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Research paper

Significance of Regulations in Driving Internal Environmental Management among Contractors for GSCM Application

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Abstract

This paper is aiming to study the significance of Regulations as driver in Internal Environment Management practice as part of GSCM practices. Accordingly, the objectives are to identify the drivers in driving Internal Environmental Management among Contractors for GSCM application and to analyse the significance of Regulations in comparison to other Drivers in driving Internal Environmental Management among Contractors for GSCM application. Quantitative research design approach is employed in this study. The independent variables in this study are the drivers of GSCM implementation in construction sector, while the dependent variable is the level of adoption of Internal Environmental Management for GSCM application in the construction sector. The result shows that Regulations driver is the significant factor for Internal Environmental Management practice. The research is significant in providing all relevant parties insights into the most significant driver in Internal Environmental Management, so that further improvement can be carried out for a successful GSCM application in Malaysia.

Keywords: Regulations, Driver, Internal Environmental Management, GSCM, Construction Industry.

1. Introduction

Environmental degradation is an undisputable fact due to growing human and industrial impacts. In recent decades, environmental issue becomes a foremost global concern, suchlike global warming and ozone depletion which emerge as major pollution issues. The environmental pollution issues are greatly caused by various construction activities.[1] It causes the reduction and exhaustion of non-renewable resources, devastation of landscapes as well as occurrence of safety and health problems to the human being.[2] According to United Nations Environmental programme (UNEP) in 2007, 30% of the global total greenhouse gases (GHG's) has been produced from the construction industry.[3]

About 23% of global construction activities are taken up by developing countries.[4] Malaysia as one of the developing countries, is experiencing rapid construction growth. Malaysia is targeted to become a 'high-income economy' by 2020 from current 'upper-middle-income economy'.[5] Unfortunately, statistics show that about 24% of CO2 from total CO2 emissions come from construction industry in the country.[6] Safaai et al. (2010) found that carbon dioxide (CO2) emissions of Malaysia in 2020 tend to amount to 285.73 million tonnes, which is 68.86% hike compared to year 2000.[7]

In 2015, Datuk Dr. Judin Abdul Karim, the chief executive of Construction Industry Development Board (CIDB) Malaysia, mentioned that "Sustainable Construction" is the game changer for construction industry under the Eleventh Malaysia Plan (11MP) 2016-2020 at Zofnass Programme Symposium at Harvard University in United State.[8]

Green Supply Chain Management (GSCM) is found to be an innovative strategic tool that can stimulate both environmental and financial performance at the same time.[9] Green Supply Chain Management (GSCM) is an advanced strategic tool that can promote environmental and financial performance simultaneously. Previous studies found that green supply chain management (GSCM) plays active roles in improving firm's economic, environmental as well as operational performances in various industries such as automotive, manufacturing, construction, electrical and electronic.[10-19]

GSCM is also known as "supply chain environmental management", "green purchasing and procurement", "green logistics and environmental logistics" and "Integrating environmental concerns into the inter-organizational practices of SCM including reverse logistics".[20] There are numerous definitions of GSCM and some of them are demonstrated as table below (Table 1).

Table 1: Definitions of GSCM from Different Authors

Author/s	Definitions of GSCM
Srivastava (2007) [9]	GSCM is the integration of environmental thinking into supply chain management which together with product design, material sourcing and selection, manufacturing process, final product delivery to the customers and also end-of-life management of the product after product's useful life. The author also underlined the importance of closing the loop with reverse logistics in the GSCM.
Zhu & Sarkis (2007) [17]	GSCM covers all phases of a product's life cycle from design, production and distribution phases to the use of products by the end users and its disposal at the end of product's life cycle.
Shi (2008) [21]	Green Supply Chain Management as "Environmentally Conscious Supply Chain Management" because new ideas are required in design utilisation, raw materials purchasing, manufacture organising, distributing and supplying, consuming, and recycling. Incorporation between department and even enterprises in the supply chain can optimise the whole supply chain system in both internal and external environment.

Hsu & Hu (2008) [22]	GSCM is an approach for improving performance of the processes and products according to the requirements of the environmental regulations.
Albino et al. (2009) [23]	GSCM is a strategic methodology addressed to extend environmental measures to the whole supply chain.

In a nutshell, with reviewing some definitions from previous literature, the definition and understanding of GSCM in construction sector is summarized as:

GSCM is an innovative strategy/concept that integrates environmental and social considerations with involving all parties in product (building) design stage, procurement, materials sourcing and selection, completion and handover to the ultimate users without overlooking the end-of-life management of the product in order to improve both short and long-term competitiveness and profitability of the organization.

As an environmental friendly approach, GSCM initiative can reduce material wastage, promote recycling and reuse [24-26], sale of scrap or used materials, decrease the energy consumption and lastly decrease the material usage. [27] With the several benefits of GSCM, GSCM application should not be compromised due to the supply chain efficiency of the firm.

The unsustainable construction activities and processes have caused various irretrievable effects to the environment, social as well as economics. Study found that construction industry is one of the major contributors of environmental pollutions. [1] The statistics from UNEP 2007 show that construction industry consumed 3 billion tonnes of raw materials, produced 10-40% of solid wastes and created 30% of global GHGs yearly. [28] Elbarkouky and Abdelazeem (2014) mentioned that construction industry is responsible to review the sustainability and the environmental performance of their projects. [29]

Sustainable construction emphasizes on the energy conservation, water preservation and natural resources protection by re-use, recycling, innovative design and waste and pollution deduction in order to meet the future demands without jeopardising the needs of our future generations. [30] Yet, firms in Malaysia are still in the learning stage of sustainable practices and gap is existing between awareness and adoption of green strategies.[31] Apart from that, Zulkefli, Zainudin and Azlan (2014) mentioned that the implementation level of GSCM in Malaysian construction sector remains at the development stage.[32] In a nutshell, a lot of challenges may be faced and suitable policy needs to be implemented in the form of an executive order by CEO, governor or public leader.

Zhu, Sarkis, Cordeiro and Lai (2008) have classified GSCM practices into five (5); green design, green purchasing, investment recovery, internal environmental management and cooperation with customers.[27] These practices of GSCM are referred from some literatures.[33-37]

2. Background of the research

Internal Environmental Management (IEM) practice, which is one of the practices of GSCM is focused in this research. While it is important for all GSCM practices to be applied for successful GSCM implementation, this research will be focusing on the drivers influencing the implementation of internal environmental management practice.

2.1 Internal Environmental Management

Darnall et al. (2008) pointed out that Internal Environmental Management (IEM) is an organized process that containing a set of environmental policies, internal policies, environmental impacts assessment, measureable environmental goals, action plans, responsibilities and checks through systematic auditing of these features.[38] It acts as one of the keys to improve the performance of the companies.[35]

Internal environmental management is a significant enabler for effective adoption of innovations, technologies, programs and activities.[39] Yet, full commitment of top management is needed in order to ensure complete environmental excellence.[40,41] According to Zhu and Sarkis (2007), internal environmental management able to develop environmental sustainability as organizational imperative strategic by the support and commitment from senior and mid-level managers. [17]

2.2 Drivers for GSCM Implementation

Four (4) drivers for GSCM implementation are described as below, which are market driver, regulations driver, competitiveness driver and internal factors driver.

2.2.1. Market Driver

Rao and Holt (2005) noted that government and market forces can promote the implementation of GSCM.[15] Customers are the backbone of any organizations as they can simply serve as an external pressure for the management practices of the firms. Carter and Jennings (2002) identified that customers pressure are about 43% of the external factors which influencing the integration of green activities into the supply chain practices and customer demands have a more positive impact on environmental management when investigating the role of purchasing in environmental management. [42]

2.2.2. Regulations Driver

Min and Galle (2001) discovered that regulatory laws force many buying companies involved in green purchasing in a reactive manner to prevent violations of regulatory laws.[43] Environmental legislations and regulations have been known

as drivers of the adoption of GSCM practices.[19] Yet, there are some firms are ahead on the regulatory curve in adopting green practices before required to do so by law and regulations. In an overview, regulations and legislations are necessary to make sure that firms adopt green practices which may reduce the profits of the firm. Hall (2001) claimed that legal environmental responsibilities are less concerned compared with stakeholder pressures in larger firms while suppliers are often face pressures from customers.[44]

Alvarez Gil, Berrone, Husillos, and Lado (2007) also said that government regulation is one of the major pressures in GSCM implementation.[45] Another research by Zhu, Sarkis and Geng (2005) also defined that government regulations as of the strongest drivers for environmental determinations of the firms.[46]

2.2.3. Competitiveness Driver

Chung and Wee (2008) found that commercial competitive pressures have caused organisations to implement internal eco-design initiatives.[47] Companies need to gain competitive advantage to become more aware of the customers' needs. Gonzalez-Benito and Gonzalez-Benito (2006) claimed that firms used to undertake policy of environmental purchasing not simply due to the reason that desire to 'Save the world', but because they want to gain competitive advantage and improve the financial performance.[48] Value of the organisation can be created with the integration of sustainability into the supply chain management. This value can create a sustainable competitive advantage for the firm with the collaboration of both social and environmental awareness.[49]

2.2.4. Internal Factors Driver

A research was carried out to examine the relationship between GSCM enablers and GSCM practices among the EMS ISO 14001

certified manufacturing firms that registered as members of the Federation of Malaysian Manufacturers (FMM).[50] Besides that, the relationship between GSCM practices and performances was also measured by Rahman et al. (2014).[50] The Malaysian manufacturers have experienced great external pressures like customer pressures, regulatory and marketing pressures in GSCM adoption. Simultaneously, management commitment and industry competition also caused the manufacturers to adopt GSCM practices. However, the adoption of external activities of GSCM are still at a moderate level with the absence of internal environmental initiatives.

Apart from that, policies of practices of the big companies are generally manipulated by the demands or needs of their stakeholders and investors.[51] Therefore, sustainability practices are positively interrelated to achieve high customer satisfaction as well as attain higher quality products.[52]

External stakeholders and environmental performance are vital factors that will affect the GSCM practices.[53,54] Subsequently, the performance of the supply chain will also greatly affected by the suppliers therefore process of green supplier selection is important to organizations' environmental performance.[55]

2.3. Significance of the Research

The aim of the research is to study the significance of Regulations in Internal Environmental Management practice. In particular, the objectives of this research are to identify the drivers in driving Internal Environmental Management among Contractors for GSCM application and to analyse the significance of Regulations in comparison to other Drivers in driving Internal Environmental Management among Contractors for GSCM application.

The significance of this research will enable us to understand the importance and significance of regulations in driving Internal

Environmental Management for GSCM application. It is vital in providing all relevant parties insights into the matter, with the intention of further improvement can be carried out for a successful GSCM application in the Malaysian construction industry.

3. Mehodology

Research methodology can describe the principles of methods which includes system methods, procedures, rules, techniques, tools and hypothesises in the scientific knowledge process.[56]

Quantitative research design approach is employed in this research with closed-ended questionnaire survey method. Quantitative approach is useful for theories testing by determining the relationship between the variables.[57] The rationale for quantitative strategy is used in this study is that, a relative large number of data can be collected in a shorter time when it is compared with qualitative approach.[57] In addition, quantitative approach can be engaged to observe and measure information as well as employ statistical procedures.

The population of the study is the construction companies which registered with the Construction Industry Development Board ("CIDB") and hold a G7 certificate of registration issued by CIDB and located in Penang, Wilayah Persekutuan and Johor. The reason that G7 class are selected is because those companies might have ideas about the current trends and demands in Malaysian construction industry as tendering sum exceed 10 million or more in the construction projects will involve a lot of parties such as sub-contractors and sub-suppliers either locally or internationally and advanced construction technologies and practices.

Table 2: Description of Variables and Items

Variable	Items Description
Internal Environmental Management	• Cross-functional cooperation for environmental improvements • Provide special training for employees and workers for environmental issues • Practise environmental compliance and auditing programmes • Adopt Total quality environmental management (TQEM) • Certified with ISO certification (eg. ISO 14001)
Market Driver	• Achieve economic benefits • Demand of green products from foreign customers • Establish company's green image locally and globally • Achieve first mover benefits and gain competitive advantage
Regulations Driver	• Central government's environmental regulations • Regional government's environmental regulations • Cost of pollution preventions • Government environmental rules and legislation • Standard quality certifications like ISO 14001 certification
Competitiveness Driver	• Competitors' green environmental protection strategy • Influence from professional environmental protection group • Maintain the competitive advantage from main competitor
Internal Factors Drivers	• Company's environmental vision and mission • Investors and stakeholders' pressure • Investors and stakeholders' pressure • Improve operational efficiency of the supply chain • Environmental issues are well communicated between the environmental function and other departments

The measurable variables are generally measured with instruments and the collected numerical data can be analysed by using statistical procedures. In this study, the measured variables are gender, age, working experience in construction field, education level, behaviours and attitudes of personnel in construction field such as project manager, engineer, quantity surveyor and etcetera.

Two types of variable are covered in this study, which are independent variable and dependent variable. Independent variables are the change variables which responsible for changing in a situation, condition or phenomenon.[58] Dependent variables are the outcome or effect variables which are the effects, impacts or results of an independent variables.[58] The independent variables in this study are the drivers of GSCM implementation in construction sector, while the dependent variable is the level of adoption of Internal Environmental Management for GSCM application in the construction industry. The variables and items of the questionnaire are displayed as Table 2.

4. Results and discussion

420 questionnaires were distributed through mail and email between 5th August and 20th December 2016. After the questionnaire distribution, the follow up process was made by phone calls and reminder emails. A total of 98 responses were received with different of completeness. Only 92 useable responses are used and loaded into SPSS software. The response rate for the questionnaire survey is found to be low, which is 21.8% (98 out of 450). This response rate is not unusual and tolerable as Dulami, Ling and Bajracharya (2003) stated that the norm response rate in the construction industry is around 20% to 30% for postal questionnaire.[59]

The data is analyzed with multiple linear regression analysis with IBM SPSS Statistics software, version 22.0. The outcome of the analysis is displayed as Table 3. Table 3 shows the Beta coefficients value (β) of four (4) adoption drivers as independent variables and Internal Environmental Management practice as dependent variable.

Table 3: Results of Coefficients for Adoption Drivers and Internal Environmental Management

Model		Standardized Coefficients Beta	t	Sig.
1	(Constant)		4.747	0.000
	Market	0.119	0.902	0.369
	Regulations	-0.225	-1.883	0.063*
	Competitiveness	0.004	0.035	0.972
	Internal Factors	-0.094	-0.850	0.398

* significant at 0.10 **significant at 0.05 ***significant at 0.01

In respect with Internal Environmental Management dependent variable, Regulations driver records a close-to-critical value (p=0.063), making regulations as the only significant driver to the Internal Environmental Management practice (significant at 0.10). The negative β-value (-0.225) of Regulations driver proposes that when reducing the Regulations driver, the adoption of Internal Environmental Management practice can be improved. For the Market driver, the β-value is 0.119 which is the second highest among the drivers. While the β-values of Internal Factors and Competitiveness drivers are much closer to zero (less than 0.10),

which are -0.094 and 0.004 respectively. In short, Regulations driver is the only driver that is significant to Internal Environmental Management.

For Internal Environmental Management practice, Regulations driver is the significant factor that can affect the green practice. The regulations like government influential policies play a vital role in adopting the GSCM initiatives.[60,61] Several studies and research found that the government regulation and legislation are the key drivers of GSCM implementation.[43-44, 62-64]

5. Conclusion

Commitment of government to sustainability is able to encourage a sustainable culture among clients as well as stakeholders. Malaysian government has put a lot of effort by making some regional and domestic laws and concepts. The research findings revealed that Regulations is very significant and plays a major role in the implementation of GSCM. Unfortunately, the adoption rate is still unsatisfactory, hence greater effort from government and businesses are needed in order to promote GSCM adoption. Further research in improving the Regulations as a driver for Internal Environmental Management practice, as part of GSCM practices.

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