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RESEARCH ARTICLE

A REVIEW OF IMPLEMENTATION ON ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) IN SABAH

Mohd Adzrie*, J Renessh

Mechanical Engineering Program, Faculty of Engineering, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah
**Corresponding Author Email: mohdadzrie@ums.edu.my*

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ABSTRACT

This paper describes the general perspective of industrial organizations operating in Sabah, regarding the implementation of environmental management system (EMS), particularly, ISO 14001 and IS0 14004. Based on the results from literature review, which was used to identify factors and problem of EMS implementation among organizations, are presented. The findings of this review were synthesized to study the impacts that organizations had experienced after the implementation, alongside ways of encouraging implementation of an EMS, with or without the help of ISO 14004. The scope of the study covered several number of industrial organizations that actively operate within Sabah. The methodology employed was a questionnaire that contains open-ended and close-ended questions, sent to target respondents. Data analysis was done using descriptive statistics to explain trends in dataset and Principal Component Analysis with Factor Analysis to indicate correlation. Analysis of the questionnaire results are summarized in this paper to illustrate the significant evidence of problems in implementing an EMS, as well as understanding motivations in pursuing an EMS and findings ways to encourage implementation of an EMS.

KEYWORDS

Environmental, Management System, Industrial.

1. INTRODUCTION

Climate and environmental awareness is at an all-time high, with the advent of the Paris Climate Accords and renewed interest after countries reaffirm their support in tackling this man-made crisis. Almost all countries have shown specific initiatives in surpassing the targets set in the accords, despite no mechanism in place to force countries to meet the targets.

Given Malaysia's ratification of the agreement, it is now up to organizations to show the level of initiative required in surpassing these targets set in COP21. While the Malaysian government, in the form of regulatory bodies such as SIRIM and Department of Standards Malaysia, can offer trainings and measures to have in place a n environmental management system, organizations are only bound to following such regulations when required. This problem however is circumvented by the presence of mechanisms such as customer and investor perception, which would prefer being seen in positive light when it comes to the environment.

After the success of Technical Committee (TC) 127 in creating the ISO 9000 series for quality management, one of the world's most adopted and accredited standards, the International Organization of Standards was requested to make a commitment at the United Nations Conference on Environment and Development (UNCED) in crafting international environmental standards. As a result, TC 207 was formed by ISO's Technical Management Board (TMB) in developing such tools and systems, resulting in the now widely-cited ISO 14000 family of environmental management standards. TC 207 in its current form handles several tasks, namely environmental management systems, environmental auditing and related environmental investigations, environmental performance evaluation, environmental labelling, life cycle assessment, environmental communication, environmental aspects of product design and development, environmental aspects in product standards, terms and definitions, greenhouse gas management and related activities, and finally, measuring the carbon footprint of products.

Despite these positive turns of events, it can also be seen that most organizations with an existing ISO 14001 certification are focused in the Peninsular Malaysia region, further supported by sample space previously utilised in studies on EMS in Malaysia. On the other hand, only one such study has been conducted in East Malaysia, with Sarawak being the focus of the study.

There are several reasons as to why this may be the case, which will be further investigated in this study. Firstly, big organizations such as multinational corporations (MNCs) are incentivised to implement an EMS due to presence of global support, and constant advice being provided on adoption and improvement of existing systems. Under this paradigm, small and medium enterprises that lack such support will not be able to enjoy the benefits that are waiting to be reaped, which is shown in Figure 1. Additionally, since such support is lacking in SMEs, these organizations are often lacking in training and advice, and may experience difficulties in adopting an appropriate EMS. Often, implementation of an EMS may even be regarded as troublesome, and thus may be ignored altogether to be implemented.

2. LITERATURE REVIEW

Some organizations or manufacturers in many different business sectors have invested in the implementation of EMS in their operations. A review of previous research exploring the factors and problems was accomplished. Besides that, strategies and impacts of the implementation of the EMS also being studied.

2.1 Factors of implementation

Previous research stated that an EMS was implemented by organizations due to internal reasons, regulations, market pressure on the supply chain, and ultimately, to increase accessibility to respective markets [1]. A study also pointed out that compliance issues such as inefficient preparation, absence of responsibility at the proper level, and lack of information can be circumvented with an effective environmental management system [2].

It was also pointed out that for firms in almost all nations surveyed, the most cited reason for implementation was a need to show environmental initiative and leadership. In addition, not many firms stated governmental pressure or out of a want for administrative help as reasons. The most

critical contrast is in the explanations behind looking for enrolment. The overview uncovered that most Malaysian sought the ISO 14001 enrolment due to request from top administration as opposed to due to client's request or the frequently referred to cost-sparing reasons.

2.2 Problems in implementation

A review study identified several impediments that may deter organizations from implementation, such as vulnerability of organizations to legal litigations [3]. Documentation that is created for the express purpose of EMS can be used against the organization itself via court action if the targets narrowed down are not achieved. The review also states that on the other hand, ISO 14000 does not require organizations to carry out environmental reporting. A previous study also found similar challenges cited by top management for implementation, stating further that employees prefer to stay at status quo of the company prior to implementation [4]. A research found in their study that ISO 14001 prerequisites and determining environmental performance issues were the difficulties faced during the implementation of the standard [5].

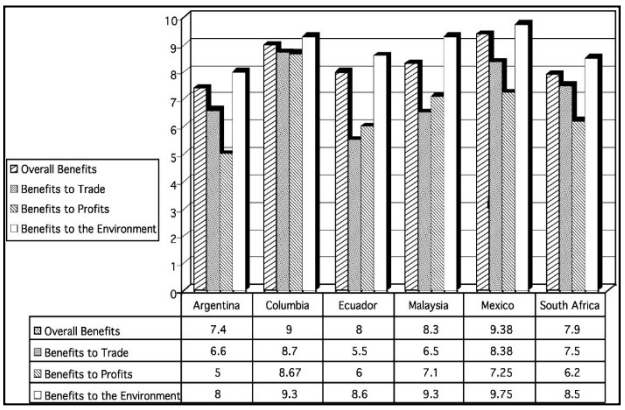
2.3 Strategies of implementation

Proposed designing design a system that incentivises active participants, in addition to adequate training for awareness purposes on the objectives and benefits of an EMS. Constant reviews and recommended solutions that are applicable to their organizations are also stated as possible remedies to the problem statement [4]. Another investigation stated that the most non-specific essential achievement factors in utilizing EMS ISO 14001 are administration and support of the administration, learning and preparation, inside examination, and continuous support [6].

Similarly, a study among small and medium enterprises in Malaysia stated that the senior administration ought to basically have a reasonable viewpoint with regards to the crucial achievement factors in the implementation of an EMS [7]. In addition, specialist strengthening, administrative duty, constructive criticism and rewards, and regular audits were named as the significant viewpoints in utilising environmental management [8]. Another investigation has underlined that the best administration ought to reliably make progress toward EMS documentation, natural perspectives, reviews, preparing, operational control, objectives and targets, ecological administration activities, and record control [9].

2.4 Impacts of implementation

Summers-Raines (2002) found that satisfaction on the impact of an implemented EMS is consistent on both spectrums of developed and developing countries, with the latter reporting slightly higher satisfaction [10]. This can be seen in Figure 1, which provides the visual comparative between countries. Organizations in developing countries outlined greater savings in terms of costs than did firms in developed countries. EMS usage may give both substantial and non-substantial advantages to the execution of each organization in economic and environmental terms.



	Argentina	Columbia	Ecuador	Malaysia	Mexico	South Africa
Overall Benefits	7.4	9	8	8.3	9.38	7.9
Benefits to Trade	6.6	8.7	5.5	6.5	8.38	7.5
Benefits to Profits	5	8.67	6	7.1	7.25	6.2
Benefits to the Environment	8	9.3	8.6	9.3	9.75	8.5

Figure 1: Satisfaction with ISO 14001 for Developing Countries [10]

A research stated that benefits such as better business control, transparency, advantage in marketing, reduction in cost, reduction in environmental mishaps, improvement in research and development, improvement in operations efficiency, improvement in company image, and change in work culture among staff, are cited among organizations surveyed in Malaysia. In a comparison, the same study also found that the benefits experienced by Malaysian organizations were concurrent and shared with places such as Hong Kong's organizations and other industrialised countries thus further concluded that the existing notion of ISO 14001 being unable to achieve what it was created for is highly untrue [11].

Based on a study also concurred with previous studies, stating that in investigating the impact an EMS can have on a firm's performance, they found that the certification has a positive impact in terms of economic and environmental performances of organizations. "Enhanced corporate image" was perceived by organizations to be the best trade-off in gaining certification, outweighing the cost of implementation altogether. They had also concluded that failing to capitalise on the marketing opportunity to be gained by certification can lead to a major loss of market share [12].

3. METHODOLOGY

Instrument of study is a questionnaire, with Part A enquiring general information, and Part B containing statements based on the 5-point Likert Scale of Agreeability. Part B provides specific statements that gauge responses on specific aspects being studied such as challenges in adopting an EMS and so on. Proportional representation was used for determining sample space is applied to the population to determine the appropriate number of respondents from each industry [13].

Descriptive statistics provides a general overview of how respondents perceived the statements given. It can be further defined as a holistic look at the pre-processed data collected in a study. Mann (2016) describes this approach as consisting of methods that organise, display, and describe data, with the usage of summary measure and graphical expressions such as tables and graphs. This study used methods of descriptive statistics such as bar charts and frequency plots that detail the responses received from the sample space of respondents, while indicating the skewness of response received [14].

The method, which was decided on for the fulfilment of inferential statistics, was Principal Component Analysis, defined as the analysis of multivariate data that serves to transform original variables into new ones, which then can be used to account for decreasing proportions of the variance within the dataset. Taking into consideration, the nature of the instrument of study in using numerous variables in gauging respondents, this method is appropriate where dimensionality of the data is reduced. This technique was described as allowing a researcher to confirm if such measures or factors are driven by the same underlying variable. In this study, these variables were fixed to be problems, motivations, impacts, and ways to implement ISO 14000. Additionally, SPSS allows number of factors to be fixed during pre-processing of the data, which means the default setting of displaying factors above an eigenvalue of one can be overwritten.

This method was further customised using certain settings in SPSS. Firstly, the method of rotation was changed to Direct Oblimin rotation from Varimax rotation, considering the factors were highly correlated within the study instrument. One advantage of using this rotation was that factors could be correlated within a large dataset, thus fitting the study instrument. Additionally, the Varimax rotation is an orthogonal rotation method, which is not suitable due to preliminary analysis which found inconsistent high loadings across the data factors, rather than consistent high loadings which is preferred in Varimax rotations. Within this method, another subset of analysis was also carried out concurrently by SPSS, known as Factor Analysis. This procedure was defined as postulation where covariances or correlations between a set of variables, come from the relationship between such variables to a small pool of underlying latent variables, which is commonly known as common factors [15].

Additionally, sampling adequacy was tested to determine the suitability of the dataset for factor analysis, which is a subset analysis within principal factor analysis. This adequacy was tested using two methods; the Kaiser-Meyer-Olkin test, academically known as Kaiser's Measure of Sampling Adequacy. This test can be defined as a measure for proportion of variance within variables that may be common variances. This analysis is carried out by comparing the values returned in SPSS for the KMO test with the normalised quartimax criterion. Kaiser (1974) evaluated KMO values between 0.8 to 1.0 as being adequate, while values above 0.6 as adequate. It should be noted that KMO values close to zero means that widespread correlations are present, which poses significant problems for Factor Analysis [16].

Bartlett's test of sphericity is commonly used in academic research to test if a correlation matrix has an identity matrix. If the correlation matrix tested has an identity matrix, it can be concluded that the variables found inside the correlation matrix are unrelated, thus dismissing the dataset for structure detection. Bartlett's test checks for this identity matrix by testing for the null hypothesis, H_0, which states that the correlation matrix has an identity matrix. Thus, the test returns a p-value that is either above or

below the cut-off point of 0.05. The null hypothesis is rejected when the p-value is less than 0.05, indicating statistical significance. This null and alternate hypothesis were further customised to fulfil the objectives of the research, stated as follows;

H_0: There is no statistically significant interrelationship between variables affecting the implementation of ISO 14000 among industrial companies.

H_1: There may be statistically significant interrelationship between variables affecting the implementation of ISO 14000 among industrial companies.

4. RESULTS

A total of 100 questionnaires were sent out to consenting organizations, with 80 responses achieved at the end of the day. Several responses were removed from the data pool, due to reasons such as incomplete responses. Additionally, out of the 80 responses, four more responses were eliminated, due to lack of familiarity with the ISO 14000 family of standards. This was achieved by a Part A question in the questionnaire which enquired specifically, prior knowledge on ISO 14000.

The responses were representative of the type and spread of industries within Sabah, with Kota Kinabalu being the location of most of the organizations involved in manufacturing operations. Most respondents were representatives of their respective organization's human resource and management department, with an approximate number of 81.6% (62 respondents) from the respondent pool. This was followed by 15.8% (12 respondents) identifying as representatives of their production department, and 3% (2 respondents) identifying as representatives of their research and development department. Table 1 shows the descriptive statistics based on the Likert scale.

Table 1: Descriptive statistics for Likert Scale Data

Category	No.	Mean	Standard Deviation	Median	Mode	Range	Minimum	Maximum	Skewness
Problems	1	1.565789	0.618289	1.5	1	2	1	3	0.612358
	2	1.712329	0.824612	1	1	3	1	4	0.738299
	3	2.144737	0.90486	2	2	4	1	5	0.482514
	4	2.315068	0.955637	2	2	4	1	5	0.500146
	5	1.473684	0.576742	1	1	2	1	3	0.747412
Motivations	6	3.256757	0.966009	3	3	4	1	5	0.207339
	7	2.986842	1.125385	3	3	4	1	5	0.026418
	8	1.851351	0.715435	2	2	2	1	3	0.227061
Impacts	9	2.72	0.863056	3	2	3	1	4	0.06365
	10	2.72973	0.763864	3	3	3	1	4	-0.06327
	11	3.210526	1.036864	3	3	4	1	5	0.078198
	12	3.013158	0.901753	3	3	4	1	5	-0.02629
Ways	13	1.794521	0.706299	2	2	2	1	3	0.31509
	14	1.565789	0.596334	2	1	2	1	3	0.514283
	15	1.789474	0.698871	2	2	2	1	3	0.314713
	16	2.039474	0.823663	2	2	3	1	4	0.366851
Relationship with ISO 14004	17	2.118421	1.0828	2	2	4	1	5	0.923681
	18	2.851351	0.855	3	3	4	1	5	-0.11171

A total of four iterations were carried out to remove variables which did not correlate with the factors found by the analysis. At the end of 4 iterations of Principal Component Analysis and Factor Analysis, five factors were clustered within the variables. Table 2 represents the five factors correlate with the category of Likert scales as predetermined earlier; namely, Factor 1 correlates with the impact of implementing an EMS, and includes Q10, Q11, and Q12 as variables. Factor 2 correlates with the motivations of implementing an EMS, and includes Q6, Q7, and Q8 as variables. Factor 3 correlates with the ways to implement an EMS, and includes Q15, Q16, and Q17 as variables. Factor 4 correlates with problems in implementing an EMS and includes Q1 and Q2 as variables. Factor 5 correlates with relationship between an EMS and ISO 14004, and includes Q14 as a variable. The KMO test shown in Table 3 yielded a value of 0.590, which is above the predetermined value 0.5, thus making the matrix is acceptable statistically. Bartlett's test of sphericity yielded a p-value of 0.00, which is less than 0.05, thus allowing rejection of the null hypothesis, in favour of the alternate hypothesis.

Table 2: Pattern Correlation Matrix

Pattern Matrix

	Component				
	1	2	3	4	5
Q11	.888				
Q12	.839				
Q10	.765				
Q6		.771	-.314		
Q8		.735			
Q7		.600			
Q18		.544			
Q16			.720		.355
Q15			.620		
Q4			-.608		.406
Q17			.538		
Q2				.780	
Q1				.771	
Q5					.769
Q14					.609

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Table 3: KMO-Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.590
Bartlett's Test of Sphericity	Approx. Chi-Square	208.783
	df	105
	Sig.	.000

5. DISCUSSION

Considering both descriptive statistics and inferential statistics, the factors and statements from the Likert Scale that correlate at the end of the study were as follows in order;

a. Factor 1 (Problems in implementing an EMS): Q1, Q2
b. Factor 2 (Motivations in implementing an EMS): Q6, Q7, Q8
c. Factor 3 (Impact of implementing an EMS): Q10, Q11, Q12
d. Factor 4 (Ways to implement an EMS): Q15, Q16

5.1 Problem in Implementing an EMS

Organizations cite problems such as lack of training and lack of resources as pitfalls in implementing or even considering in adopting an EMS into their organization. Both of these problems can be further postulated as financial constraints that an organization may face, due to the size of the organization. For instance, lack of training and resources can be attributed to an organization attempting to reduce their standard overhead expenditures [2]. He also further added that at times, cost implications may be dependent on how a government body aids an organization, either via government funds or a private certification body. It can be reasoned that organizations in Sabah lack this form of support from government bodies and are left to understand this standard on their own, while also considering, the little resources they have remaining.

5.2 Motivations in Implementing an EMS

Organizations cite their motivation of pursuing an EMS as reduction of environmental impacts due to organizational activities. These activities can be construed as detrimental to the environment, as such, requires a metric by which organizations can measure their levels of environmental impact. Using this metric, organizations can further plan to reduce their emissions, and at the same time, comply with governmental regulations regarding the environment. A recent research concluded in his study that risk minimization was anticipated as a benefit from EMS implementation in organizations, which also concurs with ISO 14001's Continual Improvement Survey, which found that significant values of environmental performance was the improvement experienced by organizations [17].

5.3 Ways to Implement an EMS

Organizations cite ways that they use to implement an EMS as follows; firstly, organizations agree that adoption or maintenance of an EMS is easier when top management takes active roles in helping staff and employees to understand future changes. A study stated in her study that organizations should, in fact, be proactive and provide detailed trainings for employees that play a key role within the organization, for influencing environmental impacts. This is in line with the understanding that such key employees often times bridge the divide between top management and low-level employees, and thus should take the role of conveying the wishes of top management to other employees, with regards to implementation. Secondly, organizations agree that maintaining an EMS will require yearly audits. This is also in line with the requirements stipulated within maintenance of an EMS, where organizations must be proactive in calling for independent audits, which helps them to repair key areas that require improvement [18]. A study further stated two improvements that occur within an EMS after an audit, namely, the ability of an audit to highlight non-compliance with existing regulations on the environment, and the reduction of non-compliance after several audits [19].

In conclusion, two out of three objectives were fulfilled, these objectives were problems and motivations in implementing an EMS, and ways to implement an EMS. The objective of finding the impacts of implementing an EMS cannot be sufficiently fulfilled, despite descriptive statistics providing evidence otherwise, due to lack of correlation between variables within the study instrument. Figure 2 provides a graphical overview of the data collected.

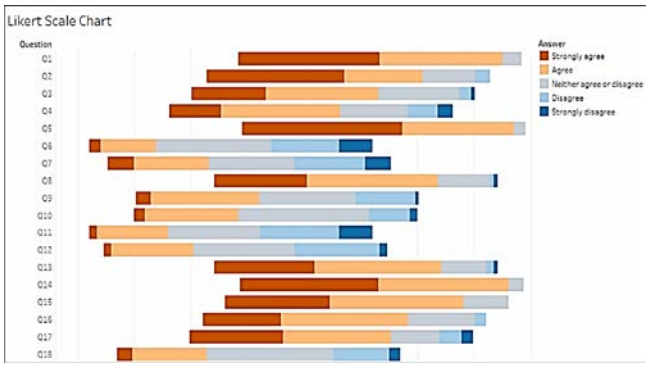


Figure 2: Stacked bar chart for frequency of responses in Likert Scale data

6. CONCLUSION

This study can be further used as a basis in finding correlations between independent variables such as size and type of organization, and dependant variables, which can be found in the study instrument used in this study. Additionally, appropriate hypothesis tests pertaining to the independent variables can be carried out, such as an ANOVA or a two-tailed t-test. Carrying hypothesis testing for two samples can be applicable to the industry in many ways, including comparison of different organization sizes, or comparison of industry type.

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