

GREEN REVERSE SUPPLY CHAIN MANAGEMENT AND A CONCEPTUAL MODEL FOR CUSTOMER PARTICIPATION FOR RETURNING THE EOL PRODUCTS

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ABSTRACT : *Environmental issues and resource depletion caused producers to follow up an extended producer responsibility (EPR) to improve their reverse supply chain management. Currently many companies use reverse supply chain management (RSC) to return their end of life (EOL) products from their customers for environmental purposes such as: reuse, refurbishment or repair and recycling. Recently, researcher are investigating the new methods to improve the quality of RSC in protecting the environment and saving the resources. Despite RSC needs interaction between producers and their customers but companies and researchers mainly focused on activities in manufacturing while the customer's role for returning EOL products is not explicit yet and customers are not considered as a key player in RSC. This study would propose a conceptual model for investigating the important factors that influence customers' participation intention in RSC through returning EOL products. This is an interdisciplinary study which connects the RSC and customers behavioural intention for solving environmental problem and resource scarcity. The theory of planned behaviour is used as a spanning theory for this research.*

KEYWORDS: Reverse Supply Chain, Customer Participation, End of Life Product, Reuse, Refurbishment, Recycling, Theory of Planned Behaviour

1.0 INTRODUCTION

Natural resources are essential inputs in the production process. This is factual for marketed resources (such as metals, minerals, and land) and non-marketed resources (such as clean air, weather, and myriad ecosystem services). Over the past century, the global population quadrupled and economic production increased about 20-fold, so demand for natural resources rose greatly. The extraction of construction materials grew by a factor of 34, ores and minerals by a factor of 27 (UNEP, 2011). Besides, the climate change and environmental problems have become a new challenge. So protecting the environment and saving the energy and resources became among the top priorities of human being in last decades. Therefore researchers, companies and governments started to add environmental perspectives to economic and social activities through establishing the environmental standards, rule and regulations. As a result, new paradigm has been proposed in the name of triple bottom line to cover the social, economic and environmental needs of human.

For more than several decades supply chain management has been improved for the movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption. The old concept of supply chain management (SCM) is slightly changed to green supply chain management (GSCM) to cover environmental needs and requirements. Green supply chain (GSC) aims at confining the wastes within the industrial system so as to conserve energy and prevent the dissipation of harmful materials into the environment (Ho et al., 2009). Despite many researchers have worked on GSCM, these efforts has not been enough. Since GSC mainly covers forward supply of material with intention to

environmental consideration, while reverse supply chain received less attention and has potential for more investigation. As the supply chain is a channel between production and demand sides, the customer those are consuming the products play a significant role by receiving the products from manufacturers as well as providing the resources for manufacturers. This definition is also demonstrated by reference [1] that conceptualized service supply chains according to the unified service theory (UST). UST defines services as bidirectional supply chains that have customers both providing resources to and receiving resources from service providers. Besides, with the extended producer responsibility (EPR), companies are more committed to produce green products and supply them through green reverse supply chain management as well as collecting their end of life (EOL) products from their customers. Hence customer participation is needed for returning their EOL products, for reuse and recycling purposes. Meanwhile, companies need to educate their customers and help to facilitate their participation in returning their EOL products through reverse supply chain management [2]. Customer participation in RSC for returning their EOL products to the manufacturers for reuse and recycle purposes is a key element that helps to save the environment and resources. Predicting customer participation in RSC is also important in order to know how they are responding to the green initiatives and what critical factors may influence their behaviour.

The spanning theory that would explain the customer participation in RSC is that a theory of planned behaviour (TPB). The review of literature in RSC shows that there is a need to add new variables to the TPB in order to make it proper in the context of this study. This paper is the first

attempt in its kind to consider the role of customer for returning the EOL products through RSC to manufacturers

that may facilitate or impede performance of the behaviour (control beliefs). In their respective aggregates, behavioural beliefs produce a favourable or unfavourable *attitude toward the behaviour*; normative beliefs result in perceived social pressure or *subjective norm*; and control beliefs give rise to *perceived behavioural control*. In combination, attitude toward the behaviour, subjective norm, and perception of behavioural control lead to the formation of a behavioural *intention*. As a general rule, the more favourable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behaviour in question". It is notable that there are a few studies close to the context of this study, those considered the consumer recycling behaviour in electronic industries and waste management and they also used several factors and their impacts on the customer behaviour [21],[22]. Despite all of these efforts, factors influencing customers' participation is limited to the context of those studies and new variables should be added to this research those are discussed in following part.

Table 1: Summary of Related Literature in RSC

What have been done in RSC (main areas)	References
Model/strategy/planning	[4] ,[5],[6],[7],[8]
Liquidity implication in RSC(RL)	[9]
Main factors affecting RSC and bullwhip in RSC	[10],[11]
Reverse supply chain and integration	[12]
Linking forward and reverse supply chain	[13]
Factors affecting EOL computer recycling	[14]
Electronic scrap and subsidy	[15]
E-market waste	[16]
Remanufacturing RSC based on CLSC management process	[17]
Consumer demand and RSC	[18]

for environmental purposes. The main objective of this research is to model the factors influence customer's participation intention in RSC through returning the EOL products to their manufacturer for reuse, refurbishment, recycling purposes.

2.0 LITERATURE REVIEW

2.1 Reverse Supply Chain Management

The definition of RSCM is given by reference [2] who defined and described RSC as a "series of activities required to retrieve a used product from a customer and either dispose of it or reuse it". For a growing number of manufacturers, in industries ranging from carpets to computers, reverse supply chains are becoming an essential part of business. Reference [3] used another definition. She stated that "companies that combine the 'reduce, reuse, recycle' mantra with the supply chain wisdom of managing costs and stamping out inefficiencies are developing reverse supply chains that helps the Earth, the customer, and the bottom line which is named green reverse supply chain". Literature in reverse supply chain is mainly focused on manufacturing activity. Table 1 describes the summary of related literature in RSC.

Accordingly, the main focus of researchers and companies is mainly on a manufacturer side hence the role of customer is not discussed in reverse supply chain. Furthermore there is not any model that shows important factors those influence customers for returning their EOL products for reuse, refurbishment (repair) and recycling purposes through RSC. To show the factors and their influence which could explain customer participation intention (CPI) in SCM, theory of planned behaviour [19] is the best model to predict factors influence CPI in this study. This is a popular theory which has been used for examining the behavioural intention of different people in different studies (i.e. internet banking, health services and waste management).

Reference [20] mentioned that "human behaviour is directed through three kinds of considerations: beliefs about the likely consequences of the behaviour (behavioural beliefs), beliefs about the normative expectations of others (normative beliefs), and beliefs about the presence of factors

2.2 Hypotheses and Conceptual Model

Since customers' intention of EOL products through RSC is a post-consumer behaviour for saving the resources and environment, the adopted literature about influencing factors is mostly related to the field of customer behaviour. In order to understand the CPI in RSC the following and a conceptual model based on TPB are proposed.

Financial Incentive: Rationally, if the companies use financial incentives, it may encourage customers for returning their EOL products through influencing their attitude to participate in RSC. By the definition of reference [23] an incentive is something that motivates an individual to perform an action. Reference [24] found that the households are wouling to accept a mean cash incentive of GH¢1.2003 (US\$1.1983) per month to participate in source separation. A normative decision analysis is developed by reference [25] to determine how incentives impact consumer decision on EOL products. Incentive structures could affect the way members cooperate or compete the way they exchange information [26], and perform or shirk their responsibility [27]. The following hypothesis is proposed.

Hypothesis 1: *Financial incentives toward GRSC participation are positively associated with attitude about GRSCM participation.*

Advertisement: Logically, advertisement could impact the attitude of people or customers to behave in a particular direction. In the context of this study if companies use advertisement, they could persuade their customers to return their EOL products through GRSCM for protecting the environment. Reference [28] mentioned that advertising, in the name of advertisers, via mass media with fees, could pass to consumers the information of existence, characteristics, interests, trader or labor service, and the like. Reference [29] mentioned that sustainability advertising on the radio refers only to audio. They also illustrated those high imagery ads that elicit visual images in the minds of listeners show positive effects on attitude toward the brand

and purchase intention. Reference [29] found that advertising was effective in triggering desired communications outcomes, and was associated with significant changes in attitudes and affective beliefs about speeding. Accordingly hypothesis 2 is proposed.

Hypothesis 2: Advertisement about consumer participation in GRSC (through returning the used, EOL products) are positively associated with attitude about consumer participation in GRSM.

Information: It is assumed that if a customer has enough information about product (its useful life, the way of returning that product, advantages of returning that product besides some information about the producer and how it could be collected by the collector), his/ her participation intention would be influenced by these information. Here, based on the context of this study, provided information by companies for returning the EOL products could facilitate customers' participation to RSC. Reference [30] found that label information (identity, price and nutritional benefit) had a significant effect on intention to buy, especially when combined within personal liking. Reference [31] found that Information transmission (information on how to use, transport, recycle, or dispose of the package or product is often contained on the package or label) is one of the elements in products packaging that influence consumers' buying behaviour. Therefore, the operational definition of information is any information about returning process, name of company, recycling or reuse advantages or process, EOL products, advantages associated with returning the products and so on. Hypothesis 3 is proposed by the authors accordingly.

Hypothesis 3: Information shared by producers is positively associated with perceived behavioural control (PBC) about customer participation in GRSCM.

This study is an effort to cover the gap of consumer participation in reverse supply chain management through returning the EOL products to their manufacturer.

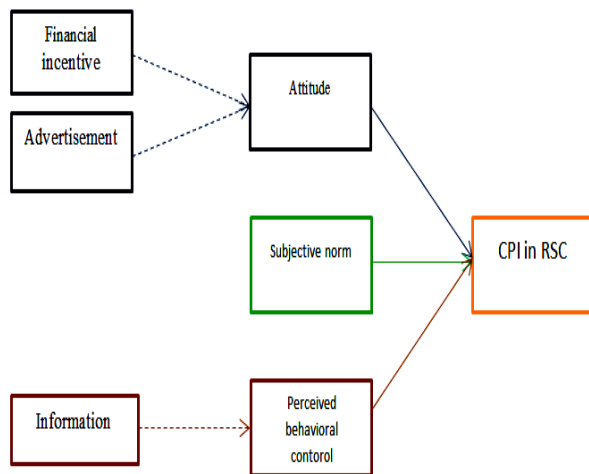


Figure 1 is an illustration of proposed conceptual model.

Considering the original model of theory of planned behaviour, the following model is produced for customer's participation intention to RSC. The additional variables in this conceptual model are supposed to influence customers

Figure 1: Proposed conceptual model of CPI in RSC through returning EOL products for reuse, refurbishment and recycle to return their EOL products for reuse, refurbishment/repair and recycling purposes. The variables include incentives, advertisement and information.

RESEARCH METHODOLOGY

The proposed model would be tested through following methodological steps. Unit of analysis would be individual. A five Likert scale questionnaire would be designed. The sampling method would be non-probability sampling and sampling technique would be convenient sampling. As respondents are consumers (Customers) there is no sampling frame or list and they considered as public participants, hence non-probability sampling is chosen. Structural Equation Modeling (SEM) would be considered as analysis method and AMOS software would be used to model the variables in this research.

3.0 CONCLUSION

Environmental problems and resource depletion, causes companies to take responsibility to collect their products for reuse and recycling purposes through reverse supply chain management. According to extended producer/manufacturer responsibility (EPR) manufacturers are responsible for entire life-cycle of the product and especially for the take-back, recycling and final disposal. Although many companies currently adopted EPR strategy, but success of this strategy, strongly depends on factors influence customer's collaboration with producers which are not considered in current studies.

For overcoming the lack of collaboration between producers and customers in the context of RSC, a conceptual model of customer participation to RSC through returning the EOL products to producers for reuse, repair and recycle is proposed in this article. Hence three factors (financial incentive, advertisement and information) were supposed to positively influence the CPI in RSC through returning the EOL products to producers.

Companies or producers could increase their products return if they offer some financial incentives to their customers such as, discount, buy back policy, deposited back policy and gift cards or bonus to encourage or motivate them for returning their EOL products. Advertisement mostly influences customers' behaviour and it supposed to influence customers to return their EOL products through RSC, if producers and companies try to use it for saving the environment and resources. Finally information shared by companies about product life cycle, collection channels, company's information and the advantages of returning the EOL products, could facilitate customer's participation. Having enough information could enable customers to know: what, how and why they should return their EOL products and it could influence their participation through influencing the perceived behavioural control.

This conceptual model is an extended model of theory planed behaviour that would help to understand the factors that influence customers' participation intention to return their EOL products.

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