which should ideally be measurable; helps with the development of control and management procedures and processes and serves to highlight any relevant legal requirements, which can then be built into the policy.
Do (D)	During this stage, the organisation identifies the resources required and works out the list of members of the organisation responsible for the EMS implementation and control. This includes documentation of all procedures and processes; including operational and documentation control, the establishment of emergency procedures and responses, and the education of employees, to ensure they can competently implement the necessary processes and record results. Communication and participation across all levels of the organisation, especially top management, is a vital part of the implementation phase, with the effectiveness of the EMS being dependent on active involvement of all employees.
Check (C)	During the check stage, performance is monitored and periodically measured to ensure that the organisation's environmental targets and objectives are being met. In addition, internal audits are regularly conducted to ascertain whether the EMS itself is being implemented properly and whether the processes and procedures are being adequately maintained and monitored.
Act (A)	After the checking stage, a regular planned management review is conducted to ensure that the objectives of the EMS are being met, the extent to which they are being met, that communications are being appropriately managed and to evaluate changing circumstances, such as legal requirements, in order to make recommendations for further improvement of the system. These recommendations are then fed back into the planning stage to be implemented into the EMS moving forward.

### 3.2 Process, Procedure and Cost of ISO 14001 Certification

Figure 3.2 shows the process of ISO 14001 certification as stipulated by Department of Standards Malaysia (DSM). There are six (6) stages to implement the ISO 14001 which starts from application until the last stage of re-assessment every three (3) years.

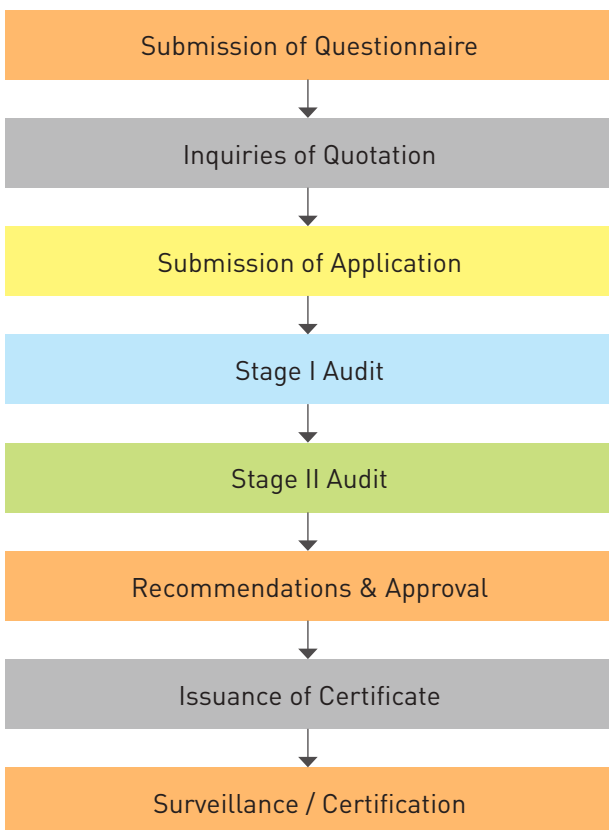


Source: Department of Standards Malaysia

**Figure 3.2**

Process of ISO 14001 Certification

Figure 3.3 show the application procedure for ISO 14001 certification from SIRIM QAS International Sdn. Bhd.



Source: SIRIM QAS International Sdn. Bhd.

**Figure 3.3**

Application Procedure for ISO 14001 Certification

The cost of ISO 14001 implementation might be different based on the accredited company's requirement. For an example, BSI Services Malaysia Sdn. Bhd. charged RM1,000 for ISO 14001: 2015 Requirements and RM1,500 for ISO 14001:2015 Implementation. The cost for ISO 14001 application as stated by SIRIM QAS International Sdn. Bhd. ranges from RM5,000 up to RM15,000 based on three (3) factors which are operational, number of manpower and location of the company. Table 3.2 expounds the estimated cost to implement ISO 14001.

**Table 3.2**

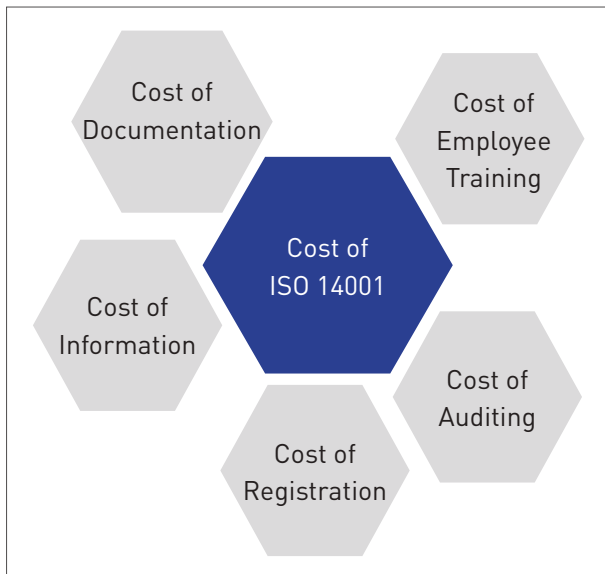
Cost of ISO 14001 Implementation

No	Activities of Implementation	Cost of Implementation (RM)
1	Cost of application	RM 5,000 – RM 15,000
2	Training Awareness and Internal Auditing	RM1,950 (per person)
3	Auditing Stage 1 (review)	RM4,000 (include GST and two auditors)
4	Auditing Stage 1 (issue certification)	RM4,000 (include GST and two auditors)
5	Annual surveillance assessment	RM500
6	Documentation	RM500 per person
7	Annual printing cost	RM200

Department of Standards Malaysia has listed 14 accredited bodies for EMS ISO 14001 and the list is as follows:

1. Intertek Certification International Sdn. Bhd.
2. SIRIM QAS International Sdn.Bhd.
3. SGS (Malaysia) Sdn. Bhd.
4. Independent European Certification (M) Sdn. Bhd.
5. CI International Certification Sdn. Bhd.
6. AJA EQS Certification (M) Sdn. Bhd.
7. Lloyd's Register of Shipping (M) Bhd.
8. Bureau Veritas Certification (Malaysia) Sdn. Bhd.
9. CARE Certification International (M) Sdn. Bhd.

10. NIOSH Certification Sdn. Bhd.
11. BSI Services Malaysia Sdn. Bhd.
12. KGS Certification Sdn. Bhd.
13. DQS Certification (M) Sdn. Bhd.
14. TUV NORD (Malaysia) Sdn. Bhd.



**Figure 3.4**  
*Cost of ISO 14001 Implementation*

The example of cost of ISO 14001 can be calculated through QMS International ISO Free Calculation which the company needs to key in the sector, annual turnover, total staff and number of office.

### 3.3 Factors of ISO 14001 Implementation

All construction processes contribute to environmental problems such as deforestation, land, air and water pollution, erosion and siltation to the discharge of hazardous toxic waste (Nor Hafizah Buari, 2007). The factors that lead to ISO 14001 implementation are as below:

Ofori (2009) had distinguished the impacts of construction activities towards the environment which are detrimental to the land. Such construction activities have adverse effect on the plots of land and the environment such as disruption of ecological characteristics, substantial consumption of both renewable and non-renewable resources, production of substantial volumes of waste, consumption of large amount of energy during the processing of materials, the construction process and the use of constructed items, pollution of air due to dust and other hazardous and toxic substances

released during the production and transportation of materials and disturbances of lives of the people living in the vicinity of the construction sites via traffic diversions and noise pollution – to name a few.

From the above statement made by Ofori (2009), it is evident that construction works could be detrimental and have harmful effects on the environment, thus a vital action needs to be adapted to minimize the impact towards the environment for long term sustainability.

Besides that, respondents of the ISO 14001 research agreed to fulfil client or government agencies' requirement to minimize construction activities' impact towards the environment. Improving company's image in the eyes of the public is also the reason why they should apply EMS ISO 14001. One of the respondents also agreed that ISO 14001 can reduce operating cost in the long run as all the works will be monitored properly especially for activities that could potentially affect the environment. Additionally, one respondent said that he will consider using the EMS ISO 14001 when there is demand from the end user because when the end user demands the 'eco-friendly' type project, the developer will also consider the demand as a requirement which they need to fulfil. Respondents also commented that this system requires voluntary conduct by the construction company. Contractors should have the concern to protect the environment then the system will be successfully applied.

All of them agreed that the reason of implementation of the system is to fulfil clients' requirement especially government agencies. In addition, by having the system they can enter international tenders. They also believe by implementing the system, it can improve their image, build trust from the public, minimize negative and harsh impacts towards the environment as well as gain the possibility to get more projects from government or private firms.



**Table 3.3***Factors of ISO 14001 Implementation*

No	Factor	Author/s
1	Customer demands and public relations benefit	Selih (2007) Ann, Zailani, & Wahid (2006) Din & Riduan (2009)
2	Management commitment	Ann et al., (2006) Din & Riduan (2009) Nee (2011)
3	Performance tracking	Ann et al., (2006)
4	Product acceptability	Ann et al., (2006)
5	Documentation orientation	Ann et al., (2006)
6	Process design culture	Ann et al., (2006)
7	Lead to increased profitability due to cost reduction	Ann et al., (2006)
8	Excellent experience of ISO 9000	Ann et al., (2006)
9	Perceived customer satisfaction and company's image	Ann et al., (2006) Haslinda & Fuong (2010)
10	Perceived economic and environmental impact	Ann et al., (2006)
11	High chance to get more project locally and entering International tenders	Din & Riduan (2009)

### 3.4 Benefits of ISO 14001 Implementation

The benefits of ISO 14001 implementation have been stated by a few researchers. Research done by BSI (2015) stated that ISO 14001 implementation can reduce around 57% waste whilst 48% of the respondents mentioned that the implementation of ISO 14001 can protect the business and reducing the business risk. Besides that, the implementation of ISO 14001 can increase the competitive advantage to the company and inspiring trust in the business.

However, the implementation of ISO 14001 varies significantly across the globe. In 1998, 52.4% of the 7,887 ISO 14001 certified facilities were located in Western Europe and 37% in Asia. On the contrary,

American companies, although ahead in many areas of environmental management, seem reluctant to adopt this voluntary standard. U.S. certified facilities accounted for only 3.7% of the total of ISO 14001 certified facilities in the world in 1998. According to Delmas, 2002, the benefits of ISO 14001 implementation can be divided by four categories which are social, economic, environmental and regulatory.

The social benefits include the following:

- Increase leadership involvement and engagement of employees
- Improve company reputation and the confidence of stakeholders through strategic communication
- Achieve strategic business aims by incorporating environmental issues into business management
- As awareness on environmental issues increases so does the need for companies to address these public concerns. Tenants' existing and future environmental concerns will be met through certification, thus providing a competitive edge to rented properties.

Economic benefits are:

- Provide a competitive and financial advantage through improved efficiencies and reduced costs.
- Certification is assurance to the landlord and tenants that the managing agent is managing the property in a manner that maximises the efficiency of its running, therefore minimising costs, and ensures compliance with legislation. For example, costs can be reduced through effective waste management and energy efficiency.

Environmental benefits are:

- Encourage better environmental performance of suppliers by integrating them into the organization's business systems.

Regulatory benefits are:

- Demonstrate compliance with current and future statutory and regulatory requirements.
- Reduction in exposure to non-compliance

with environmental legislation. The controls introduced by the system, and programme of internal and external audits will increase compliance.

**Table 3.4**

*Benefits of ISO 14001 Implementation*

No	Benefit	Author/s
1	Improving an organization's efficiency	Delmas (2000)
2	Waste reduction and pollution prevention	Chan (2011) Din & Riduan (2009)
3	Competitive advantage against companies that do not adopt the standards	Chan (2011)
4	Improved public perceptions and company reputation	Chan (2011) ISO (2015) Din & Riduan (2009) Haslinda & Fuong (2010)
5	Provide a competitive and financial advantage through improved efficiencies and reduced costs	ISO (2015) Din & Riduan (2009) Haslinda & Fuong (2010)
6	Achieve strategic business aims	ISO (2015)
7	Improve awareness about environmental aspect, regulations and impact to employees	Haslinda & Fuong (2010)
8	Improve relations with vendors	Haslinda & Fuong (2010)
9	Improve relations with the relevant legal authorities	Haslinda & Fuong (2010)
10	Increased productivity	Haslinda & Fuong (2010)

### 3.5 Challenges of ISO 14001 Implementation

Hillary (1999) mentioned that the barriers of ISO 14001 implementation can be internal challenges and external challenges. The internal challenges involve the following:

- Lack of resources: including, among others, lack of time, cost constraints and lack of
- knowledge and specialists in environmental issues.
- Negative attitudes and company culture like inconsistent top management support for
- EMS or a general resistance to change.
- Inadequate understanding and perception such as low awareness of EMSs and lack of knowledge on certifiers' systems, confusion between ISO 14001 and other EMAS.
- Implementation problems which shall include difficulty in dealing with environmental aspects such as the evaluation of company's environmental impact and uncertainty about how to maintain continual improvement.

The external challenges involve the following:

- Difficulty in obtaining the certification and associated costs or the amount of documentation and bureaucracy involved.
- Economic aspects like the uncertainty about the value of an EMS in different markets.
- Lack of support and guidance.
- Institutional weakness such as lack of EMS promotion or financial support.

**Table 3.5***Challenges of ISO 14001 Implementation*

No	Benefit	Author/s
1	Scarcity of qualified personnel	Ofori, Gang and Briffett, (2002) Abdullah, Madros and Ahmad (2001) Din & Riduan (2009)
2	Lack of awareness	Ball (2002)
3	Minimal attention on overall sustainability goals	Ofori, Gang and Briffett, (2002) Abdullah, Madros and Ahmad (2001)
4	Complexity and massive resources needed	Bakkmoen (1996) Abdullah, Madros and Ahmad (2001)
5	Cost for EMS implementation	Abdullah, Madros and Ahmad (2001) Din & Riduan (2009)
6	Did not show significant advantages to the company	Din & Riduan (2009)
7	Lack of government pressure	Din & Riduan (2009)
8	Weak environmental culture among other competitors	Din & Riduan (2009)
9	Complex documentation process	Din & Riduan (2009)

### 3.6 Best Practice of ISO 14001 Implementation

Kadir Arifin, Jamaluddin MD. Jahi &, & Abd Rahim MD.Nor (2006) mentioned that the best practice to implement ISO 14001 is as follows:

- Develop policies, procedures and documents on quality, environment, health and safety as well as all business risks
- To train staff at all levels of the organization to each correlating the elements of quality, environment and safety and health
- To focus on the process approach in implementing management system

### 3.7 Current Incentive Available

Table 3.6 shows the current incentive available around the world for ISO 14001 implementation.

Organisation	Incentive	Country
Malaysian Rubber Export Promotion Council	50% of audit costs incurred in attaining management system certification / accreditation excluding the consultation and training cost, for a company previously not certified/ accredited, subject to a minimum claim of RM20,000 per company per certification/ accreditation	Malaysia
GiatMARA	Incentive of implementation of ISO 9001 to SME for the first year	Malaysia
MSME – Development Institute Government of India	Reimbursement of expenses of acquiring Quality Management System (QMS) ISO 9000 certification / EMS-ISO-14001/ HACCP Certification for the Micro & Small Scale Sector to the extent of 75% of the amount limited to Rs 75,000/ to each enterprise	India

<p>SPRING Singapore</p>	<p>Local Enterprise Technical Assistance Scheme (LETAS)</p> <ul style="list-style-type: none"> <li>• Help SMEs to engage an external consultant to implement quality management and IT systems, including the ISO 14001 Environmental Management System standard. Funding is provided up to 50% of consultancy cost, subject to a maximum grant cap of \$5,000.</li> </ul>	<p>Singapore</p>
<p>Government of UK</p>	<p>Incentive of membership fees to join ISO 14001</p>	<p>United Kingdom</p>

# CHAPTER 4: RESEARCH METHODOLOGY

This chapter describes the methodology done in the research. Research design, population and sample, research instrument, research procedure and data analysis will be discussed to align with research objectives and research questions. This study employed mixed method research which encompass quantitative and qualitative research. Quantitative research include surveys with G7 active contractors while qualitative research involve interview approach.

## 4.1 Research Process

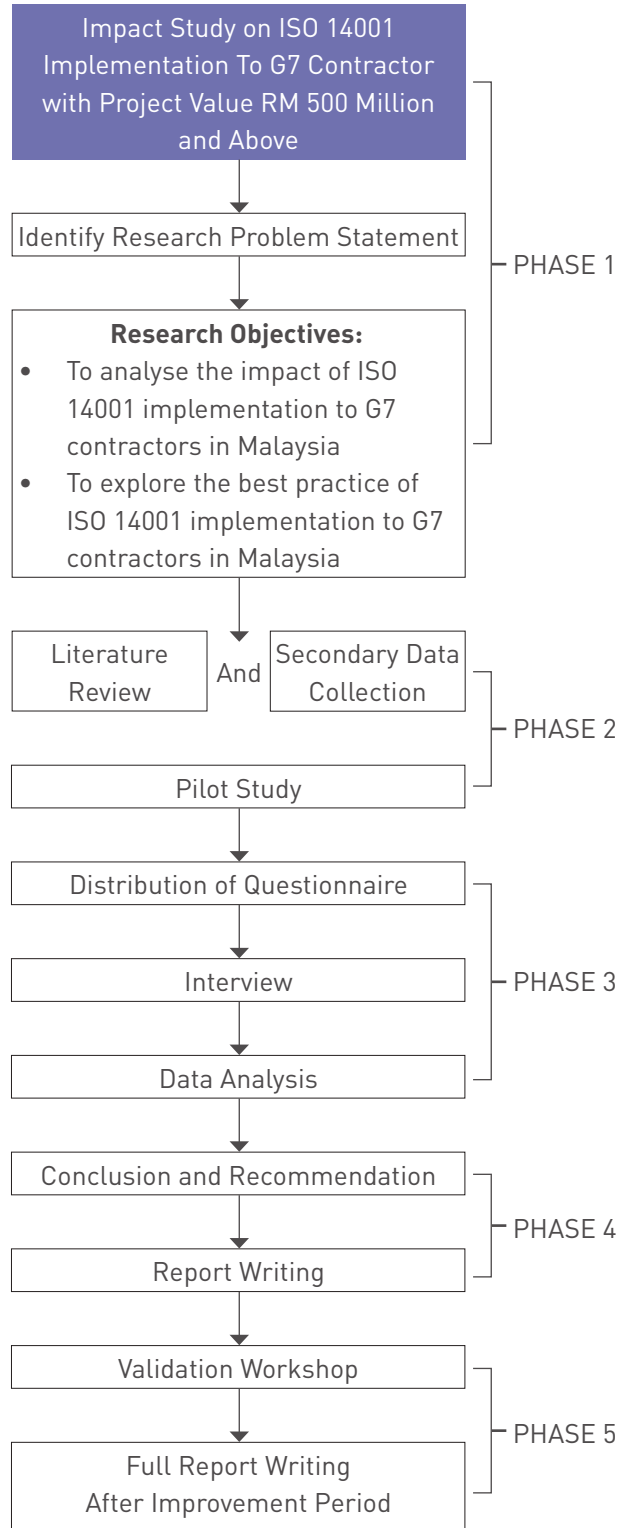
Figure 4.1 shows the research flow of the whole study. There are five phases in the study. Phase 1 involves confirmation on the research title, identifying research problem, research objectives and literature review. The purpose of Phase 1 is to get a detailed and clear idea on the issue. Phase 2 is a pilot study which was conducted involving 22 respondents from various occupational background through a questionnaire distributed amongst Master Builders Association Malaysia (MBAM) members. The purpose of Phase 2 is to gain information from the respondents regarding the items in the questionnaire.

Phase 3 is the distribution of the questionnaire to the respondents. The purpose of this phase is to collect the main data to achieve the objectives of the study. This phase also involves interview session with the experts to gain in-depth information of the study and to validate the findings from the questionnaire. The data is analysed from quantitative and qualitative, drawing conclusion and recommendation. The questionnaire is as attached in **Appendix A**.

Phase 4 involved drawing conclusion from the data analyses and the recommendation will be proposed in this phase. The final stage is Phase 5 which will be validation from the industry and writing the full report.

The main criteria in selecting respondents for the interview session is they should preferably be a member of the top management in the company. Besides that, the respondent must have more than 10 years of experience in the construction industry and have implemented ISO 14001 in the company.

The questions for the interview session are as attached in **Appendix B**.



**Figure 4.1**  
Research Process

## 4.2 Population and Sampling

The population of this study is G7 contractors registered with Construction Industry Development Board (CIDB). The sampling used in this study is stratified random sampling. This sampling technique is chosen because the data are categorised by state and more suitable to use stratified random sampling technique.

Based on Krejcie & Morgan (1979), for a total population of 6,000, the sufficient number of sampling is 361. Out of the 5680 active G7 contractors in Malaysia, a sampling frame of 361 G7 contractors were selected as a stratified random sample. The number of sample for each state is as shown in Table 4.1.

**Table 4.1**

*Number of Sample of G7 Active Contractors by State*

State	Number of G7 Contractor	Sample
Johor	432	27
Kedah	163	10
Kelantan	98	7
Melaka	126	8
Negeri Sembilan	106	7
Pahang	126	8
Perlis	23	1
Perak	172	11
Pulau Pinang	378	24
Sabah	385	24
Sarawak	469	30
Selangor	1450	92
Terengganu	189	13
Wilayah Persekutuan	1563	99
<b>Total</b>	<b>5680</b>	<b>361</b>

## 4.3 Purpose of Each Methodology

There are three (3) methodologies used in this study which are survey questionnaire to G7 contractors, interview session with companies which have already implemented ISO 14001 and workshop session with industry players and decision makers. Table 4.2 show the purposes of each research methodology used in this study.

**Table 4.2**

*Research Methodology and Purpose*

Benefit	Purpose
Survey Questionnaire	To collect data on the perception of G7 Contractors towards ISO 14001. The elements in this survey included awareness on ISO 14001, benefits of ISO 14001, factors of ISO 14001 implementation and challenges of ISO 14001 implementation
Interview	To get in depth information about the implementation of ISO 14001 in the Malaysian construction companies. This method also to gain information regarding the best practice of ISO 14001 implementation in their companies.
Secondary Data Collection	To get the real data regarding IOS 14001 from Department of Statistics and International Organisation for Standardisation (ISO).
Workshop	To validate the findings from the survey and interview before the full report writing.

## 4.4 Questionnaire Design

The questionnaire design sources are from literature review approach. The questionnaire in this study are divided into main five (5) sections. A questionnaire is utilised as it is an efficient data collection mechanism to collect the required data of the variable of interest. Sekaran & Bougie (2010) defined questionnaire as reformulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives. Questionnaires are an efficient data

collection mechanism when the researcher knows exactly what is required and how to measure the variables of interest. The respondents who will answer the questionnaires are G7 active contractors. Table 4.3 shows the sections in the questionnaire.

**Table 4.3**

*Description of Parts in Questionnaire*

Part	Description
Part A	Awareness on ISO 14001
Part B	Factors of ISO 14001 Implementation
Part C	Factors of ISO 14001 Implementation
Part D	Challenges in ISO 14001 Implementation
Part E	Best Practice of the ISO 14001 Implementation

In Part B, C, D and Part E, Likert Scale is utilised to obtain respondent's opinion easily. A Likert scale is an ordered scale from which respondents choose one option that best aligns with their view (Losby & Wetmore, 2012). It is often used to measure respondents' attitudes by asking the extent to which they agree or disagree with a particular question or statement. Losby & Wetmore (2012) explains that Likert Scale have typical scale of "Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree". This statement is supported by Sekaran & Bougie (2010) which mentioned that the Five Likert Scale is designed to examine how strongly subjects agree or disagree with statements on a five-point scale with the following anchors:

Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

#### **4.4.1 Part A: Awareness on ISO 14001**

The awareness on ISO 14001 is collected in this part. Part A consists of ten (10) items which contains the awareness on purpose, process and procedure and training of ISO 14001. The main question in this part is the implementation of ISO 14001 in their organisation and range of annual turnover in their

organisation. Also, in this part the opinion from the respondent is on the enforcement of ISO 14001 to all contractors and relevance of compulsory for companies with annual turnover RM200 million and above.

#### **4.4.2 Part B: Factors of ISO 14001 Implementation**

Part B consists of 12 items related to factors of ISO 14001 implementation in the organisation. The questions are arranged in Likert's scale. For an example, top management's commitment, client's requirement, awareness on environment and so on.

#### **4.4.3 Part C: Benefits of ISO 14001 Implementation**

The 11 items in this part are about benefits of ISO 14001 implementation. All of the questions is in Likert's scale. Some of the example of benefits on implementation of ISO 4001 are improved the company's image, increased customer satisfaction, building up better teamwork and maintained or increased the profit margin.

#### **4.4.4 Part D: Challenges of ISO 14001 Implementation**

The challenges of ISO 14001 implementation are depicted in this part with 11 items. All the questions in this part is in Likert's scale. The questions in this part are lack of government's enforcement, scarcity of qualified personnel, lack of knowledge on ISO 14001 and etc.

#### **4.4.5 Part E: Best Practice of the ISO 14001 Implementation**

The last part in the questionnaire is about the best practice of the ISO 14001 implementation. Some of the best practices in the questionnaire are to establish environmental objectives and targets and establish the programmes to achieve those targets, establish procedure to control the documents and other best practices. Table 4.4 shows the developed questionnaire consist of 40 items which include four parts.

**Table 4.4***Development of Questionnaire*

Part	Instrument	No. of Item
Part A	Background of the Respondent	10
Part B	Information on IBS Project Detail	12
Part C	Factors Influencing Payment for IBS Project	11
Part D	Challenges of ISO 14001 Implementation	11
Part E	Best Practice of the ISO 14001 Implementation	6
<b>Total</b>		50

#### 4.5 Reliability Test

Nunnally & Bernstein(1994) and Bland & Altman (1997) stated that there are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95. A low value of alpha could be due to a low number of questions, poor interrelatedness between items or heterogeneous constructs. George & Mallery (2003) provide the rules of thumb as shown in Table 4.5.

**Table 4.5***Indication of Cronbach's Alpha Value*

Cronbach's Alpha Value	Indication
> 0.90	Excellent
> 0.80 – 0.90	Good
> 0.70 – 0.80	Acceptable
> 0.60 – 0.70	Questionable
> 0.50 – 0.60	Poor
< 0.50	Unacceptable

Since the Cronbach's Alpha value in this study is 0.871, it is indicated that the content of the questionnaire reliable as rated as "Good". This statistic proves that the sampling in this study reflects the population.

#### Reliability Statistics

Cronbach's Alpha	No of Items
.871	46



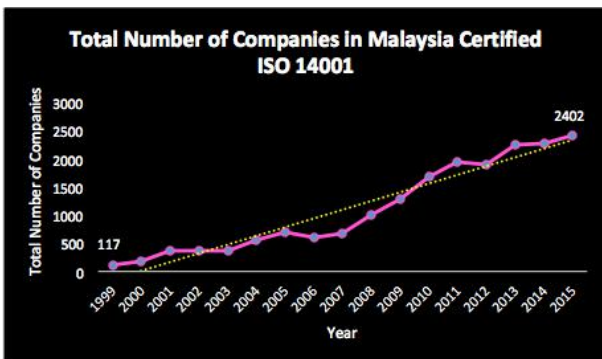
# CHAPTER 5: DATA ANALYSIS AND FINDINGS

This study involves two types of data findings which are secondary data statistics from Department of Statistics Malaysia (DOSM), International Standardisation for Organisation (ISO) and Construction Industry Development Board (CIDB) Malaysia and the primary data which was done through the distribution of questionnaire to G7 active contractors registered with CIDB Malaysia.

## 5.1 Secondary Data Statistics

### 5.1.1 Number of Companies in Malaysia Certified ISO 14001

The survey on Management System Standards Certification from International Organization for Standardisation (ISO) in 2015 display that until 2015, there are about 2402 companies in Malaysia certified ISO 14001 in all sectors. This data show that the ISO 14001 is well accepted in Malaysia and is expected to grow rapidly. The trendline in Figure 5.1 shows that the number of companies in Malaysia certified ISO 14001 is increasing.



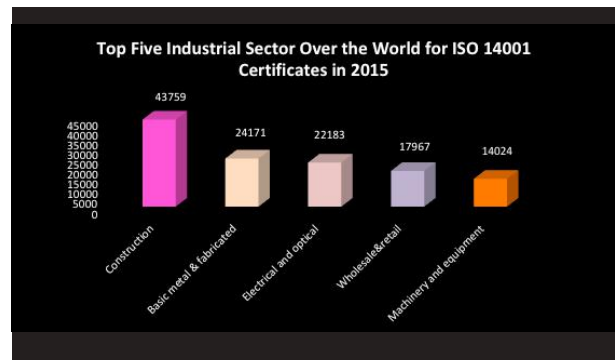
Source: Department of Standards Malaysia

**Figure 5.1**

Total Number of Companies in Malaysia Certified ISO 14001

### 5.1.2 Top Five Industrial Sector Over the World for ISO 14001 Certificates

The construction sector record as the highest holder of ISO 14001 certificates in 2015 over the world as shown in Figure 5.2. The second highest is basic metal & fabricated metal products followed by electrical and optical equipment sector and wholesale & retail trade, repairs of motor vehicles. The least number of ISO 14001 certificates in 2015 is machinery and equipment sector.



Source: ISO Source: ISO

**Figure 5.2**

Top Five Industrial Sector Over the World Certified ISO 14001 in 2015

### 5.1.3 Number of Establishments with ISO 14001 in Malaysia by Sector

The total number of establishments with ISO 14001 certificates by sector in Malaysia shown in Table 4.1 for year 2008 until 2014. This data is collected annually by Department of Statistics Malaysia (DOSM).

**Table 5.1**

Number of Establishment with ISO 14001 Certificates by Sector

Total Number of Establishments with ISO 14001 Certificates by Sector					
Year	Construction	Agriculture, Forestry & Fishing	Mining & Quarrying	Manufacturing	Services
2008	12	1	2	450	14
2009	11	6	7	478	6
2010	20	17	9	739	42
2011	40	5	7	698	44
2012	51	9	8	713	45
2013	50	3	10	600	40
2014	46	5	8	599	42

Source: Department of Statistics Malaysia (DOSM)

Figure 5.3 show the comparison of the number of establishments with ISO 14001 certificates by sector. There are five sectors included in the survey which are construction sector, agriculture, forestry & fishing sector, mining & quarrying sector and services sector. As expected, manufacturing company is the highest number of establishment with ISO 14001 certificates in Malaysia followed by construction sector and services sector.



Source: Department of Statistics Malaysia (DOSM)

**Figure 5.3**

Number of Establishment with ISO 14001 Certificates by Sector

### 5.1.4 Number of Establishments with ISO 14001 in Malaysian Construction Industry

Number of establishments with ISO 14001 in construction industry in Malaysia is illustrated as Figure 5.4. From the table, it shows that the number of establishments with ISO 14001 certificates in construction industry is increasing from year 2008 until 2014. In 2011, residential building in the construction industry recorded the highest number of establishments which have environmental protection expenditure at 26.4% as compared with other activities (Department of Statistics [DOSM], 2012).



Source: Department of Statistics Malaysia (DOSM)

**Figure 5.4**

Number of Establishments with ISO 14001 in Malaysian Construction Industry

### 5.1.5 Number of Establishment with ISO 14002 by Grade of Contractor in 2015

ISO 14002 is an ISO standard that provides detailed guidelines to be used by small and medium enterprises to implement the ISO 14001. As of 2015, there are about 118 G7 contractor companies certified with ISO 14002 which contributed about 1.9%. 46 companies out of 118 companies have paid up capital RM200 million and above (refer Table 5.2).

**Table 5.2**

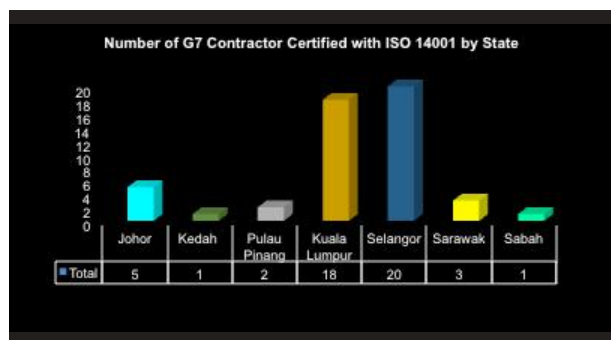
*Number of Establishment with ISO 14001 by Grade of Contractor in 2015*

No	Grade of Contractor	Total	Certified by ISO 14002	Percentage (%)	Paid-up capital RM200 million and above
1	G1	34,068	9	0.026	1
2	G2	12,407	3	0.024	0
3	G3	9,375	10	0.107	2
4	G4	3,408	2	0.059	0
5	G5	4,746	10	0.211	1
6	G6	1,589	4	0.252	1
7	G7	6,206	118	1.901	46

Source: CIDB

### 5.1.6 Number of G7 Contractor Establishments with ISO 14001 by State

As by 2016, there are about 50 G7 contractor companies certified with ISO 14001 with paid-up capital of RM200 million and above. Figure 5.5 shows the number of G7 contractor certified with ISO 14001 by state. As shown in the Figure, most of the G7 contractor certified with ISO 14001 are in Selangor with 39.2% (20) followed by Kuala Lumpur with 35.3% (18). The minorities are Sabah and Kedah with 2% respectively.



**Figure 5.5**

*Number of G7 Contractors Certified with ISO 14001 by State*

### 5.1.7 Total of G7 Contractors and Number of Projects Worth RM500 Million and Above

Figure 5.6 shows the number of G7 contractors and number of projects worth RM500 million and above. The construction sector grows rapidly in year 2012 and 2014. In 2014, 17 projects worth RM500 million and above were awarded to 16 contractors. However, in 2015, the number of projects worth RM500 million and above awarded to G7 contractors decreased to 11 projects.



**Figure 5.6**

*Number of G7 Contractors and Number of Projects*

### 5.1.8 Annual Turnover Set by Department of Statistics

Department of Statistics Malaysia (DOSM) has carried out annual surveys to determine the number of companies with certified ISO 14001. In order to run the survey, they have divided the construction sector into four (4) strata which are large strata, medium strata, small strata and micro strata. The indication of the type of strata is based on the annual output value of the company as shown in Table 5.3.

**Table 5.3**

*Annual Turnover Set by Department of Statistics Malaysia (DOSM) for Construction Sector*

Sector	Type of Strata	Annual Output Value
Construction	Large Strata (Strata 1)	RM 5,000,001 and above
	Medium Strata (Strata 2)	Between RM 1,500,001 & RM 5,000,000
	Small Strata (Strata 3)	Between RM 500,000 & RM 1,500,000
	Micro Strata (Strata 4)	Less than RM 500,000

### 5.2 Primary Data

#### 5.2.1 Rate of Response

The database of G7 contractors was gathered from IT department, Construction Industry Development Board (CIDB). From the database, there are 5680 G7 active contractors in Malaysia. The approach of sampling is Stratified random sampling, of which the samples were demarcated based on the states in Malaysia. The samples of 361 G7 contractors were sufficient based on Krejcie & Morgan table. Table 5.4 shows the rate of response for overall respondents is 65.28% which is satisfactory to portray the sampling. Majority of the respondents involved in this survey were project managers, administrative managers and project engineers. The decision to select this group of respondents would ensure the reliability of the answer of each respondent. The respondents selected had in-depth knowledge on the implementation of ISO 14001 in their companies.

**Table 5.4**

*Rate of Response from Respondents*

State	Number of G7 Contractor	Sample	No. of Distribution	Rate of Response (%)
Johor	432	27	51	52.94
Kedah	163	10	17	58.82
Kelantan	98	7	10	70.00
Melaka	126	8	15	53.33
Negeri Sembilan	106	7	9	77.78
Pahang	126	8	14	57.14
Perlis	23	1	1	100.00
Perak	172	11	16	68.75
Pulau Pinang	378	24	43	55.81
Sabah	385	24	37	64.86
Sarawak	469	30	48	62.50
Selangor	1450	92	129	71.32
Terengganu	189	13	27	48.15
Wilayah Persekutuan	1563	99	136	72.79
<b>Total</b>	<b>5680</b>	<b>361</b>	<b>553</b>	<b>65.28</b>

### 5.2.2 Background of Respondents

Figure 5.7 shows the background of the respondents involved in the study. Most (24.1%) of the respondents were from administration department such as administration managers and account managers. The second highest (21.1%) group of respondents' background in this study was from project management department which were project managers, heads of project and project coordinators. The details of percentage are explained in Table 5.5.

Background of Respondent	
Administration	87
Contractual Department	9
Manager	19
Project Management Department	76
Quantity Surveyor	21
Audit Department	3
Engineer	60
Director	7
Health & Safety Officer	24
Environment Officer	3
Account Manager	3
QA/ QC Department	18
Executive	14
Site Supervisor	8
Others	9

**Figure 5.7**

*Background of the Respondents*

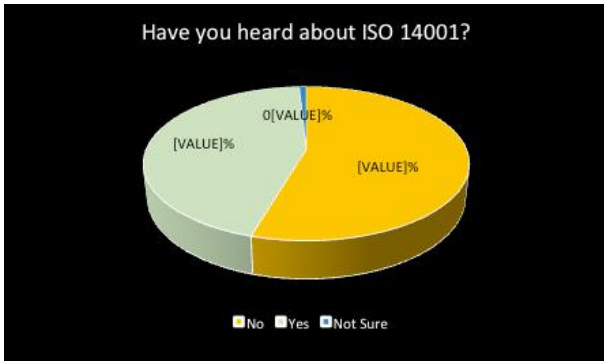
**Table 5.5**

*Background of the Respondents*

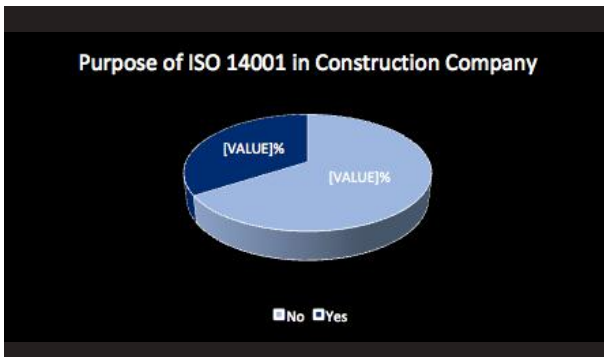
Background of Respondent	Frequency	Frequency
Administration	87	24.1
Contractual Department	9	2.5
Manager	19	5.3
Project Management Department	76	21.1
Quantity Surveyor	21	5.8
Audit Department	3	0.8
Engineer	60	16.6
Director	7	1.9
Health & Safety Officer	24	6.6
Environment Officer	3	0.8
Account Manager	3	0.8
QA/ QC Department	18	5.0
Executive	14	3.9
Site Supervisor	8	2.2
Others	9	2.5
<b>Total</b>	<b>361</b>	<b>100.0</b>

### 5.2.3 Awareness on ISO 14001

This section shows the percentage of respondent's awareness on ISO 14001 in their companies (refer Figure 5.8). Surprisingly, majority (54.6%) of the respondents never heard about ISO 14001 and only 44.6% of the respondents had ever heard about ISO 14001. Based on the survey too, as shown in Figure 5.9, 65.9% did not know the purpose of ISO 14001 and 34.1% were aware of the purpose of ISO 14001 in their companies.



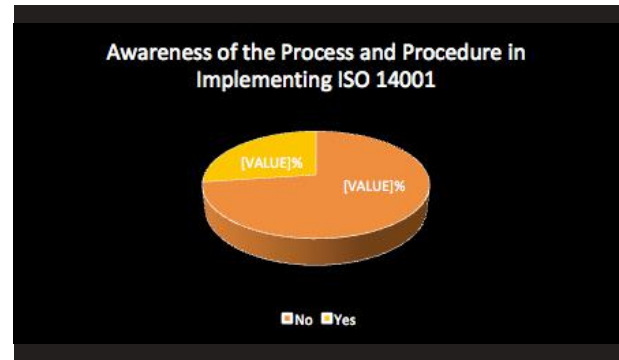
**Figure 5.8**  
Percentage of Respondent's Heard about ISO 14001



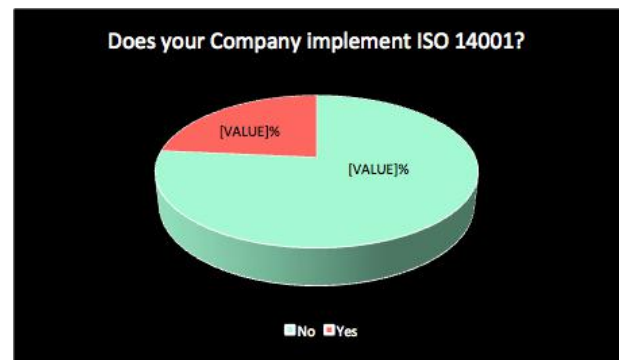
**Figure 5.9**  
Percentage of Respondent's Knowledge on Purpose of ISO 14001 in Construction Company

Figure 5.10 shows the percentage of awareness of the respondents about the process and procedure in implementing ISO 14001. Most (72.9%) of the respondents were not aware of the process and procedure in implementing ISO 14001 and only 27.1% knew the process and procedure in implementing ISO 14001. This data reveals that only 23.5% of the G7 contractors in Malaysia implemented ISO 14001 in their companies and the rest of 76.5% did not implement ISO 14001 in their

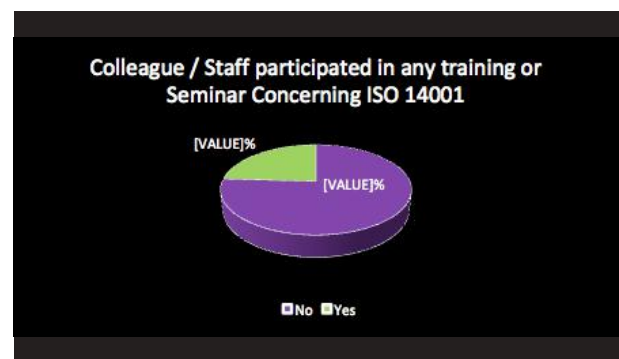
companies (refer Figure 5.11). Thus, the percentage of staff or colleagues participating in any training or seminar concerning ISO 14001 was minimal with 24.1% (refer Figure 5.12).



**Figure 5.10**  
Percentage of Respondent's Awareness of the Process and Procedure in Implementing ISO 14001



**Figure 5.11**  
Percentage of Company's Implementation ISO 14001



**Figure 5.12**  
Percentage of Participation in ISO 14001 Trainings and Seminars

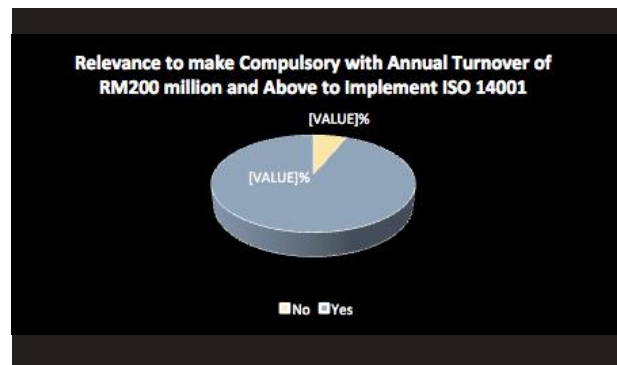
Figure 5.13 shows the respondent's opinion on the relevance to make compulsory of ISO 14001 to all contractors regardless of grade of the contractor. Surprisingly, majority (65.7%) of the respondents agreed to make ISO 14001 compulsory to all contractors. Only 34.3% did not agree to make compulsory of ISO 14001 to all contractors.



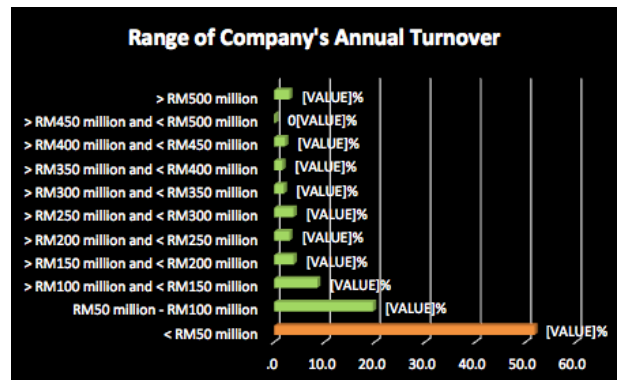
**Figure 5.13**  
Percentage of Respondent's Response on Relevance of ISO 14001 Enforcement to All Contractors

As shown in Figure 5.14, most (93.6%) of the respondent agreed to make compulsory of ISO 14001 implementation to companies with annual turnover of RM200 million and above. Only 6.4% did not agree to make compulsory of ISO 14001 implementation to companies with annual turnover of RM200 million and above.

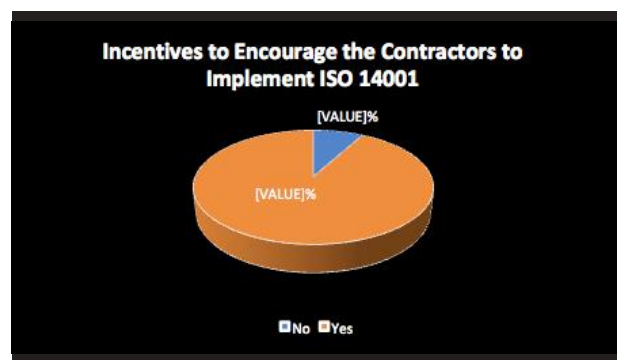
The data from Figure 5.15 shows that only 16% of companies with annual turnover of RM200 million and above while majority of the companies have annual turnover of less than RM50 million. Thus, in order to encourage the contractors to implement ISO 14001 in their companies, most (92.0%) agreed that incentives should be given to the respective contractors (refer Figure 5.16).



**Figure 5.14**  
Percentage of Respondents' Response on Relevance to Make Compulsory with Annual Turnover of RM200 million and Above to Implement ISO 14001



**Figure 5.15**  
Percentage of Range of Company's Annual Turnover



**Figure 5.16**  
Percentage of Respondents' Response on Incentives Encouragement to the Contractors to Implement ISO 14001

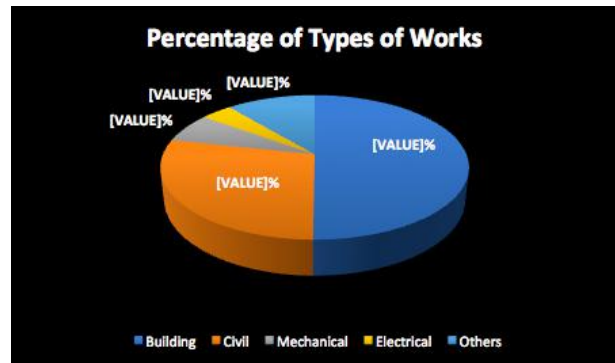


Table 5.6 shows the number of company's implementation of ISO 14001 with range of company's annual turnover. From the table, majority of the respondents regardless if they were implementers of ISO 14001 or not, their range of company's annual turnover was less than RM50 million. However, the statistics show that companies who implemented ISO 14001 and had annual turnover of more than RM200 million and above was 10.8% whereas companies with the same annual turnover but did not implement ISO 14001 was 5.3%.

**Table 5.6**  
*Number of Company's Implementation of ISO 14001 with Range of Company's Annual Turnover*

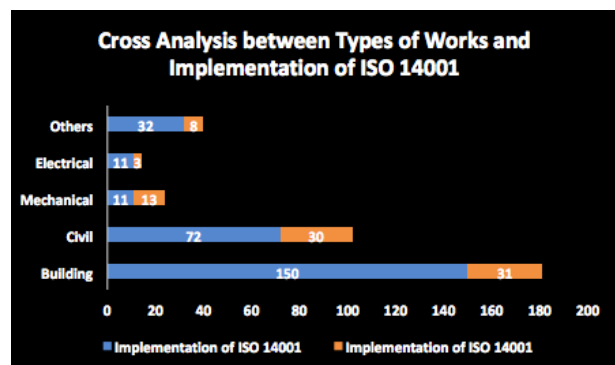
Range of Company's Annual Turnover	Implementation of ISO 14001	
	No	Yes
< RM50 million	171	16
> RM50 million and < RM100 million	60	11
> RM100 million and < RM150 million	19	12
> RM150 million and < RM200 million	7	7
> RM200 million and < RM250 million	7	4
> RM250 million and < RM300 million	4	10
> RM300 million and < RM350 million	1	6
> RM350 million and < RM400 million	2	4
> RM400 million and < RM450 million	2	6
> RM450 million and < RM500 million	0	1
> RM500 million	3	8
<b>Total</b>	<b>276</b> <b>(76.5%)</b>	<b>85</b> <b>(23.5%)</b>
	<b>361</b>	

Figure 5.17 shows the percentage of types of works of the respondents. Majority (50.1%) of the companies were categorised under building types of works and the second biggest percentage types of works were under civil types of works. The balance of the percentage were mechanical (6.6%), electrical (3.9%) and other types of works with 11.1%.



**Figure 5.17**  
*Percentage of Types of Works*

Figure 5.18 shows the cross analysis between types of works and the implementation of ISO 14001 in the company. Majority of the companies who implemented ISO 14001 came from building types of works and the second highest majority came from civil types of works.



**Figure 5.18**  
*Cross Analysis between Types of Works and the Implementation of ISO 14001*



## Multiple Regression between Implementation of ISO 14001 and Factors of the Implementation

The purpose of multiple regression is to analyse the relationship between factors of ISO 14001 implementation and the implementation of ISO 14001 in the organisation. From Table 5.7, the positive relationship between implementation of ISO 14001 and the factors of implementation of ISO 14001 in the organisation were improving the company's image (x1), top management commitment (x2), excellent experience of ISO 9001 (X4), lead to increased profitability due to cost reduction (x5), documentation orientation (x6), high chance to get more projects locally and entering international tenders (x8) and client's requirement (x9).

**Table 5.7**

*Standardised Coefficients for Factors of ISO 14001 Implementation*

Factors of ISO 14001 Implementation	Standardised Coefficients
Improving the company's image (x1)	0.045
Top management commitment (x2)	0.045
Awareness on environmental issues (x3)	-0.142
Excellent experience of ISO 9001 (x4)	0.106
Lead to increased profitability due to cost reduction (x5)	0.032
Documentation orientation (x6)	0.018
Performance tracking of the company (x7)	-0.016
High chance to get more projects locally and entering international tenders (x8)	0.12
Client's requirement (x9)	0.133
Product acceptability from the public (x10)	-0.166
Demand from the end user (i.e. house buyer) (x11)	-0.217

$$y = 0.045_{x_1} + 0.045_{x_2} - 0.142_{x_3} + 0.106_{x_4} + 0.0302_{x_5} + 0.018_{x_6} - 0.016_{x_7} + 0.12_{x_8} + 0.133_{x_9} - 0.166_{x_{10}} - 0.217_{x_{11}}$$

Which:

*y = Independent variable: Implementation of ISO 14001*  
*x = Dependent variable*

## Cross Analysis between Implementation of ISO 14001, Annual Turnover and Types of Works

As shown in Table 5.8, the implementation of ISO 14001 was divided into two categories namely non-implementation of ISO 14001 and implementation of ISO 14001. Most of the companies who had annual turnover of more than RM200 million were involved in building and civil type of works.

**Table 5.8**

*Cross Analysis between Implementation of ISO 14001,  
Annual Turnover and Types of Works*

Range of Company's Annual Turnover			Types of Works					Total
			Building	Civil	Mechanical	Electrical	Others	
No	Annual turnover	< RM50 million	88	46	6	6	25	175
		RM50 million and RM100 million	29	19	4	3	5	60
		> RM100 million and < RM150 million	13	3	1	1	1	19
		> RM150 million and < RM200 million	5	2	0	0	0	7
		> RM200 million and < RM250 million	6	1	0	0	0	7
		> RM250 million and < RM300 million	4	0	0	0	0	4
		> RM300 million and < RM350 million	0	0	0	1	0	1
		> RM350 million and < RM400 million	2	0	0	0	0	2
		> RM400 million and < RM450 million	0	1	0	0	1	2
		> RM450 million and < RM500 million	3	0	0	0	0	3
		<b>Total</b>			<b>150</b>	<b>72</b>	<b>11</b>	<b>11</b>
Yes	Annual turnover	< RM50 million	8	3	3	0	2	16
		RM50 million and RM100 million	2	4	2	1	2	11
		> RM100 million and < RM150 million	3	4	3	0	2	12
		> RM150 million and < RM200 million	5	2	0	0	0	7
		> RM200 million and < RM250 million	2	2	0	0	0	4
		> RM250 million and < RM300 million	4	2	3	0	1	10
		> RM300 million and < RM350 million	1	4	0	0	1	6
		> RM350 million and < RM400 million	0	2	1	1	0	4
		> RM400 million and < RM450 million	3	2	1	0	0	6
		> RM450 million and < RM500 million	0	1	0	0	0	1
		> RM500 million	3	4	0	1	0	8
<b>Total</b>			<b>31</b>	<b>30</b>	<b>13</b>	<b>3</b>	<b>8</b>	<b>85</b>

### 5.2.4 Factors of ISO 14001 Implementation

Table 5.9 shows the ranking of factors of ISO 14001 in their companies. The main factor of ISO 14001 implementation in their companies was to improve the company's image. The second highest factor of ISO 14001 implementation was because of top management commitment. From the table, awareness on environmental issues was also the main factor to implement ISO 14001 in the companies. However, minority of the respondents agreed that demand from end users was the factor of ISO 14001 implementation in their companies.

**Table 5.9**

*Factors of ISO 14001 Implementation*

Factor	Mean	Standard Deviation	Ranking
Improving the company's image	4.34	.642	1
Top management commitment	4.33	.670	2
Awareness on environmental issues	4.31	.623	3
Excellent experience of ISO 9001	4.30	.668	4
Lead to increased profitability due to cost reduction	4.28	.732	5
Documentation orientation	4.27	.670	6
Performance tracking of the company	4.25	.676	7
High chance to get more projects locally and entering international tenders	4.24	.620	8
Client's requirement	4.21	.654	9
Product acceptability from the public	4.08	.818	10
Demand from the end user (i.e. house buyer)	4.07	.779	11

### 5.2.5 Benefits of ISO 14001 Implementation

Table 5.10 shows the respondents' opinion on benefits of ISO 14001 implementation in the company. As expected, the main benefit of ISO 14001 implementation was to improve the company's image. Besides that, competitive and financial advantage against companies that did not adopt the standards was also the main benefit of ISO 14001 implementation. The second and third highest ranking was to improved relationship with relevant authority and to increase productivity. The least agreement from the respondents was to increase customer satisfaction.

**Table 5.10**

*Benefits of ISO 14001 Implementation*

Benefit	Mean	Standard Deviation	Ranking
Improving the company's image	4.39	.631	1
Competitive and financial advantage against companies that not adopt the standard	4.39	.667	1
Improve relationship with relevant authority	4.37	.645	2
Increase productivity	4.34	.611	3
Maintain / increase profit margin	4.33	.636	4
Reduce operation costs in a long-run	4.32	.639	5
Improve relationship with vendors	4.28	.617	6
Improve staff morale & awareness about environmental aspect, regulation and impact	4.25	.682	7
Building up better team work	4.25	.662	7
Increase customer satisfaction	4.24	.656	8

## 5.2.6 Challenges of ISO 14001 Implementation

Table 5.11 shows the challenges of ISO 14001 implementation from the respondents' point of view. Majority of the respondents agreed that the main challenge in ISO 14001 implementation was documentation process related issues. Besides that, the respondents felt that the implementation cost of ISO 14001 was expensive and scarcity of qualified personnel also contributed to challenges of ISO 14001 implementation. However, the least agreed statement was unforeseen significant advantages to their companies.

**Table 5.11**

*Challenges of ISO 14001 Implementation*

Challenges	Mean	Standard Deviation	Ranking
Involving complicated documentation process	4.44	.677	1
Expensive implementation cost	4.35	.676	2
Scarcity of qualified personnel	4.29	.632	3
Lack of environmental awareness among industry players	4.28	.664	4
Lack of knowledge on the ISO 14001	4.23	.691	5
Lack of government enforcement	4.22	.655	6
Subcontracting system creates difficulty to manage ISO 14001	4.16	.686	7
Lack of exposure and training to ISO 14001 among staffs	4.12	.653	8
Lack of client's requirements	4.01	.730	9
Unforeseen significant advantages to the company	4.01	.760	9

## 5.2.7 Best Practices of ISO 14001 Implementation

Table 5.12 shows the respondents' opinions on best practices of ISO 14001 implementation. Most of the respondents agreed that establishing procedures to control EMS documents can be the best practice by companies who were interested to implement ISO 14001 in their business outfits. Besides that, provision of relevant training and awareness programmes can be of the best practices towards the implementation of ISO 14001. Top management commitment to implement ISO 14001 was also the main success factor in implementing ISO 14001 in their companies.

**Table 5.12**

*Best Practices of ISO 14001 Implementation*

Challenges	Mean	Standard Deviation	Ranking
Establish procedure to control EMS documents	4.28	.629	1
Providing relevant training and awareness programmes	4.26	.617	2
Top management commitment to implement EMS ISO 14001	4.26	.682	2
Establishing internal audit procedure, conduct internal audit and report result to management	4.25	.652	3
Establishing environmental objectives and targets and establish programmes to achieve those targets and objectives	4.24	.636	4

### **5.3 Interview Session with Gerbang Nusajaya Sdn. Bhd.**

The interview session in this study involved Gerbang Nusajaya Sdn. Bhd. The person in charge of the interview session was Mrs. Noremy Melan, the Assistant Audit Manager in Gerbang Nusajaya Sdn. Bhd. The company has one (1) officer to control the environmental issue. The nature of business is civil engineering construction. The company has 3 certificates namely ISO 9001:2015, ISO 14001:2015 and OHSAS. The company has been implementing ISO 14001 for more than three years now. However, Mrs. Noremy Melan has not heard about CITP nor she knew that the environmental issue is one of CITP initiatives.

Mrs. Noremy Melan stated that the annual turnover of the company is more than RM50 million. The reason of ISO 14001 implementation is because of client's requirements before a project was awarded. However, she realised that the implementation of ISO 14001 is not only for client's requirements but also for the sake of the company's improvement.

She stated that the implementation of ISO 14001 gives the positive impact as the employees in the company will be more alert at project sites towards the environment and can have a better project planning implementation. For an example, before a project could commence, they will take a sampling of water quality.

In the interview session, the company felt that the implementation cost is not a big problem for them. However, the training and documentation issue takes more time to understand.

As for the best practice implemented in the company, the steps taken are as such:

- The environment department will issue the memo about the EMS ISO 14001 implementation to all employees.
- Follow the requirements as stated in the standards
- Issue a circular to all employees
- Conduct briefing during toolbox meeting

Mrs. Noremy Melan suggested that the implementation of ISO 14001 is the responsibility of all parties. The implementation of ISO 14001 will be successful through the enforcement by the government. For example, companies who do not implement ISO 14001, they cannot renew their CIDB certificates. She also suggested the implementation of scoring system (star) for ISO 14001.

## CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

There is no doubt that ISO 14001 helps the company to reduce the impact on the environment. This success stretches globally from a wide range of business sectors and sizes, however, it is clear that there are a lot of opportunities to improve the implementation of ISO 14001 to meet the challenges for upcoming decades. One of the key areas of improvement must be to link ISO 14001 to the current and / or planned future environment legislation. Many of the larger companies have the resources to implement ISO 14001, however, many SMEs do not have the capability. Though this study included G7 contractors which is the highest grade contractor in CIDB, there is still lack of resources in implementing ISO 14001. The confidence level in this study are 95% and proved that it can represent the population.

Most of the respondents agreed that enforcement to all contractors regardless of grade should be done to increase the implementation of ISO 14001. However, the minority who disagreed with the statement mentioned that the implementation should focus on G5 until G7 contractors which they might have higher annual turnover as compared to the lower grade of contractors (G1 until G4). Besides that, the respondents mentioned that not all organisations were suitable to implement ISO 14001 in their organisation as some of the organisations were based on machinery business.

Based on the respondents' answers in this study, the main factor of ISO 14001 implementation is to improve the company's image. Besides that top management commitment to implement ISO 14001 also leads to ISO 14001 implementation. The respondents also responded that the awareness on environmental issues also brings them to implement ISO 14001. However, the least agreement for the factor of ISO 14001 implementation is because of the demand from the client.

Majority of the respondents agreed that the implementation of ISO 14001 can improve the company's image and give competitive and financial advantage against companies that do not adopt the standard. However, least number of respondents agreed that the implementation of ISO 14001 can increase customer satisfaction. This is, however,

in contradiction to the interview session held with Gerbang Nusajaya Sdn. Bhd., whereby the reason for ISO 14001 implementation is because of the requirements from their clients to get projects.

Study done by Kumar (2011) shows that majority of the respondents disagreed that internal audits added value to the systems and businesses. The findings in this study also supported the study done by Kumar (2011) that more than half (52%) of respondents mentioned that documentation system was complicated. This study proves that major barriers in the implementation of ISO 14001 is documentation process. In order to resolve the issues of documentation, the organisation and implementers should cooperate to issue the guidelines for ISO 14001 documentation process.

Study done by Kumar (2011) also mentioned that the commitment from the organisation to implement ISO 14001 was low and the organisation did not provide any incentive to the staff who worked well for the ISO system. This statement proved that top management involvement is important to ensure the success of ISO implementation. From this study, it is evident that top management buy-in is the top three of the best practices of ISO 14001 implementation.

In terms of incentives to organisations who implement ISO 14001, majority of the respondents agreed that incentives should be given due to high cost of implementation including the cost of staff's training and awareness programmes. Surprisingly, there were respondents who disagreed with the statement mentioned above and they opined the awareness on environment is the responsibility of all organisations and individuals. Respondents also suggested that the incentives should be in the form of monetary and training incentives. Some countries provide free implementation cost of ISO 14001 to their contractors for the first year as one of the means to inculcate environmentally responsible operations in the construction industry.

Study done by James Marsh (2001) mentioned that the cost shall include the internal cost such as cost for new equipment for taken measurement of the modification of existing equipment. There will be also cost of training staff and employees for planning

and implementation of ISO 14001. There may be additional cost for system to record environmental data and the communication of this data which costs are estimated to take up 80% of the overall budget required. External cost includes the service of an external 3rd party auditor for registration and annual audits. A legal representative to check compliance with environmental legislation may also be required in relation to the demographic of their products and /or services.

Besides that, the main challenges in implementing ISO 14001 is complicated documentation process, expensive implementation cost and scarcity of qualified personnel. This data is supported by "The United States EPA Environment Management System (EMS) Pilot Program for Local Government Entities" mentioned that the implementation of ISO 14001 involved complicated documentation process and distract their direct job.

In terms of the cost of ISO 14001 implementation, the respondents mentioned that the cost of implementation is expensive. It might not be a problem for a big company but it will have affected smaller companies. Qualified personnel are crucial if the company wants to implement ISO 14001 and huge expenses should be allocated for training and sustainability of training materials.

The best practice of ISO 14001 implementation as mentioned by the respondents in this study include establishing procedures to control EMS documents. Besides that, provision of relevant training and awareness programmes can be the best practice in the company to implement ISO 14001. It is also important for members of the top management to be committed towards the implementation of ISO 14001.

Based on study done by Zhang, Shen, Love, & Treloar (2000), the crucial factor of ISO 14001 is the commitment of top management. Other than that, the best practice for ISO 4001 implementation is by establishing internal audit procedure, conduct internal audit and report results to the management and establishing environmental objectives and targets and establishing programmes to achieve those targets and objectives.

Based on the data collected in this study, it can be concluded that enforcement on the relevant contractors is not suitable to be implemented (yet) since the awareness on ISO 14001 is still low. The main suggestion in this study is to increase the awareness of ISO 14001 amongst contractors and inculcate the importance of environmental regulations before full enforcement could be mandated.

# CHAPTER 7: STRATEGIC PLAN OF ISO 14001 IMPLEMENTATION

Table 7.1 shows the strategic plan of ISO 14001 implementation to industry players. The strategic plan involves short term plan and long-term plan.

**Table 7.1**

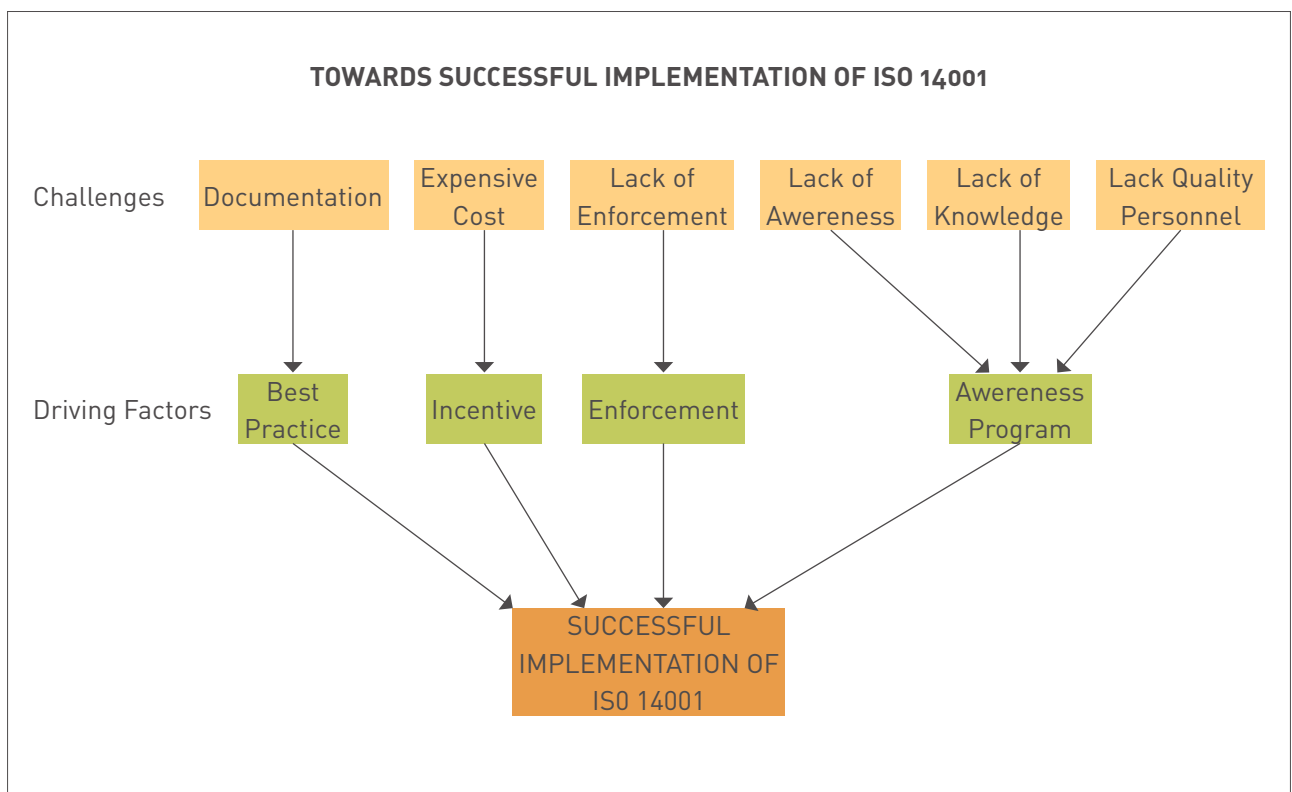
*Strategic Plan of ISO 14001 Implementation*

No	Implementation Plan	Responsible Parties	Implementation Period		
			Phase 1	Phase 2	Phase 3
<b>1.0</b>	<b>Approach Industry Player</b>				
1.1	Strengthen the awareness of ISO 14001 to the industry <ul style="list-style-type: none"> <li>Emphasise the definition and importance of ISO 14001 to the industry</li> <li>Raise awareness and benefits of ISO 14001</li> </ul>	CIDB			
1.2	Encourage industry players to adopt best practices <ul style="list-style-type: none"> <li>Identify few companies who have successfully implemented ISO 14001</li> <li>Highlight the best practices in their company en route implementing ISO 14001</li> </ul>	CIDB			
1.3	Disseminate information about ISO 14001 training <ul style="list-style-type: none"> <li>Disseminate list of accredited bodies for EMS ISO 14001</li> <li>Introduce risk of management in ISO 14001</li> </ul>	CIDB & Department of Standards Malaysia			
<b>2.0</b>	<b>Government Enforcement</b>				
2.1	Approach Top Management <ul style="list-style-type: none"> <li>Focus on top management involvement in ISO 14001</li> <li>Open discussion with top management of the company</li> </ul>	CIDB			
2.2	Initial Enforcement Stage <ul style="list-style-type: none"> <li>Start with G7 contractors with annual turnover RM200 million and above</li> <li>List of G7 contractors whose nature of business are related to the environment</li> <li>Include ISO 14001 requirement as part of the scheme for contractor's registration</li> </ul>	CIDB			
2.3	Incentives to Industry Players <ul style="list-style-type: none"> <li>Free implementation fee of ISO 14001</li> <li>Provide financial assistance for industry players</li> <li>Levy exemption for implementers</li> </ul>	CIDB Financial Institution			



<b>3.0 Impact Study on Enforcement</b>				
3.1	Research on the impact of government enforcement to industry players <ul style="list-style-type: none"> <li>Continuous R&amp;D activities towards the improvement of ISO 14001 implementation</li> <li>Develop ISO 14001 best practices implementation model</li> </ul>	CIDB CREAM		
<b>4.0 Measure the Effectiveness</b>				
4.1	Implement performance assessment framework <ul style="list-style-type: none"> <li>Develop performance assessment framework</li> <li>Identify the benchmarking activities</li> </ul>			
<b>5.0 Continual Improvement</b>				
5.1	Seminar/ conference/ workshop related to the environment <ul style="list-style-type: none"> <li>Involve ISO 14001 implementers during the seminar to share the best practices</li> </ul>	CIDB		
5.2	Foster awareness on environmental protection <ul style="list-style-type: none"> <li>Promote environment friendly practices</li> <li>Prepare guideline for environment friendly initiatives stage by stage</li> </ul>			
5.3	Annual environment report <ul style="list-style-type: none"> <li>Encourage listed companies to provide the environment report</li> </ul>			

**Figure 7.1**  
Towards Successful Implementation of ISO 14001



## References

1. Abdullah, A. M., Madros, N. H. & Ahmad, A. S. (2001). Environmental Problems Confronting The Construction Industry in Producing Sustainable Development. *Conference Proceedings of the National Conference of Construction Industry*, Skudai, Malaysia.
2. Ann, G. E., Zailani, S., & Wahid, N. A. (2006). A Study on the Impact of Environmental Management System (EMS) Certification towards Firm's Performance in Malaysia. *Management of Environmental Quality: An International Journal*, 17(1), 73–93. <http://doi.org/10.1108/14777830610639459>
3. Bland, J. M., & Altman, D. G. (1997). Statistics notes: Cronbach's alpha. <http://doi.org/http://dx.doi.org/10.1136/bmj.314.7080.572>
4. Din, S. A. M., & Riduan, B. (2009). THE IMPLEMENTATION OF ( EMS ) ISO 14001 AMONG CONSTRUCTION COMPANIES IN MALAYSIA. *Journal of Architecture, Planning & Construction Management*, 1(2), 89–108.
5. George, D., & Mallery, P. (2003). *SPSS for Windows Step by Step: Answers to Selected Exercises. A Simple Guide and Reference*. <http://doi.org/9780335262588>
6. Haslinda, A., & Fuong, C. C. (2010). The Implementation of ISO 14001 Environmental Management System in Manufacturing Firms in Malaysia. *Asian Social Science*, 6(3), 100–107.
7. Kadir Arifin, Jamaluddin MD. Jahi &, & Abd Rahim MD.Nor. (2006). Pelaksanaan ISO 14000 dan Kesannya Terhadap Peningkatan. *Malaysian Journal of Environmental Management*, 7, 77–92.
8. Losby, J., & Wetmore, A. (2012). Using Likert Scale in Evaluation Survey Work. CDC.
9. Nee, G. Y. (2011). Determining Factors for ISO14001 EMS Implementation among SMEs in Malaysia : A Resource Based View. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 59(11), 1294–1299.
10. Nunnally Jum C., & Bernstein Ira H. (n.d.). *Psychometric Theory* (3rd ed.). McGraw-Hill Education (India) Pvt Limited.
11. Sekaran, U., & Bougie, R. (2010). *Research Methods for Business: A Skill Building Approach* (5th ed.). John Wiley & Sons.
12. Zhang, Z. H., Shen, L. Y., Love, P. E. ., & Treloar, G. (2000). A framework for implementing ISO 14000 in construction. *Environmental Management and Health*, 11(2), 139–148.
13. Šelih, J., (2007). Environmental management systems and construction SMES: a case study for Slovenia. *Journal of Civil Engineering and Management*, Vol. XIII, No 3, pp. 217–226.