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Implementation of Energy Efficiency (EE) System According to the Green Building Index (GBI): A Case Study on Panasonic Industrial Devices Semiconductor Malaysia (PIDSCMY)

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ABSTRACT

The implementation of Energy Efficiency (EE) is no more an option but a necessity for every particular industry or sector concern especially for developing country like Malaysia. The building sector which consumes as much as 40 % of the world's energy, 12 % water and contributes 40% of the waste sent to landfill is a major part of this global problem (GBI Malaysia, 2009). The energy expense and the issues of global warming urge government to come out with many initiatives as an alternative. One of the initiatives is the introduction of Green Building Index (GBI) in the year 2009. In Malaysia, only 69 companies had implemented and utilized GBI in their building while PIDSCMY is the only one in Industrial Existing Building (IEB) category. In this case study, PIDSCMY was selected among the GBI building to investigate how this company has been able to implement EE according to Green Building Assess Criteria (GBIAC), to identify the key factors which influence the implementation of EE and to suggest innovative solutions to the company. Research is focusing on GBI as the GBIAC at PIDSCMY. A series of interview were conducted to collect respondents' answers, while collected data were analyzed by using mixed method. It is found that the PIDSCMY has implemented almost 70% of the criteria in the GBIAC which is extremely well for the IEB category, with the award of the Best Factory at Melaka for four times (1995, 1996, 1998 & 2001) and Green Factory Award from Panasonic Corporation recently (2012).

Keywords : *Green Building Index, Energy efficiency*

1. INTRODUCTION

According to Hong, et al., (2007), buildings are some of the biggest energy consumers in the world, accounting for one-quarter to one-third of all energy use and a similar amount of greenhouse gas emissions. Unfortunately, little action has been made in energy efficiency (EE) although buildings have tremendous

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impact on costs and the environment. Recent research (Lawrence Berkeley National Laboratory, 2012) states that, EE is "using less energy to provide the same service". Going green and promoting energy efficiency do not help much to solve the world's environmental problems as the world is already in the saturated state. However, EE is able to reduce the impacts of climate changes in the future. Recent research (Isover Saint Gobain, 2008) states that EE is a fundamental element in our global fight against climate change. The main idea about EE is not about turning off the electrical appliances if it is not being used; it is more about how to use energy with less consumption. McKinsey Global Institute (2010), which has studied the issue on a worldwide basis, estimates that four of the five most cost-effective measures taken to reduce greenhouse-gas emissions involve building efficiency. That is why Malaysia includes EE, as a significant element of government policy, addressed in the Ninth Malaysia Plan (2006-2010) as well as in the Tenth Malaysia Plan (2011-2015). According to GBI (2009), PAM (Pertubuhan Arkitek Malaysia / Malaysian Institute of Architects) and ACEM (the Association of Consulting Engineers Malaysia) jointly founded Green buildingindexSdnBhd in February 2009, the purpose of the formation was to develop and drive a more sustainable and green architecture due to an increasing demand from building end-users for green-rated buildings. GBI is derived from the existing rating tools from Singapore Green Mark and the Australian Green Star system; however it is modified and designed to fit Malaysian tropical weather, environmental context, cultural and social needs. Panasonic Malaysia Sdn. Bhd. has many outlets in the country and the head quarter is located at Petaling Jaya, Selangor. However, the study is only conducted at one of the Panasonic outlets located in Malacca. The Panasonic Industrial Devices Semiconductor Malaysia Bhd. (PIDSCMY) is selected as the research location due to its active participant in promoting EE in the company. PIDSCMY is the only company in Malaysia that implements the GBI for the Industrial Existing Building (IEB) category. Besides, the connection that lies during the industrial training programme early this year (25th January 2012 until 6th July 2012) gives an advantage to the researcher in collecting and obtaining the necessary data for the research study.

1.1 Research Questions

EE is one of the ways towards conserving our environment. Through initiatives from every sector especially government sector, it contributes towards a more sustainable environment. Therefore, the researcher comes out with a research question as follow: "How effective is the implementation of the EE system according to the GBI in PIDSCMY?"

1.2 Research Objectives

The objective of this study is to investigate the effort taken by PIDCMY to implement EE System according to the GBI introduced by PAM and ACEM. The elements include Design & performance, Commissioning, Monitoring, Improvement, and Maintenance. Specifically, the objectives of the study are stated as below:

1. To examine how the company is able to implement the EE according to GBIAC.
2. To identify the key factors which influence the implementation of EE.
3. To suggest innovative solutions to PIDSCMY for better EE implementation according to the GBIAC.

2. LITERATURE REVIEW

2.1 Introduction

This section discusses about the literature review used in the research. The literature review includes several sources such as books, journals, articles, as well as internet sources. In section 2.2, the researchers review about the theoretical concept of Green Building Index (GBI); section 2.3 is the application of theory which is the criteria of Energy Efficiency (EE) under the GBI; section 2.4 reviews about the latest development of GBI, section 2.5 reviews the key factors for GBI implementation, and section 2.6 is the review of theoretical framework.

2.2 Theoretical Concept

In this section, the researchers provide the theory used in this research. Most of the information is collected from the book sources.

2.2.1 Green Building Index

The GBI is an environmental rating system for buildings developed by PAM (Pertubuhan Arkitek Malaysia / Malaysian Institute of Architects) and ACEM (the Association of Consulting Engineers Malaysia). The Green Building Index is Malaysia's first comprehensive rating system for evaluating the environmental design and performance of Malaysian buildings. GBI is basically classified into 2 main sections which are GBI rating system and GBI rating tools. The GBI rating system consists of six (6) main criteria which are: Energy Efficiency, Indoor Environment Quality, Sustainable Site Planning & Management, Materials & Resources, Water Efficiency, and Innovation. While GBI rating tools consist of building classification which are: Non - Residential New Construction (NRNC), Residential New Construction (RNC), Non - Residential

Existing Building (NREB), Industrial New Construction (INC) and Industrial Existing Building (IEB). The GBI is fundamentally derived from existing rating tools, including the Singapore Green Mark and the Australian Green Star system, but extensively modified for the relevance to the Malaysian tropical weather, environmental context, cultural and social needs. This PAM/ACEM GBI initiative aims to assist the building industry in its march towards sustainable development (GreenbuildingindexSdnBhd, 2012).

Buildings use over 80 percent of electricity globally; reduced energy use in efficient buildings can slow the growth of power plants, which can liberate funds for other social objectives (Institute for Building Efficiency, 2011). In addition, the GBI environmental rating system is created to:

- Define green building by establishing a common language and standard of measurement; Promote integrated, whole-building design;
- Recognize and reward environmental leadership;
- Transform the built environment to reduce the environmental impact of development; and Ensure new buildings remain relevant in the future and existing buildings are refurbished and thereafter sustained properly to remain relevant. PAM/ACEM encourages all members of project teams, building owners, developers and other interested parties (including Contractors, Government and Design and Build Contractors) to use the Green Building Index to validate environmental initiatives of the design phase of existing industrial building construction or refurbishment; or construction and procurement phase of industrial buildings and their industrial process. Use of the Green Building Index is encouraged on all such projects to assess and improve their environmental attributes. Use of the Green Building Index (Industrial) tool without formal certification by an independent accredited GBI does not entitle the user recognition from GBI rating achieved (GreenbuildingindexSdnBhd, 2012).

Table 1: Green Building Index Assessment Criteria

DETAIL ASSESSMENT CRITERIA
SUMMARY OF FINAL SCORE

PART	ITEM	MAXIMUM POINTS	SCORE
1	Energy Efficiency	38	
2	Indoor Environmental Quality	22	
3	Sustainable Site Planning & Management	10	
4	Material & Resources	8	
5	Water Efficiency	12	
6	Innovation	10	
	TOTAL SCORE	100	

Source: Greenbuildingindex Sdn Bhd.

Table 2: Green Building Index Classification

GREEN BUILDING INDEX CLASSIFICATION	
POINTS	**GBI RATING**
86 points and above	Platinum
76 to 85 points	Gold
66 to 75 points	Silver
50 to 65 points	Certified

Source: Greenbuildingindex Sdn Bhd

2.3 Three criteria of energy efficiency under Green Building Index

The criteria are designed to improve energy consumption by optimizing building orientation, minimizing solar heat gain through the building envelope, harvesting natural lighting, adopting the best practices in building services including use of renewable energy, and ensuring proper testing, commissioning and regular maintenance (GBI Malaysia, 2009). EE contributes 38 points from the overall criteria, which are the highest points. Building efficiency codes and standards are regulatory tools that require a minimum level of energy efficiency in buildings, appliances, equipment, or lighting. If they are well designed, they can cost-effectively decrease energy costs over the lifetime of that building, appliance, equipment, or light bulb (Institute For Building Efficiency, 2011). The explanation of the three criteria of EE is discussed in detail below according to GreenbuildingindexSdnBhd, (2012).

2.3.1 Design and Performance

The items that need to be considered include minimum EE performance, lighting zoning, electrical sub-metering, renewable energy, and advanced or improved EE performance which contribute 25/38 points of EE score. It needs to establish minimum EE performance to reduce energy consumption in buildings, thus reducing carbon dioxide (CO2) emission to the atmosphere.

Meet the following minimum EE requirements as stipulated in MS 1525:2007:

1)Overall Thermal Transfer Value (OTTV) ≤ 50, Roof Thermal Transfer Value (RTTV) ≤ 25. Submit calculations using the Building Energy Intensity Tool (BEIT) software or other GBI approved software(s),

2)Provision of Energy Management Control system where Air-conditioned space ≥ 4000m2 In lighting zoning, it needs to provide flexible lighting controls to optimize energy savings. All individual or enclosed spaces to be individually switched; and the size of individually switched lighting zones shall not exceed 100m2 for 90% of the Nett Lettable Area (NLA); with switching clearly labeled and easily accessible by building occupants. Provide auto-sensor controlled lighting in conjunction with day lighting strategy for all perimeter zones and day lit areas, if any. It also needs to provide motion sensors or equivalent to complement lighting zoning for at least 25% NLA and monitor energy consumption of key building services as well as all tenancy areas Electrical sub-metering for all energy uses of ≥ 100kVA; with separate sub-metering for lighting and separately for power at each floor or tenancy, whichever is smaller. In renewable energy, where 0.5 % or 5 kWp whichever is the greater, of the total electricity consumption is generated by renewable energy, OR Where 1.0 % or 10 kWp whichever is the greater, of the total electricity consumption is generated by renewable energy, OR Where 1.5 % or 20 kWp whichever is the greater, of the total electricity consumption is generated by renewable energy, OR Where 2.0 % or 40 kWp whichever is the greater, of the total electricity consumption is generated by renewable energy Exceed Energy Efficiency (EE) performance better than the baseline minimum to reduce energy consumption in the building. Achieve Building Energy Intensity (BEI) ≤ 150 kWh/m2yr as defined under GBI reference (using BEIT Software or other GBI approved software(s)), and less BEI is better.

2.3.2 Commissioning

The items that need to be considered are enhanced or recommissioning and ongoing post occupancy commissioning which contribute 7/38 points of EE score. Ensure building's energy related systems are designed and installed to achieve proper commissioning so as to realize their full potential and intent. Appoint an independent GBI recognized Commissioning Specialist (CxS) at the onset of the design process to verify that comprehensive pre-commissioning and commissioning are performed for all the building's energy related systems in

accordance with American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Commissioning Guideline or other GBI approved equivalent standard/s by:

1. Conducting at least one commissioning design review during the detail design stage and back-check the review comments during the tender documentation stage.

Developing and incorporating commissioning requirements into the tender documents.

1. Developing and implementing a commissioning plan.
2. Verifying the installation and performance of the systems to be commissioned.
3. Reviewing contractor submittals applicable to systems being commissioned for compliance.
4. Developing a system manual that provides future operating staff with the information needed to understand and optimally operate the commissioned systems.
5. Verifying that the requirements for training operating personnel and building occupants are completed. Carry out post occupancy commissioning for all tenancy areas after fit-out changes are completed:

- Design engineer shall review all tenancy fit-out plans to ensure original design intent is not compromised and upon completion of the fit-out works, verify and fine-tune the installations to suit.
- Within 12 months of practical completion (or earlier if there is at least 50% occupancy), the CxS shall carry out a full post/re-commissioning of the building's energy related systems to verify that their performance is sustained in conjunction with the completed tenancy fit outs.

2.3.3 Monitoring, Improvement and Maintenance

The items that need to be considered are EE monitoring and improvement, and sustainable maintenance which contributes 6/38 points of EE score. Verify predicted energy use of key building services:

1. Use Energy Management System to monitor and analyze energy consumption including reading of sub meters.
2. Fully commission Energy Management System (EMS) including Maximum Demand Limiting programme within 12 months of practical completion (or earlier if there is at least 50% occupancy). Ensure the building’s energy related systems will continue to perform as intended beyond the 12 months Defects & Liability Period:

- At least 50% of permanent building maintenance team to be on-board one to three months before practical completion and to fully participate

(to be specified in contract conditions) in the Testing & Commissioning of all building energy services.
- Provide for a designated building maintenance office that is fully equipped with facilities (including tools and instrumentation) and inventory storage.
- Provide evidence of documented plan for at least 3- year facility maintenance and preventive maintenance budget (inclusive of staffing and outsourced contracts).

2.4 Latest development of Green Building Index

Malaysia and Singapore further promote the development of green building through various development efforts such as having a common stand at international forums on green building. The mutual support for each other's' initiative at international forums can be established and documented. Besides that, cooperation can be through an exchange of experts on training program, ramping out up advanced' training on green building skills (Shamsiah, 2012). Besides, Malaysian Government announced it will stop all production, import, and sales of traditional incandescent light bulbs by 2014 to reduce carbon dioxide emissions and also reduce total energy usage in the country by 1% (Singh, 2010).

2.5 Key factors Green Building Index Implementation

Institute for Building Efficiency (2011), states that the barriers to EE must be overcome in order to achieve the full economic potential of energy efficiency. Several key factors have been identified that influence the implementation of EE systems according to the GBIAC. The key factors are based on TEMIF model (Chew, 2012). Efficient buildings can help meet both economic and climate goals (Institute for Building Efficiency, 2011). It is these key factors that contribute to the successes of the implementation.

Table 3: Sub-factors of TEMIF

Major Factors	Sub-factors
Technical Factors	1.1 Demand and usage of GBI for anorganizational operation (a) Future need on this new technology 1.2 Competitive advantage that GBIbrings (a) Organization is more competence (b) Benefits come by using thistechnology such as: maximize resourceuse, enhance productivity, enhance efficiency
Environmental Factors -Internal environment of the organization -External environment of the organization	2.1 Implications on PESTLE aspects (a) Align with the government andcompany policies (b) Fosters economic growth (c) The working organization supports new technology use. (d) Comply with the legal framework,rules and regulations (e) Improve the environmental conditionin the organization
Managerial Factors	3.1 Managerial capability (a) Ease of new technology used (b) Capability of an organization tomanage and exploit the technology used
Institutional Factors	4.1Organizational generalobjectives/goals (a) Top management preference/expectation (b) Align with organizational vision/ mission
Financial Factors	5.1 Cost (a) Capital cost, operating cost,maintenance cost, repair cost 5.2 Funding (a) Government and private sector (b) Grant 5.3 Cost and benefit (a) Tax incentives (b) Reduce utility cost

Source: Simplified framework adopted from TEMIF

2.6 Theoretical Framework

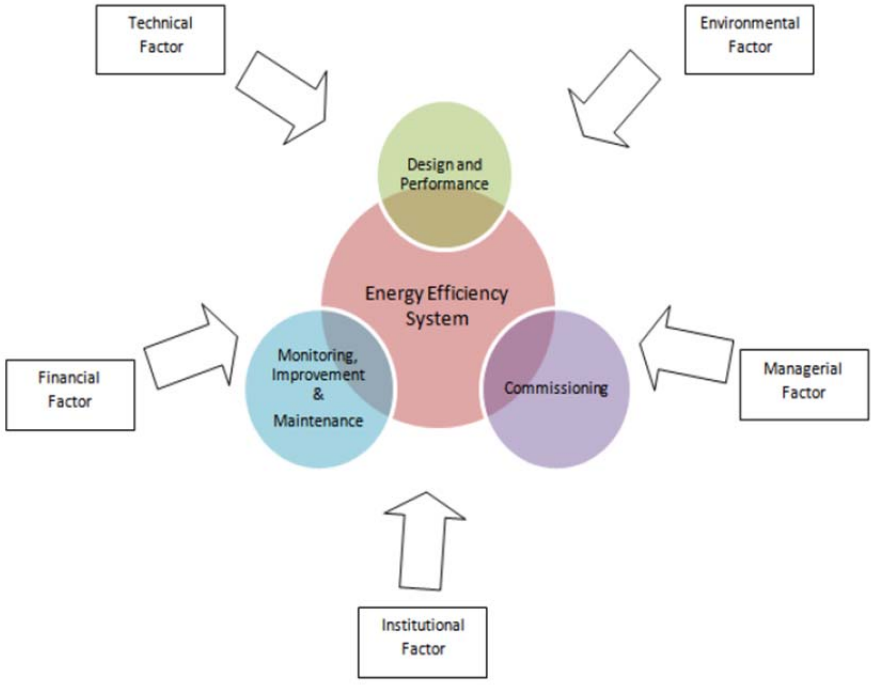


Figure 1: Research Model

3. METHODOLOGY

3.1 Introduction

Panneerselvam (2004), defines research methodology as a system of model, procedure, and technique used to find the result of a research problem. In this research, the case study is the main form of research that is conducted. Case study is defined as a phenomenon (the "case") in its real world context (Yin, 2011). According to Zainal (2007), case study can be considered a robust research method particularly when a holistic, in-depth investigation is required. Recent research by (Rowley, 2002) states that, the case is widely used because they may offer insights that might not be achieved with other approaches. This means that a case study may provide an explanation beyond other sources. The case study is a descriptive research. Descriptive research is conducted to describe phenomena as they exist (Colliss and Hussey, 2009). The reason to study a particular case is to figure out why certain situation prevails or how an organization or group has succeeded. Research methods are rules and procedures, and can be seen as 'tools or ways of proceeding to solve problems' (Ghauri and Gronhaug, 2010). Rowley (2002) illustrates that research strategy is

often emerged as an obvious option for students and other new researchers who are seeking to undertake a modest scale research project based on their workplace or the comparison of a limited number of organizations. In other words, a case study examines a current phenomenon in its real- life situation, using whichever research strategies are necessary to address the problem at hand.

3.2 Research Design

Carriger (2000) points out research design as the strategy, plan, and the structure of conducting a research project. It is basically designed to give an overall idea of the research. As for this study, the researchers used descriptive research, which demonstrates the current situation. Saunders, M. et al. (2012) states that the object of descriptive research is to gain an accurate profile of events, persons, or situations. The researchers are actually studying and describing how Panasonic Industrial Devices Semiconductor Malaysia (PIDSCMY) does the Energy Efficiency (EE) system implementation in the company. Research design can be thought of as the structure of research - it is the "glue" that holds all of the elements in a research project together (Trochim, 2006). A structure is the framework, organization or configuration of the relations among other variables of a study. Research design expresses both the structure of the research problem and the plan of investigation used to obtain empirical evidence on relations of the problems. According to Rowley (2002), a research design is the logic that links the data to be collected and the conclusions to be drawn to the initial questions of a study; it ensures coherence. It is basically designed to outline the movement of research throughout the study. It also gives the researcher early points of view and plan of action that need to be taken from finding the operational implication to the final analysis of data. The research study in PIDSCMY is conducted by using mixed method. In this study:

Firstly, the research has selected the PIDSCMY as the main source of investigation. The relevant information is collected throughout qualitative interview and quantitative questionnaire method to get the answers for the research questions and achieve the research objective; specifically how PIDSCMY implements the EE system according to the Green Building Index (GBI).
Secondly, the framework is setup for specifying the relationship among the study's variables. In this study, GBI is the independent, while EE is the dependent variable.

Thirdly, the model that outlines the EE system from the beginning of the analysis data is setup.

3.3 Mixed Method Research

This case study in PIDSCMY was conducted by implementing mixed method research. Tashakkori and Teddlie (2003), state mixed method research studies use qualitative and quantitative data collection and analysis techniques in either parallel or sequential. This method is chosen as researchers think that this method is able to meet research objectives more significantly. Different objectives comply different method. There are certain objectives which can only be met by using qualitative/ quantitative and vice versa. By using this method, researchers can collect homogenous data to support the study. The researchers used qualitative method to meet the first and the third research objectives which are to identify how the company has been able to implement the EE according to the Green Building Index Assessment Criteria (GBIAC) and to suggest innovative solutions to PIDSCMY for better EE implementation according to the GBIAC. While quantitative method is used to meet research objective number two which is to identify the key factors which influence the implementation of EE. In this case study, researchers used a quantitative questionnaire, qualitative interview, semi – structured questions, and direct observation as a tool of collecting data.

3.4 Method of Primary Data Collection

Colliss and Hussey (2009), define case study as a methodology that is used to explore a single phenomenon (the case) in a natural setting using a variety of methods to obtain in-depth knowledge. In a case study, the research question is used to get the primary data. One proposition could be that PIDSCMY is successful because the company has successfully implemented the EE system according to GBI. This indicates that, the top management of the company has effectively implemented and applied the EE system to support the GBIAC.

Case study research is particularly useful when the phenomenon under investigation is difficult to study outside its natural setting and also when the concepts and variables under study are difficult to quantify (Ghauri and Gronhaug, 2010). In the PIDSCMY case study, the units of analysis depend on the exact nature of the research question. As this case study focused on how to implement the EE system in the company according to GBI, the unit of analysis is the implementation process. The researchers decided to use mixed methods as the tools of collecting data. The respondents are from the PIDSCMY staff itself; 5 respondents are from the top management while 25 respondents are from the executive level. So, the total target group is 30 respondents. According to Yolles (2006), primary information can be qualitative and acquired through pattern knowledge, or it can be derived from quantitative measures of primary data and the creation of data information through analysis. The collected data must address the propositions. In PIDSCMY study, the focus is given on the implementation of the EE system according to the GBI. The researcher studied

various EE systems according to the GBI that might detect patterns in which the implementation seems to be more effective and that might relate these patterns to the propositions. The ability to link the collected data to the propositions set out for the study is related to the final component needed in a case study research design, as the setting of criteria to determine the findings of the study.

4. DISCUSSION AND CONCLUSION

4.1 Introduction

This section discusses the conclusion of the research study. The researcher divides the sub-section based on the research questions and research objectives. Sub-section 4.2 to conclude the research question/ objective number one, 4.3 to conclude the research question/ objective number two, 4.4 to conclude the research question/ objective number three.

4.2 The Effectiveness of Energy Efficiency System Implementation According to Green Building Index

This section illustrates how effective the implementation of every system installed in PISDCMY is. After the implementation of all systems, PIDSCMY is granted a score of 28 out of 38 with percentage of 73.68% for the EE criteria. Researcher personally thinks that this is quite a good achievement for a company that conducts High Impact Production (HIP) industry which requires high commitment in term of job performance but yet still fulfilling their Corporate Social Responsibility (CSR). Previously, Carbon dioxide emission was 9.788 tons/ year while the saving cost is RM 5,492.189/ year. After the implementation of GBI, the amount of carbon dioxide reduction is 11.8 ton/ year while the saving cost is 15,239.00. Yet, the researcher believes that there are still more to come when PIDSCMY is ready to leverage the systems throughout the company. The impact would be even double or more from the existing one. Almost all the systems receive and enjoy cost and environment advantage through implementation. However, the researcher thinks that PIDSCMY has the potential to receive more if the systems are fully occupied and utilized. PIDSCMY has reached its first stage of implementation, the next step is to maintain and improve the existing system. The researcher also thinks that it is important to look seriously on this matter since the company has invested large sum of money for the installation of the systems. Through continuous commitment from everyone in the company especially the committees, PIDSCMY has the opportunity to enjoy or shorten the Return on Investment (ROI) for the upcoming years.

4.3 The Factors Influenced the Implementation of Energy Efficiency System

There are many factors influencing the implementation of EE especially for the Industrial Existing Building (IEB) like PIDSCMY. However, the researcher has sorted out 5 main factors which have been simplified, adopted from TEMIF (Chew, 2012). All the factors have their own significant outreach. Begin from the idea from top management meeting turn into the implementation process. PIDSCMY top management gives their 100% support in the implementation. In the researcher opinion, it is very important to obtain support from the top management as without their support, it seems impossible to implement the GBI concept in the first place as been discussed. The implementation needs huge commitment especially financial commitment. However, the researcher believes that it is only for temporary basis; the company has been very consistent in implementing the systems. Once PIDSCMY reaches its ROI then the company may begin enjoying the benefits of going GBI. Below is the cost variance for the EE implementation in the Green Office.

Table 4.3 a: New Production Office Equipment Cost Variance

No	Item	Normal Concept (RM)		Green Concept (RM)		Cost Diff
1	Air Conditioner System	Conventional Air-Cond (25hp) Ducting System Cooling Tower System Total	= RM 72,000 = RM 10,000 = RM 35,000 = RM 117,000	Fujitsu VRF air conditioner system (25hp)	= RM 120,000	RM 3,000
2	Lighting System	HF lighting system	= RM 7,700	Solatube (Install LED back-up, old stock LED)	= RM 51,500	RM 43,800
3	Roof Paint	Normal Paint	= RM 6,000	Solar reflect Paint	= RM 13,000	RM 7,000
						RM 53,800

(Source: PIDSCMY, 2013)

To shift into the green concept systems, it bears some costs. From table 4.3a we can see that the company needs to invest extra RM3,000 for air condition system, RM43,800 for lighting system, and RM7,000 for roof paint. The total cost for green concept is RM53, 800, which is quite a huge amount of money. According to Executive 3, the company tries to reduce the cost as much as it can by using the existing equipment that is still in shape. In the researchers' opinion, perhaps PIDSCMY may need to focus on one particular area first instead of jumping into all the areas. By focusing on one area first, perhaps the company could be able to see and then forecast whether the installed systems are worth to invest or not. If the system cannot contribute much then perhaps, there is no need to extend into another area and the company may need to start thinking of another strategy.

Table 4.3 b: Savings Comparison Before and After Replacement

No	Item	Normal Concept		Green Concept		Saving /yr
1	Air Conditioner System	=18.75 kw x 12 hrs/day x 288 days yr x 0.85 x RM 0.281	= RM 15,477 /yr	'0' Energy usage.	= RM 0	RM 15,477
2	Lighting System	=222pcs x 44w x 12hrs/d x 288d/yr = (33,758,208 / 1,000) x RM 0.281	= RM9,486 / yr	Solatube = RM 0 /year	= RM 0	RM 9,486
3	Roof Paint			Reduce the energy	Saving RM	RM 3,095

				consumption of air cond. about 20%. = 55,080 kwh x 0.2 = 11,016 kwh saving	3,095	
						RM 28,058

(Source: PIDSCMY, 2013)

One of the advantages received through implementation of GBI is exempted from tax. Payment of tax influenced the ROI. Below is the calculation showing with and without tax incentive.

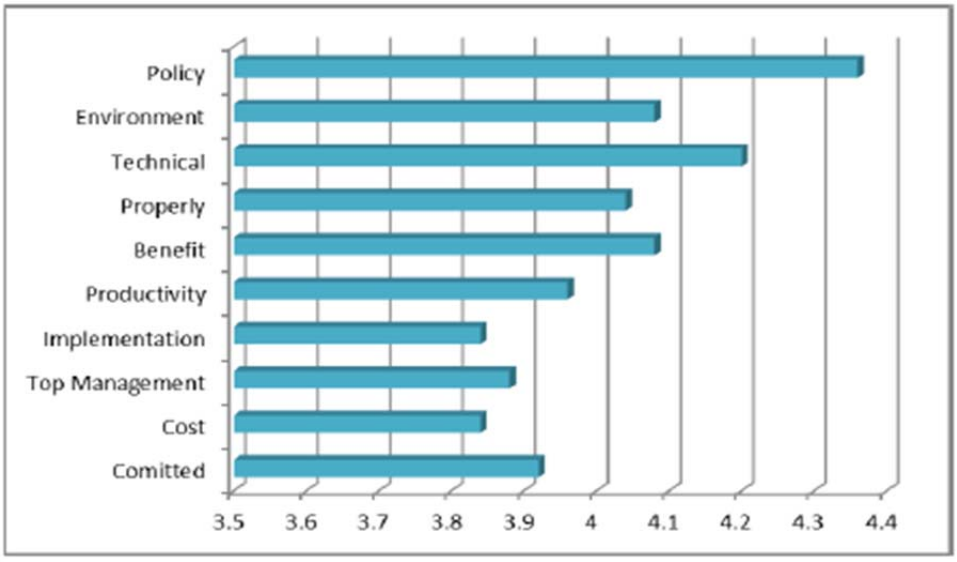
ROI = (53,800 / 75%) / 28,058
= 2.6 years (without tax incentive)

ROI = 53,800/28,058
= 1.9 years (with tax incentive)

In addition, GBI implementation also brings advantages to PIDSCMY since the ideas of GBI assimilates quite well with the company policy, vision, mission of doing business. In the researchers' opinion, besides ability to reduce the production, and utility cost, the key reason for the implementation is to fulfill their Corporate Social Responsibility (CSR) towards the society, environment and economy of Malaysia.

Figure 4.3 shows the factors influenced the implementation of EE. We can see the pattern ranges from 3.5 to 4.4 which lie in the state of "neutral" and "agree". This is a good sign for the early stage of implementation. It shows all the factors are almost equally important. From the researchers' point of view, PIDSCMY may need to explain and expose more about the importance of EE implementation to the employees. The result below shows that some of the employees are still not clear and do not receive enough ideas why the company implements EE. The researcher believes that if the company spends a bit more time to instil and improve the understanding of the employees, then fewer employees will choose "neutral" as their decision.

Figure 4.3: Factors Influenced the Implementation of Energy Efficiency



(Source: SPSS, 2013)

4.4 The Innovative Ideas for Better Energy Efficiency Implementation

The researchers have listed out several innovative ideas from their own perspective. The researchers have basically proposed four ideas, of which three ideas are more related to technical point of view (systems) and one idea is more related to management point of view.

Dealing with the systems requires huge investment. However, PIDSCMY should have started looking into these systems. If not, the company would leave behind since the technology pace now is getting quicker. Thus, by introducing such systems could somehow trigger and stimulate the company to think of more strategy and innovative solution for better implementation.

Basically there are two types of innovation namely breakthrough innovation and incremental innovation. Perhaps, PIDSCMY should focus more on incremental innovation through improvement of the existing technology. PIDSCMY can do some improvised with the systems and think of ways to reduce the price while maintaining the concept of the systems.

4.5 Recommendation for Further Study

There are many initiatives from government towards making Malaysia into a greener country. One of the initiatives is the introduction of GBI Malaysia which is also the main subject discussed in this research. The researchers just hope that the readers could gain benefit and inspiration through this research to discover more about GBI Malaysia. They are mainly six assessment criteria and five types of building for the GBI implementation. In this research, the researcher

have covered one assessment criterion; EE and one type of building; IEB. There are many more to explore and discover for other criteria of GBI. Different criteria and different types of building have different results and contribution to reveal. Besides, the implementation of GBI is very subjective and based more on the creativity of the practitioners. Therefore, through further study, one can gain more information about how creative a company is in fulfilling the GBI criteria. Furthermore, other researchers can also look for another company as their case study for future study. As for now, there are about 69 companies that have implemented and utilized GBI in their building. There are buildings that have achieved platinum rating. Grab the opportunity to discover how those companies are implementing the GBI in their building. Not only that, the readers can also take benefit from the theoretical framework that the researchers have generated in this research. The researchers have generalized the theoretical framework so that it might be practical for others. Through further study in this field, one can somehow gain more knowledge and information about GBI of Malaysia and indirectly contribute back to the society and environment through knowledge sharing. There are always gaps for improvement to be filled which one can obtain through the study in GBI area.

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