Measures to Enhance the Applications of Eco Labels in Construction Industry

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Abstract

As Malaysia is forecasted to be confronted with energy scarcity and variety of resource consumption for growing population and development, green urban planning and practices of energy use and consumption are the keys components for sustainable future. Hence, in the context of sustainable development, Malaysia's construction industry is now calling for green practices and procurement in their industry. The international community had adopted measures to reduce environmental damage by establishing eco labelling schemes. It started with the Malaysian government also has responded very positively to this matter. In 1996, Standards and Industrial Research Institute of Malaysia (SIRIM) launched the national eco-labelling program verifying products according to environmental criteria as tools and initiatives to express concern and support to sustainable development. Taking into consideration the infancy stage of the Malaysia green marketing initiative, this study therefore conducted with the aim to propose measures to enhance the applications of Eco Labels in Malaysian construction industry. The objectives of the research are to investigate the existing policies pertaining the eco labelling, to determine the factors in implementing the eco labelling scheme as well as to identify the barriers and possible measures to further enhance the use of eco labelling in construction industry. Survey were conducted via data from the literature review regarding the policies pertaining the eco labelling in Malaysia and questionnaire method for factors and barriers to implement the eco labels and the measures to enhance the application of eco labels with respondents from various construction companies among construction players that have involved and experienced with green project. Data obtained were analysed using Average Index and Correlation method via the SPSS. The result shown that, the applications of eco labels product among construction players were relatively acceptable which still can be utilised with most of the significant measures to be proposed.

Keywords: Eco-label, Eco-label policies, Green construction materials, Sustainable development

1.0   Introduction

In 1987, Brundtland Report was introduced and the term „sustainable development" was used to express the following definition „the development that meets the needs of current people without affecting the future generations [8]. In other words, sustainable development responsive to it objectives of development without jeopardizing the future generation. Since then, more conference were organised in support of sustainable development such as The Rio Earth Summit in 1992 and The World Summit on Sustainable Development (WSSD) in Johannesburg in 2002. The Agenda 21 also had been highlighted request to the government in integrating the sustainable development into their national strategies and highlighted the importance involving of private and public bodies in the process [26].

In Malaysia there are bodies such as Malaysia Green Building Confederation (MGBC), Green Purchasing Network Malaysia, National Green Technology & Climate Change Council (MTHPI), Sustainable Development Network Malaysia (SUSDEN) and Environmental Protection Society Malaysia (EPSM) to support the Ministry of Energy, Green Technology and Water (KeTTHA) to strength and ensure the smooth implementation of sustainable activities in Malaysia [8]. Several commitments and incentives were introduced and implemented such as Copenhagen climate change summit in 2009 in which Dato Sri Najib Tun Razak explained up to 40 percent of emissions could be reduced in the gross domestic product (GDP) by the year 2020 compared to 2005. Besides that there are also National Energy Efficiency Master Plan (NEEMP), National Green Technology Policy, National Renewable Energy Policy and Action Plan, and United Nations development program Malaysia (UNDP

Malaysia) among of the sustainable development strategies and actions taken by the government to promote sustainable concept in Malaysia.

Eco-label in Malaysia started when the National Advisory Committee on Eco-labelling was formed in year 1992 and managed by Standards and Industrial Research Institute of Malaysia [49]. In 2004, SIRIM has launched eco-labelling scheme where it has 37 criteria of sustainable materials and products available [49]. Then, in April 2009, Green Building Index was introduced as measuring tools as one of the government's action to promote eco-label material usage in Malaysia [53].

Furthermore, the term "green" does not mean the shade of paint of the building or green colours by the materials but it signify the impact of the building on the environment. A building that has average life span of 50 years is estimated to consume about 80 percent of energy when it is occupied throughout the building's lifetime [9]. These are facts regarding energy consumption which generally consists of operational and embodied energy. To achieve this eco labelling scheme for the products, the parties involved must know about the policies, product achieves and relevant parties instead of the certificates.

Problem Statement

The approach of sustainable construction and with its underlying principles provides a comprehensive guide to enable the construction stakeholders to be more responsible to the environmental protection needs without neglecting the social and economic needs in striving for better living [37]. In Malaysia, it still in regret that the policies in order to attain sustainable and development industry have not been properly implemented [33]. The existing policies that available might be no enough to pertain the standards of Eco Labels. This showed that the guidelines for the green concept still in slow progress as there is not clear policies or guidelines regarding the eco labeling in Malaysia.

In SIRIM eco-label, currently there are 37 eco-labelling criteria involving materials and products that are sustainable to the environment [50]. This number however is considered small compared to other country such as Germany that has about 12,000 products in 120 product categories. The small amount of materials and products available has indicated just how much of materials and products can be supplied by local supplier. The limited number of material supply will create difficulties for developer to obtain the material especially when then project is big and requires lots of materials. Besides that it will affects the choice available for stakeholders to select the green products to be used in their project.

The level of developing green technology in Malaysia is not satisfied and government has a key role in the development of green buildings in Malaysia [45]. This showed that the level of implementing the green concept and eco labelling still in lower stage at Malaysia. Furthermore, the top four most critical factors in developing eco-labelling on materials in construction industry are expensive implementation cost, lake of client requirements or supports, lack of training and also lack of government pressure [26]. It can be stated that the design team and stakeholders in this developing country do not familiar with green construction concept.

Besides, most of design team, stakeholder and developer in this developing country do not familiar with green construction concept as there is lack of guideline, information about the product, function, ability, price and also uncertainty of legislation contribute to the challenges in implementing the sustainable construction [26]. Even though lot of initiatives has been brought by many body locally and internationally, stakeholders still unaware of the green initiative [46]. Naturally, stakeholders persist in the old ways and are reluctant to make the first move to new territory. Developer, on the other hand, is afraid that the building will cost more and take a longer time [54].

With this scenarios there will be potential where developer against to adapt eco-label material to be part of their construction without thinking about the consequences that could impact the environment. Found that financial issues, lack of knowledge and top management commitment were the most significant barrier on sustainable practices in Malaysia [32]. Lack of above information has made them become unaware about the importance of implementing the green approach concept in their construction. Identified a major failure consequence of the development has been that the stakeholders are unaware skills in optimizing energy use, life-cycle cost and comfort benefits in the building [54]. Supposedly, the stakeholders whom play the most important role in construction should be fully aware about green construction as they are the one who will shape the construction pattern in this country. It requires awareness and knowledge from all stakeholders to explore new territory in construction approach and prepares to adopt new products, ideas and practices.

Thus, this research is to identify possible measures to enhance the applications of eco labels in Malaysian construction industry.

2.0   Literature Review

Sustainable Construction

The sustainable construction refers to the adoption of building designs, construction methods and materials that are environmentally friendly [53]. The term "sustainable development" that is stated in Brundtland Report began to appear in 1987 where sustainable development has been defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [57]. The objective is not to disturb future needs for future generations with current development. In other words, our decisions should take into account the possibility of impact on society, environment, and economy while the action will not effects on the future [28]. This means that the current traditional development cannot be use any longer since if effects the environment, social, and economic.

Green building play as big role as a sustainability of construction. Generally, green homes are healthier, more comfortable, more durable, and more energy efficient and have a much smaller environmental footprint than conventional homes. There 1 categories considered for the green building [29] which are:

Table 1: Categories considered in Green Building (Leong, 2009)

1. Energy Efficiency	Establish minimum energy efficiency performance to reduce energy consumption in buildings
2. Indoor Environmental Quality	To enhance indoor air quality in building, thus contributing to the comfort and well-being of the occupants.
3. Environment Management	Encourage protection or restoration of the habitat in conversation and open space.
4. Materials & Resources	Used green product which contain refrigerants & clean agents.
5. Water Efficiency	Help minimise uses of expensive and energy intensive treated potable water wherever possible.
6. The Innovation	Helps in design & environment design to parallel with green building index rating system.

Implementation of Green Programmes

Malaysia's framework for energy development in terms of energy diversification and efficient utilisation as well as to emphasis on sustainable environmental started when National Energy Policy 1979 (NEP79), National Depletion Policy 1980 (NDP80), Four Fuel Diversification Policy 1981 (4FDP81) and Fifth Fuel Policy 2000 (5FP2000) were formed [39]. The objectives of NEP79 was formulated as to (i) supply: to ensure the provision of adequate, secure and cost effective energy supplies through developing indigenous energy resources, both non-renewable and RE resources using the least cost options and diversification of supply sources both from within and outside the country, (ii) utilisation: to promote EE and discourage wasteful and non-productive patterns of energy consumption, and (iii) environment: to minimise the negative impacts of energy production, transportation, conversion, utilisation and consumption on the environment. Table 2 shows progress in green developments in Malaysia [39].

Table 2: Progress in Green developments in Malaysia (Oh and Chua, 2011)

1. Green Financing Scheme	Green financing from various banking institutions: - Sumitomo Mitsui makes USD 200mil financing for local manufacturers on green initiatives such as recycling and waste management projects. - HSBC offer special green financing rates to encourage customers to conduct their business in a sustainable manner. It has launched a Commercial Banking Green Campaign since November 2009. - Maybank also provide advice and financial assistance to companies intending to upgrade their manufacturing process, green their premises or go into large-scale implementation of clean development mechanism and green projects. - Standard Chartered Green financing is opened to all sectors, including biomass and biofuels.
2. Green Townships	- The GoM plans to initiate green townships in which Putrajaya and Cyberjaya. - Main goals are to introduce green township guidelines as to achieve green rating system and promote environmental friendly living. - Other goals to ensure 10% saving in energy and water in all government buildings and setting a carbon footprint baseline using common carbon metric (CCM).
3. Green Procurement and Eco Labelling	- Green procurement is to be implemented in all government agencies. - This includes also working with SIRIM (Malaysia's research and standards development organisation) to develop green procurement manual, procedures and standards, certification and labelling mechanism to provide good link management between government and private sector in green purchasing.
4. Green Vehicles	- This green initiative for the transportation sector is pursued via the National Automotive Policy (NAP). - NAP was introduced in 2006 to highlight the development of related infrastructure to promote hybrid and electric vehicles.
5. Green Jobs Creation	Among the green jobs include in the environmental consultants, project managers, green building architects, designers and engineers, green vehicle engineers, green business owners, green auditors, environmental educators, green technologists, construction workers in green developments, etc.
6. Green Awareness	Green courses are to be included into the national education syllabus through Ministry of Education and Ministry of Higher Education including both public and private institutions.
7. Green Conferences	- National Forum on Green Technology and Innovation (23 to 24 November 2009) - Malaysia Green Forum (MGF) (26 to 27 April 2010) - National Conference on Green Procurement in the Public Sector (21 May 2010) - Green Technology Seminar (17 June 2010) - International Green Technology and Eco Products Exhibition Conference in Malaysia (14 to 17 October 2010) - Asia Pacific Regional Conference and Exhibition on Energy Efficiency (18 to 21 October 2010)

Initiatives for Green Concept in Malaysia

Malaysia is an industry that recognised green rating tool for buildings to promote sustainability in the built environment and raise awareness among Developers, Architects,

Engineers, Planners, Designers, Contractors and the Public about environmental issues and our responsibility to the future generations [20]. An initiative has been made by the government and responsible body to increase the awareness on environmental and green building. SIRIM establish REMAP and CIDB that establish 1BINA and followed by Persatuan Arkitek Malaysia (PAM) that establish Green Building Index (GBI) as a guideline tools so that construction industry can contribute in a positive and proactive manner towards environmental protection if all organization aware of all the initiatives and sustainable concept [34].

Furthermore the bodies involved for green initiatives in Malaysia are also a party to the UNFCCC & had rectified the 1992 Kyoto Protocol in term of sustainability of construction, KeTTHA in formulating policies and establishing the legal framework and effective regulation. Besides, CIDB also develop good construction planning and management to safeguard the environment and lastly SIRIM Berhad Malaysia in producing eco labels scheme [48]. Figure 1 shows several bodies involved for green initiatives at Malaysia.
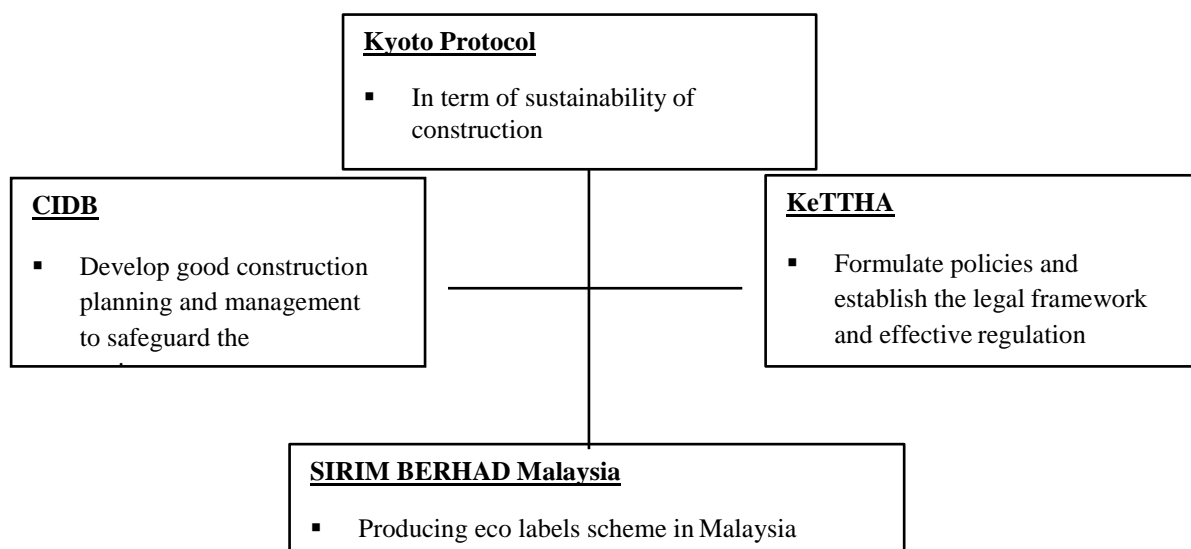

Figure 1: Body involved for green initiatives at Malaysia

CIDB: Green Initiatives

CIDB calls upon the researchers and construction practitioners to reassess the process of construction to develop good construction planning and management to safeguard the environment. To initiate research in this field, they have formed many focus groups in research and development. One of the focus group focuses on environment and sustainability, which is presently involved in research in waste minimization, environmental management plan, water management and construction hazard identification [12].

KeTTHA: Green Initiatives

The initiatives are restructuring *Pusat Tenaga Malaysia* into Malaysian Green Technology Corporation, *Majlis Teknologi Hijau* and *Perubahan Iklim* (MTHPI) establishment, introduction of Green Technology Fund Scheme (GTFS), implementation of The Planning and National Development Doctrine for Putrajaya and Cyberjaya, Eco-Labeling program, introduction towards the electrical vehicle usage, International Green Technology conference and

expo, eco-product and other promotion activities such as green technology road show which incorporated by other state government, green community carnival and many other activities.

SIRIM Berhad: Green Initiatives

The construction sector is very sensitive to quality, safety and environmental issues. Malaysia's construction industry is governed by both foreign and local standards as well as Uniform Building By-Laws (UBBLs), all which are designed to ensure the safety and sustainability of construction projects [48]. These standards not only ensure the quality and reliability of the infrastructure, but also of the materials and components used in these projects [50]. SIRIM certify the green certification for the materials that will be used in the construction project.

Eco Labelling Scheme in Malaysia

The construction using sustainable materials offers many benefits throughout the various stages of a building's life cycle. Green building materials are those that earn high marks for resource management, impact on indoor environment quality (IEQ) and performance, energy-efficient and water efficient [48].

To help consumers make decisions about the products they procure and to decide whether they are environmentally friendly, eco-labels were introduced in the late 1970s [9] and it was starting with the German Blue Angel. It aims to conserve the environment, encourage environmentally sound innovations, and build consumer awareness of these environmental issues [9] .The eco-label, in contrast to a self-styled environmental symbol or claim statement developed by a manufacturer or service provider, is awarded by an impartial third party to products that meet established environmental leadership criteria [8]. Eco-labels can cover a range of environmental attributes, which may include health issues, atmospheric and other environmental impacts, packaging and other industrial issues or the pollution.

SIRIM Roles for Eco Labelling Scheme

Certificating of products lunched in 1996 in Malaysia based on voluntary certification schemes by supervising SIRIM which also matches its programs with Ministry of Environment [49]. In Malaysia, an eco-labelling program which is voluntary with independent third-party confirmation in term of guarantee goods meet green specified criteria or standards that are publicly available and uniformly applicable.

Few products have been eco-labeled such as energy (plum free); papers and packaging (recycle), CFC (Chloro-fluorocarbon) free and biodegradable household goods [50]. However, eco- labelling schemes in Malaysia contain third-party certification that is done by a body that that is not included the production, market, or consumption of products. Currently, certification schemes are proved in Malaysia that can be grew up under Type II -ISO 14021 standards that provide a self- declaration depending on eco-friendly specification of the product [49]. In fact, Certification dictates whether a presented good in the market meets the green specific standards, while marketing expands consumer knowledge and assure in the claim.

Eco-labelling will provide consumers with accurate environmental information on products and services. It will also induce manufacturers to produce environmentally preferable products. The Scheme was launched on 17 September 2004 by SIRIM QAS International Sdn. Bhd. to encourage the demand and supply of those products and services that cause less stress to the environment, and stimulate the potential for market driven environmental preferable products

through communication of verifiable and accurate information on environmental aspects of products and services [50].

3.0   Research Aim and Objectives

The aim of this project is to determine the strategies to enhance the application of SIRIM Eco-Label products among construction players in Malaysian construction industry.
  i.   To explore the existing policies pertaining eco labels in construction industry.
  ii. To determine factors to enhance the implementation of eco labels in construction industry.
  iii. To identify a possible measures in reducing the gaps in the implementation of eco-labelling in Malaysia.
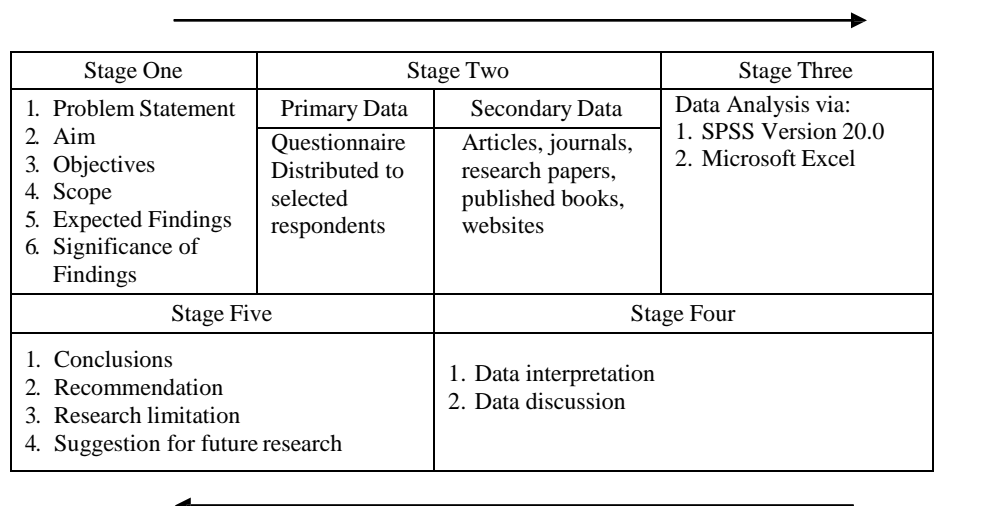
4.0   Methodology

The research is as a process used to collect and gather all relevant and helpful information to have further understanding with an issue or topic through analysis of collected data. He also stated that an expressed quantitative research as a method for exploring and understanding meaning individuals and groups ascribe to a social or human problem [14].

For this purpose of the research, quantitative research method was adopted by way of questionnaire survey. Open ended and closed-ended questionnaires had been utilized in order to tackle the issues of the application of eco labelling in the Malaysian construction industry as means of enhancement of green building. Open ended questions were incorporated into the surveys to help generate fresh ideas from the respondents [1].

A set of questionnaire survey had been distributed to all selected construction professionals team which had an experienced in managing the green building which located in Klang Valley via mailed (online) and self-administered approach. Of the number of respondent that successfully respond to the questionnaire. These respondents are limited to construction players working either with private, public and semi-private sectors only which the list of respondents are get from the private company which is procuring the eco labels materials. Hundred (100) sets of questionnaire were distributed, while only forty three (43) of them were returned. All data proven are reliable when tested with Alpha‟s Cronbach‟s test that achieved (0.862). The methodology flowchart is displayed as in Table 3.

Table 3: Methodology flowchart

Stage One	Stage Two		Stage Three
	Primary Data	Secondary Data	Data Analysis via: 1. SPSS Version 20.0 2. Microsoft Excel
1. Problem Statement 2. Aim 3. Objectives 4. Scope 5. Expected Findings 6. Significance of Findings	Questionnaire Distributed to selected respondents	Articles, journals, research papers, published books, websites	
Stage Five	Stage Four		
1. Conclusions 2. Recommendation 3. Research limitation 4. Suggestion for future research	1. Data interpretation 2. Data discussion		

5.0 Results and Analysis

For the purpose of the research, frequency distributions have been applied as method of analysing the data. The average index has been calculated by using the formula. Next, rating has been given on the average index scored. Five (5) point of Likert scale of measurement is applied and the rating to each of the average index obtained in this research was determined based on the following scale of measurement. Secondly, the correlation method had been used to analysing the data.

The Pearson Correlation is a numbers measure the strength and direction of the linear relationship between the two variables [10]. The correlation coefficient can range from -1 to +1, with -1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, and 0 indicating no correlation at all. If the correlation was higher, the points would tend to be closer to the line; if it was smaller, they would tend to be further away from the line [10]. Furthermore, any variable correlated with it has a correlation of 1. Secondly the Sig. (2-tailed) means this is the p-value associated with the correlation. The footnote under the correlation table explains what the single and double asterisks signify [10].

The average index formula:

$$\text{Average index} = \frac{\sum a_i \times n}{\sum N}$$

Where:

a_i is weighting given to each factor by repondents

n is the frequency of the respondents

N is the total number of respondent.

A total of forty three (43) out of 100 respondents have returned their responses and feedback by completing and answered the questionnaires. Table 4 shows the tabulation of respondent's profession.

Table 4: Respondent's breakdown based on profession in the organization

No.	Respondent	Total	Percent return (%)
1	Architect	16	38%
2	Developer	8	18%
3	Contractor	8	18%
4	Supplier	11	26%
	Total	**43**	**100%**

From the data collected, it can be concluded that the respondents are from professional level or position and most of the respondent are from qualified and adequate level of education. Therefore, the results from respondents' perspective believed as significant to this research area of concern.

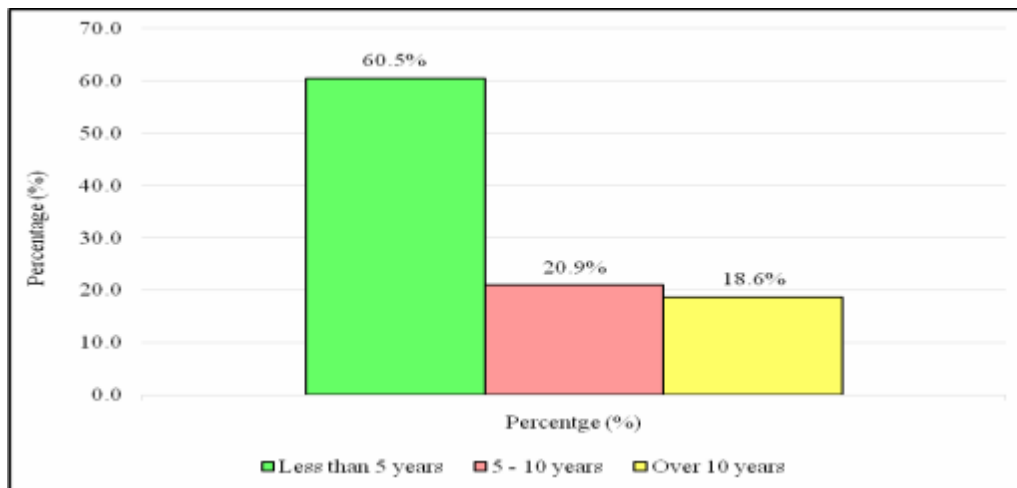**Respondent's working experience and experience in green construction**

Figure 2: Respondents" years of working experience

From the data collected, Figure 2 illustrated that 26 respondents (60.5%) having less than 5 years' experience, 9 respondents (20.9%) with 5-10 years and 8 (18.6%) were 10 years or more experienced in construction industry. The bulk of the experienced respondents demonstrating that respondents probably to be experienced enough to comment on eco labelling application matters.
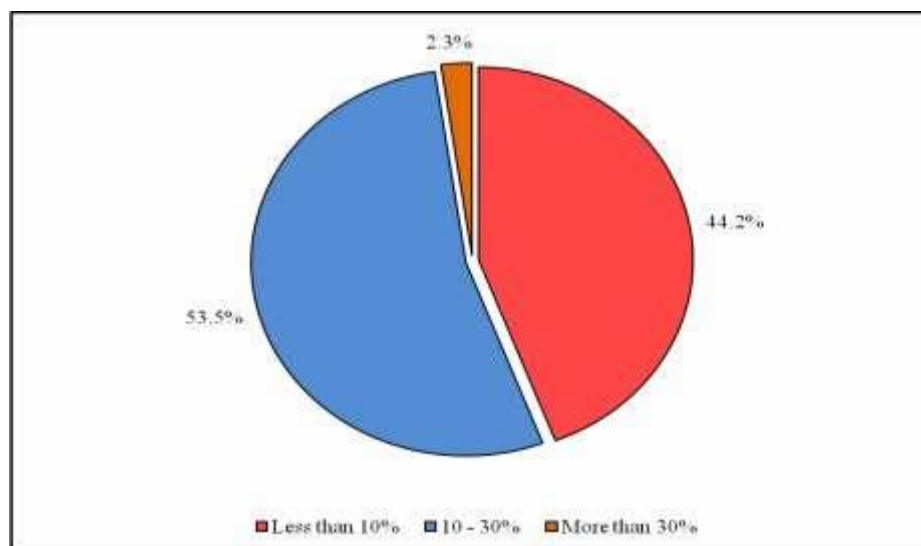

Figure 3: Respondents" experience in green construction

In terms of number of experience in green construction, Figure 3 shows that almost 44% of respondents described themselves as having less than 10% involvement, 54% considered themselves as having 10% to 30% involvement and only 2% believed that they had more experience which is more than 30% experience.

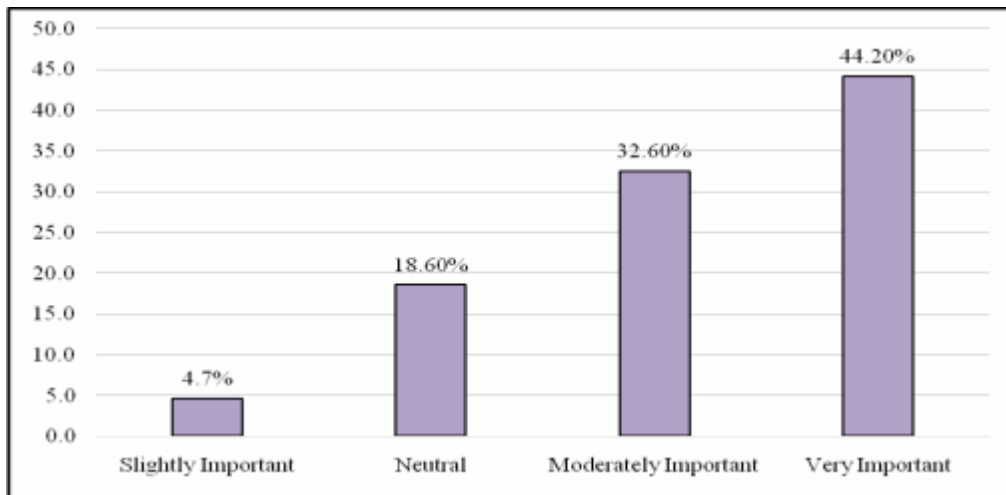**Respondent's acceptance towards the Eco Labelling scheme in Malaysia.**

Figure 4: Percentage Eco-labelling acceptance among construction players

From the data collected, Figure 4 illustrated that 19 respondents (44%) stated that the Eco Labelling is very important, 14 respondents (33%) with moderately important, 8 respondents (19%) with neutral acceptance and 2 respondents (4%) with slightly important acceptance towards the Eco Labelling scheme in Malaysia.

It can be concluded that the majority of the respondents accept and experienced in green and eco labelling scheme and capable to answer the survey. Therefore, the results from respondents" perspective believed as significant to this research are of concern.

Objective 1: To explore the existing policies pertaining eco labels in construction industry.

The first objective of this research is to explore the existing policies pertaining eco labels in construction industry. This objective was achieved through literature review from the proven and relevant sources such as CIDB Guideline Books. In order to achieve objective 1, the several readings had been done. Based from the literature review gathered, the first policy that being implemented for green concept since 2002 was the National Policy on the Environment from the Ministry of Non Renewable Energy. Secondly is the National Green Technology Policy from Ministry of Energy, Green Technology and Water.

As both of this to ensure the green initiatives going well, each of it had its own reliable objectives. The first policy help to provide guidance to all federal and state agencies, industry sector, local community and other stakeholders in ensuring the environment is clean, well-managed, healthy and productive in future. Meanwhile, the second policy is to conserve the natural environment and resources and it helps to minimises and reduces the degradation of the environment. Table 5-8 are showed some of the NRE and KETTHA principals, policies and programs in Malaysia.

Table 5: Eight (8) principles framework sources from www.nre.gov.my

*First **Stewardship of the Environment** Exercise respect and care for the environment in accordance with the highest moral and ethical standards	*Fifth **Integrated Decision Making** Integrate environment dimensions in the planning and implementing of the policies, objectives and mandates of all sectors to protect the environment
*Second **Conservation of Nature's Vitality and Diversity** Conserve natural ecosystems to ensure integrity of biodiversity and life support systems	*Sixth **Role of the Private Sector** Strengthen the role of the private sector in environmental protection and management
*Third **Continues Improvement in the Quality of the Environment** Ensure continuous improvement in the productivity and quality of the environment while pursuing economic growth and human development objectives	*Seventh **Commitment and Accountability** Ensure the highest commitment to environmental protection and accountability by all decision makers in the public and private sectors, resources users, non-governmental organisations and the general public, in formulating, planning and implementing their activities
*Fourth **Sustainable Use of Natural Resources** Manage natural resources utilisation to sustain the resource base and prevent degradation of the environment	*Eighth **Active Participation in the International Community** Participate actively and efficiently in regional and global efforts towards environmental conservation and enhancement

Table 6: 4 keys major Improvements from National Policy on Environment source: www.kettha.gov.my

Energy Sector Application of Green Technology in power generation and in the energy supply side management, including co-generation by the industrial and commercial sectors.	**Buildings Sector** Adoption of Green Technology in the construction, management, maintenance and demolition of buildings.
Water and Waste Water Management Sector Adoption of Green Technology in the construction, management, maintenance and demolition of buildings.	**Transportation Sector** Incorporation of Green Technology in the transportation infrastructure and vehicles, in particular, biofuels and public road transport.

Table 7: 5 Projects/Programs by the Ministry of Energy, Green Technology and Water
source from www.kettha.gov.my

1. National Green Technology & Climate Change Council (MTHPI)	To formulate policies and identify the strategic issues in the National Green Technology Policy development and climate change. It also coordinates, monitors and evaluates the effectiveness of the National Green Technology Policy and Green Technology programmes and climate change at the national level.	2. Eco Labelling	In creating a conducive environment in terms of Green Technology, the Ministry of Energy, Green Technology and Water (Green Technology Sector) in collaboration with SIRIM Berhad as the program developer with Malaysian Green Technology Corporation (GreenTech Malaysia), has been tasked to implement the Green Procurement Pilot Program and Eco labeling started in August 2010 and was completed on April 2011. Eco labelling is a voluntary scheme to encourage businesses sector in order to create environmentally friendly products as well as to help consumers to identify environmentally friendly products.
3. Green Township	KeTTHA and GreenTech Malaysia had agreed for Putrajaya and Cyberjaya to become the Green Township pilot project which will be a development model to the other cities in Malaysia. In addition, a committee was established under the Green Technology and Climate Change Council (MTHPI) framework which is to be known as the Green Neighbourhood Development Working Committee is responsible to coordinate the implementation of legislation, policies, guidelines, programs, activities and role of responsible agencies in the implementation of the Green Neighbourhood.	4. Green Technology Studies	The Green Technology Sector also has implemented a few studies to decode the National Green Technology Policy into an action plan and also map out its implementation. The main studies are the Green Technology Infrastructure Masterplan and Electric Vehicles Roadmap. (a) Green Technology Masterplan For the first phase, the baseline study focuses on six (6) identified sectors, which are the energy, building, transportation, water and waste management, manufacturing and information communication technology. The second phase defines the Green Technology, Low Carbon Economy and to design the Low Carbon Economy Action Plan which will cover all the major economic sectors including agriculture and forestry sectors and develop detailed guidelines in producing the green technology action plan to realize DTHN. b) Electric Vehicle Infrastructure Roadmap KeTTHA has appointed GreenTech Malaysia to facilitate the preparation of the Electric Vehicle Infrastructure Roadmap.

Table 8: 5 Projects/Programs by the Ministry of Energy, Green Technology and Water
(cont'd) source from www.kettha.gov.my

5. Smart Partnership	One of the strategies in the agenda to strengthen the National Green Technology. This smart partnership covers the National, State, Local Government until the International level.
	a) Green Jobs The Ministry has been working with the Department of Skill Development (JPK), Ministry of Human Resources (MoHR) to develop the Occupational Analysis (OA) and the National Competency Standard (NCS) on Green Technology. OA and NCS documents have been approved by the MoHR in 2010. Occupational Analysis (OA) is a systematic process to collect the information on the important tasks from the specific work. The NCS was developed to list out the generic competency of the occupations in order to create the green jobs. International Labour Organization (ILO) also helped out in providing a "roadmap" for green jobs in Malaysia.
	b) Integration of green topics in the syllabus and curriculum to all levels of Schools and Higher Education Institutions The Ministry has conducted a measurements analysis and curriculum related to Green Technology in pre-school, primary and secondary schools. As a result of the analysis, it was found that the integration of green topics is not comprehensive and should be updated in accordance with the levels of understanding.
	c) Green ICT The Ministry found that the ICT sector also plays an important role in reducing the GHG emissions (Green House Gas). The Ministry has been working with the ICT Policy and Planning Division, MAMPU in collecting the input on the application of Green Technology in ICT.
	d) Cooperation between Malaysia and South Korea on Green Technology The collaboration between Malaysia-Republic of Korea directly benefits Malaysia as the following: (i) Sharing information on policy and regulatory framework in the field of green technology; (ii) Human resource development, including training, seminars, workshops, etc (iii) Cooperation project, including in the areas of R &D; (iv) Conference between Malaysian-Republic Korea business entities in Green Technology (v) Promote trade and investment in green technology between Malaysia and the Republic of Korea.

This research discovered the existing policies of eco labelling started since early 2000 in Malaysia and has roots in the green concepts and technology. The rising of demand from the client to built more environmental buildings contribute to the implementation of eco labelling scheme. As a result, SIRIM Berhad as the program developer with Malaysian Green Technology Corporation (GreenTech Malaysia), has been tasked to implement the Green Procurement Pilot Program and Eco labelling started in August 2010 and was completed on April 2011.

Furthermore, this research noticed out that for the eco labels policy, there is no any eco labels policy or green materials policy. The only body involved is SIRIM Berhad for all the process as to assure consumers of the products are sustainable. Under this eco labelling scheme, more than 30 product categories have been developed such as Environmentally Degradable, Non Toxic Plastic Packaging Material, Hazardous Metal-free Electrical and Electronic Equipment, Biodegradable Cleaning Agents and etc.

The existing policies, The National on Environment and National Green Technology continue the development and encouragements of the government toward the implementation of Eco Labelling scheme. These policies have been gazette on 21 0ctober 2002 and 24 July 2009 respectively. In short, these policies was launched in order to promote and encourage the use of sustainable concept and green environment as a essence to guide all the stakeholder to ensure the environment is clean, well-managed, healthy and productive in future. Prior to that, this polices has been come with several programs managed by the government such as National Green Technology & Climate Change Council (MTHPI), Eco Labelling, Green Township, Green Technology Studies and lastly Smart Partnership. Therefore, the enforcement of these policies should be boost up the growth and uses of Eco Labelling products as one strategies to preserve the environment.

Objective 2: To determine factors that prevents to enhance the implementation of eco labels in construction industry.

For the second objective, this objective was achieved fully from the questionnaire survey. In order to achieve objective 2, the factors and barriers in implementing the eco labelling scheme had been identified first in order to acknowledge the roots of the matter. Subsequent to that, these factors and barriers have been listed in questionnaire survey and respondents were requested to rank such causes based on strongly agree to the strongly disagree. These factors and barriers results are showed as in Table 9.

Table 9: Results for factors and barriers to enhance the implementation of eco labelling

Factors that prevents	**Barriers from the factors**
1. Lack of client requirement/ supports. 2. Separate design & build. 3. No competitors take action first. 4. Market for Green Materials. 5. Green Technology.	1. Cost of Implementation (perceive higher upfront cost). 2. No coordination and consistency between rating tools and regulations and standards. 3. Irrelevant standard, Code, regulation for certification process. 4. Trending to make limited the consumers choice and competitive between products. 5. Lack of awareness from the colleagues.

The findings revealed that the most of respondents with 4.60 agreed that the key factors are because client did not interested with the eco labelling scheme due to the higher upfront cost such as at the early of cost of implementation. The support from the professional team members such as, clients, consultants, main contractor and supplier would perceive a lot of differences in order to success the eco labelling implementation. Whereas, respondents declared that that involvement of the professionals was in low stage due to no competitor take action and no coordination and consistency between rating tools and regulations and standards.

Furthermore from the data collected, the education system regarding the sustainable construction should be improvised or compulsory syllabus in local universities to achieve the success factors of eco labels implementation from the beginning level. When all of the students understand about the eco labels and sustainable implementation, is easily for them to replicate the theory in the working sector after being graduated. So this factors can avoid the factors such as lack of worker/colleagues support that obtained 3.56 and also weak environmental culture among other competitors which is 3.50. When they had been absorbed with the relevant knowledge at the young age, automatically the awareness to use the eco labels product would be help in future.

Objective 3: To identify possible measures in reducing the gaps in the implementation of eco- labelling in Malaysia.

From the data collected, the method of correlation was being used in order to identify the possible measures in reducing gaps in the implementation of eco labelling. Among all of the drivers, only driver T (availability of proven green specification model clauses) considered insignificant since they having Mean Index lower than 3.5 while the others considered being significant. The highest Mean Index is driver O (Availability of green product information should be from the reliable database) and followed by driver J (reducing energy consumption), M (selecting materials based on their low risk to the environment) and Q (clear requirements of green characteristics for perspective specifications) where all of these has Mean Index higher than 3.5 and be scaled as to be very important for this study.

Furthermore, the driver M (selecting materials based on their low risk to environment) also had the strong relation with the driver I (life cycle consideration for projects) and driver O (clear requirements of green characteristics for perspective specifications). The Pearson's value is 0.745 and 0.754 respectively which is the most close to 1. Thus in order to enhance the eco labelling scheme, the selected materials shall be considered with the life cycle in term in of that the products can sustain or used longer in the projects. Furthermore it also strong correlated with the specification which means the low risk products should also have a well define specification or guidelines to the consumers in order to enhance the application of eco products in green project.

Thus, the respondents believed that to identify possible measures in reducing gaps in implementing eco labelling are as follows:

- Driver O (Availability of green product information from reliable database) can help all stakeholders to refer in order to purchasing the eco products.
- Driver M (Selecting materials based on their low risk to environment) can help in reducing the energy consumption, friendly environmental products and low toxicity.
- Driver I (Life cycle consideration for projects) part of all stakeholders should have specific goals in order to follow all the policies, guidelines to ensure the life cycle.
- Driver J (Reducing energy consumption) all stakeholders should aware with this definition because the green concept is part of reducing the energy consumption
- Driver L (Selecting materials based on their renewability / recyclability) in future hoping that the SIRIM Berhad should improvise and enlarging the scale of certified products to enhance the application of eco labelling.

Acknowledging the barriers of widespread the application on eco labelling scheme, active initiatives should be taken to fully utilize the application of eco labelling as one of the part of governments initiatives. Therefore, support encouragement from professional bodies, government and manufacturers/suppliers has been recommended to boost up the application of eco labelling.

6.0   Conclusion

From the research, the literature review provides theoretical roots of the research toward eco labelling issues which will compliment to the questionnaire survey. The findings revealed the current existing policies of eco labelling in construction industry takes into place with the establishment of The National on Environment and National Green Technology Policy, with functions to provide guidance to all federal and state agencies, industry sector, local community and other stakeholders in ensuring the environment is clean, well-managed, healthy and productive in future and to conserve the natural environment and resources and it helps to minimises and reduces the degradation of the environment. Continue with implementation of Eco Labelling Scheme by SIRIM Berhad on 2009 to capture the green materials in order to achieve the standard to preserve the environment parallel with other country such as Germany, Hong Kong and Singapore. Various of critical issues causes of on why eco labelling is not widely used due to lack of clients requirements, no competitor to take action, lack of awareness among the colleagues, lack of education and training become more complicated and tend to be no improvement. Hence, a specific and reliable data or standard specification of eco products suggested as a one way to enhance the eco labelling scheme in Malaysia. Last but not least, in future hoping that the SIRIM Berhad should improvise and enlarging the scale of certified products to enhance the application of eco labelling and availability of green product information from reliable database recommended as the most significant measures to enhance the application of eco labelling. Therefore, active initiative to enhance the application of eco labelling in Malaysia should be identify and put in practice. In conclusion, construction industry can accept and widely known the function of eco labelling. Thus, the industry as a whole must collaborate and improve the adoption of eco labelling in Malaysian construction industry.

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