

# Impact of Reverse Logistics in the Malaysian Electrical and Electronics Industry

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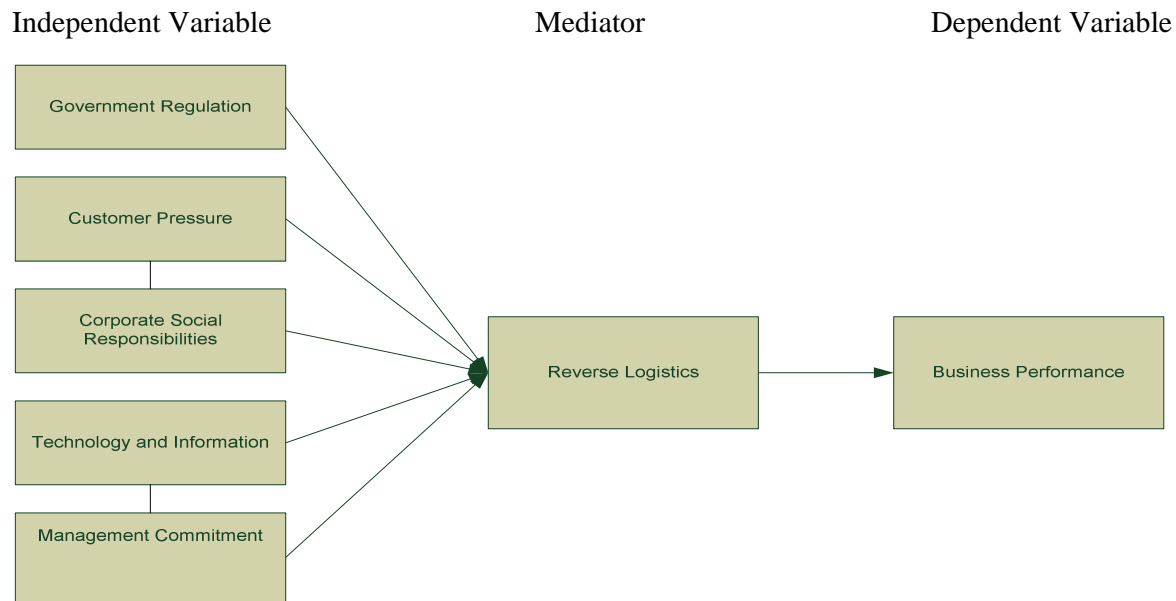
**Abstract** - In Malaysia, Electrical and Electronic industry plays a leading role in the manufacturing sector by contributing 26.94% of manufacturing output, 48.7% of export and 32.5% of employments [33]. There are approximately 1,900 companies active in this industry spread across a diverse range of sub-sectors such as consumer electronics, electronic components, industrial electronics and electrical product. The rapid expansion of E&E industry and the rapid continuous innovation of state of art technology accelerated the E&E product to be outdated at a short leading to significant increase in e-waste which consists of materials that are no longer usable which come from a range of electronics, from computers to household appliances to cell-phones [28]. However, the current RL in Malaysian E&E is still low and not able to help in the reduction of all this e-waste. By adopting RL, e-waste can be dispose in a proper way or being reuse.

**Keywords** — Reverse Logistics, *Electrical & Electronics, Logistics complexity, Business performance-Waste*

## 1. Introduction

E&E industry is a fast-changing industry which the customer's demand is very volatile. Hence, the product life cycle of the electronic product is shortened which caused product to become obsolete in a short time [51]. Shortened product life cycle caused the amount of e-waste in Malaysia to increasing by an average of 14% annually, and by the year of 2020, there will be 1.17 billion units or 21.38 million tons of e-waste generated [15]. As environmental issue had become the concern of Malaysian government and public, ISO 14000, 14001 EMS had been introduced in Malaysia since 1996. Recently, Ministry of Energy, Green Technology and Water (KeTTha) begin to support the product for

sustainable resource consumption [30]. However, manufacturers in Malaysia are not proactive in product take back and reprocessing activities as according to Nik Abdullah [37] research show that the adoption of RL by Malaysian manufacturer is still low. This will be a challenge for them to go global as in foreign country as reverse logistic is widely adopted by the manufacturing firm at there. For example Europe, had introduced Waste Electrical and Electronic Equipment Directive which assign full responsibility for the manufacturer to recycle house hold equipment [30]. Customer is becoming more and more demanding nowadays. Recently, with the growing of green consumerism, customer is starting to demand for green product and they are willing to spend more on this type of green product. Furthermore, customer also places more pressure on firms to improve their reverse logistic activities. For example, in European E&E market, customer cycle time is being introduced as the indicator of their efficiency indicator of reverse logistic, and the customer at there is applying ongoing pressure to those companies there to keep the CCT as short as possible [47]. In another word, a best price with completely flexible and hassle-free return policy is wanted by the customer [4]. However, the demand of customer is still did not being fulfil well. The return system is still not being paid attention by most of the company. The problem stated is occurred at the certain part of the supply chain showed by figure 1 above. At part I, where the product is return from customer to the distribution, this is the part where the distribution channel such as retail/service/centre facing growing demand of customer. At this part, customer would need an effective return system which allowed back to get back their product at the shortest time. Meanwhile for part II, this is the part where e-waste issue takes in. As PLC shortens, the E&E product become obsolete at a fast rate and leads to the e-waste issue which cause severe environmental issue.



**Figure 1.** Research Framework

## 2. Research Objectives

Research objective is a statement of research purpose which the researcher wants to investigate to identify the factor affecting the reverse logistic adoption in Malaysian E&E industry and to examine antecedent to generate business performances from RL implementation

## 3. Significance of Study

The results of this research will provide some insights and information to serve as a future reference for researchers on reverse logistic in Malaysian E&E. Importantly this research will sort out the driver/barrier behind the adoption of RL in this industry which will be useful for those companies as the government nowadays is becoming concerning about the environmental issues which caused by this industry. Moreover, this research will be helpful to all the RL practitioners and non-practitioners by pointing out the aspect which should be paid attention during the adoption/improvement process of RL in company's operations. This research can serve as a basic in the study on the RL in Malaysian Industries especially the E&E industry. This study will contribute to help the company to identify the barrier/driver in adopting RL. Consequently, by adoption/improvement in RL, there

will be a great improvement in the company's overall performance.

## 4. Literature Review

### 4.1.1 Reverse Logistics (RL)

The APICS Dictionary defines RL as a complete supply chain dedicated to the reverse flow of products and materials for returns, repair, remanufacture, and/or recycling [3]. The Reverse Logistics Association defines RL as all activity associated with a product/service after the point of sale, with the goal to optimize or make more efficient aftermarket activity, thus cutting down the costs and environmental resources [52]. According to Gailen Vick, President of the Reverse Logistics Association, "In other words, anytime money is taken from a company's Warranty Reserve or Service Logistics budget that is a Reverse Logistics operation" In Malaysian Study, RL is defined as responsible product disposition on used product and packaging which are collected from customer and/or reversed back to supplier [17]. Furthermore, RL encompasses the traditional logistics activities of transportation and inventory management, but its focus is to get product back from customer rather than moving product to customers [20][35]. Lastly, a true RL process involving [57]:

2.1.3 Options of Action in the Reversed Flow

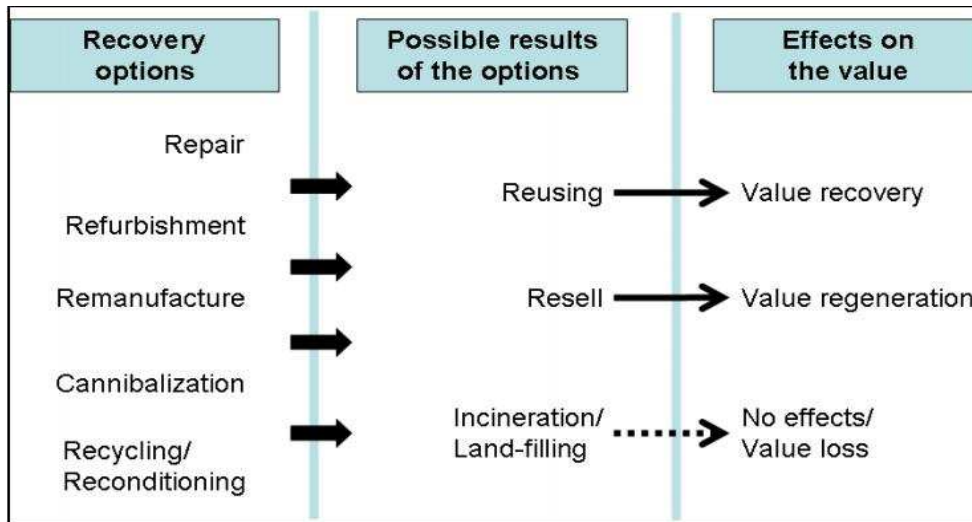


Figure 4.1.3 Options for Recovery and Implications for the Value Return obtained from: (A. Gandolfo, 2008)

Per [20], there are 5 options of action in the reversed flows which are:

**Repair** or in another word return to its original state by replacing broken or worn parts.

**Refurbishing** or restoration after careful verification which involve replacement of some of its parts and modules, including upgrading and the key components to the latest version.

**Remanufacture** which involves the test of functionality of all

modules and also update to the latest version.

**Cannibalizations** that involve disassemble of product.

**Recycling/ reconditioning** recycling the materials that makes up the item

However, another model of product recovery option was proposed by Skinner (2008) is having a slightly different with the one proposed by [20]

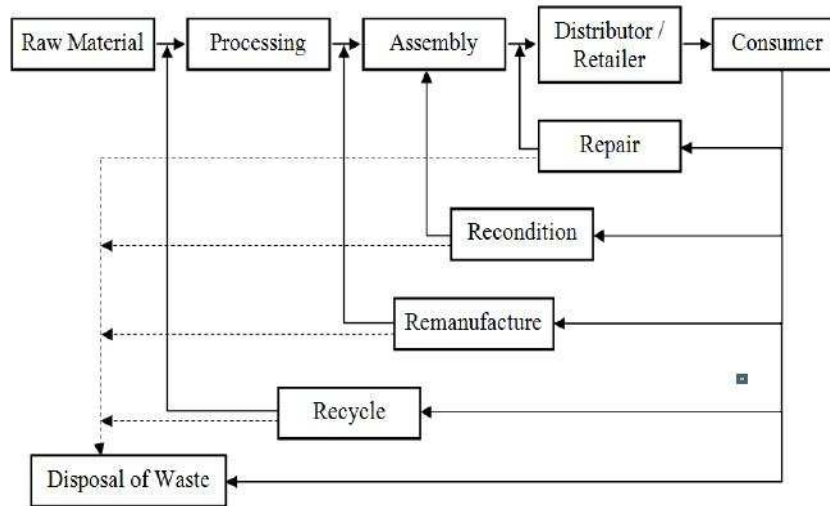


Figure 2.1.3.1 Product Disposition Options in Closed Loop Supply Chain Process obtained from (Khor & Zulkifli, 2012; King, 2006; Thierry, 1995)

The main differences between the 2 models proposed are, [20] does not include the disposal of waste because at the end, non-recoverable products are disposed of without any further process of value recovery, by means of incineration or landfill [20]. Besides that, recycling and recondition also being group together by A. Gandolfo whereas the model proposed above separated both of them to become an individual action.

#### 4.1.2 Government Regulation

Ref. [33] states that RL has received increasing attention since the past couple of years due to strict environmental standards and the growing environmental awareness, and because of the awakening to the economic attractiveness of reusing products instead of discarding them. [10] believe that the most effective way to the products return to the revaluation is through laws and regulation. They state that there are high rates of recycling in Germany due to the existence of laws which make the manufacturer responsible for the disposal of their waste. [30] claims that the European Union had makes the collection and recycling of waste to be mandatory. This is proven during January 2007 when WEEE Divertive was introduced to require the manufacturers to comply with this scheme in order to trade in Europe [60]. Most firms that are practicing environmental -friendly programs are complying only because they are trying to prevent themselves from violating environmental-related regulations [38]. In Malaysia, Ministry of Energy, Green and Technology (KeTHA) was established during 9th April 2009 to strengthen the green management program in Malaysia [69]. Other than that, [69] said that, National Green Technology Policy (NGTP) was formulated to provide guidance and opportunities for Malaysian business and industries. As more and more environmental regulation being introduced in Malaysia, Malaysian E&E industry have to innovate their operation in order to adapt with regulatory requirement and this will have great influence on the reverse logistics of the E&E firm .

#### 4.1.3 Customer Pressure

Since the past couple of decades, RL is continuing to grow in importance. As the world modernizes, the value placed on being environmentally aware raises and customers looking forward that the products they purchase and return are not significantly impacting the environment [26]. Per [30], due to the importance of environmental issues, people are more interested in sustainable production process, which refers mainly to the recycling of produced waste. Companies that act ethically and environmental friendly with society are better valued by consumers, employees, and suppliers [56]. Customers with high level of environmental awareness will more preferably choosing the product from company which had labelled green, additional revenue which inherently cutting down cost of goods [30]. Besides that, efficient after-sales service will boost the customers' satisfaction [62]. From the review above, it shows that effective and efficient return strategy as after sale service will enable the company to retain their customers. At the same time, it

also provides additional revenue source to the company as E&E company able to carry out the action within the reverse flow to make the best use of those return product.

#### 4.1.4 Corporate Social Responsibilities

Corporate Social Responsibility of an organization has been rapidly gaining concern from the society as the business environment now tend evolve with a socially responsible manner. According to Signitzer and Prexel, CSR is an "umbrella term" represents various concepts reflecting the role of businesses in the society [64]. Under CSR, there are many terms that can be labelled as the synonym of it, for example corporate or business governance, corporate citizenship, corporate accountability business ethics, sustainability or sustainable development, corporate environmental management, business and society, stakeholder management, corporate philanthropy, triple-bottom line, community development or social performance [37] Businesses are required to be socially responsible for meeting legal, ethical and economic responsibilities placed on them by shareholder with the purpose to improve the living standard and quality of life in the communities, and at the same time preserving profitability for the sake of stakeholders [38]. This phenomenon can be clearly seen at Europe Country where WEEE Directive which as being introduced in January 2007. Under this regulation, the manufacturers have to bear the responsibility to manage the returned product/ e-waste under their company's brand. In addition, the investors of the organization are becoming more concern about the environmental impact that created by the firms. They will tend to boycott or punish those firms if they found out there is any negative aspects of the firm's CSR [26]. Hence, CSR will bring a positive influence to the RL adoption by the firms since every parties in the society are tend to be more alert to the environmental impact that created by the firms. According to Cater (2004) and [19] as CSR is gaining more and more attention, it will drives the organization to offer more intensive return policy which will then increase the significance of returns disposition. In order for the firms to maintain their goodwill in the market and to be acknowledges by the shareholder as a worthwhile investment, its CSR activities will need to have the ability to stimulate customer's active support. Yet, some of the firms will only embrace the CSR as it yields concrete business benefits compare to the resources and time invested by the management [27].

#### 4.1.5 Technology and Information System Capabilities

According [26] to information system and technology can be differentiator in logistics performance. An efficient information and technological system is crucial in supporting the RL during different stages of the product life cycle [59]. In addition, information support is being recognized to create linkages for company to attain effective RL operations [14]. [63] also said that, efficient information systems are required for individually tracking and tracing the returns of the product,

corresponding with the pervious sales. Past research that conducted by [11] proven that information technology capabilities will significant influence on the logistic competence. Information technology permits greater vertical coordination throughout the whole RL process, internal and external to the firm [25]. This is proven from the facts that information is normally being perceived as a vital input to the design of a RL system as well as an antecedent to achieving efficient and effective RL operations [24]. By providing and prompting in accurate information to the information technology system, it will enhance the visibility of the return product that will be receive by the logistic manager and therefore the process of product receipt and return can be carried out efficiently [66]. However, only a few organizations have successfully implemented information system support in their return process and the allocated resources to the system is limited [28][55]. From past few decades, many SCM system such as electronic data interchange (EDI) system or enterprise resource planning (ERP) system, customer relationship management (CRM) and warehouse management system (WMS) is being used by firm to improve their logistics performance. Yet, all these system is not reliable enough to handle the return products effectively as they provided limited RL capabilities [40]. One of the most significance feeble of these systems is they are lacking in end-to-end capabilities in some of the areas such as return forecasting, customer return collaboration.

#### 4.1.6 Managerial Commitment

Generally, management support and commitment is an essential element in the process of adoption and implementation of innovation in an organization practices, especially the environmental managements system [13], as top management support can influence the success of new system initiative by promoting employee commitment and cultural shift through effort such as providing training, incentives and encourage teamwork in the organization [12][49]. According to [25], supportive management in term of strategic focus, resource commitment and continuous improvement or innovation of a company is a crucial influential factor for managing the reverse logistic activities in every organization. Management support is essential to ensure the progress for sustainability programs in the business practices, for

example, voluntary take back and recover operations, eco-design /green innovation/logistics innovation development. In order for an organization to succeed, proper education and training of the employees are one of the crucial elements. According to [26], there is a need to gain firm and clear cut understanding about the RL construct, performance measures and the needs of the necessary levels of resource commitments which required the logistics manager and top management within an organization. A lack of capabilities and resources, low number of specialist staff and inadequate technical knowledge and skills of the personnel will make the implementation of RL practices to become harder [22][44] as the company personnel do not have enough knowledge to manage all the procedure of the RL and furthermore the do not have the capability to manage all those return product in a systematic manner. Furthermore, RL is a cross functional program that require high level of top management commitment and support. Many researchers have proven that support/commitment from an organization's top managements is a critical factor for the implementation of RL [50].

The dependent variable in this research is business performance which included the reduction of cost, better company image, and customer satisfaction. The benefit of RL is tangible, and many firm had becoming more and more aware that being green means more cost effective [42]. According to the research done by [7] RL will lead to reduction of final disposal cost and creation of indirect benefits to the company such as green image, competitiveness and other strategic. Reduction cost in another word means that it increase the profit of a company and help it to achieve higher market share in the industry. Besides that, RL can also promote a firm's environmental image and opening opportunities in retaining customer from primary market [30]. The image of the company will greatly affect its performance as it is related with the brand recognition of a company. Furthermore, similarly to forward logistics, proper RL management will help the firm to boasts up their competitive advantages. Some of the manufacturers had already implemented RL, and this had benefit them through cost reduction and at the same time receive a financial return on the process through the sale of refurbished goods, and most important capitalizing on their "green" credential in marketing terms [37].

The Five Forces That Shape Industry Competition

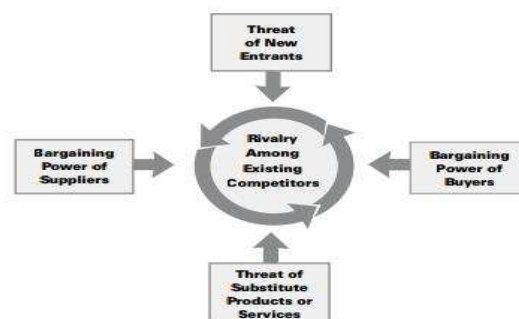


Figure 2.4 Porter Five Force Model Obtained from (Porter, 2008)

The Porter’s Five Forces model was used to support this research. According to Porter (1980), the competitive situation faced by companies in an industry can be understood by examining the underlining five basic forces acting in the industry. Competitive rivalry in the industry is based on several attributes such as innovation, quality and price. Based on analysis, the rivalry among the firms in the Malaysian E&E industry is extremely high. This situation had become worsen as nowadays more and more foreign E&E companies setting up their subsidiary in Malaysia through foreign direct investment. Hence, based on the Porter’s Five Forces analysis and the review before, there is a crucial role of RL in the operation of Malaysian E&E firms. As there is a tense competition and high bargaining power of buyer, RL can be use as strategic weapon for a firm’s operation. RL can enable a firm to cut down their cost, create a differentiated image thorough green image and most importantly ensure the customer satisfaction by efficient after sale service.

### 5. Research Design

Quantitative method is being used to conduct this research project because the relationship between one of the independent variable (government regulation, customer pressure, management commitment, corporate social responsibilities and information system and technology and capabilities) and dependent variable (business performance) will be determined. Quantitative method was used in order to obtain quantitative data for statistical testing of the hypotheses. Under the quantitative method, descriptive statistic method and inferential statistic method was chosen. Descriptive method was to describe characteristics of the population, according to [61], descriptive research is “undertaken in order to establish and enable the description of the characteristics of the variables of interest in a

situation”; whereas inferential method was used to form hypotheses to seek the relationship between the independent variable and dependent variable The population of this research consists of all environmental management system (EMS) ISO 14001 certified E&E manufacturing firms in Malaysia. ISO 14001 certified firms were selected as they are deemed to be embarked in the adoption of RL. According to Green Productivity and Green Supply Chain Manual, “ISO 14000 set up environmental performance targets, but instead provide organizations with the tools to assess and control the environmental impact of their activities, products or services”. [61] suggested that researchers should meticulously select the subjects under study to collect reliable data. Therefore, the population of this study is electrical and electronic manufacturing companies which are operating in Malaysia and have obtained ISO 14001 accreditation on their EMS. The selection of population with ISO 14001 certification is appropriate as international standards for implementing a comprehensive EMS build on established framework. Sampling frame is the list of population elements where sample is drawn [71]

#### 5.1.1 Sampling

The sampling frame obtained from [30] will be used in this study. Under this list there are 176 E&E firms from Peninsular of Malaysia. Stratified sampling method was used by dividing the list per Northern and Southern region of Malaysia and then simple random sampling method was used to select out 20 firms (sampling units) for this research. For each firm, 5 respondents will be given to obtain a target sample of 100 respondents.

## 6 Results and Analysis

**Table 4.1 Summary Result of Reliability Test**

Description	Cronbach’s Alpha Value	Number of Items
Customer Pressure (CP)	0.857	6
Government Regulation (GR)	0.944	6
Corporate Social Responsibilities (CSR)	0.810	6
Managerial Commitment (MC)	0.797	5
Information System and Technology Capabilities (IT)	0.879	6
Business Performance (BP)	0.777	7

The reliability of a variable relies on how well the measurement items within it generate a consistent result [23] [71]. The level of the internal consistency of measurement items within a variable are assessed based on the value of reliability coefficient (Cronbach’s alpha), the higher the value the greater the consistency. The rule of thumb suggests that alpha value must exceed 0.70 [41]. Hence in this research, since all the alpha value for each measurement is more than 0.7, it is reliable

### Pearson’s Correlation Analysis

Variables	Business Performance (DV)	
Customer Pressure (IV1)	Pearson Correlation	.579**
	Sig. (2-tailed)	.000
Government Regulation (IV2)	Pearson Correlation	.384**
	Sig. (2-tailed)	.000
Corporate Social Responsibilities (IV3)	Pearson Correlation	.570**
	Sig. (2-tailed)	.000
Information System and Technology	Pearson Correlation	.585**

Capabilities (IV4)	Sig. (2-tailed)	.000
Managerial Commitment (IV5)	Pearson Correlation	.634 <sup>**</sup>
	Sig. (2-tailed)	.000
Business Performances (DV)	Pearson Correlation	1
	Sig. (2-tailed)	
** Correlation is significant at the 0.01 level (2- tailed)		

H<sub>1</sub>: There is a significant relationship between customer pressure and business performance

Based on the result shown by table 4.4, there is a relationship between customer pressure and business performance. Refer to the table, the strength of association between customer pressure and business performance is moderate ( $r=0.579$ ). Besides that, the P-value (0.000) is less than 0.05, thus the null hypothesis is rejected and can be conclude that there is a significant relationship between customer pressure and business performance.

H<sub>2</sub>: There is a significant relationship between government regulation and business performance.

Based on the result shown by table 4.4, there is a relationship between government regulation and business performance. Refer to the table, the strength of association between government regulation and business performance is small bus definite ( $r=0.384$ ). Besides that, the P-value (0.000) is less than 0.05, thus the null hypothesis is rejected and can be conclude that there is a significant relationship between government regulation and business performance.

H<sub>3</sub>: There is a significant relationship between corporate social responsibilities and business performance.

Based on the result shown by table 4.4, there is a moderate relationship between corporate social responsibilities and business performance. Refer to table 4.4, the r value is 0.570 and the P-value (0.000) is more than 0.05. , Thus the null hypothesis is rejected and can be conclude that there is a significant relationship between corporate social responsibilities and business performance

H<sub>4</sub>: There is a significant relationship between information system and technology capability and business performance.

Based on the result shown by table 4.4, there is a relationship between information system and technology capabilities and business performance. Refer to the table, the strength of association between information system and technology capabilities and business performance is moderate ( $r=0.585$ ). Besides that, the P-value (0.000) is less than 0.05, thus the null hypothesis is rejected and can be conclude that there is a significant relationship between information system and technology capabilities and business performance.

H<sub>5</sub>: There is a significant relationship between managerial commitment and business performance.

Based on the result shown by table 4.4, there is a relationship between managerial commitment and business performance. Refer to the table, the strength of association between managerial commitment and business performance is moderate ( $r=0.634$ ). Besides that, the P-value (0.000) is less than 0.05, thus the null hypothesis is rejected and can be conclude that there is a significant relationship between managerial commitment and business performance.

**6.1 Multiple Regression Analysis**

H<sub>1</sub>: The five independent variables (customer pressure, government regulation, corporate social responsibilities, information system and technological performance and managerial commitment) are significant to explain the variance in business performance.

**Table 4.3.3.1 Multiple Regression Analysis Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.797 <sup>a</sup>	.635	.615	.07499

Predictors: (Constant), ITVar, GPVar, CPVar, CSRVar, MCVar

**Table 4.3.3.2 Multiple Regression Analysis ANOVA**

ANOVA <sup>b</sup>						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	.919	5	.184	32.688	.000 <sup>a</sup>
	Residual	.529	94	.006		
	Total	1.447	99			

Predictors: (Constant), ITVar, GPVar, CPVar, CSRVar, MCVar

Dependent Variable: DVVar

**Table 4.3.3.3 Multiple Regression Analysis Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.440	.525		.891	.412
	CPVar	.309	.123	.194	2.506	.014
	GRVar	.159	.050	.220	3.178	.002
	CSRVar	.179	.041	.329	4.377	.000
	MCVar	.097	.035	.219	2.788	.006
	ITVar	.171	.076	.192	2.259	.026

Dependent Variable: DVVar

Based on the ANOVA result showed by Table 4.7, the F-value is 32.688 with P-value of 0.000. Since P-value is less than 0.05, the null hypothesis is being rejected. The F-statistic is significant. The model for this study is a good descriptor of the relation between the dependent and predictor variables. Based on Model Summary in Table 4.3.6 the value of correlation coefficient (R value) for this research project is 0.797. This shows a positive relationship and a high correlation between dependent variable (business performance) and independent variables (customer pressure, government regulation, corporate social responsibilities, information system and technological performance and managerial commitment). Thus null hypothesis is being rejected. In this research project, five of the independent variables can explain 63.5% of the variations in the dependent variable.

Lastly, the five independent variables are concluded to be significant to explain the variance in business performance as all the p-value for the variables is less than 0.05. Thus, the alternate hypothesis is supported by the data. Thus the model for this study can be represented by the following equation:

$$BP = 0.309 CP + 0.159 GP + 0.179 CSR + 0.097 MC + 0.171 IT + 0.440$$

## 7 Implications of the Study

This research is done to study the five factors that will influence the business performance of companies in E&E industry. There five factors (customer pressure, government regulation, corporate social responsibilities, information system and technological performance and managerial commitment) have been proven to influence business performance of E&E companies. Hence, the findings from this research project provide implications for all E&E companies. According to Department of Environment, the volume of electronic waste generated by in Malaysia is 78278.04 metric tonnes (Department of Environment, 2010). Hence, it is very important for the E&E industry practitioners to understand the importance

of RL and factor which influence the implementation of RL in their firm during this current situation to prevent the amount of E-waste to continue increase which will in the end lead to serious environmental issue and health issue.

This study confirmed that the business benefits of RL are viable due to the influence of legislative requirements. Industry practitioner should be more proactive to develop or design a suitable RL model that will bring the most benefit to their own firm. Apart from that, from the recommendation and opinion obtained from the respondent, in order to implement RL in a successful manner, it must be carried out with the involvement of all level of employees together with a leading competent committee. Most of the respondents respond that even though the managers are aware of the RL issue, the knowledge and skills together with information system technology they used are not sufficient enough to handle the reverse flow of their company supply chain. Hence, training and development for those departments' employee that are involve in the firm's supply chain activities and the upgrading of the system are important according to most of the respondents that are holding managerial position and executive position.

## 8 Conclusion

Through this research, a better insight regarding how the five independent variables (customer pressure, government regulation, corporate social responsibilities, information system and technological performance and managerial commitment) influence the firm's business performance. The research shows that the all five variables play an important role in influencing business performance. Researcher hopes that this research study will be used as a fundamental for other research to be carried out in different industries.



## REFERENCES

- [1] Market-Driven Management. *Symphonya. Emerging Issues In Management*, Issue 2, Pp. 28-40.
- [2] Alena.K, 2013. *ISSUES OF CORPORATE SOCIAL RESPONSIBILITY WEB SITE COMMUNICATION*. Brno, Czech Republic, EU, S.N.
- [3] APICS – The Association For Operations Management, 2008. Reverse Logistics. In: *APICS Dictionary*. 12 Ed. S.L.:S.N.
- [4] Arnab.C, N. &. , 2011. *Cognizant*. [Online] Available at: <http://Www.Cognizant.Com/Insightswhitepapers/Revers e-Supply-Chain.Pdf> [Accessed 23 July 2013].
- [5] Asma K., M. S., 2009. Reverse Logistics in Pakistan's Pharmaceutical Sector. *South Asian Journal Of Management Sciences*, 3(1), Pp. 27-36.
- [6] BADENHORST, A. 2013. *A BEST PRACTICE FRAMEWORK IN REVERSE LOGISTICS*. Master of Commerce. UNIVERSITY OF SOUTH AFRICA.
- [7] Brito M. P., D. R., 2003. A Frame Work for Reverse Logistics. *Eramus Research Institute of Management (ERIM)*, *Eramus University Rotterdamresearch Paper*.
- [8] Bryman, A &. B. E., 2007. *Business Research Methods*. 2nd Ed. New York: Oxford University Press Inc..Carter, C., 2004. Purchasing and Social Responsibility: A Replication and Extension. *Journal of Supply Chain Management: A Global Review Of Purchasing And Supply*, 40(4), Pp. 4-17.
- [9] CASTANHO, S. C. R. & SACOMANO NETO, M., 2009. Análise Dos Canais Reversos Sob A. *Revista Gestão Industrial.*, 5(3), Pp. 21-40.
- [10] Closs, D. G. T. C. S., 1997. Information Technology Influences On World Class Logistics Capability. *International Journal of Physical Distribution and Logistics Management*, 27(1), Pp. 4-17.
- [11] Daily BF, B. J., 2003. TQM Workforce Factors and Employee Involvement: The Pivotal Role of Teamwork. *Journal Of Managerial Issues*, Winter (15), Pp. 393-417.
- [12] Daily BF, H. S., 2001. Achieving Sustainability through Attention to Human Resource Factors in Environmental Management. *International Journal of Operations and Production Management*, 21(12), Pp. 1539-52.
- [13] Daugherty, P. M. M. R. R., 2002. Information Support for Reverse Logistics: The Influence of Relationship Commitment. *Journal of Business Logistics*, 23(1), Pp. 85-106.
- [14] Department Of Environment, 2010. *Environmental Quality Report*, Putrajaya, Malaysia: S.N. Department Of Environment, 2013. *E-Waste*. [Online] Available At: <Http://Www.Doe.Gov.My/Webportal/En/Info-Untuk-Industri/Buangan-Elektronik/> [Accessed 15 Aug 2013].
- [15] Eltayeb T. K., Z. S. R. T., 2010. Green Supply Chain Initiatives among Certified Companies in Malaysia and Environmental Sustainability: Investigating The Outcome. *Resources, Conservation And Recycling*, 55(5), Pp. 495-506.
- [16] Eltayeb, T. &. Z. S., 2009. Going Green through Green Supply Chain Initiatives towards Environmental Sustainability. *Operations and Supply Chain Management*, 2(2), Pp. 93-440.
- [17] Eris, D. E. & Tuna, O., 2012. Reverse Logistics Channels: An Exploratory Study For Household Waste Collection. *International Journal Of Advances In Management And Economics*, 1(6), Pp. 230-235.
- [18] French, M. &. D. R., 2006. Returns In Process Industries: A Managerial Perspective.. *Management Research News*, 29(12), Pp. 769-781.
- [19] Gandolfo, A., & Sbrana, R. (2008). Reverse Logistics and Market-Driven Management. *Symphonya. Emerging Issues in Management*, (2), 28-40.
- [20] Goldsby, T. &. S. T., 2000. World Class Logistics Performance And Environmentally Responsible Logistics Practices. *Journal Of Business Logistics*, 21(2), Pp. 187-208.
- [21] González-Torre, P. Á. M. S. J. A.-D. B., 2009. Barriers To The Implementation Of Environmentally Oriented Reverse Logistics: Evidence From The Automotive Industry Sector. *British Journal Of Management*, 9999(9999).
- [22] Hair, J. F. B. W. C. B. B. J. &. A. R. E., 2010. *Multivariate Data Analysis: A Global Perspective*. Upper Saddle River, NJ: Pearson Education.
- [23] Hsu, S.-L., 2005. *A Conceptual Framework for Exploring the Antecedents Of Reverse Logistics Performance In E-Tailing*. Bangkok, Thailand, S.N
- [24] Huscroft, J., 2008. Practical Challenges In Managing The Reverse Logistics Process In A Supply Chain..
- [25] Huscroft, J., 2010. The Reverse Logistics Process In The Supply Chain And Managing Its Implementation. *A Dissertation Submitted To The Graduate Faculty Of Auburn University*. Investopedia, 2012. *Corporate Citizenship*. [Online] Available at: <http://Www.Investopedia.Com/Terms/C/Corporatecitizen ship.As P#ixzz1pd1b Ue2h> [Accessed 1 Jan 2014].
- [26] Isabelle, M. &. F. O. C., 2001. Corporate Citizenship As A Marketing Instrument - Concepts, Evidence And Research Directions. *European Journal Of Marketing*, 21(2), Pp. 56-73.
- [27] Jayaraman, V. R. A. &. A. A., 2008. Role Of Information Technology And Collaboration In Reverse Logistics Supply Chains. *International Journal of Logistics Research and Applications*, 11(6), Pp. 409-425.
- [28] K.K., D. & A.A., P., 2005. Reverse Logistics In The Computer Industry.
- [29] *International Journal of Computers, Systems and Signals*, 6(2), Pp. 57-67. KANG, S. E. A., 2009. *The Current State of Waste Reverse Logistics In Korea And It's Future*. S.L., S.N.
- [30] Khor, K. S. & Zulkifli, U. M., 2012. Impact of Reverse Logistic Product Disposition towards Business Performance in Malaysian E&E Companies. *Journal of Supply Chain and Customer Relationship Management*, 2012(2012), Pp. 1-19

- [32] King, A. M. B. S. C. I. W. M., 2006. Reducing Waste: Repair, Recondition, Remanufacture Or Recycle. *Sustainable Development*, Volume 14, Pp. 257-267.
- [33] KONSTANTARAS, I., 2010. Optimal Control Of Production And Remanufacturing In A Reverse Logistics Model With Backlogging. *Mathematical Problems In Engineering*. Volume 2010, P. 19.
- [34] Malaysian Investment Development Authority, 2012. *Industries In Malaysia*. [Online] Available At: <http://www.mida.gov.my/Env3/Index.php?page=Ee> [Accessed 14 Aug 2013].
- [35] Mir Saman P, K. K. B. K., 2009. *Reverse Logistics Network Design Using Simulated Annealing*. S.L.:Springer-Verlag London Limited.
- [36] Mollenkopf, D. & C. D., 2005. The Hidden Value in Reverse Logistics. *Supply Chain Management Review*, 9(5), Pp. 4-43.
- [37] MORENO, A. C. P., 2009. Communicating CSR, Citizenship and Sustainability on the Web. *Journal of Communication Management*, 13(2), Pp. 157-175.
- [38] Nik Ab Halim, N., Sabariah, Y. & Haim Hilman, A., 2011. *Reverse Logistics Adoption Among Malaysian Manufacturers*. Bangkok, S.N.
- [39] Nik Ab Halim, N. S. Y. H. H. A., 2013. Reverse Logistics: Pressure For Adoption and the Impact on Firm's Performance. *International Journal Of*
- [40] Norman, L. & S. W., 2007. *Reverse Logistics: The Bearer Of Good Fortune*. [Online] Available At: <http://www.takesupplychain.com/news-article-11-30-07.php> [Accessed 25 Jan 2014].
- [41] Nunnally, J. C. (1978). *Psychometric Theory* (2nd Ed.). New York: Mcgraw-Hill.
- [42] Patridge, A., 2011. *Full Circle: Reverse Logistics Keeps Products Green To The Field*. *Inbound Logistics*. [Online] Available At: <http://www.inboundlogistics.com/cms/article/full-circle-reverse-logistics-keeps-products-green-to-the-end/> [Accessed 19 Jan 2014].
- [43] Perunding Good Earth Sdn Bhd, N.D. *Ministry Of Environment*. [Online] Available At: [http://www.env.go.jp/en/Recycle/Asian\\_Net/Project\\_N\\_Research/E-WasteProject/06.pdf](http://www.env.go.jp/en/Recycle/Asian_Net/Project_N_Research/E-WasteProject/06.pdf) [Accessed 21 July 2013].
- [44] Peter.Y, M. F. M. A. W. M. N. S. A., 2012. Barriers To Reverse Logistics Practices In Malaysian. *International Journal Of Academic Research In Economics And Management Sciences*, 1(5), Pp. 204-214.
- [45] Porter, M. E., 1980. *Competitive Strategy*. New York / London, Macmillan Press.
- [46] Porter, M. E., 2008. *Harvard Business Review*. [Online] Available At: <http://hbr.org/2008/01/the-five-competitive-forces-that-shape-strategy/> [Accessed 20 Aug 2013].
- [47] Porter, M. E., 2008. The Five Competitive Forces That Shape Strategy. *Harvard Business Review*, January. 24-40.
- [48] Pricewaterhousecoopers, 2008. *Reverse Logistics\* How To Realise An Agile And Efficient Reverse Chain Within The Consumer Electronics Industry*, Nederland: Price Water House Coopers.
- [49] Pun KF, C. K. G. R., 2001. Determinants Of Employee Involvement Practices In Manufacturing Enterprise. *Total Quality Management*, 12(1), Pp. 95-109.
- [50] Q. Zhu, J. S. J. C. L., 2008. Firm-Level Correlates Of Emergent Green Supply Chain Management Practices In The Chinese Context. *Omega*, Volume 36, Pp. 577-591
- [51] Qinghua Zhu, J. S. K.-H. L., 2006. Green Supply Chain Management: Pressures, Practices and Performance within the Chinese Automobile Industry. *Journal of Cleaner Production*, Pp. 1-12.
- [52] Rajesh, D. & Shyam, C. S., 2011. *Supply Chain Strategy for the Consumer Electronic Future Of Manufacturing*, India: Wipro.
- [53] Reverse Logistics Association, 2013. *What Is Reverse Logistics*. [Online] Available At: <http://www.reverselogisticstrends.com/reverse-logistics.php> [Accessed 16 Aug 2013].
- [54] Richey, R. G. G. S. E. & D. P. J., 2005a. The Role Of Resource Commitment And Innovation In Reverse Logistics Performance. *International Journal Of Physical Distribution & Logistics Management*, 4(233-257), P. 35.
- [55] Rogers, D. & T.-L. R., 1998. *Going Backwards: Reverse Logistics Trends and Practices*. [Online] Available At: [www.rlec.com](http://www.rlec.com) [Accessed 25 Jan 2014].
- [56] Ronan Torres Quintão, L. F. N. D. J. J. S., 2012. *Determinants of Reverse Logistics Execution in the Brazilian Supermarket Industry*. Chicago, Illinois, U.S.A., S.N.
- [57] RS, T.-L., 2002. Life after Death: Reverse Logistics and the Product Life Cycle. *Int. J. Physical Distribution and Logistics Management*, 32(3), Pp. 223-244.
- [58] Ryder Supply Chain Solutions, 2012. *Reverse Logistics From Black Hole To Untapped Revenue Stream*, United States: Ryder Supply Chain Solution.
- [59] S.K. Sharma, B. P. S. M. S. S., 2011. Analysis of Barriers for Reverse Logistics: An Indian Perspective. *International Journal of Modelling and Optimization*, 1(2), Pp. 101-106.
- [60] Scott, A., 2008. Taking It Back: Why Reverse Logistics Will At Last Be Taken Seriously. *Logistics & Transport Focus*, 10(6), Pp. 34-35.
- [61] Sekaran, U., 2003. *Research Methods for Business: A Skill Building Approach*. 4 Ed. New York: John Wiley & Sons, Inc.
- [62] Shaharudin, M. R. M. Y. K. M. E. S. J. & W. M. S., 2009. Factors Affecting Customer Satisfaction In After-Sales Service Of Malaysian Electronic Business Market. *Canadian Social Science*, 5(6), Pp. 10-18.
- [63] Sharma, S., Panda, B., Mahapatra, S. & S.Sahu, 2011. Analysis of Barriers for Reverse Logistics: An Indian Perspective. *International Journal of Modelling And Optimization*, June, 1(2), Pp. 101-106.
- [64] SIGNITZER, B. P. A., 2008. Corporate Sustainability Communications: Aspects of Theory and Professionalization. *Journal of Public Relations*

- Research*, 20(1), Pp. 1-19.
- [65] Skinner, L. R. B. P. T. & R. R. G., 2008. Examining the Impact of Reverse Logistics Disposition Strategies. *International Journal Of Physical Distribution & Logistics Management*, 38(7), Pp. 518-53
- [66] Tan, A. Y. W. A. A. K., 2003. Improving The Performance Of A Computer Company In Supporting Its Reverse Logistics Operations In The Asia-Pacific Region. *International Journal Of Physical Distribution & Logistics Management*, 33(1/2), Pp. 59-74.
- [67] Tarig, E. K. & Suhaiza, Z., 2009. Going Green through Green Supply Chain Initiatives towards Environmental Sustainability. *Operations and Supply Chain Management*, 2(2), Pp. 93-110.
- [68] Thierry, M. S. M. V. N. J. V. W. L., 1995. Strategic Issues in Product Recovery Management. *California Management Review*, Volume 37, Pp. 114-135.
- [69] Wan Hasrulnizam W. M., M. N. A. R. B. .., 2011. The Relationship between Manufacturing System Performance and Green Practices in Supply Chain Management. *World Academy of Science, Engineering and Technology*, 59(2011), Pp. 2454-2458.
- [70] Wong, C. L. K. C. T., 2009. Complementarities and Alignment of Information Systems Management and Supply Chain Management. *International Journal of Shipping and Transport Logistics*, 1(2), Pp. 156-171.
- [71] Zikmund, W. G., 1991. *Business Research Methods*. 3rd Ed. Orlando: FL: Dryden. Zikmund, W. G., 2003. *Business*