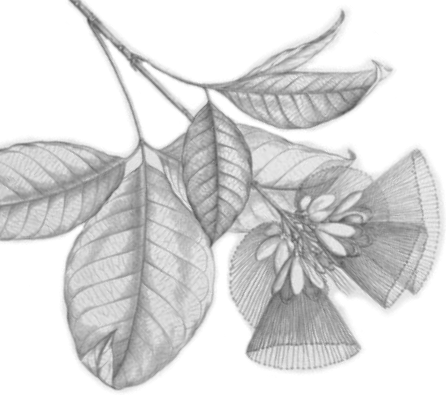

Environmental Management Systems (EMS) Adoption in Sarawak (Malaysia): Implementation Motivations

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ABSTRACT:

Environmental management has been in the process of evolution since Industrial Revolutions of 18th and 19th centuries. And the more recent is the development of international environmental management standards and guidelines to facilitate global trade. These environmental management standards and guidelines are usually known as Environmental Management Systems (EMS). This research investigates the implementation motivations in relation to EMS adoption in Sarawak, Malaysia organizations. Empirical findings of a survey on the above in Sarawak organizations are presented. About 112 survey questionnaires invitations were forwarded to various organizations in Sarawak and a total of 47 responses were received. The results of this research show that among the Sarawak organizations, the top three implementation motivations or benefits from implementing EMS according to their importance by the Sarawak EMS user's organizations are 1) Legal compliance as the top benefit of EMS implementation; 2) Improvement in operational environmental protection; and 3) Corporate image advantages.

Keywords: Environmental Management Systems; Implementation Benefits; Environmental Performance; Legal Compliance.

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Environmental management has been in the process of evolution since Industrial Revolutions of 18th and 19th centuries. In the early 20th century, industry faced the challenge of lack of standards for its products and processes and in 1970s, started the creation of environmental laws and regulations (CSCA 2014). From 1970s to 2000s, there were voluntary codes of environmental management practices, as well as international developments related to the environment management. And the more recent is the development of international environmental management standards and guidelines to facilitate global trade. The most widely accepted definition of EMS is by ISO/TC 207/SC 1 from International Organization for Standardization (ISO 2015) that defines an EMS as "part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risk and opportunities."

Environmental management systems (EMS) in industry have their origins in voluntary codes of environmental conduct and "eco-auditing" programs adopted by various industries, include the Responsible Care® program, first adopted by the Association for the American and Canadian Chemical Industry (now the Chemistry Industry Association of Canada) in 1988 and the Strategies for Today's Environmental Partnership program adopted by the American Petroleum Institute in 1990 (Watson & Emery 2004). United Nations Conference on Environment and Development (UNCED) was convened in Rio De Janeiro from 3 to 14 June in 1992 (UN 1997). Two major documents emerged from this conference were the Agenda 21 the comprehensive policy guidance document and the Rio Declaration, a set of twenty-seven principles for achieving sustainable development. A call for improved environmental management was reflected in both documents.

Also in the international realms, British Standard 7750 (BS 7750) by the United Kingdom was published in 1992; the world's first standard for EMS which also inspired the ISO 14001 EMS in later stage (BSI 2015). The European Commission began to draft a regulation on environmental management and auditing since 1990 and in 1993, the Eco-Management and Audit Regulation (1836/93/EC) was adopted, which included the Eco-Management and Audit Scheme (EMAS). EMAS is a premium environmental management tool to enable organizations in the European Union to improve their environmental performance (EC 2015). According to Ritchie & Hayes (1998), both BS 7750 and EMAS failed the test of harmonizing industries differences in environmental management; as well as providing an effective tool for managers to protect their organizations against potential negative impact on trade and commerce while achieving their environmental objectives. Therefore, to address these shortcomings, in 1991, International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) formally established the Strategic Advisory Group on the

Environment (SAGE) to develop recommendations regarding international standards for environmental management. As a result, ISO 14000 series was first introduced by ISO Technical Committee 207 in 1993 with the aims of helping organizations globally to become environmental friendly and sustainable (ISO 2005); and in 1996, the ISO 14001 EMS specification was first published; and second edition was in 2004.

In the United States, the adoption of ISO 14001 led to a variety of experimental and pilot programs such as USEPA's Performance Track in year 2000. Performance Track recognizes and rewards organizations that consistently exceed regulatory compliance requirements, demonstrate environmental stewardship and performance improvement, and were actively involved in working closely with their local communities. Implementation of an EMS is among the criterion for Performance Track membership (USEPA 2007).

The most important reason why organizations are implementing EMS is to improve the organization's environmental performance. According to Ho & Law (2015b), EMS adoption in organization has demonstrated to provide measurable environmental as well as business performance improvements for many countries, in both local governments and private sector organizations throughout the world over the last decade or more. Since the adoption of EMS is linked to implementation benefits, more organizations have developed and adopted EMS to achieve similar enhancements in various activities and facilities.

Many researchers have conducted studies and written literatures on link of EMS implementation and improved environmental performance, compliance of legislations, non-environmental benefits such as increase of corporate image and increase of sales; however, there is little research on the investigation of EMS implementation motivations in organizations. Besides, the uptake of EMS is not as encouraging in Malaysia, compared to other countries such as in Japan and Finland where there were over 90% of organizations which have some ISO 14001 or EMAS certified sites (Maier & Vanstone 2005). And in Malaysia, there are only a handful of organizations in Sarawak that are implementing EMS. Questions arise, if EMS implementation can lead to improved environmental performance, why are there only a handful of organizations in Sarawak that are adopting EMS? What are the implementation motivation for EMS adoption in Sarawak?

The primary objective of this research is the development of implementation motivations for an effective EMS in Sarawak. This research will fill the growing gap between the perception on EMS and the actual practices of the Environmental Management Systems (EMS) in Sarawak. One of the specific aims of this research is to determine the implementation motivations for EMS implementation

in Sarawak, such as benefits of good environmental performance, compliance to legal requirements and other non-environmental benefits.

IMPLEMENTATION MOTIVATION

In this research, the following EMS implementation motivations were considered:

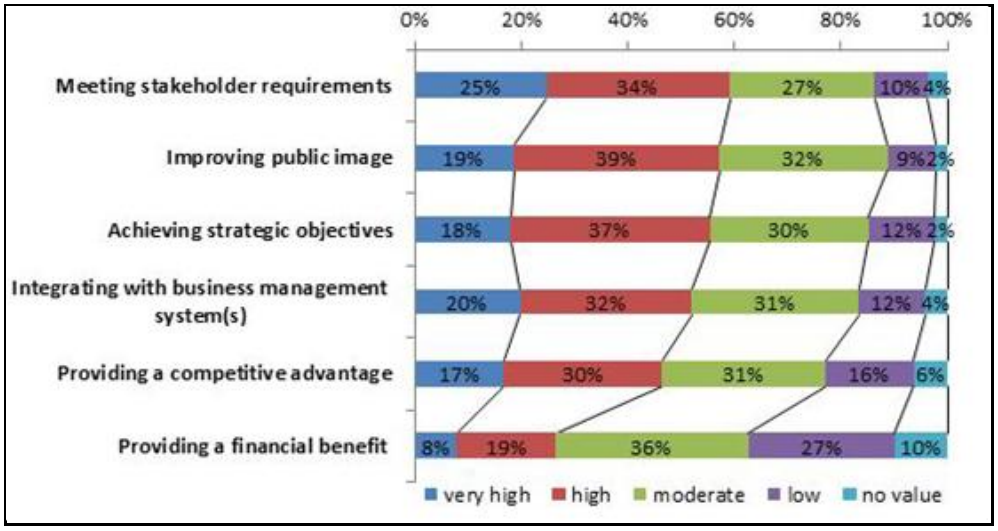
BENEFITS OF IMPLEMENTING EMS

Table 1. Anticipated Benefits from EMS Implementation in European Firms.

REASONS FOR USING EMS	PERCENTAGES		
	DISAGREE	INDIFFERENT	FULLY AGREE
Corporate image	0.7	15.7	83.6
Owner's and top management's satisfaction	2.2	33.7	64.1
Product image	2.2	34.9	62.9
Long-term profits	11.7	32.4	55.9
New market opportunities, sales, competitiveness	6.1	58.8	35.1
Productivity increase	14.4	60.4	25.2
Short-term profits	32.3	49.0	18.7

Source: Rivera-Camino (2001).

Figure 1. Results of ISO 14001 Continual Improvement Survey 2013: Value of ISO 14001 for Business Management.



Source: ISO (2014).

According to Rivera-Camino (2001), European firms' directors considered EMS to be more a way of improving corporate image and political relations than a method of acquiring long-term benefits, as results tabulated in Table 1. The results also show that the firms are not convinced that EMS will increase productivity (25.2%) or competitiveness (35.1%). And they almost all agree that EMS do not add to short-term benefits (18.7%). Responses from users from the ISO 14001 Continual

Improvement Survey 2013 (ISO 2014), also suggested that ISO 14001 has provided considerable value for business management, most notably for meeting stakeholder requirements, improving public image, achieving strategic objectives, and integrating with business management systems (Figure 1). More than half of participants indicated 'high' to 'very high' value, and more than 80% indicated at least a moderate value in these areas. Furthermore, 78% and 63% of responses indicated at least a moderate value in terms of providing a competitive advantage and financial benefit, respectively.

COMPLIANCE WITH ENVIRONMENTAL REGULATIONS OR LEGISLATIONS

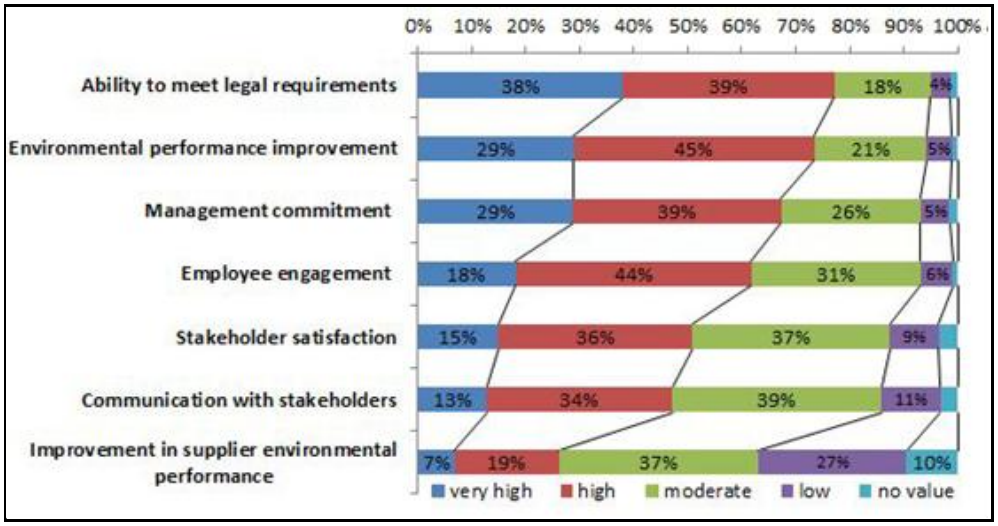
According to Maier & Vanstone (2005), companies in the United States, in particular, have historically been more tightly regulated. Achieving regulatory compliance, or even preventing increased future regulation, is a commonly cited driver for establishing environmental management systems. The upsurge in EMS reflected the pressures on business, together with the realization that the presence of a functioning EMS might be a mitigation factor should a company find itself in court for environmental breaches; governments encouraged the voluntary aspect of environmental reporting seeing the prospect for progress without the need for confrontation (Scott 2003). Giles (2008) viewed that most facilities in the United States, full compliance with federal, state and local regulatory requirements is a bottom-line concern, as well as the main value expected from an EMS implementation.

With implementation of EMS in Unilever South East Africa, Harare, Zimbabwe was well conversant with the legal instruments obtaining at local, national, and international levels that govern its activities, products and services. Thus this knowledge became a pre-requisite for the company to establish its acquiescence process as legal conformity was measured for all selected significant environmental aspects with legal obligations (Marambanyika & Mutekwa 2009). In China, the main driver for EMS was reported to be to ensure regulatory compliance (Fryxell et al. 2004). Scott (2003) also viewed that more often, risk minimization was the primary driver, whether risks from actual and anticipated legislation, or those to corporate and brand reputations.

Responses from users from the ISO 14001 Continual Improvement Survey 2013 (ISO 2014) suggested that organizations have realized significant value from ISO 14001 in terms of meeting legal requirements, improving environmental performance, and enhancing management commitment and stakeholder engagement (Figure 2). Close to 75% of participants indicated 'high' or 'very high' value for meeting legal requirements and improving the organization's environmental performance, while more than 60% indicated 'high' to 'very high value' for management commitment and employee engagement. Overall, 85% or more indicated at least a moderate value in all categories except improvement in

supplier environmental performance. 63% of user responses indicated at least moderate value in this area.

Figure 2. Results of ISO 14001 Continual Improvement Survey 2013: Value of ISO 14001 for Environmental Management.



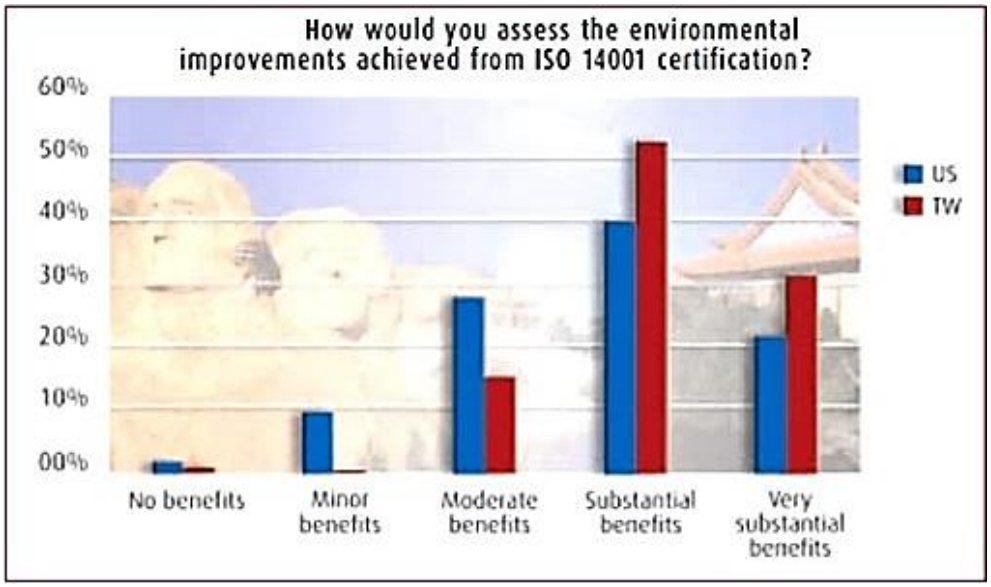
Source: ISO (2014).

ENVIRONMENTAL PERFORMANCE

In Hong Kong's Printed Circuit Board industry, manufacturers intended to implement ISO 14001 EMS to improve their environmental performance and sustain their competitive position in the global market place (Chin 1999). A case study which was carried out in a manufacturing facility in Sarawak, Malaysia had proof that ISO 14001 EMS implementation since year 2004 until 2010 had improved the environmental performance through the various environmental management programmes introduced in the facility (Ho & Law 2015a).

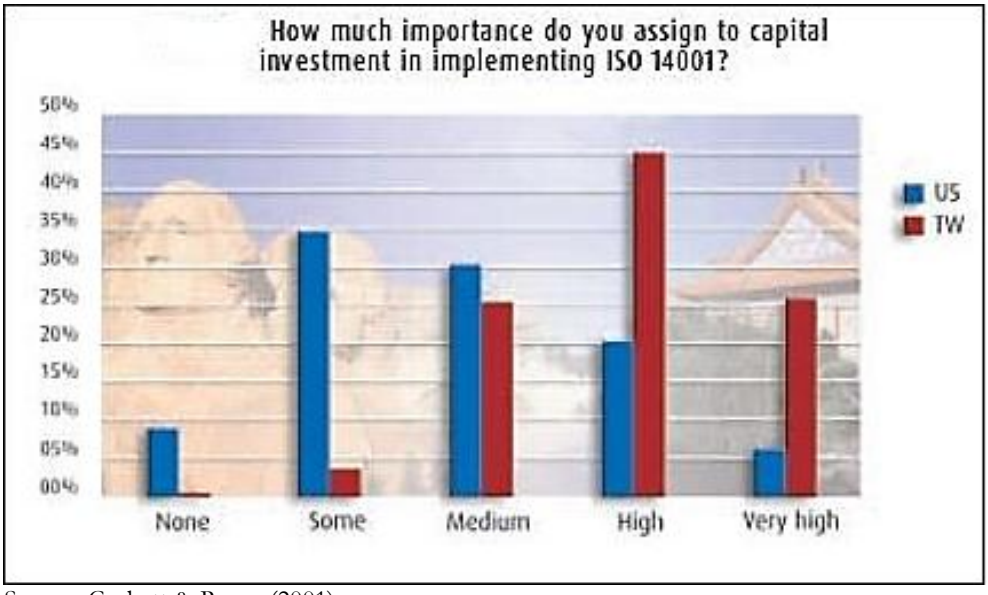
In the special report by Corbett and Russo (2001), it seemed likely that firms in United States would experience less environmental benefits from ISO 14001 registrations compared to Taiwanese firms. It was simply because Taiwanese firms were less regulated in their environmental aspects and impacts compared to United Stated firms. Therefore, more capital investment was assigned in implementing ISO 14001 in Taiwanese firms. Figure 3 shows the comparison of United States and Taiwanese firms in assessing their environmental improvement achieved from ISO 14001 certification. Figure 4 is the importance of capital investment assignment in implementing ISO 14001 in United States and Taiwanese firms. These analyses suggest that the environmental impact of ISO 14001 may be greater in Taiwan than in the United States, which in turn suggests that there may be some truth in the notion that ISO 14001 does more for less environmentally advanced firms.

Figure 3. Comparison of US and Taiwanese Firms in assessing their Environmental Improvement.



Source: Corbett & Russo (2001).

Figure 4. Comparison of the importance of capital investment assignment in implementing ISO 14001 in United States and Taiwanese firms.



Source: Corbett & Russo (2001).

Companies with an EMS discovered the benefits of identifiable reductions in waste management, energy and water costs (Scott 2003). In a research conducted by researchers from the University of Oregon's Lundquist College of Business on facilities in electronics industry, it showed that the non-certified ISO 14001 firms has higher toxic release index compared to the ISO 14001

adopters (Figure 5). This research suggested that implementing and ISO 14001 registration led to reduced toxic emissions in the United States (Corbette & Russo 2001).

On the other hand, in a study of examines the motivations of mainland Chinese facilities in seeking ISO 14001 certification found that no significant relationships between motivation to reduce costs and perceptions of the effectiveness of EMS components (Fryxell et. al. 2004).

Figure 5. Comparison of the Toxic Release Index for certified and non-certified firms.

Source: Corbett & Russo (2001).

MATERIAL & METHODS

The research methodology structure entailed the following target: determination of the EMS implementation motivations among organizations in Sarawak, where the implementation motivations are chosen through researcher's experience as well as factors that several literatures indicate play significant roles in determining adoption of an EMS. The source of information and the relevant research techniques that were employed to achieve the targets mentioned above including but not limited to the followings:

i) Primary sources of information: questionnaire with a total of seven sections; informal interviews with Environmental Management System Representatives (EMR) from several organizations from Sarawak, Malaysia, government or government-linked bodies, such as Department of Standards Malaysia and SIRIM-QAS International as well as a few other accredited certification bodies certifying EMS; and
ii) Secondary sources of information: the literature; retained documented information of EMS of one of the organization in Sarawak, Malaysia; data from International

Organization for Standardization (ISO), Department of Standards Malaysia and SIRIM-QAS International.

SAMPLING DESIGN

The population of this study comprised of organizations in Sarawak only that are certified to EMS under SIRIM QAS International Sdn. Bhd.; certified to EMS under other accredited certification bodies accredited to Department of Standards Malaysia, United Kingdom Accreditation Services (UKAS) and others; and registered under Sarawak Manufacturers' Association (SMA).

Department of Standards Malaysia (DSM 2015) has a total of 13 accredited certification bodies for Environmental Management Systems (EMS). The statistics which was updated from quarter 3, year 2015 show that the total number of EMS accredited certification or certified organizations in Malaysia is 1,137 organizations. SIRIM QAS International Sdn. Bhd., as the main DSM accredited certification body for EMS has issued a total of 723 EMS certifications in Malaysia, which comprises of about 40 percent of the total EMS certificates under DSM (SIRIM QAS 2015). Out of the total 723 EMS certificates, a total of 38 EMS certificates issued for 32 organizations in Sarawak. The researcher has invited all the 32 organizations from Sarawak to participate in the survey questionnaire and or informal interview regarding their EMS implementation. This conformed to Walford's (1995) assertion that sampling techniques require at least 10 percent of observations or sampling fraction for them to be considered representative of the total population.

Besides, to increase the reliability of this research, researcher has invited the other 20 EMS certified organizations from other 12 accredited certification bodies accredited to Department of Standards Malaysia, United Kingdom Accreditation Services (UKAS) and other accreditation bodies to participate the study. Researcher has randomly selected 60 organizations from the list of Sarawak Manufacturers' Association members, or about 30 percent of the total 204 organizations from SMA list. The purpose of this study is mainly to understand their general awareness in EMS as well as the barriers and limitations for them to implement an EMS in their organization.

DATA COLLECTION METHOD

One of the key source of information for this study is through the data gathered and or data analysis performed from questionnaire with title, "SURVEY ON IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT SYSTEMS". The questionnaire was prepared in hardcopy as well as softcopies such as in the format of Microsoft Word and PDF format, sent through email and or hand carry to targeted respondents. Besides, the researcher has prepared the same questionnaire online

using the Goggle Forms template for those who prefer to reply online. Besides having to choose the most suitable answer(s) on the different items in the questionnaires, a five-point Likert scale was used to measure the variables, which is described as 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (strongly agree).

Nunnally and Bernstein (1994) recommended that when a measuring instrument is used for data collection and the subjects should be used to be those for whom the instrument is intended. Therefore, the respondents targeted in this study through questionnaire were the organizations' Environmental Management Representatives (EMR), Safety, Health and Environment (SHE) managers, and other director or executive whose job related to environmental issues. A cover letter from researcher's academic supervisor was attached together with the questionnaire to request the targeted respondents to reply. Besides, the researcher has made personal telephone calls to most of the targeted respondents and to some, personal meet up appointment to explain to them personally the purpose of the questionnaire. Informal interviews were conducted through informal meetings and other means of telecommunication with selected EMR of the certified organizations who have responded to the questionnaire.

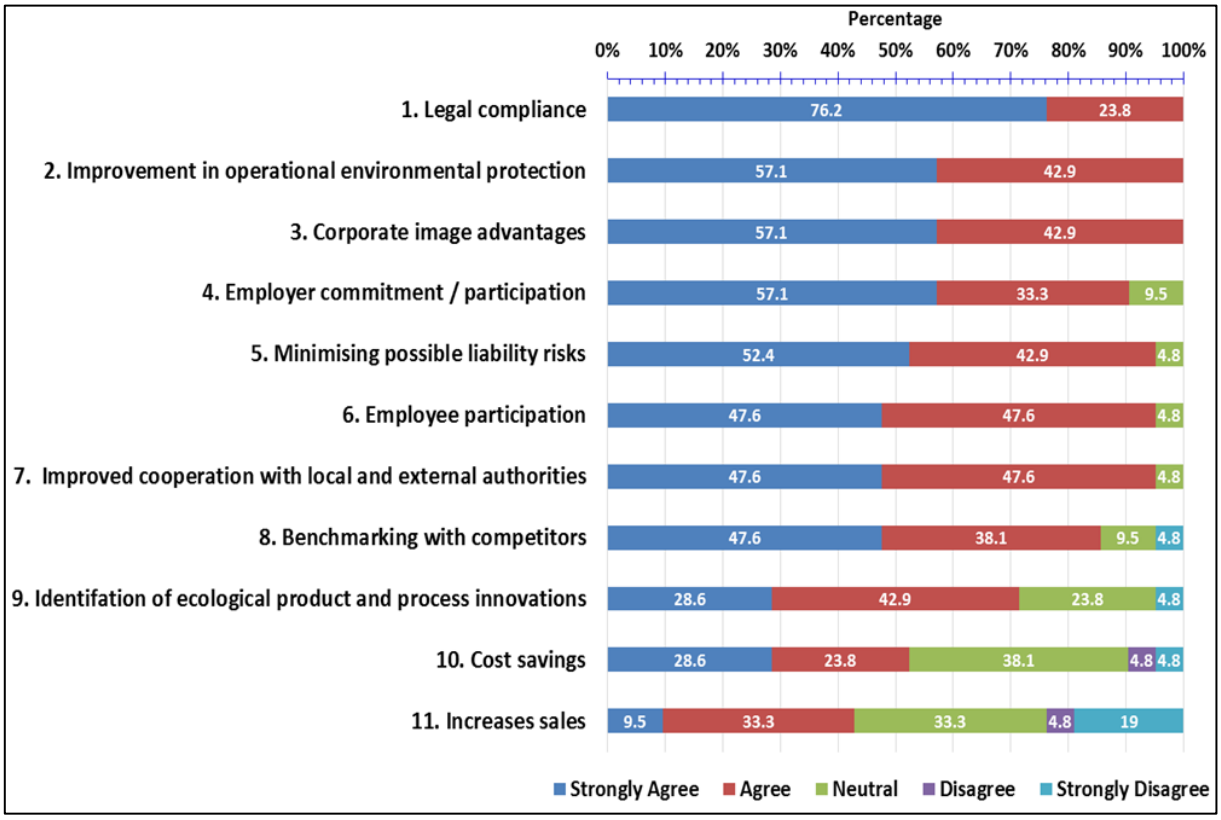
RESULTS & DISCUSSION

The results were collected, analyzed and interpreted by researchers. Figure 6 shows the comparison of EMS implementation motivations according to their importance by the EMS user's organizations in Sarawak. Different EMS implementation motivations are getting a total of at least 42.8% to 100% of agree and strongly agree from respondents. The following are the top three implementation motivations with 100% of responses with either "strongly agree" or "agree"; results from the EMS survey questionnaires replied by the EMS user's organizations:

i) **Legal compliance** as the top EMS implementation motivation; with 76.2% of respondents strongly agree and 23.8% of respondents agree about it. This result confirmed to the literature of Maier & Vanstone (2005) who cited that EMS establishment could achieve regulatory compliance; confirmed to the literature of Scott (2003) who viewed that the presence of a functioning EMS might be a mitigation factor should a company find itself in court for environmental breaches; and to literature of Giles (2008) who viewed that most facilities in the United States, full compliance with federal, state and local regulatory requirements is a bottom-line concern, as well as the main value expected from an EMS implementation. Besides, the benefit of EMS implementation in legal compliance also confirmed by literature by Marambanyika &

Mutekwa (2009) who found that implementation of EMS in Unilever South East Africa, Harare, Zimbabwe reaped the benefit of its users' well conversant with the legal instruments obtaining at local, national, and international levels that govern its activities, products and services; and literature by Fryxell et al. (2004) who found that in China, the EMS was reported to be implemented to ensure regulatory compliance. Responses from users from the ISO 14001 Continual Improvement Survey 2013 (ISO 2014) also confirmed that organizations have realized significant value from ISO 14001 EMS in terms of meeting legal requirements.

Figure 6. Comparison of EMS Implementation Motivations.



Source: The Authors.

ii) **Improvement in operational environmental protection**; with 57.1% of respondents strongly agree and 42.9% of respondents agree about it. This result confirmed to literature by Scott (2003) who viewed that risk minimization was the anticipated benefit from EMS implementation in organizations. This finding also confirmed to results from ISO 14001 Continual Improvement Survey 2013 (ISO 2014) which found that organizations have realized significant value from ISO 14001 EMS in terms of improved environmental performance; to the case study findings by Ho and Law

(2015a) that ISO 14001 EMS which was implemented in a manufacturing facility in Sarawak had improved the environmental performance in the facility; to the literature by Scott (2003) that companies with an EMS discovered the benefits of identifiable reductions in waste management, energy and water costs; to research finding of Corbette and Russo (2001) who suggested that implementing and ISO 14001 registration led to reduced toxic emissions in the United States.

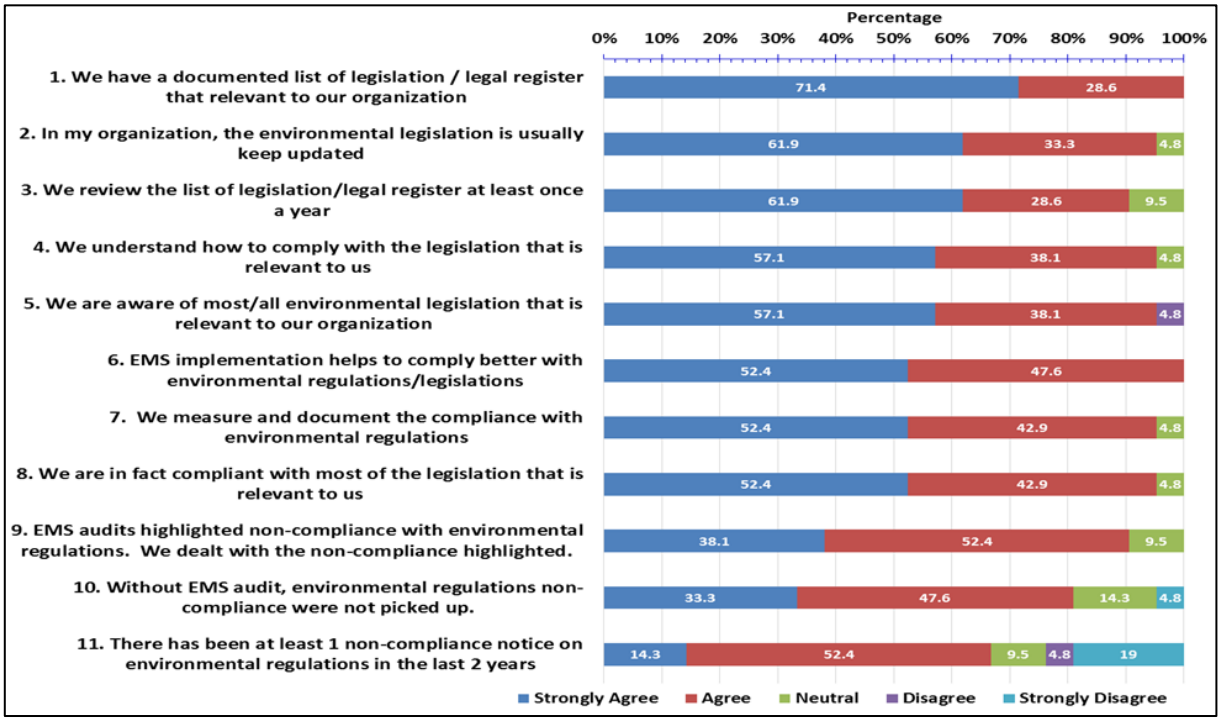
iii) **Corporate image advantages**; with also 57.1% of respondents strongly agree and 42.9% of respondents agree about it. This result confirmed to the survey results by ISO 14001 Continual Improvement Survey 2013 (ISO 2014), that ISO 14001 EMS has provided considerable value for business management, with one of the most notable benefit as improving public image. Besides, the same benefit from EMS implementation also confirmed by the literature of Rivera-Camino (2001) who found that European firms' directors considered EMS to reap an important benefit as in improving corporate image and political relations than a method of acquiring long-term benefits.

Figure 7 is the comparison of EMS effectiveness, in term of compliance with environmental regulations and legislations. It shows further detail on the legal compliance; how far and from which aspects of legal compliances do an EMS implementation benefit respondent's organizations. From **Figure 7**, effectiveness of EMS in terms of compliance with legal legislations based on respondent's opinions according to their importance are as followings:

- We have a documented list of legislation/legal register that relevant to our organization;
- In my organization, the environmental legislation is usually keep updated;
- We review the list of legislation/legal register at least once a year;
- We understand how to comply with the legislation that is relevant to us;
- We are aware of most/all environmental legislation that is relevant to our organization;
- EMS implementation helps to comply better with environmental regulations/legislations;
- We measure and document the compliance with environmental regulations;
- We are in fact compliant with most of the legislation that is relevant to us;

- EMS audits highlighted non-compliance with environmental regulations. We dealt with the non-compliance highlighted;
- Without EMS audit, environmental regulations non-compliance were not picked up; and
- There has been at least 1 non-compliance notice on environmental regulations in the last 2 years.

Figure 7. Comparison of EMS Effectiveness: Compliance with Environmental Regulations and Legislations.

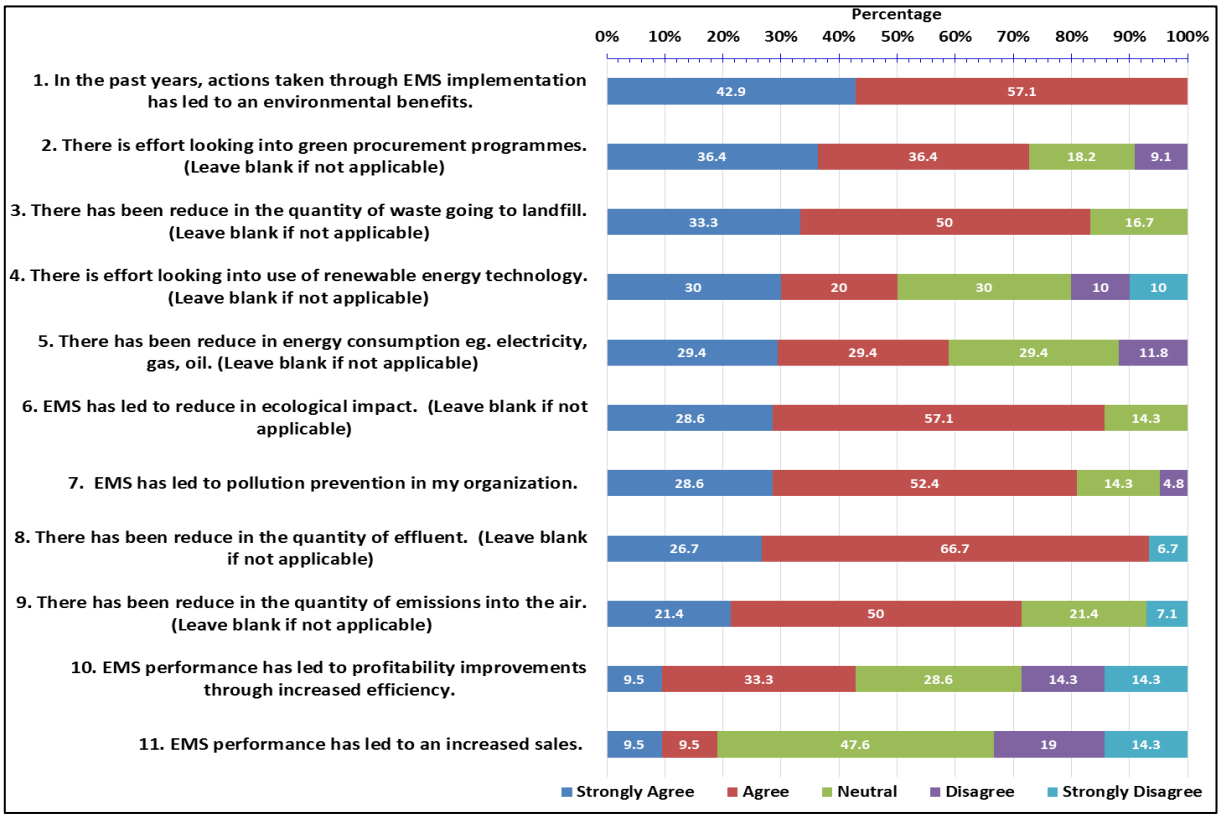


Source: The Authors.

In fact, most of the respondents from organizations with an EMS implemented have at least a total of 66.7% to 100% of strongly agree and agree on all the eleven legislation compliance related matters as stated in the previous paragraph. Therefore, EMS implementation has resulted the user organizations to understand, document and maintain their related legislations and regulations well; thus, enhanced the legal compliance of the organizations implementing EMS better compared to those organizations which do not implementing one.

Figure 8 is the comparison of EMS effectiveness, in term of environmental performance; how far and from which aspects of operational environmental protection do an EMS implementation benefit respondent's organizations. From Figure 8, effectiveness of EMS in terms of environmental performance based on respondent's opinions according to their importance are as followings:

Figure 8. Comparison of EMS Effectiveness: Environmental Performance.



Source: The Authors.

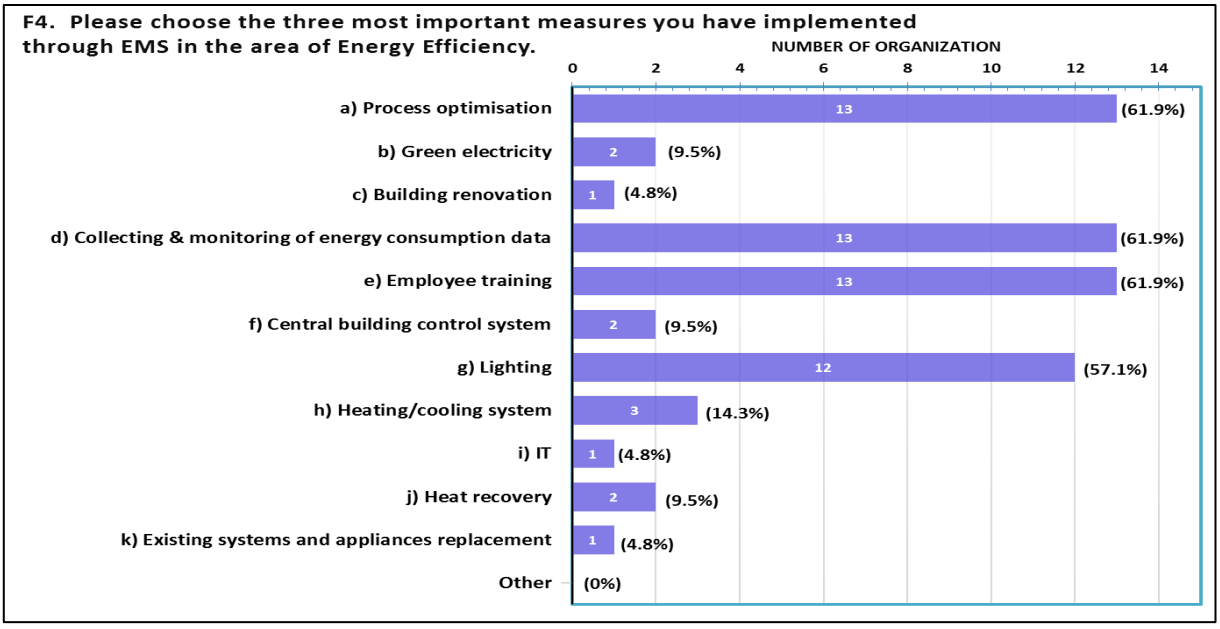
- In the past years, actions taken through EMS implementation has led to an environmental benefits;
- There is effort looking into green procurement programmes. (Leave blank if not applicable);
- There has been reduce in the quantity of waste going to landfill. (Leave blank if not applicable);
- There is effort looking into use of renewable energy technology. (Leave blank if not applicable);
- There has been reduce in energy consumption eg. electricity, gas, oil. (Leave blank if not applicable);
- EMS has led to reduce in ecological impact. (Leave blank if not applicable);
- EMS has led to pollution prevention in my organization.
- There has been reduce in the quantity of effluent. (Leave blank if not applicable);
- There has been reduce in the quantity of emissions into the air. (Leave blank if not applicable);

- EMS performance has led to profitability improvements through increased efficiency; and
- EMS performance has led to an increased sale.

In fact, most of the respondents from organizations with an EMS implemented have at least a total of 71.4% to 100% of strongly agree and agree on the first until ninth environmental performance related matters as stated in the previous paragraph and shown in Figure 8. The remaining two environmental performance related matters, which is on the tenth and eleventh ranking as also in Figure 8, are below at total of 50% of strong agree and agree on the matter. Therefore, EMS implementation is effective for the user organizations to have good environmental performance.

From Figure 9, the three most important measures that respondents have implemented through EMS in the area of energy efficiency are: 1) process optimization; 2) collecting and monitoring of energy consumption data; and 3) employee training. These three measures have each 13 respondents. The fourth measure that where 12 respondents have implemented is in the area of lighting of the organizations. The fifth measure which 3 respondents have implemented is heating or cooling system. Other measures such as green electricity, central building control system and heat recovery has 2 respondents each. 1 respondent organization each has implemented building renovation, IT as well as existing systems and appliances replacement through EMS in the area of energy efficiency. No other measures being mentioned.

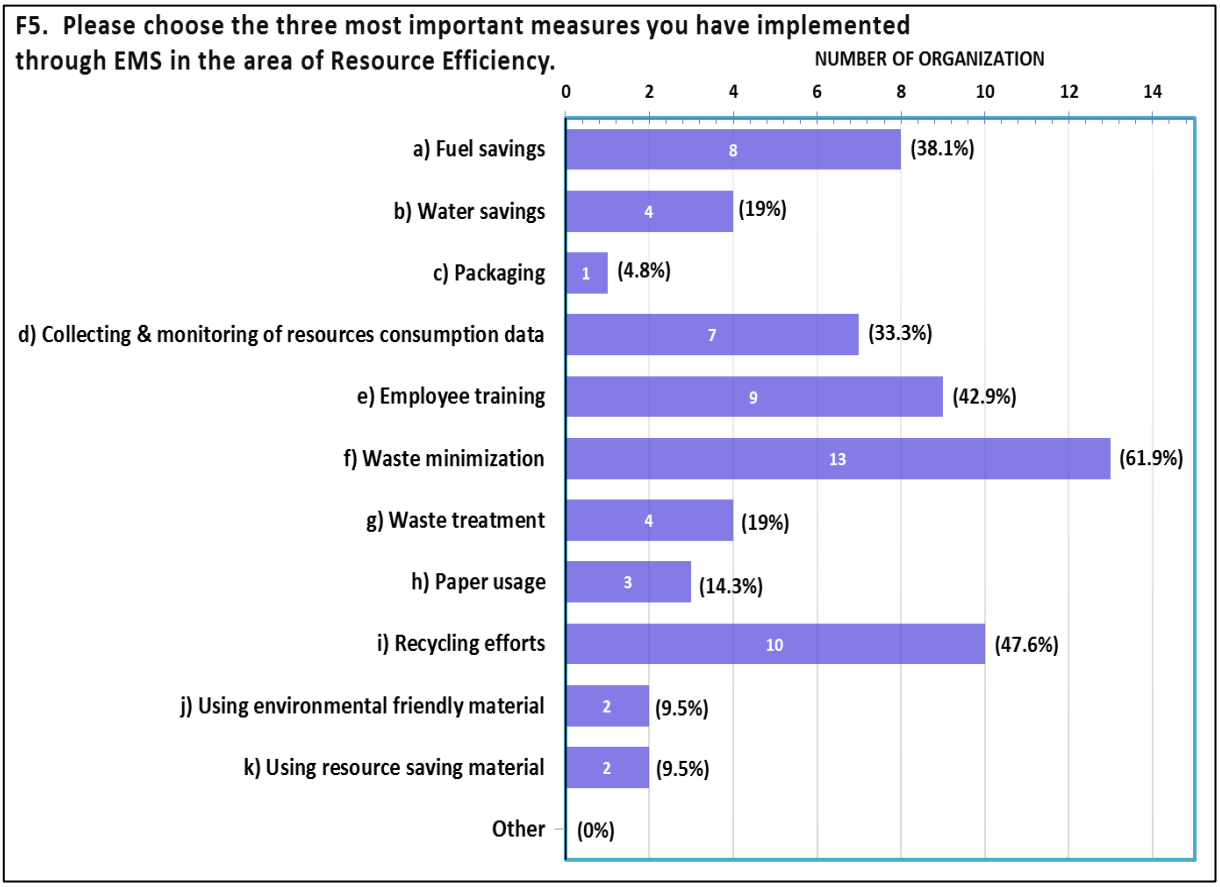
Figure 9. Measures Implemented through EMS in the area of Energy Efficiency.



Source: The Authors.

From Figure 10, the three most important measures that respondents have implemented through EMS in the area of resource efficiency are: 1) waste minimization (13 respondents); 2) recycling efforts (10 respondents); and 3) employee training (9 respondents). The fourth measure that where 8 respondents have implemented is fuel savings measure. The fifth measure that 7 respondents have implemented is collecting and monitoring of resources consumption data. Other measures such as water savings and waste treatment have 4 respondents' each. 3 respondents have chosen paper usage as the measure that have implemented. 2 respondents each have chosen implemented environmental friendly material as well as using resource saving material through EMS in the area of resource efficiency. Only 1 respondent have chosen packaging measure. No other measures being mentioned.

Figure 10. Measures Implemented through EMS in the area of Resource Efficiency.



Source: The Authors.

CONCLUSION

EMS implementation has resulted the user organizations in Sarawak, especially in the area to understand, document and maintain their related legislations and regulations well and improvement in operational environmental protection compared to those organizations which do not implementing

one. Top three implementation motivations or benefits from implementing EMS according to their importance by the Sarawak EMS user's organizations are as followings:

i) Legal compliance as the top implementation motivation of EMS adoption;

ii) Improvement in operational environmental protection; and

iii) Corporate image advantages.

REFERENCES

Accreditation [database on the Internet]. Department of Standards Malaysia (DSM) [updated 2015; cited 2015 December 19]. Available from: http://www.jsm.gov.my/accreditation#.V1VOMPl97IU

British Standards Institution [database on the Internet]. Our History. [updated 2015; cited 2015 December 27]. Available from: http://www.bsigroup.com/en-GB/about-bsi/our-history/

Chin KS 1999. Factors Influencing ISO 14000 Implementation in Printed Circuit Board Manufacturing Industry in Hong Kong. *Journal of Environmental Planning and Management*, 42(1):123-134.

Conference of Southern County Association (CSCA) [database on the Internet]. The History of EMS [updated 2014; cited 2015 December 28]. Available from: http://www.cscaweb.org/EMS/

Conference on Environment and Development (1992) [database on the Internet]. United Nation Department of Public Information [updated 1997; cited 2015 December 28]. Available from: http://www.un.org/geninfo/bp/enviro.html

Corbett CJ, Russo MV 2001. The Impact of ISO 14001. *ISO Management Systems*, (December 2001), pp. 23 – 29.

European Commission [database on the Internet]. About EMAS [updated 2015; cited 2015 December 27]. Available from: http://ec.europa.eu/environment/emas/about/index_en.htm

Fryxell GE, Lo CW, Chung SS 2004. Influence of motivations for seeking ISO 14001 certification on perceptions of EMS effectiveness in China. *Environmental Management,* 33(2):239-251.

Giles F 2008. Assessing the effectiveness of your environmental management system. *Environmental Quality Management*, 18(2):1-6.

Ho LL, Law PL 2015a. Impact of Implementation of ISO 14001 Environmental Management Systems on Environmental Performance: A Case Study. *International Journal of Engineering Research and Science & Technology*, 4(1):80-90.

Ho LL, Law PL 2015b. A Review on Benefits and Roles of Implementation; and Major Frameworks of Environmental Management Systems. *International Journal of Current Research*, 7(4):14446-14450.

International Organization for Standardization 2014. *ISO 14001 Continual Improvement Survey 2013: Executive Summary*. International Organization for Standardization, Geneva.

International Organization for Standardization 2015. *ISO 14001:2015 (E) Environmental Management Systems – Requirements with guidance for use*. International Organization for Standardization, Geneva.

Maier S, Vanstone K 2005. *Do good environmental management systems lead to good environmental performance?* Ethical Investment Research Services (EIRIS), London.

Malaysian Certified [database on the Internet]. SIRIM QAS International Sdn. Bhd. [updated 2015; cited 2015 December 17]. Available from: http://www.malaysiancertified.com.my/MgmtCertification.aspx

Marambanyika T, Mutekwa T 2009. Effectiveness of ISO 14001 Environmental Management Systems in Enhancing Corporate Environmental Sustainability at Unilever South East Africa in Harare, Zimbabwe. *Journal of Sustainable Development in Africa*, 11(1):280-297.

Nunally JC, Bernstein IH 1994. *Psychometric theory*, Issue 972. McGraw-Hill, 94 pp.

Performance Track Could Improve Program Design and Management to Ensure Value, Report No. 2007-P-00013 [database on the Internet]. United States Environmental Protection Agency [updated 2007; cited 2016 May 2]. Available from: https://www.epa.gov/sites/production/files/2015-11/documents/20070329-2007-p-00013.pdf

Ritchie I, Hayes W 1998. *A guide to the implementation of the ISO 14000 series on environmental management.* Prentice Hall, Upper Saddle River, N.J.

Rivera-Camino J 2001. What motivates European firms to adopt environmental management systems? *Eco-Management and Auditing*, 8(3):134–143.

Scott P 2003. Management systems and sustainable development. *ISO Management Systems,* September – October 2003, pp. 27-32.

The ISO Survey – 2005 [database on the Internet]. International Organization for Standardization [updated 2005; cited 2014 November 12]. Available from: http://www.iso.org/iso/survey2005.pdf

USEPA - United States Environmental Protection Agency 2007 [database on the Internet]. *Performance Track Could Improve Program Design and Management to Ensure Value, Report No. 2007-P-00013* [WWW] U.S. Environmental Protection Agency. [cited 2016 May 02]. Available from: https://www.epa.gov/sites/production/files/2015-11/documents/20070329-2007-p-00013.pdf

Walford N 1995. *Geographical Data Analysis*. John Wiley and Sons, New York.

Watson M, Emery ART 2004. Law, economics and the environment: A comparative study of environmental management systems. *Managerial Auditing Journal*, 19(6):760 – 77.

Aprovação dos Sistemas de Gestão Ambiental (EMS) em Sarawak (Malásia): Motivações de Implementação

RESUMO:

A gestão ambiental tem estado no processo de evolução desde as Revoluções Industriais dos séculos XVIII e XIX. E a mais recente é o desenvolvimento de normas e diretrizes de gestão ambiental internacional para facilitar o comércio global. Esses padrões e diretrizes de gerenciamento ambiental geralmente são conhecidos como Sistemas de Gerenciamento Ambiental (EMS). Esta pesquisa investiga as motivações de implementação em relação à adoção de EMS em organizações da Sarawak, na Malásia. São apresentados resultados empíricos de uma pesquisa sobre as organizações de Sarawak acima mencionada. Cerca de 112 questionários foram enviados para várias organizações em Sarawak e foram recebidos no total de 47 respostas. Os resultados desta pesquisa mostram que, entre as organizações Sarawak, as três principais motivações ou benefícios da implementação de EMS de acordo com sua importância pelas organizações de usuários Sarawak EMS são: 1) Conformidade legal como o principal benefício da implementação do EMS; 2) Melhoria da proteção ambiental operacional; e 3) vantagens da imagem corporativa.

Palavras-Chave: Sistemas de Gestão Ambiental; Benefícios de Implementação; Desempenho Ambiental; Conformidade Legal.

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