The Supply Chain Process of Environmental Information System in the Malaysian Manufacturing Industry

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***Abstract*— The purpose of this study is to examine the supply chain process of environmental information system and to develop the supply chain process of environmental information system in the Malaysian manufacturing industry. This study utilized the Statistical Package for Social Sciences Statistics software and Structural Equation Modelling to analyze statistical analysis. This study will used exploratory factor analysis and confirmatory factor analysis to identify the supply chain process of environmental information system and to develop the supply chain process of environmental information system in the Malaysian manufacturing industry. Data will be collected using a questionnaire survey from 2,700 manufacturing companies. Therefore, environmental information system can assist the organization to monitor, improve, and evaluate environmental management in the manufacturing industry.**

***Keywords*—** *Environmental information system, supply chain, technology, processes, manufacturing industry*

1. Introduction

The manufacturing industry is important and strategic industries in the Malaysian manufacturing sector. For this reason, organizations of the manufacturing sector needs to improve sustainability and ensure to increase the productivity [1, 2]. According to [3] a study conducted by Ministry of International Trade and Industry (MITI) is to analyze issues related to manufacturing ecosystem in Malaysia and also related to technology in the manufacturing industry. However, in a developing country like Malaysia, environmental sustainability is still at early stage in promoting environmental practices in the industry [4]. In addition, [5] supported that manufacturing firms has not received much attention about environmental management by researchers. Thus, manufacturing industry in Malaysia is chosen in this study in order to improve the environmental management and performance, particularly in the Malaysian manufacturing industry.

Malaysian manufacturing industry faces a gap in information systems related to the environment [6]. In this study, Environmental Information System (EIS) is one of the tools for improving environmental management in the Malaysian manufacturing industry. However, [7] stated that most companies lack providing EIS in managing environmental data collection for decision making. EIS can be used to improve environmental management for Malaysian manufacturing industry. Regarding to this, EIS is one of the current solutions that related to information system

for evaluating, monitoring, and planning in order to manage the environment and performance, particularly in the manufacturing industry [8]. Thus, EIS can integrate data and information systems to support of the environmental management and to improve performance in the Malaysian manufacturing industry.

2. Research Questions

There are two research questions to be addressed in this research:

1. What is the supply chain process of environmental information system in the Malaysian manufacturing industry?
2. How to develop the supply chain process of environmental information system in the Malaysian manufacturing industry?

3. Research Objectives

There are two research objectives:

1. To identify the supply chain process of environmental information system in the Malaysian manufacturing industry.
2. To develop the supply chain process of environmental information system in the Malaysian manufacturing industry.

4. Literature Review

The environmental information system (EIS) operates with a particular focus on materials and energy flow information and environmental cost information [9]. It can be generated through an organization's internal information system and cover all types of environmentally related management activities such as product and process design, cost control and allocation, product pricing, acquisition or modification of capital equipment, supply chain management, and performance evaluation. Thus, this study suggests that EIS is particularly useful for decision-makers in assessing the feasibility of technological and processes aimed at improving environmental performance and in assessing organizational environmental performance.

In this study, EIS dimensions focused on technology and processes for managing information system in the Malaysian manufacturing industry. As [10] mentioned that technology and processes support EIS in order to manage the environmental management activities within the organization. Thus, Malaysian manufacturing industry can adopt EIS dimensions for improving the environmental management and performance.

One of the EIS dimension in this study is the technology. Technology is used to assist organizations in providing quality information to the company. Technology interacts with the EIS and uses the information to improve performance [11, 12]. In order to develop an EIS, the technology information can help organizations to achieve their goals, particularly in the Malaysian manufacturing industry.

According to [13] stated that technology can be used in EIS to enhance information system in operations and decision making. It includes data collection, data processing, and database software related to the EIS. This is supported by [14] who mentioned that technology is important to improve the information systems for organizations. For example, the implementation of technology can assist organizations to reduce the environmental management issues in terms of waste, costs, and operations. Therefore, technology can assist the Malaysian manufacturing industry in enhancing EIS.

In this study, the second dimension of EIS involves processes. Processes consist of a sequence of activities carried out in the manufacturing industry. The processes provide benefits to the organization which are used for EIS such as activities, procedures, and systems [15]. Besides, processes are a set of activities which have more input to produce an output in the company's operations [16]. Processes can be used in EIS in order to increase process improvement, process management, and process development. As such, processes can be considered an important dimension for managing EIS in Malaysian manufacturing industry.

Therefore, processes support EIS in order to enhance the information system regarding the environmental issues in the organization. This is supported by [17] who mentioned that processes can be used to increase environmental improvement and to evaluate the production process. Hence, two dimensions of EIS which are technology and processes can be applied in the Malaysian manufacturing industry.

According to [18], EIS can be considered as a tool to improve the performance such as financial information, processes, and operations of the company. EIS includes the information technology in improving the environmental management [19]. The implementation of EIS is significant in order to improve environmental management and performance in the Malaysian manufacturing industry [20]. Study by [21] also supported that EIS had been utilized for environmental management such as to increase operational management, environmental improvement, environmental cost, and environmental protection. The implementation of EIS can improve the environmental management in the Malaysian manufacturing industry.

In the manufacturing industry, information system is important in managing the environment, especially for information technology. Therefore,

EIS can assist the organization to monitor, improve, and evaluate environmental management in the manufacturing industry. This study will help to develop the supply chain process of EIS in the Malaysian manufacturing industry.

5. Methodology

This study used a quantitative approach. As a quantitative study, questionnaires will distribute to the respondents. This study utilized the IBM Statistical Package for Social Sciences (SPSS) Statistics Version 22.0 software and Structural Equation Modelling (SEM) Version 22.0 to perform statistical analysis.

Factor analysis such as Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) will used to examine the constructs in this study. The main purpose of EFA is to determine the minimum number of factors required for reproducing the item correlation [22]. Firstly, to analyze the EFA output, the data can be checked whether suitable for conducting EFA by Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of sphericity. Secondly, EFA used the total variance explained to determine the variables [23]. Thirdly, rotated component matrix results are used to determine the number of variables that had high loadings on the factors. The rotated component matrix results were used to identify the items which correlated the highest to one factor and the lowest remaining factor. Meanwhile, CFA is conducted to examine the measurement model for quality and fit as well as construct validity.

The population in this study focused on the manufacturing industry. The population of Malaysian manufacturing sectors comprised 2,700 manufacturing [5]. Data will be collected using a questionnaire survey from 2,700 manufacturing companies selected from the [5]. The manufacturing sector includes automotive/machinery, electrical/electronics, plastics/rubber/metal, chemical/wood, and food/tobacco.

Therefore, this study will used EFA and CFA to identify the supply chain process of EIS and to develop the supply chain process of EIS in the Malaysian manufacturing industry.

5.1 A supply chain process of environmental information system (EIS)

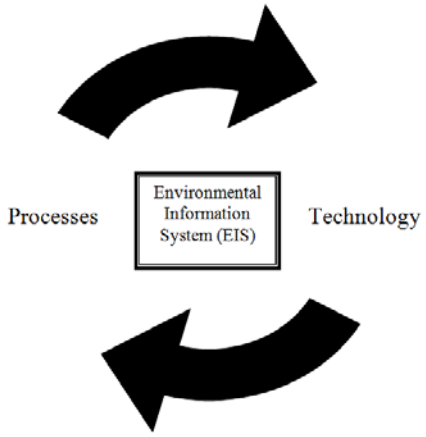

Figure 1. A supply chain process of environmental information system (EIS)

6. Conclusions

This research should prove helpful to decision makers as it identifies the supply chain process of EIS in the Malaysian manufacturing industry. This research may provide insights to guide future research to join manufacturing efforts with practical about EIS for the Malaysian manufacturing industry. This research also suggests that EIS is particularly useful for decision-makers in assessing the feasibility of technological and processes aimed at improving environmental performance.

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