FACTORS INFLUENCING THE INTENTION TO ADOPT GREEN SUPPLY CHAIN INITIATIVES IN MANUFACTURING FIRMS BASED ON THEORY OF PLANNED BEHAVIOR (TPB)

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ABSTRACT

Nowadays, manufacturing firms have exerted huge impacts toward the degradation of the environment. It's essential for the firms to implement green practices in order to conserve the mother nature. However, the intention of the firms to practice green supply chain initiatives (GSCI) remained ambiguous. Hence, this research was carried out to analyze the factors influencing the intention to adopt GSCI in manufacturing firms. Theory of Planned Behavior (TPB) model with three attributes, namely attitude (ATT), subjective norm (SN) and perceived behavioral control (PBC) was applied as a framework to predict the intention to adopt green purchasing (INTGP), eco-design (INTED) and reverse logistics (INTRL). The data was successfully collected from 50 respondents at Electronics & Electrical (E&E) manufacturing firms in Penang. Purchasing and Operation & Production manager's intention were treated as the proxy to ascertain the firm's behavioral intention. Data was analyzed by using the IBM Statistical Package for Social Science Software (SPSS 22). Multiple regressions were carried out for hypotheses testing. TPB attributes were able to explain 46.5% of variance in INTGP, 9.8% of variance in INTED and 23% of variance in INTRL. Consequently, PBC was the only significant predictor of INTGP and INTRL. The results provide practical implications for researcher, managers, as well as practitioners to implement strategies for behavioral intervention and designation of policy to influence firm's intention to practice GSCI.

ABSTRAK

Kebelakangan ini, kilang-kilang pembuatan di Malaysia telah menyebabkan banyak pencemaran terhadap alam sekitar. Oleh itu, firma pembuatan dikehendaki untuk melaksanakan inisiatif rantaian bekalan yang mesra alam yang dimulakan daripada proses pembelian bahan mentah oleh pembekal, proses pembuatan dan akhirnya sampai kepada akhir pengguna. Walaubagaimanapun, rancangan untuk melaksanakan inisiatif yang mesra dari kilang masih dalam keadaan yang tidak jelas. Oleh itu, kajian telah dijalankan untuk menyiasat faktor yang mempengaruhi kilang untuk melaksanakan inisiatif mesra alam. Terdapat tiga unsur yang boleh meramalkan kelakuan iaitu sikap, norma masyarakat, dan kawalan terhadap kelakuan. Maka, teori kelakuan terancang telah disesuaikan untuk menyiasat faktor yang meramalkan rancangan firma untuk membuat pembelian hijau, reka bentuk alam sekitar, dan logistik tersongsang. Koleksi data telah dikumpul daripada seramai 50 pengurus kilang di Penang. Data telah analisa dengan menggunakan IBM SPSS 22. Regresi telah dikaji untuk membuktikan hipotesis. Sebanyak 46.5% dapat diterangkan oleh teori melalui regresi terhadap rancangan untuk melaksanakan pembelian hijau, 9.8% boleh diramalkan oleh teori melalui regresi terhadap rancangan untuk membuat reka bentuk alam sekitar, an sebanyak 23% dapat diramalkan oleh teori melalui regresi terhadap rancangan untuk membuat logistik terbalik. Tetapi, hanya kawalan terhadap kelakuan dapat meramalkan rancangan untuk melaksanakan pembelian hijau dan logistik tersongsang dengan betul. Konklusinya, keputusan kajian ini dapat menghasilkan implikasi kepada penyelidikan, pengurus, dan pengamal untuk merancangkan strategi untuk mengubah tingkah laku dan mengubahsuai polisi untuk meningkatkan rancangan firma untuk membuat rantaian bekalan yang penting untuk alam sekitar.

TABLE OF CONTENTS

CHAPTER 1   INTRODUCTION

CHAPTER 2   LITERATURE REVIEW

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF FIGURES

LIST OF FIGURES (CONTINUED)

LIST OF ABBREVIATIONS

ATT	Attitude
ATTGP	Attitude Towards Green Purchasing
ATTED	Attitude Towards Eco-Design
ATTRL	Attitude Towards Reverse Logistics
ED	Eco-Design
GP	Green Purchasing
GSC	Green Supply Chain
GSCM	Green Supply Chain Management
GSCI	Green Supply Chain Initiatives
INTGP	Intention to Adopt Green Purchasing
INTED	Intention to Adopt Eco-Design
INTRL	Intention to Adopt Reverse Logistics
PBC	Perceived Behavioral Control
PBCGP	Perceived Behavioral Control Towards Green Purchasing
PBCED	Perceived Behavioral Control Towards Eco-Design
PBCRL	Perceived Behavioral Control Towards Reverse Logistics
RL	Reverse Logistics
SN	Subjective Norm
SNGP	Subjective Norm Towards Green Purchasing
SNED	Subjective Norm Towards Eco-Design
SNRL	Subjective Norm Towards Reverse Logistics
TPB	Theory of Planned Behavior

CHAPTER 1

INTRODUCTION

1.1   INTRODUCTION

Supply chain management (SCM) involves the combination and collocation of strategy arrangement and business development right through the supply chain in order to transfer the finished products to satisfy the needs of end users (Green et al., 2008).

Therefore, business mechanism should integrate and coordinate the marketing, manufacturing, purchasing, logistics, and information systems. Subsequently, Zelbst et al. (2010) stressed that for the strategic alignment in SCM, the elements of environmental sustainability with the effectiveness and responsiveness for customer oriented must be concerned.

Although some of the organizations have successfully improved their SCM practices, they are still neglecting the importance of the environmental issues such as pollution in terms of air, land and water, as well as global warming. Consequently, our healthy and natural environment has deteriorated due to the recent years of global and local environmental problems.

Beamon (1999) emphasized that business operations and activities such as sourcing, manufacturing and logistics are the leading factors that caused environmental problems. Hence, government, society and customer demand have exerted pressures towards organization to execute green supply chain management (GSCM) to sustain the environment as well as conforms to ISO 14001 or Environmental Management System (EMS) standards. Walker and Jones (2012) also mentioned that GSCM has emerged as

crucial topic which includes environmental protection and producing commodities throughout the supply chain.

According to Pagell and Wu (2009), GSCM is involved in the organization's innovation process. Innovation is beneficial and imperative for the firm to stay competitive edge (Lee et al., 2012).

GSCM can be referred as a new approach that incorporate "green thinking" with an ecology consciousness towards SCM which involves designation of product, sourcing and selection of materials, processes of manufacturing, distribution of the finished merchandise to the end user as well as obsolescence management of the goods after it decays (Zhu and Sarkis, 2004).

In other words, as Hervani et al. (2005) proposed, green supply chain is trying to minimize the resource consumption in terms of energy, products and materials as well as reduce the negative effects towards our mother nature, from the raw materials extraction until the ultimate usage and dumping of items.

Nowadays, environmental issues have become the main concerns of organizations and government in the world. Shukla et al. (2009) stressed that poorly regulated manufacturing activities caused those environmental issues like global warming, ozone layer depletion, pollution and waste in the world.

In addition, there's an assumption that our planet's population is going to increase from today's 6 billion to 8 billion in the year 2020. Therefore, in order to satisfy the increasing demand, more natural resources are needed to be exploited and used. Nevertheless, Huong (1999) expressed that land, water, and air pollution as well as the natural resource degradation will be caused by the booming demand of society and development of industry.

According to Hu and Hsu (2010), most of the manufacturing firms have to face the pressures from stakeholders, for example, the end customers that would prefer green products, and also the institution of environmental governance. Thus, organizations

need to seek for alternatives to reduce the adverse effect towards surrounding by offering green products.

New actions have been introduced in manufacturing, for instance, design for the environment, reverse logistics, product stewardship and product retrieval for recycling, reuse and remanufacture.. It is undeniable that industrial products are causing issues towards environment.

So, producers are responsible to act green and think green by considering the negative effects from beginning to end of life cycle. Gonzales et al. (2010) clarified that although these green initiatives are well established, but the developing countries still did not practice it.

Zhu and Liu (2010) stated that especially in Asia, besides the lack of actual green practices of the organization, the quantitative study about the green actions also inadequate. Holt and Ghobadian (2009) explained that green supply chain research needed to be adopted theoretically grounded with empirical frameworks.

Based on the journal published, there are different factors which are internal and external drivers that influenced manufacturing firms to go green through green supply chain efforts towards ecology conservation. As a consequence, this research apply the Theory of Planned Behavior (TPB) model to ascertain and analyze the factors influencing the intention to embrace green supply chain initiatives (GSCI) in manufacturing firms.

1.2   PROBLEM BACKGROUND

Currently, the major global issue highlights the natural environment problems. It is certain that environmental issues become more critical and deteriorated. According to the IPCC (2007), global warming, ozone depletion, species diversity, and degradation of natural resources have become apparent as widespread environmental issues. Nowadays, Anbumozhi and Kanada (2005) urged that eco-friendly merchandise are becoming more desirable by the society.

Nevertheless, global surrounding carrying capacity has its own limitation that we cannot obtain beyond of it. Therefore, it is imperative for us to know that there are limitation for the natural assets like mineral ores, fossil fuels, agricultural productivity and the self-purification capacity of our mother nature (WBCSD, 2006). Matos and Hall (2007) exposed that global surrounding carrying capacity overloaded are caused by unwise consumption of materials along with irresponsible acts towards surrounding.

By considering the problems of sustainable development in business operations, organizations need to take care of the environment while achieving their economic and environmental performances. Sustainable development can be declared as meeting the needs of the existing generation without compromising the strength of future generation to meet their own needs. Hence, industries would have to produce more environmentally sustainable products by practicing green supply chain.

However, Vachon (2003) found that the increasing alertness of environmental issues have caused the production operations, supply chain networks, and business practices of the manufacturing industries gained attention and questioned by important stakeholders.

The important stakeholders, for instance, a purchaser that select green products using eco-friendly materials and processes such as recycled paper; industrial and commercial customers who select suppliers based on environmental requirements; Global, government and society's attention towards the preservation of the environment. So, it is compulsory for them to adopt environmental practices that would satisfy with the stakeholder's requirements.

Apparently, the traditional green initiative like "end-of-pipe" solution suffered from many disadvantages. The firm only attempted to minimize its bad effects of the environment instead of taking proactive action to reduce the wastes or pollution. Moreover, the underperformed environmental standards of suppliers also affect the achievement and impression of the firm.

Recently, most organizations acknowledged the advantages offered by green technology. Ninlawan et al. (2011) stated that environmental regulations from customers in the United States, the European Union (EU), and Japan are highly concerned by manufacturers.

Therefore, many firms have extended their green supply chain actions with the intention to minimize waste and achieve environmental performance. These expanded duties involve upstream and downstream organizations.

Several studies (Guide et al., 2003, Jayaraman, 2006, Vachon and Klassen, 2006) show that the environmental initiatives like Eco-design, Green Supply Chain, Reverse Logistics, Product Stewardship, Design for the Environment, Design for Recyclability have been initiated in developing countries such as European, Australia and Japan.

In Malaysia, environmental issues have also been concerned by government and the society (Eltayeb et al., 2010). The manufacturing industry is one of the main contributors that cause adverse impacts for the environmental deterioration because many industries need to have productivity in order to respond to consumer demands and needs which resulting in contributing more emissions, pollutions and wastes towards the environment. For instance, the number of water pollution contributed by manufacturing industry have increased from 2007 to 2010 as stated as below in Table 1.1:

Table 1.1: Number of water pollution point sources produced by the manufacturing industry in year (2007- 2010)

Year	2007	2008	2009	2010
Number of water pollution point sources	8708	6830	9762	9069

Source: Department of Environment Annual Report (2010)

The Table 1.1 has shown that industry of manufacturing has brought disaster to the mother nature. Therefore, Rao (2006) emphasized that the concept of GSCM is

becoming more crucial to reduce the bad impact of the industrial process as well as keeping firms to stay competitive.

According to Department Of Statistics Malaysia (2014), the manufacturing sector sales value has increased from RM46.1 billion in 2013 to Rm53.5 billion in February 2014, with the increment of 16.1% (RM7.4 billion). Table 1.2 below shows the increase sales value of five main manufacturing industries which yields the percentage change from corresponding month of the preceding year.

Table 1.2: Sales value of manufacturing industries

Industries	Sales Value (RM million)		Increase	
	Feb 2013	Feb2014	(RM million)	%
Manufacture of diodes, transistors, and similar semiconductor devices	2719.4	5010.5	2291.1	84.3
Manufacture of consumer electronics	1622.7	2589.3	966.6	59.6
Manufacture of electrical capacitors and resistors	1509.1	2099.0	589.9	39.1
Manufacture of passenger cars	1481.1	1789.7	308.6	20.8
Manufacture of plastics in Primary forms	1051.6	1340.0	288.4	27.4

Source: Department of Statistics Malaysia (2014)

On the other hand, FMM (2013) stated that the Gross Domestic Product (GDP) from manufacturing yields RM178, 333 million in 2011, then reached RM194, 890 million in 2013 with the rose of 9.3 % (Rm16557 million).

Therefore, it is proven that the manufacturing industry is very imperative for the economic growth of Malaysia. On the contrary, manufacturing industry also causing adverse impact towards the environment. Hence, manufacturing firms need to engage in green supply chain initiatives (GSCI) to improve performances of environmental, economic, operational, and organizational as well as responding to customer demand of environmentally sustainable products.

1.3   PROBLEM STATEMENT

With the increasing pressures to sustain the environment, firms are assumed to formulate effective solutions to reduce the negative environmental effects caused by production and services. Exploitation of the materials and the rising awareness of ecological problems have fostered Malaysian Government to provide green incentives and enforce rules to cope with the problems.

The Malaysian Government encouraged and motivated organizations to offer solutions for combating environmental crisis by awarding two special awards: Prime Minister's Hibiscus Award and Malaysia's premier private sector environmental award (Kaur, 2011).

However, there're many organizations in Malaysia which still did not incorporate the green initiatives. The comparison made by Eltayeb and Zailani (2009) shown that Malaysian fully owned firms have weaker level participation of green initiatives than the foreign based companies. The reason could be the green supply chain is still something new in Malaysia, and perhaps the smaller firms like SME might suffer from the obstacles and hardship to practice it.

Although some researches have been carried out to investigate the drivers of green supply chain practices in Malaysia, the gap in body knowledge in GSCM in Malaysian context still needs to be filled and sharpened by doing a more constant study and research (Rusli et al., 2012). Therefore, in the context of green supply chain (GSC), it is imperative for this research to ascertain the factors influencing the intention to adopt GSCI in manufacturing firms.

1.4   RESEARCH OBJECTIVES

The goal of this research is to investigate the factors influencing the intention to adopt GSCI in manufacturing firms based on the TPB. There are three objectives have been constructed:

1. To examine the significant predictors of intention to adopt green purchasing (GP) in manufacturing firms.

2. To ascertain the significant predictors of intention to adopt eco-design (ED) in manufacturing firms.

3. To evaluate the significant predictors of intention to adopt reverse logistics (RL) in manufacturing firms.

1.5   RESEARCH QUESTIONS

There are three questions developed for this research, which are:

1. What are the significant predictors of intention to adopt GP in manufacturing firms?

2. What are the significant predictors of intention to adopt ED in manufacturing firms?

3. What are the significant predictors of intention to adopt RL in manufacturing firms?

1.6 RESEARCH SCOPE

This research focuses on the Electronics & Electrical (E&E) manufacturing companies located in Penang. The reason of choosing (E&E) manufacturing sector in Penang, because it represents the biggest sector in terms of employment and sales contribution towards Penang economy.

According to Penang Economic Outlook (2013), in 2001, the sector of manufacturing has recorded 49% of the gross domestic product (GDP) in Penang. On the other hand, Malaysian Investment Development Authority (MIDA) has stated that Penang has received RM12, 000 million for the approved manufacturing projects. In 2010, the largest investment yielded 60.6% for Electronics & Electrical (E&E) products (InvestPenang, 2014). Therefore, (E&E) manufacturing industry is significant in contributing to the country's economy.

However, in order to deal with the limitations and constraints with data collection, this research only focused on (E&E) firms in Penang. This research is a quantitative study that will apply the method of constructing and distributing questionnaires to operation & production manager and purchasing manager. Due to budget constraints, the questionnaires are mailed and e-mailed to the respondents in dealing with time constraints as well.

The scope of this research highlights the factors influencing the intention to adopt GSCI in manufacturing firms based on the Theory of Planned Behavior (TPB) attributes, which are attitude (ATT), subjective norm (SN) and perceived behavior control (PBC). Last but not least, TPB framework has served as a model to identify the significant predictors of intention to adopt GP, ED and RL.

1.7   SIGNIFICANCE OF STUDY

By investigating the factors influencing the intention to adopt green supply chain initiatives in Electronics & Electrical (E&E) manufacturing firms in Penang, this study can contribute to the important stakeholders like society, government, consumer and the country as well as filling the research gaps of GSCM in Malaysia.

The intention of the manufacturing firms to practice GSCI is significant towards conservation of mother earth in reducing the environmental impacts due to the manufacturing activities. Moreover, the application of the GSCI would help firms save cost, increase sales, market shares and having a better entrance to the market which would enhance the firm's economic performance. Furthermore, supply chain performance, operational performance, organizational performance and environmental performance also can be enhanced through these green initiatives.

Besides, by ascertaining the significant predictors of the intention to adopt the green supply chain initiatives based on TPB attributes, these predictors can provide a better benchmark for the government to review and restructure regulations and policies to encourage manufacturing firms in Malaysia to implement green supply chain initiatives.

However, we cannot fully understand the environmental management and organizational change without some understanding of the individuals who could influence the environmental management decisions such as adopting green supply chain initiatives. Therefore, by applying the useful model of TPB, it can provide better understanding of the complicated behavioral intention that lead towards individual decisions and actions that produce the beneficial environmental outcomes of organizations.

Thus, this research could help managers to transform and innovate their companies into profitable, economically and ecologically sustainable organizations by implementing green purchasing, eco-design and reverse logistics.

1.8   OPERATIONAL DEFINITION

1.8.1   Theory of Planned Behavior (TPB)

In TPB model, there are three antecedents of intention which are attitude, subjective norms and perceived behavioral control (Ajzen, 2012).

Attitude

Attitude belongs to the individual's desirable or undesirable evaluation of performing the behavior. In other words, attitude represents the behavioral belief that the performance of behavior is positively or negatively valued.

Subjective Norm

Subjective norm represents the perceived social pressure of the individual to do or not to do the action based on their thoughts on whether the influential people in their lives would require them to conduct the behavior.

Perceived Behavioral Control

Perceived behavioral control refers to people's perceptions of their ability to perform a given behavior under volitional control. This also represents the control beliefs and perceived power of a person to conduct the behavior.

Intention

Intention is an immediate determinant of behavior which indicates a person's readiness to enact the given behavior. Intention can be properly measured and obtained to provide the most definite prediction of behavior.

1.8.2 Green Supply Chain Management

Green Supply Chain Management (GSCM) is merging the green thinking into the SCM that involved designing of product, selection and sourcing of materials, process of manufacturing, the consignment of the commodity to the customer, and the obsolescence management of the product.

1.8.3 Green Supply Chain Initiatives

Eltayeb et al. (2011) mentioned the three main elements have been classified in the green supply chain initiatives (GSCI), namely as green purchasing, eco-design and reverse logistic.

Green Purchasing

Green purchasing is the action of purchasing with good environmental consciousness to make sure the items or materials attain the eco-friendly goals set by the firm.

Eco-Design

Eco-design also as known as environmental design or green design, which can be defined as the action taken during product development to target at reducing a commodity impacts during its complete life cycle from materials acquisition, to production, use, and until the final clearance.

Reverse Logistics

Reverse logistics is the action taken to collect the obsolescence item from end user and return it to the supplier in order to recycle, reuse, remanufacture, refurbish, repair, refill, or repackaging materials.