Environmental Management System (EMS) within Construction Site: A case study in Kelantan State, Malaysia

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Abstract. An Environmental Management System (EMS) was introduced to meet the environmental needs and an organization should have an understanding of what those environmental needs are. In a construction industry, the awareness about the environment performance is improving and the need to protect the environment quality is growing good in order to maintain the sustainability of the development in a country. Spirit of sustainable development embodied and endorsed in the medium- and long-term development strategies such as Third Malaysian Plan (1976-1980) and thereafter, e.g. Seventh Malaysian Plan (1996-2000). Thus, the construction players that involved in the construction projects have to take the responsibility to accept all the regulation related to the environment protection during construction processes. This study concluded that the awareness of EMS among the construction players in Kelantan State is very low. Most of the construction players understand an EMS. However, although they understood what EMS is, yet they did not implement and apply the system within the construction sites. They understand an EMS and its obligation, but some of them, indicated that it is not important to be implemented, as they are doing projects just to get the profit. Although, the construction players understand an EMS, but they do not have any skills and experiences in implementing EMS within construction site.

Keywords: Environmental Management System, ISO14000, Construction industry, Malaysia

1. Introduction

An Environmental Management System (EMS) was introduced to meet the environmental needs and an organization should have an understanding of what those environmental needs are. Thus, according to [1], an EMS is a useful tool in ensuring that environmental improvements are met. Environment Management System (EMS) is the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy. The use of this system aims to manage and to produce more sustainable projects that are more efficient in terms of resource and energy use, reducing the impact on the environment, providing better value of living and work conditions in improving economic productivity and competitiveness. EMS is also to produce a corporate environmental plan which will lead the organization to improve environmental performance. The use of EMS approach has challenged the construction players in the construction industry to work carefully and to think the impact on the environment and the quality of life resulting from their construction’s activities. It is also providing the perfect platform for the type of systematic approach needed to achieve sustainability. Thus, the EMS has to be implementing by construction players in any...
development project in order to create a sustainable development. Sustainable construction or ‘green construction’ describes the responsibility of the construction industry in attaining the sustainability. Sustainable construction is a process whereby, over time, sustainability is achieved. So, the environment management system must be applied by the construction players within construction site in order to strike a balance between conserving the environment and maintaining prosperity in development. The negative effects to the environment caused by construction sites will give very significant impact on the development if the environmental aspects are not properly managed by the management of every construction sites. Although Malaysia has developed expertise and tools such as environmental auditing and environmental impact assessment to help quantify impacts on the cost of environmental regulation, it is hardly keeping up with the pace of development that we are currently experiencing. Several strategies can be employed to avoid this, such as the development and adherence to guidelines of best practices provided by codes of practice and local and national laws. The EMS in Malaysia can be said as growing in a positive way because most of the organization in Malaysia aware and have gained the knowledge about the correct EMS within construction site in order to create the sustainable development. Therefore, in this study aimed at identifying the EMS in a specific area in Malaysia to check the level of awareness of certain companies about the environment impact especially in the construction industry.

1.1. Problem Statement
In a construction industry, the awareness about the environment performance is improving and the need to protect the environment quality is growing good in order to maintain the sustainability of the development in a country. Spirit of sustainable development embodied and endorsed in the medium and long-term development strategies such as Third Malaysia Plan (1976-1980) and thereafter, e.g. Seventh Malaysia Plan (1996-2000). Thus, the construction players that involved in the construction projects have to take the responsibility to accept all the regulation related to the environment protection during construction processes. The image of the modern country can be shown through the variety of the abundant development in the country. In Malaysia, the construction industry is growing up and contributes various developments such as Kuala Lumpur International Airport, Penang Bridge, Kuala Lumpur Twin Tower (KLCC) and others and as the result, it helps to jump up the name of Malaysia. Buildings and structures enabled mankind to meet their social needs for shelter, to meet economic needs for investment and to satisfy corporate objectives. However, the satisfaction of these needs usually comes with a high price for example an irreversible damage to our environment. As the people that involved in the construction industry, they need to alert and aware about the environment condition within construction site. The construction industry plays a major role in improving the quality of the built environment, but it is also impacting on the wider environment in a number of ways.

Everything that consumers, companies, institutions and authorities do has a positive or negative impact upon the environment. To prevent future violations of environmental conservation, regulatory bodies have enacted many laws pertaining to environmental protection including Malaysia but the effectiveness of these regulations is yet to be seen. According to Department of Standard Malaysia (DSM), 2004 only seven (7) organizations out of 310 are the certified organization in EMS ISO 14001 related to construction works, which mean that is only 2.3% out of the figure implement EMS within construction sites. But, in 2009, according to DSM, the number of certified organizations in EMS ISO 14001 are increasing as they are now realized that the important to implement an EMS in creating sustainable development. Some organization whether small or big, private or public organization still did not put the EMS as their top management system in order to put the environment issues as a priority. It seems that some of them put the profit as a priority in their business strategies above other things. Some of them are lack of awareness on the nature and the important of environmental management system practices within construction site and the lack of understanding about the environmental issues. Thus, the construction players in an organization whether private or public sector must be able to find a balance between development with the environment protection and begin
to take an action in order to maintain sustainability in doing their construction’s activities.

1.2. EMS Standardization: ISO 14001

Global environmental awareness grew from its embryonic in the mid-80s, and in this respect the called Brundtland report published by the World Commission on Environment and Development was highly influential and it provided for the environmental activities a global framework [2]. Morrow and Rondinelli were explained that in 1993, it was felt that an international standard was required for environmental management while in 1996, from an idea based on BS 7750, the ISO 14001 standard was born [3]. It was argued to be a step forward given the successes of the quality standard ISO 9000 and intended to replace the numerous and often conflicting sets of criteria found in various countries. ISO 14001 focuses on the processes involved in the creation, management and elimination of pollution, rather than solely on directly reducing pollution [4]. As BS 5750 had been withdrawn with the appearance of the ISO 9000 series, the outcome of emergence of the international standard ISO 14001 meant that the national standard BS7750 together with the national standards in other EU countries were, with common consent also withdrawn. Since the introduction of ISO 14001 many other ISO 14000 standards have also come into operation. The list is shown in Table 1.

| Standard | Description |
|----------|-------------|
| 14000    | Guide to environmental management principle techniques. |
| 14001    | Environmental management systems – Specification with guidance for use. |
| 14010    | Guidelines for environmental auditing – General principles of environmental auditing. |
| 14011    | Guidelines for environmental auditing – Audit programmes, reviews and assessments. |
| 14012    | Guidelines for environmental auditing Qualification criteria for environmental auditors. |
| 14013/15 | Guidelines for environmental auditing – Audit programmes, reviews and assessments. |
| 14024    | Environmental labeling – Practitioner programmes – Guiding principles, practices and certification Procedures of multiple criteria programmes. |
| 14031/32 | Guidelines on environmental performance evaluation. |
| 14040/43 | Life cycle assessment – General principles and practices. |
| 14050    | Glossary |
| 14060    | Guide for the inclusion of environmental aspects in product standards. |

Source: [2]

Melynke described that the ISO 14001 standard is a process, not performance standard that describes a system to help an organization achieve its own environmental objectives [5]. It is assumed that by helping a firm focus on its manufacturing process, the firm will improve its environmental performance. Thus, the ISO Standard 14001 is a standard that used by organization to achieve their objectives.ISO14001 internationally recognized standard for EMS. This standard already achieves about 120 000 organizations registration.

1.3. Local Agenda 21

1.3.1. About Agenda. Agenda 21 is a programme run by the United Nations (UN) related to sustainable development and was the planet’s first summit to discuss global warming related issues. It is a comprehensive blueprint of action to be taken globally, nationally and locally by organizations of the UN, governments and major groups in every area in which humans directly affect the environment.
Agenda 21 consists of 40 chapters which is all related to the sustainable development. Through the Agenda 21, the community can involve themselves in order to ensure and identify the issues of sustainable development, create an action plan to solve the issues and implement the plan. The basic approach of this program is bottom-up approach which means the community themselves can involve in determining the action plan at their areas. For example, the community that involve directly about the discussion, workshop or any activities related to the local issues. The issues that can be discussed are environment pollution, transportation issues, housing and so on.

1.3.2. Characteristic of implementing Local Agenda 21 (LA21). To implement LA21, the local authority needs to include the characteristic below:
1. Together to take account about the need of economic, social and environment.
2. To conclude the sustain future aims or target based on consensus.
3. Involving of local community.
4. To embrace a board or forum that consists of important parties to manage the process.
5. To conclude an action plan with certain target.
6. To conclude the sustainable development indicator.
7. To implement the activities and programs to achieve the action plan that has been concluded.

Thus, LA21 is not only implemented in Malaysia. According to a research by the International Council of Local Environmental Initiatives (ICLEI), there are more than 1,800 local authority from 64 countries involved in the activities by LA21 (until the end of year 1997) that was focused on 11 countries such as Australia, Bolivia, China, Denmark, Finland, Japan, Netherlands, Norway, Republic of Korea, Sweden and United Kingdom [6]. Nowadays, the LA21 is being expanding in the word in order to overcome the global warming problem. All over the world are taking part in LA21 programme together to save the earth. For example, of the programme that recently did was Sustainable Global Warming. Some of the country was taking an action in implementing LA21 by reorganized their objectives of LA21 and prepare more action plan.

1.4. EMS within Construction Sites
A study by Tse et. al explained that many natural areas are irreversibly damaged by construction activities which alter their ecological integrity [7]. Thus, there is a growing awareness of the effect of construction activities on the environment. These effects include land use and land deterioration, resource depletion, waste generation, and various forms of pollution [8]. A major environmental impact of construction stems from its consumption of materials, many of which are non-renewable. Site construction produces many atmospheric pollutants. The construction industry produces large volumes of waste and consumes large amounts of energy [9]. In the construction industry, recycling of material waste is a typical example of showing the financial benefits of ISO 14000 EMS. In 1999, about 37,100 tonnes of construction waste are produced each day and while about 80 per cent of it is re-used for reclamation, 7,900 tonnes still go to landfills. This accounted for about 44 per cent of the total waste disposed of at landfills [10]. Besides that, firms who are willing to take a more strategic approach to EMS should be able to integrate pollution prevention throughout the firm’s practices and processes and use them to create long-term advantages [11]. Moreover, if firms are not measuring the wastes associated with their production processes and do not have an integrated approach to managing these wastes, then many of the costs are not captured and subsequently placed into overhead [12]. According to the Robert et al, firms which react to new environmental regulations with end-of-pipe (e.g., scrubbers on smokestacks is at the end of the pollution proverbial pipe) solutions to pollution problems are the first to say that environmental regulations have only added to the cost of doing business [12]. Contrary to this often-expressed view, EMS and environmental regulations may do more than just add to the costs of operations. Environmental regulations that place a heavier burden on new entrants confer an advantage on existing firms by increasing the barriers to entry in industries in which pollution abatement is important [13]. This implies that incumbents may be able to use environmental regulations strategically to enhance competitive advantage [12].
2. Methods
A questionnaire survey was distributed to the involved parties in the construction industry which were contractors, developers, and consultants. The questions included in the survey, were focused about the respondent’s awareness, knowledge, skill, experiences and their contribution in EMS within construction sites. Also, identifying their awareness about Local Agenda 21 (LA21) and the respondents’ involvement in LA21. About 40 questionnaires were distributed among these construction players but only 33 of respondents answered and return back the questionnaires, yielding a response rate of 83%.

3. Result and Discussion
3.1. Respondents’ background
As presented in Table (2), most of the construction companies participated in this survey came from G07 classification (64%) even though this question were included all the classification grades available by CIDB in the Malaysian construction industry (G01 until G07). However, only companies with 2 classification grades namely G07 and G03 were participated in thus conducted survey. Concerning the company’s role, it can be seen from Table (2) that main contractor (70%) are the most important person in playing a role in the company followed by developer (24%). The other company role includes of specialist/sub-contractor and supplier. With regard to the duration of the company/respondent involved in the construction industry. The analysis showed that the highest percentage that the company involved in the construction industry was 64% which shows more than 9 years of involvement. Then, followed by 27% which shows 7 to 9 years of involvement.

| Items                                | Percentage |
|--------------------------------------|------------|
| Classification Company based on CIDB |            |
| G1                                   | -          |
| G2                                   | -          |
| G3                                   | 36%        |
| G4                                   | -          |
| G5                                   | -          |
| G6                                   | -          |
| G7                                   | 64%        |
| Company role                         |            |
| Main contractor                      | 70%        |
| Developer                            | 24%        |
| Others                               | 6%         |
| Duration of the company involved in the construction industry | |
| 1-4 years                            | -          |
| 4-6 years                            | 9%         |
| 7-9 years                            | 27%        |
| More than 9 years old                | 64%        |

3.2. Awareness to the Environmental Management System (EMS)
3.2.1. Understanding of EMS. The respondents were asked to whether they understand what is Environmental Management System (EMS) or not. However, most of the respondents (36%) are clearly understood it, followed by the thirty three percent who are not sure about it.
3.2.2. Implementation of environmental policy. The participants were asked on whether the company has any environmental and sustainability policy or not. An environmental or sustainability policy endorsed by senior management is often a first step taken in EMS implementation. Thus, as presented in Figure (4), most of the companies (82%) did not have an environmental and sustainability policy that endorsed by senior management. However, only 18% of these companies indicated that they have environmental and sustainability policy endorsed by senior management.

3.2.3. EMS-based framework. Based on the analysis made in Figure (3) concerning the respondents’ opinion on EMS framework, It can be seen that most of the respondents (70%) are implementing their EMS based on OHSAS18001 model followed by ISO14001 (21%).
3.2.4. EMS of the company. Based on the results obtained with regard to the respondents’ view on the situation of EMS. It can be stated that 52% of the participants do not have any current intention of developing an EMS. Although, most of the respondent understand what EMS is, but they did not have any intention to implement and develop an EMS within construction site. Other respondents’ views are depicted in Figure (4).

3.2.5.

3.2.6. Implementation of EMS management committee. Figure (5) shows that 88% of respondents do not have an EMS steering committee or management team, to lead the EMS.
3.3. Local Agenda 21 (LA21)

3.3.1. Awareness of LA21. In this section, respondents were asked on their level of knowledge about LA21. LA21 is a programme towards sustainable development and emphasized on the cooperation Local Authority and participation from the public. Based on the results, it is found that 100% of the respondents never heard about LA21.

3.3.2. Contribution programme by LA21. The question attempted to identify whether those who are participated in the survey contributed in any programme by LA21 or not. The analysis has shown that 100% of them never heard about LA21.

3.3.3. Programme involved with LA21. The respondents were questioned on their involvement and cooperation with the local authorities programme in managing and planning the environment to create the sustainable development. Ninety seven percent (97%) of those responded to then conducted survey did indicate that they had not involved with local authorities in such programme (See Figure 6).

Figure 5. Implementation of EMS management committee

Figure 6. Programme involved with LA21
3.3.4. Awareness of programmes done by LA21. Referring the participants in this conducted survey on the awareness programmes done by LA121. Surprisingly, it is found that 97% of them are not aware about it (refer to Figure 7).

![Figure 7. Awareness of programme done by LA21](image)

3.3.5. Implemented activities by LA21. The respondents were asked to identify whether they are agreed on the action plan and activities implemented by LA21 in their state or not. However, based on the obtained results, it is found 82% of them disagreed with the action plan and activities implemented by LA21. These results is shown in Figure (8).

![Figure 8. Implemented activities by LA21](image)

4. Conclusion
The main aim of the study was to check for the existence of environmental management skill and experience among the construction players within construction site. It was also aimed at knowing their awareness and understanding of Environment Management System (EMS). In addition, it was aimed at seeing the responsibilities and acceptance of EMS among the construction players in their construction activities and their understanding to the implementation of EMS in order to create a sustainable development. However, based on the obtained results, it can be concluded that the awareness of EMS among the construction players in Kelantan State is very low. Most of the construction players understand an EMS. However, although they understood what EMS is, yet they did not implement and apply the system within the construction sites. They understand an EMS and
its obligation, but some of them, indicated that it is not important to be implemented, as they are doing projects just to get the profit. Although, the construction players understand an EMS, but they do not have any skills and experiences in implementing EMS within construction site. In addition, they do not really know and understand which of the EMS framework, standards and specification they should follow and based on. It was observed that the construction players did not really aware and their level of knowledge of an EMS was very poor. Most of the construction companies do not have an environmental or sustainability policy, they do not have intention to develop an EMS and also do not have EMS steering committee or management team to lead the EMS. Thus, it can be recommended that the construction players should have more environmental training and they should know the EMS so that in the future can create sustainable environment and avoid any negative impacts on the environment.

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