GREEN PURCHASING: AN EFFECTIVE INTEGRATED PROCESS OF SUPPLY CHAIN PERSPECTIVE

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ABSTRACT

Green purchasing has become a significant priority for organizations and related parties to ensure a sustainable environment and future. Organizations should practise green purchasing because it provides a lot of benefits to the internal part of organization and to the external environment. The objective of this research is to examine the significant effectiveness of green fundamentals of purchasing and supply management, purchasing administration and materials management in enhancing the integrated purchasing and supply management process (green purchasing). This research focuses on a company that practising best in green purchasing-Malaysia Trade and Transport Priority (MTT Priority). Questionnaires (20 questions) were distributed to the employees and interview was conducted with the CEO and GM in the company. Green fundamentals of purchasing and supply management, purchasing administration and materials management are the independent variables for the green purchasing. Theoretically, it contributes an insight study on how the independent variables will affect green purchasing and benefit the company. Practically, this research is applicable for organizations in various industries, especially those who are operating business, in making important decisions to improve sustainable operations. Based on this research, it is found that there is positive outcome to promote Green Purchasing in the business organizations.

Key words: *Green Purchasing, Green Fundamentals of Purchasing and Supply Management, Purchasing Administration, Materials Management*

INTRODUCTION

Green purchasing also known as Environmentally Preferable Purchasing (EPP) can be defined as the procurement of products and services which have a reduced consequent to the environment and on the health of human when compared with the way used by competitors ("Green Purchasing and the Supply Chain — Procurement Services", n.d.). It should be practiced by purchasers such as government, corporate, or institutional to influence their buying decision in future. Green purchasing is a cornerstone for companies to purchase in a sustainable way which will bring environmental impact by making buying decision. Other than that, economic soundness insures overall decision is sound from a life-cycle cost and corporate sustainability perspective. Social policy ensures the responsibility of corporate citizen for the human rights and welfare (Lamoureux, 2009). There is a connection between green consumption and environmentally responsible consumption where consumers will take note of the environment impact of purchasing or using green services (Joshi & Rahman, 2015). This research is worth to study by organization because to; 1) gain

brand image by applying green purchasing; 2) reduce costs such as operational costs and disposal costs; 3) satisfy customers by showing them the daily operations while also taking care of the environment; 4) increase shareholder value from customer retention to purchase products or services (Lamoureux, 2009).

STATEMENT OF THE PROBLEM

The application of green purchasing needs a huge number of investment and consume a lot of time. Min and Galle (2001) mentioned that an organization with limited financial resources may not be able to employ a green purchasing strategy, give training to employees and carry out environmental auditing. When the organization's environmental commitment is too over or extreme, it will eventually increase the expenditure on applying green strategy which will position the organization at an economic disadvantage when comparing to other companies that carry out less environmental responsibility. Fischer (2010) stated that lack of common standards where there is wide range of definition to green purchasing, the absence of broadly accepted to assess and implement standards. This will confuse and end up with arguments between parties.

RESEARCH OBJECTIVES

1. To examine the significant effectiveness of green fundamentals of purchasing and supply management to enhance the integrated purchasing and supply management process.
2. To examine the significant effectiveness of purchasing administration to enhance the integrated purchasing and supply management process.
3. To examine the significant effectiveness of materials management to enhance the integrated purchasing and supply management process.

LITERATURE REVIEW

Integrated Purchasing and Supply Management Process (Green Purchasing)

The purchased green products or services must have the ability to conserve the energy and water, reduce the waste generated, release the pollutants, or can be recycled to preserve the environment (Dubey, Bag, Ali & Venkatesh, 2013). To implement green purchasing, top management of organization must consider and realize their organization's social and environmental accountabilities but the social and environmental accountabilities are not solely responsibilities of the top management or any individual organization. A continuous evolution of methods in academic inquiry able to help the supply chains managers to endure critical challenges (Winter & Knemeyer, 2013). If each of every individual who are motivated to contribute to sustainable development and environmental protection, their behaviour to purchase something would be a sufficient beginning of buying green (Moser, 2015). When we want to purchase something, the first thing comes to our mind will be the price before the quality of the product. Although there are many potential situational constraints that affect the success of green purchasing, the most critical factor will be price.

Green Fundamentals of Purchasing and Supply Chain Management

There are a lot of main keys which are categorized under green fundamentals of purchasing and supply management. Electronic purchasing sometimes used interchangeably with e-procurement, though e-procurement is much narrower scope as a business-to-business (B2B) requisitioning, buyers will make orders and purchase goods and services via internet (Rouse, 2016). There are significant savings for businesses and organizations by shifting to e-procurement systems for all of the purchasing requirements, which is suggested by the commercial purchasing literature on electronic procurement (Benton, 2014). According to Dubey et al. (2013), one of the way to work out green purchasing is the collaboration between consumers and suppliers in supply chain to reduce the environmental impacts by changing the design and materials used to manufacture the products. By selecting and evaluating suppliers based on environmental criteria, there is a very large set of criteria should be considered such as green image, environmental performance, re-cycle, corporate and social responsibilities and others (Govindan, Rajendran, Sarkis & Murugesan, 2013). The ISO 14000 family of standards help organizations to practise and manage their environmental responsibilities. ISO 14001:2015 is related to the environmental management system and it provides a framework as a guideline for organizations to follow and set up an effective environmental management system ("ISO 14001 Environmental management", n.d.).

Purchasing Administration

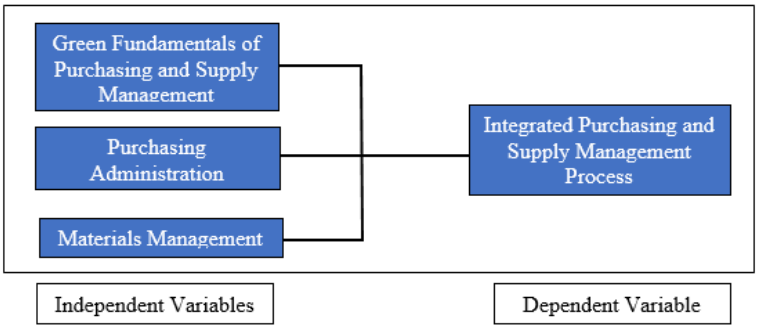
Purchasing administration includes a wide variety of activities such as establish business partnerships with the suppliers by negotiating and making a review for departmental purchase requests (Green, 2017). Purchasing and supply management function have to strive so that able to increase the cross-functional integration and take part in strategic decision making. Cross-functional integration is defined as the combination or collaboration of the purchasing and supply management function with other functions (Foerstl, Hartmann, Wynstra & Moser, 2013). To improve buyer development and performance, a buyer-supplier relationship should be developed at first. Organizations have to put more effort in leveraging suppliers' performance and capabilities through investment (Yegon, Kosgei, & Lagat, 2015). To provide professional training environmental awareness for employees to go green, first of all, employers themselves have to work with employees to show them as model (Parrish, n.d.).

Materials Management

According to Chitale and Gupta (2014), many organizations combined a few functions (purchasing, inventory control, warehouse and logistics) into two or three departments to provide good coordination among activities, enhance efficiency and reduce cost. Benton (2014) stated just-in-time (lean) purchasing is also a sub function to materials management. The key lean principles focus on the people, postponement, efficiency and also the elimination of waste. By purchasing materials or equipment which are energy efficient, an organization able to save a lot of costs from energy consumption. Moreover, some energy efficiency policies which made by government, products by organization, and practices of using energy efficient products are the efforts to reduce the greenhouse emissions and energy costs (Li & Carrión-Flores, 2017). Materials stewardship is an approach to product and materials management designed in order to improve the resource utilization efficiency and encouraging waste minimization (Adams, 2010).

Framework

The framework for this research is as follows: -



Hypotheses

The hypotheses for this research is as follows: -

H1: There is the significant effectiveness of green fundamentals of purchasing and supply management to enhance integrated purchasing and supply management process.

H2: There is the significant effectiveness of purchasing administration to enhance integrated purchasing and supply management process.

H3: There is the significant effectiveness of materials management to enhance integrated purchasing and supply management process.

RESEARCH METHODOLOGY

Research Design

Research design is a set of methods and processes used for collecting and analysing data that is needed for the research purpose. There are two main categories for the methods of collecting data, which are qualitative and quantitative. In this research, both qualitative research and quantitative research will be used. Qualitative research is a primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions and motivations. In this research, interviews will be conducted with the top management of Malaysia Trade & Transport Priority (MTT Priority). The interview session will be conducted based on prepared questions regarding application of green purchasing in the organization. Quantitative research study is to identify the relationship between independent variables and dependent variables within population. In this research, quantitative research will be conducted by distributing questionnaires to a targeted population of 50 employees in MTT Priority. This research design is used to measure the opinion regarding application of green purchasing among the employees in the organization.

Data Collection and Analysis

Primary data and secondary data are the types of data can be collected in research. Print-out questionnaires survey were distributed to the employees at MTT Priority. Also, interview was conducted with the top management. Data analysis and summary for quantitative approach were done by using Statistical Package for Social Science (SPSS) version 24 due to its flexibility and capability on handling data and data manipulation utilities. While there will be transcripts generated from interview session for qualitative approach to collect the opinion and suggestions of respondents.

FINDINGS AND ANALYSES

Quantitative Analysis

Correlation analysis is conducted to examine the relationship between the independents variables and the dependent variable. The researcher used the Pearson's Coefficient as the tool to conduct the correlation analysis.

Table 1.1: Correlation between Green fundamentals of Purchasing and Supply Management (IV1) and Integrated Purchasing and Supply Management Process (Green Purchasing) (DV)

		IV1	DV
IV1	Pearson Correlation	1	.808**
	Sig. (2-tailed)		.000
	N	30	30
DV	Pearson Correlation	.808**	1
	Sig. (2-tailed)	.000	
	N	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1.2: Correlation between Purchasing Administration (IV2) and Integrated Purchasing and Supply Management Process (Green Purchasing) (DV)

		IV2	DV
IV2	Pearson Correlation	1	.620**
	Sig. (2-tailed)		.000
	N	30	30
DV	Pearson Correlation	.620**	1
	Sig. (2-tailed)	.000	
	N	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1.3: Correlation between Materials Management (IV3) and Integrated Purchasing and Supply Management Process (Green Purchasing) (DV)

		IV3	DV
IV3	Pearson Correlation	1	.444*
	Sig. (2-tailed)		.014
	N	30	30
DV	Pearson Correlation	.444*	1
	Sig. (2-tailed)	.014	
	N	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

The above Table 1.1, 1.2 and 1.3 shows the results of Correlation Analysis. Green Fundamentals of Purchasing and Supply Management (IV1) indicates that there is a significant relationship with Integrated Purchasing and Supply Management Process (DV). The correlation coefficient is 0.808** and this show a strong relationship between IV1 and DV because the value of coefficient is more than >0.5. For the Purchasing Administration (IV2), it also indicates a significant relationship with the Integrated Purchasing and Supply Management Process (DV). The correlation coefficient is 0.620** which proves that the positive relationship is strong because the value is more than >0.5. There is a positive relationship between Materials Management (IV3) and Integrated Purchasing and Supply Management Process (DV). The correlation coefficient is 0.444** which indicates the relationship is moderate due to the value of coefficient is in between 0.30 to 0.49.

Table 1.4: ANOVA Analysis of Green Purchasing (DV) with Green Fundamentals of Purchasing and Supply Management (IV1)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.095	1	4.095	52.491	.000[b]
	Residual	2.184	28	.078		
	Total	6.279	29			

a. Dependent Variable: DV
b. Predictors: (Constant), IV1

Table 1.5: ANOVA Analysis of Green Purchasing (DV) with Purchasing Administration (IV2)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.416	1	2.416	17.515	.000[b]
	Residual	3.863	28	.138		
	Total	6.279	29			

a. Dependent Variable: DV
b. Predictors: (Constant), IV2

Table 1.6: ANOVA Analysis of Green Purchasing (DV) with Materials Management (IV3)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.236	1	1.236	6.864	.014[b]
	Residual	5.043	28	.180		
	Total	6.279	29			

a. Dependent Variable: DV
b. Predictors: (Constant), IV3

The researcher has also conducted ANOVA Analysis to prove that the hypotheses of this research are significant and supported. The Table 1.4 above shows an ANOVA Analysis which the probability value for the statistics is less than <0.05 ($p < 0.001$). Thus, we can conclude that the hypothesis about the Green Fundamentals of Purchasing and Supply Management (IV1) is supported. For Table 1.5, it indicates the probability value for the statistics which is also less than <0.05 ($p < 0.001$). Therefore, we can conclude that the hypothesis about the Purchasing Administration (IV2) is supported. The Table 1.6 shows the probability value for the statistics which is less than <0.05 ($p = 0.014$). Hence, we can conclude that the hypothesis for the Materials Managements (IV3) is supported.

Table 1.7: Hypotheses Testing for IV1

Hypotheses	Result
$H1_0$: There is no significant effectiveness of green fundamentals of purchasing and supply management to enhance integrated purchasing and supply management process.	REJECTED
H1: There is the significant effectiveness of green fundamentals of purchasing and supply management to enhance integrated purchasing and supply management process.	SUPPORTED

Table 1.8: Hypotheses Testing for IV2

Hypotheses	Result
$H2_0$: There is no significant effectiveness of purchasing administration to enhance integrated purchasing and supply management process.	REJECTED
H2: There is the significant effectiveness of purchasing administration to enhance integrated purchasing and supply management process.	SUPPORTED

Table 1.9: Hypotheses Testing for IV3

Hypotheses	Result
$H3_0$: There is no significant effectiveness of materials management to enhance integrated purchasing and supply management process.	REJECTED
H3: There is significant effectiveness of materials management to enhance integrated purchasing and supply management process.	SUPPORTED

Table 1.10: Coefficients Analysis of Green Purchasing (DV) with Green Fundamentals of Purchasing and Supply Management (IV1)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.505	.185		2.731	.011
	IV1	.695	.096	.808	7.245	.000

a. Dependent Variable: DV

The researcher also conducted a Coefficient Analysis is to show the significance relationship and determine the relationship between the dependent variable and independent variables. The regression results about the Green Fundamentals of Purchasing and Supply Management (IV1) and with the Green Purchasing (DV) shows that there are significance relationships. As a result, the estimated regression equation for the Green Fundamentals of Purchasing and Supply Management (IV1) can be written as: -

Green Purchasing (DV) = 0.695 (IV1) + 0.505

Table 1.11: Coefficients Analysis of Green Purchasing (DV) with Purchasing Administration (IV2)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.638	.284		2.243	.033
	IV2	.583	.139	.620	4.185	.000

a. Dependent Variable: DV

The regression results about the Purchasing Administration (IV2) and with the Green Purchasing (DV) shows that there are significance relationships between the Green Purchasing (DV) and Purchasing Administration (IV2). As a result, the estimated regression equation for the Purchasing Administration (IV2) can be written as: -

Green Purchasing (DV) = 0.583 (IV2) + 0.638

Table 1.12: Coefficients Analysis of Green Purchasing (DV) with Materials Management (IV3)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.012	.308		3.287	.003
	IV3	.435	.166	.444	2.620	.014

a. Dependent Variable: DV

The regression results about the Materials Management (IV3) and with the Green Purchasing (DV) shows that there are significance relationships between the Green Purchasing (DV) and Materials Management (IV3). As a result, the estimated regression equation for the Materials Management (IV3) can be written as: -

$$\text{Green purchasing} = 0.435\ (\text{IV3}) + 1.012$$

Qualitative Analysis

The researcher had conducted an interview at MTT Priority and found out that the company is actively applying green purchasing concept in their business. The company senior management staff mentioned, there are many organizations in Malaysia commercially not interested in green purchasing. He added that some companies might come out with campaigns to encourage green purchasing or green purchasing related campaigns, but the key word to use is encouragement. A campaign is commended a few years ago in MTT Priority because the organization always want to go with the new trend. 200 employees are encouraged to bring in recyclable products from house and sell in a coordinated way every week. Points will be collected for participation and can be exchanged it with money. From this campaign, MTT encourages self-usage and paper usage reduction, digitization, software and programming to replace manual processes. MTT is also applying e-purchasing by setting up its own e-purchasing system which is called Purchasing Order (PO) management system. Just-in-time (lean) purchasing is good for inventory optimization and minimization of inventory cost. Research on supplier market is also carried out though the result is disappointed. To control the quality of materials handling or equipment, they came out with a plan to change diesel based forklifts to electric forklifts to ensure cleanliness. There is also products and appliances with Energy Star such as lightings installed in the warehouse. Overall, in terms of digitizing certain business processes would create efficiency in the processes in MTT. Hence, that will able to save the environment by paper saving and it also makes the process more efficient.

DISCUSSION AND CONCLUSION

Green purchasing is a fresh topic that has potential value especially for organizations to improve the performance and at the same time carry the responsibility by sustaining the environment. From the theoretical implications, this study contributes by providing insights on the key factors that influencing the implementation of green purchasing. This research has contributed from viewpoint of integrated purchasing and supply management process by Benton (2014). In conclusion, this research project is done to identify the key factors that affect the implementation of green purchasing. The model used is to show a better view on implementation of green purchasing in Malaysia by applying the various variables. This research manages to

provide future researchers a basic understanding or foundation which will be precious for any organization and government to enhance the effectiveness of green purchasing.

LIMITATIONS OF THE STUDY

There were some unavoidable limitations that faced by researcher though this research is conducted carefully. The primary limitation of this research is the lack of prior studies regarding green purchasing especially in Malaysia. There is only encouragement for companies to go green but there is never been a must or necessary to do so. Thus, this result in there is not much information that can be collected regarding green purchasing. The data collection of this research was limited to a small sample group of employees from MTT Priority. As the data collection process was going to start, the researcher had asked from permission to distribute the questionnaire to the employees. Unfortunately, due to the period was a quite busy time, most of the employees are unable to spare some time for filling the questionnaires.

RECOMMENDATIONS FOR FUTURE RESEARCH

There are other independent variables which are also related to this topic, yet only three out of five variables were chosen in this research due to the appropriateness and significant effectiveness. Price is also an important factor that need to be considered when relating to green initiatives. The next plan that MTT is going to apply green with is the truck, which is named as "green truck". There is no any electric truck currently in the market, but there is supplier who promoted an installation of certain type of components which can reduce the carbon monoxide. This involves the installation of certain components inside the engine of the truck to make it cleaner. Besides, there is also a green paper project which was also done by collaborating with USM to promote a green environment.

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