TOWARDS SUSTAINABLE MANUFACTURING: INFORMATION SHARING FRAMEWORK OF END-OF-LIFE IMMEDIATE RETURN

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by

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ABSTRACT

We live in an economy that is exhausting natural resources. With the improvement of the world economy and the rapid development of its electrical industry, electrical and electronic products are continually upgraded, electrical and electronic equipment waste (WEEE, or e-waste) which endangers human health is increasing rapidly. To reintegrate economy within ecological limits, it is to increase social and environmental sustainability. As businesses are endowed with resources and capabilities to drive the change, they also have valuable information that can positively impact production and consumption systems. Based on this, this research is intended to explore Business-to-Consumer (B2C) communication in communicating immediate post-consumption (end-of-life) return in the closed-loop supply chain. The communication is based on information sharing activity where businesses consider including specific end-of-life return information. The purpose of this research is to explore information content and message framing that could be used to present end-of-life product return information, and how it affects consumers' attitude towards return information and consumers' immediate return intention based on formative research suggested by social marketing theory. The proposed framework visualizes the relationship of proposed types of information and information presentation towards consumers' immediate return attitude, as well as environmental motivation and environmental knowledge as the moderators in consumers' segmentation. This exploratory research is intended to support qualitative and quantitative studies which aim to clearly *(a)* justify that time and quality of return should be included in product return information, *(b)* understand the effect of information presentation (message framing) on consumers' immediate return intention of used electric and electronic appliances, *(c)* investigate how individual's environmental motivation and knowledge influence their way of processing immediate return information.

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DEDICATION

This thesis is dedicated to my mom Hanisah Yusoff and my dad Mamat Hussin. This is for you mom and dad. May Allah bless both of them and grant them Jannah.

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1.INTRODUCTION TO RESEARCH AREA

1.1   Overview

The gradual rise in environmental consciousness has increased every individual's responsibility to engage in environmental protection effort. Advocates perceive that the individual environmental concern should also be reflected in their disposal habit (Pérez-Belis et al., 2015; Jena and Sarmah, 2015). However, actual practice in disposal habit is not as satisfactory as it should be. While consumers have shown a gradual growth trend in environmental awareness, their environmental behaviour in terms of returning the used products had not increased. For instance, in the case of Waste Electrical and Electronic Equipment (WEEE) collection, only 29.5 kg per capita was reported in Norway (State of the Environment Norway, 2014). Many studies highlight that consumers tend to retain the no longer used products at home (Milovantseva and Saphores, 2013b) or dispose them along with other waste fractions in domestic bins (Bigum et al., 2013). Evidently, this shows some sort of disconnection between consumer environmental awareness and actual environmental practice.

Recent research has attempted to investigate factors influencing consumers' willingness and participation in Product Return and Recovery Management (PRRM), such as convenience (Wagner, 2013), attitudes (Milovantseva and Saphores, 2013a), financial incentives (Gunasekaran et al. 2015) and environmental education (Pérez-Belis et al., 2015). However, existing studies lack in exploring solution for the immediate return of used products. Immediate return after consumption phase is important to grant optimal recovery value of durable products and generally, will minimize the negative environmental impact. In order to solve stockpiling or storage behaviour of used products among consumers, it is important to communicate the ideal timing of return, the acceptable quality of return and the right quantity or volume of return. In current marketing and promotion practice of green products or 'ordinary', producers tend to state the product's benefit (Eisend, 2006). This positive information is used to influence the target market in their purchasing decision. For example, green products will convey the message of how it will help in environmental pollution reduction and how it helps to decelerate climate change and global warming. All these marketing messages; however, do not inform consumers about the negative impact of the products on the environment if they not properly disposed after their End-of-Use (EoU) and End-of-Life (EoL) phases. Hence, in this research, environmental information sharing is explored to investigate the effective way in conveying the message of how product return

should be practiced, considering when the right time to return the used products, what is the standard of acceptable quality of return and the right quantity of return.

1.2 Background of Research Area

Over the years, activities of the manufacturing industry have been mostly confined to extracting raw materials from the earth, manufacturing them into products and then disposing of these products into landfills or incineration after the end of use. But, this approach is not sustainable in the current competitive business environment because of the rising concern of people for the clean and safe environment in the present and the future. Realizing the gravity of the problem, various initiatives have been undertaken by the industry, government and academia and they have tried to analyse this issue from the perspective of the supply chain and more particularly in the context of closed-loop supply chains (CLSCs) (Guide and Van Wassenhove, 2009; Rubio et al., 2008; Jimenez-Para B et al., 2014). In the CLSCs area of research, many authors have studied the problems from the supply side of end-of-life (EoL) and end-of-use (EoU) products. A good number of analytical studies have also been done on the flow of goods from the consumer back to the recovery agent or to the original equipment manufacturer (OEM) or the remanufacturer, e.g., return, EoU collection, value recovery, and 4-R (reduce, reuse, recycling, remanufacturing), inventory management, etc. For example, this problem is observed in the Indian electronics industry. Electronics and electrical parts included in end-of-use and end-of-life returns are processed through remanufacturing and recycling subsequently by the (re)manufacturer. Acquiring used products from the market is a challenging task for a (re) manufacturer under the remanufacturing system. By the end of 2012, in India, the electronics waste (e-waste) touched 8, 00,000 metric tonnes, while the annual amount of e-waste was over 3, 30, 000 metric tonnes (Raghupathy and Chaturvedi, 2009) and expected to touch 1.72 million metric tonnes by 2020 (Raheja, 2013). As per the UN report, India contributes significantly to generating e-waste and the growth is around 500 percentages in just 13 years, closely followed by China at 400 percentages. Sixty-five cities in India generate 60 percentages of the total e-waste and ten states generate 70 percentages of the total waste in India (Raghupathy and Chaturvedi, 2009). Looking at the growth of e-waste, the India government has made a series of rules and regulations to return the used electronics product. But the rate of return of electronics used product is only 5% of the total e-waste costing the US $12-15billion in India (Thomas, 2012). Low return intention and negative return attitude of consumers have been listed as a major bottleneck in the development of the remanufacturing industry.

Remanufacturing is one such measure which has been carried out by CLSCs more often. It involves various key activities such as product acquisition, reverse logistics, inspection and possible product disposition (Blackburn et al., 2004). It closes the material use cycle and focuses on value-added recovery, rather than just material recycling. Guide and Jayraman (2000) have mentioned that remanufacturing systems are environmentally friendly and profitable, which has been employed in several industries ranging from mechanical automotive and aircraft parts to electronics such as computers, cellular telephones, television etc. One of the important tasks of remanufacturing is handling uncertain quantity and quality of the return items in the most effective way. In the CLSCs, OEM or remanufacturer may decide to handle the return process individually. Guide and Jayraman (2000) mentioned that 82% of firms collect the used products directly from the customers. Manufacturers know that the retailers are the closest players to the market and can influence the customers, creating knowledge and awareness of environmental concerns, and educate them to return the products in good conditions (Giovanni, 2014; Hong and Yeh, 2012). One of the major challenges in CLSCs research is to understand in depth its relationships with the market and consumers (Jimenez-Para et al., 2014). The purchase intention of consumers towards remanufactured products considering various factors was studied by Wang et al. (2013). However, to date, no researcher has unearthed the factors that underpin the consumer's immediate return intention (IRI) of the used products which is considered as the strongest predictor for consumers' participation.

Particularly, (re)manufacturers are interested to know the relationships of various factors with return attitude and intention, and how these factors can motivate consumers' to immediately return their used products. Nowadays, (re)manufacturers motivate the consumers' to return their EoU and EoL products through some benefits such as warranty, incentives, and exchange offer. However, still, they are unable to collect a sufficient amount of used products from the markets (Jena & Sarmah 2015). For that, firms want to know the key factors which impact mostly on the return attitude and intention of the consumers. Moreover, these questions are likely to be encountered by the (re)manufacturer in practice, have not been adequately addressed in the literature. Thus, this study seeks to gain insights by exploring these questions.

Considering consumers' immediate return intention and perception as the main jurisdiction for this research, the product return knowledge domain will be investigated. Product return knowledge domain will highlight types of information (information content) and information presentation (information context) as independent variables. The chosen variables are derived from work by (Philips, 2004). (Philips, 2004) was quoted to say that for education for

environmental to be more successful, it needed to appreciate in its design and delivery. The applied scope for this research is durable household waste. Briefly, this research will explore the effect of types of information and information presentation towards consumers' immediate return attitude of durable household waste.

Providing individuals with information about post consumption-related attributes such as return channel, costs or environmental impacts of improper treated/disposed products may be seen not only as a service provided to the public but also as a significant instrument to change EoU and EoL product return behaviour. The common presumption is that informed consumers will make better choices, which will be beneficial to their advantage as well as profitable product return and recovery management for manufacturers and generally, the environment. Rational choice theory suggests that individuals base choices on the attributes of the choice set (information content), the way information are being presented (information context) can also have a strong effect on consumers' use of and reaction to information (Avineri and Owen, 2013). Yet, little research has been done on the effectiveness of the design of EoU and EoL environmental information context. Hence, in the context of information presentation, this research is intended to explore how framing message concept may be applied to encourage consumers' participation in product return activity. Through the use of positive and negative terms, such information can be framed to focus attention either on the product return activity to provide environmental benefit (positive frame) or on its potential to reduce an environmental loss (negative frame).

The outcome of this research will be an empirically validated research model of consumers' IRI. The developed model will visualize the elements of Business-to-Consumer (B2C) information sharing, the translation of product return information to specific environmental knowledge, how the knowledge will be presented for consumers' reference and different segmentations of consumers. Expectantly, this model will provide information on how well the consumers are agreed on the identified variables for immediately returning their used products.

In short, this research will be conducted based on this thesis statement:

> *"Design and delivery of product return information can influence consumers' EoL and EoU immediate return intention*; *therefore, an information-sharing model that highlights product return knowledge should be developed to promote immediate 'end-of-life' and 'end-of-use' return".*

Recent research has attempted to investigate factors influencing consumers' willingness and participation in Product Return and Recovery Management (PRRM), such as convenience (Wagner, 2013), attitudes (Milovantseva and Saphores, 2013a), financial incentives (Gunasekaran et al. 2015) and environmental education (Pérez-Belis et al., 2015). In addition to all these factors, previous research also highlighted the relationship between return information and consumers' return behaviour. For instance, research conducted by Jungbluth et al., (2012), which conducted the feasibility study in developing environmental product information and relates products environmental impact to consumers' disposal decision. Another example is research conducted by Appelhanz et al., (2015) which developed a cost-benefit model of traceability information system for the capturing, processing, a provision on wood furniture product information based on information valued by consumers. Additionally, environmental information sharing has also been highlighted by Osburg et al., (2015), which noted that marketing should engage with the transmission of the information to consumers and identifies QR-codes as young consumers' preferred method of information sharing. All these examples focus on how certain factors affect consumers' return behaviour, but there is no specific research outcome focusing on EoL and EoU immediate return attitude. All these existing research give clear motive to conduct experimental research that uses information content (types of information) and information context (information presentation) as the independent variables and consumers' immediate return intention (IRI) as the dependent variables. The result is expected to offer guidelines for marketers in communicating the EoL and EoU return, in terms of what needs to be considered when they attempt the related environmental campaigns or awareness programs.

1.3 Problem Statement

Advocates perceive that the individual environmental concern should also be reflected in their disposal habit (Pérez-Belis et al., 2015; Jena and Sarmah, 2015). However, actual practice in disposal habit is not as satisfactory as it should be. While consumers have shown a gradual growth trend in environmental awareness, their environmental behaviour in terms of returning the used products had not increased. For instance, in the case of Waste Electrical and Electronic Equipment (WEEE) collection, only 29.5 kg per capita was reported in Norway (State of the Environment Norway, 2014). Many studies highlight that consumers tend to retain the no longer used products at home (Milovantseva and Saphores, 2013b) or dispose them along with other waste fractions in domestic bins (Bigum et al., 2013). Evidently, this shows some sort of disconnection between consumer environmental awareness and actual environmental practice.

This sort of disconnection leads to another problem, which is uncertainty. Uncertainty in quality and quantity of EoL and EoU return has been acknowledged in literature since the 1990s (Pérez-Belis et al., 2015). The uncertainty problem caused by a high variety of type, quality, and condition of raw materials (returned products). The early research in closed-loop supply chain conducted by Thierry et al., (1995) identifies that businesses were facing a challenge in uncertainty related to timing, quantity and quality of the returned products, and the mismatch between the supply and demand of the returned and remanufactured product. The same problems then continually had been highlighted in research conducted by Gungor and Gupta (1998), Seitz and Peattie (2004), and Toffel (2004). These problems remain unresolved as Guide and Van Wassenhove (2009) and Jena and Sarmah (2015) also indicate that it still exists. One of the reasons for this uncertainty problem is growing stockpiling of electronic waste (e-waste) among consumers (Milovantseva & Saphores 2013b). Consumers tend to retain their used products at home and delaying the return process. This will affect the recycling rate. For instance, the recycling rate of TVs in the United States was only 17% of the units ready for end-of-life management in 2012 (EPA, 2014). To increase the figure of the units ready for end-of-life management, immediate return attitude should be practised. Public participation in immediately return the used products will lead to the optimal recovery operation. Optimal recovery not just promise the profitable remanufacturing process for (re)manufacturers, but also offer better quality remanufactured products for consumers (Milovantseva & Saphores 2013a). Overall, effective recover operation will give socio-economic benefit to all of us. Here, shows the importance of conducting this research, which focusing on the social change to immediately return their e-waste, minimizing the retaining period. Immediate return attitude is assumed to be a good social change in consumers' EoL and EoU return behaviour.

Educating consumers about the importance of immediate return after consumption is another method to minimize the uncertainty problem. It is as additional to other interventions and methods to improve the quality of return that have been highlighted in extensive literature and research reports (for example, Wagner, 2013, Milovantseva and Saphores, 2013a, Gunasekaran et al. 2015, Pérez-Belis et al., 2015, Jungbluth et al., 2012, Appelhanz et al., (2015), Osburg et al., 2015). Most literature found that there is a need to polish the environmental education system, particularly the EoL and EoU return practice. Pérez-Belis et al. (2015) said that although environmental education has been acknowledged as being the 'heart' of all environmental education programs, the role of the Original Equipment Manufacturers (OEM) concerning the environmental learning experience of end consumers is still an area of long-standing confusion. This unresolved problem has led to the lack of a

concerted effort in the provision of educational input in the EoL return subject and the quality of return is indirectly being affected.

In closed-loop supply chain literature, more attention has been given on consumer's behavioural attitude towards remanufactured products (Jena & Sarmah 2015). However, discussion about the consumer's immediate return intention of the used products which can help in solving the uncertainty problem in the closed-loop supply chain is absent in the existing literature. This research has tried to bridge this gap in the literature. This research is intended to study consumers' intention and perception towards returning the used products. Particularly, this research is intended to examine the role of product return information in modifying consumers' return attitude. The word "modifying" here means that result of this research may help in introducing changes in current consumers' return behaviour. The expected change is, consumers will no longer practice to stockpiling used products and take immediate action to return them for proper treatment or disposal. Therefore in such a situation, the information-sharing strategy for EoL and EoU return through product return knowledge which highlights the inclusion of information such as time and quality of return are crucial. The existence of this specific environmental information is expected to initiate greater commitment among consumers to immediately return their durable household waste.

1.4 Research Aim and Objectives

Customer participation can be viewed as critical resources for environmental management practices implementation such as product returns and reverse logistics (Chan, 2005). For environmental management, customer participation and their recognition are important for firms to fulfil their extended producer responsibility on product return and cycling (Lai et al., 2014). Therefore, this research aims to explore end-of-life and end-of-use return information formulation concerning amplifying immediate return of household electronic waste. This research is aimed to identify types of information content and information context and to explain the effect of the information in encouraging immediate post-consumption return. The outcome for this research is a validated information-sharing framework with the proposed constructs.

To achieve the latter aim, this research is conducted based on two categories of objective; general research objectives and objectives related to hypotheses development. The general research objectives are as followed:

- to form an introductory chapter to provide a road map to the research study

- to undertook a comprehensive literature review to identify the key themes in product return and recovery management, information content and information context
- to explain underpinning theory that will be used
- to develop the hypotheses statement that will explain the relationship between identified constructs
- to explain the methods used to collect empirical data that will be used to validate the proposed EoU and EoL return information sharing framework
- to perform descriptive and inferential analysis on collected data
- to explain the findings on data analysis and the process of validating the proposed frameworks
- to explain research contribution, future research direction and research limitation

For hypotheses development, the following objectives are articulated:
- to examine the role of product return knowledge in consumers' attitude towards EoL and EoU immediate return
- to explore the relationship between consumers' attitudes toward EoL and EoU immediate return and their immediate return intention
- to decide whether positively or negatively framed message is more effective in appealing for the electronic waste immediate return
- to examine the relationship between message framing and different segmentation in environmental motivation towards immediate return intention
- to examine the relationship between message framing and different segmentation in environmental knowledge towards immediate return intention

The first two hypotheses-development objectives cover the aspect of information content. Meanwhile, the other objectives cover the aspect of information context (presentation). Consumers' segmentation applied in this proposition. The segmentation will be based on respondent's environmental motivation and environmental knowledge. Result of this proposition will be used to suggest either positively or negatively framed message is more effective in different segmentations of consumers. All of the constructs and stakeholders (consumers and Original Equipment Manufacturer) will be visualized in the EoU and EoL return information sharing framework. Finally, the proposed information-sharing framework will be assessed and evaluated by collecting primary data.

1.5 Nature of Study

This research is conducted by using a mixed-method methodology. Qualitative method is used in pre-development phase and quantitative method is used in the post-development phase. Before the development of the proposed framework, key themes are explored by using qualitative content analysis. The exploration of key themes in product return and recovery management (PRRM) is done through systematic literature reviews. Literature review also conducted to find the gap in underpinning theory and contributed to the identification of constructs included in the conceptual framework.

This research uses the quantitative method to explain and predict observed variables in product return activity. The quantitative method systematically guides this research in collecting numerical data for hypotheses testing purpose. To collect numerical data, this research uses questionnaires. Questionnaires distribution is based on a convenience sampling method. Respondents for the self-administered questionnaires are completely on voluntary basis. To maximize the response rate, different approaches are planned to be employed. The participants are guaranteed privacy of their data and were free to opt online or offline survey. For the online survey, respondents received an e-mail message containing an information letter and an active link to an anonymous Web-based survey, whereas, in the offline survey, authors visited the respondents' location personally and collected data through the hard copy of questionnaire survey form. For the research approach, this research uses the deductive approach, which means the basis for this research is created based on existing theories. Data analysis and conclusion then will be drawn based on deductive reasoning based on the result from empirical data. Additionally, this research use positivism paradigm, where this research is conducted to validate the theory and to increase the understanding of phenomena through formal propositions, quantifiable measures of variables and hypothesis testing.

1.6 Thesis Outlines

- ***Chapter 1: Introduction -*** Chapter 1 discusses the research background focusing on product return in general. The highlighted issue is consumers' motivation and participation in product return activity. This chapter also introduces the importance of product return information that could affect consumers' immediate return attitude. The aim and objectives then followed.

- *Chapter 2: Literature Review* - Chapter 2 contains a depth discussion on reviewed literature. Initially, this chapter reviews product return and recovery management from numbers of subtopics. Return methods, stakeholders, impediments and drivers are the subtopics that will be discussed to give a clear vision of research direction. This chapter will be highlighting the uncertainty problem in the recovery process and storage behaviour among consumers that have been identified as the previous chapter. The discussion also leads to the introduction of constructs that will be used in conceptual model development. The literature review also will discuss the application of social marketing theory in the research area.

- *Chapter 3: Conceptual Model Development* - Chapter 3 proposes a conceptual model to show the relationship between the identified independent and dependant variables. Additionally, the discussion of moderator and selected theory will be included. This will include all constructs that have been discussed in the previous chapter.

- *Chapter 4: Research Methodology* - This chapter is particularly to describe research strategies. The research strategies will be used to test the proposed conceptual model and to introduce the approach in gathering the first-hand data regarding the effects of influential factor. Questionnaires design will be elaborated and relevancy of question set will be provided.

- *Chapter 5: Research Analysis* - This chapter will gather all the result of the questionnaire approach. Specific software will be used for analysis purpose. The result will be presented in graphical presentations for better understanding

- *Chapter 6: Research finding* - Critical assessment on the effect of influential factor will be described in this chapter. The description of how the finding could be used by interested parties also will be provided

- *Chapter 7: Conclusion, contribution, future research and limitations* - This chapter summarises the research process, objective achievement, limitations and lesson learnt. Possible future research opportunity will also be included.

1.7 Conclusion

In product return activity, acquisition strategy is one of the core processes. By having good platform and facilities to collect, inspect and consolidate returned products with forward logistic activities, plus the costly outsourcing arrangement, manufacturers, especially among the big names in the manufacturing industry are currently in the right track to support this process. But, all these things are meaningless if the return rate is way too small to cover the cost of investment. For that reason, there is a need to extend manufacturers responsibility in educating consumer towards product return. In other word, manufacturers are responsible for making sure that product return information is visible for consumers' references. OEMs should start considering this aspect to overcome the product return uncertainty problem.

The needs of these motivation factors are relevant based on the wide variance of how people react and show their accountability in creating a better environment to live in. If consumers only "feel obliged" or to have a natural environmental concern, they may feel less motivated to return used products. Furthermore, environmental concern not really naturally developed in everyone. It seems to create a win-win situation for businesses and consumers. The research finding is expected to be considered as an important input for business organizations to improvise their collection plan and less down the reliance on one-way effort as current practice.

2. LITERATURE REVIEW

SUMMARY

This chapter reviews relevant research on Reverse Logistics (RL), with particular attention to related literature on Product Return and Recovery Management, information flow in reverse supply chain and EoL and EoU product return information. The chapter starts with a broad discussion on product return and recovery management (PRRM) before emphasizing the parties involved in related activities, problems and relevant factors that influenced the participation of related parties. Additionally, discussion on types of return and recovery options also included presenting a clear understanding of research direction. The second part of this chapter will cover information flow in the reverse supply chain that will lead to the discussion of crucial information type which fortifies successful product recovery management. Then, this chapter will present the landscape of Business-to-Business (B2B) and Business-to-Customer (B2C) information sharing practices. At the end of this chapter, the research summarizes the literature reviews by identifying relevant gaps and associating them with the main purpose of this study.

2.1 Introduction

To cope with the upsetting reality that the world facing today, which are resources scarcity and environmental degradation, scholars, policymakers, government and manufacturers start to pay attention to product return and recovery management (PRRM) practice. According to Srivastava and Srivastava, 2006, practitioners and academia are focusing on how to proficiently and ecologically manage product returns. This practice is believed to help manufacturers in providing guidelines to recapture value from unproductive assets from returned products (Shaharudin et al. 2015) and at the same time to fulfil strict environmental policy and legislation (Guide and Van Wassenhove, 2009).

The serious threat for sustainability efforts development occurs due to manufacturers' ignorance in proper management of used products as what has been practised in the conventional approach (Jayaraman and Luo, 2007). As to improvise the conventional approach, scholars started to come out with valuable findings such as closed-loop supply chain, reverse supply chain, reverse logistic, green manufacturing and green supply chain initiatives. All these findings show that manufacturers can no longer ignore and need to extend their post-production responsibility. Since then, knowledge and awareness of this topic start to spread out to other parties, such as distributors and consumers. Nonetheless,

literature also has shown that there is an inconsistent pattern of green practice awareness happens around the world. According to Zhu et al. (2007), green initiatives are well-acknowledged in developed countries but not widespread in developing countries. Guide and Wassenhove, 2009 found out that two main reasons that motivate firms to proactively engage in product returns and recovery management in the developed countries are to support commercial returns in the United States and fulfil strict environmental policy and legislation in Europe. On the other hand, practitioners in developing countries typically perceive product returns and recovery management as a grave burden on scare resources (Shaharudin *et al.*, 2014). Shaharudin et al. (2014) also highlight that researchers have overlooked sustainability and green supply chain management, especially in the area of product returns and recovery in developing nations.

2.2 Overview of Product Return and Recovery Management

Product returns and recovery management can be defined as all the activities involved in managing product returns such as avoidance, gatekeeping, reverse logistics, disposal, warranty, remanufacture, reclaim, and other green practices (Rogers et al., 2002). From the logistics point of view, product recovery creates a reverse flow of goods that originates at the locations of product holders, referred to as customer zones. After returns are consolidated at some facilities called collection centres, they are shipped to remanufacturing facilities where inspection, sorting, and disassembly operations are performed, and product recovery takes place. Unrecoverable returns may be sent to disposal sites (Aksen et al., 2009). From another perspective, product return and recovery management involve a different set of activities. For product return alone, it involves activities of returning purchased or used products from point of consumption; consumer to retailer or appointed third-party collector. The products then will be channelled back to its point of origin; manufacturer. At this point, manufacturers will decide the best recovery option to obtain initial value or to find the most appropriate use for parts or materials (Ramirez, 2012) from the returned products. If the returned products left no value, manufacturers are responsible to properly dispose them. In short, product return involves activities such as collection or acquisition, reverse logistic and product disposition where products sorting, testing and grading will take place.

Product returns can be grouped according to the three phases of the supply chain: manufacturing, distribution, and customer use or consumption (De Brito and Dekker, 2004; Talbot et al., 2007; Stindt and Sahamie, 2012). Manufacturing returns occur during the production stage whereas distribution returns refer to returns that occur during product distribution. For example, De Brito and Dekker, (2004); Talbot et al., (2007); Stindt and

Sahamie, (2012) define manufacturing return as the return that emerge during the production process, such as production scrap materials, rejected parts, surplus products and by-products. As for the UK Environmental Agency, manufacturing return means discarded products (The Chartered Institute of Purchasing and Supply, 2007). As for customer return, this type of return is initiated by the customers after any purchase. From a customer's perspective, there are various reasons for returning products; commercial return, false failure return, end-of-use and end-of-life return. Commercial return means consumer returns the products to the reseller within 30 to 90 days after purchase. Some customers do not understand how to operate a product or have changed their minds, and then claim that the product did not function properly (Rogers and Tibben-Lembke, 2001). Such returns are called non-defective or false failure returns. In the state of end-of-use, products are returned when a functional product is replaced by a technological upgrade. When the product becomes technically obsolete or no longer is useful for the current user, product backflow occurs in the form of end-of-life returns. The last kind of product returns are repair and warranty returns that occur throughout, and even beyond, the product life cycle.

For recovery management, scholars agree that manufacturers practice these five options; repair, refurbish, remanufacture, cannibalize or recycle (Thierry et al., 1995). Repair or also known as parts replacement is the recovery option that restores particular functionality of used products to working order. Repair requires product disassembly at product level. As for refurbishing, used products will undergo some sort of technological upgrading to return them to specified quality level, so that they will satisfy demand in the secondary market. The amount of recovery work for this type of recovery option is less rigorous than for new products, but more when compared to the repair option (Lamsali, 2013). The third recovery option is remanufacturing. Remanufacture basically involves a lot more work. It started with disassembly, followed by modules or parts inspection and finally technological and module upgrading. All these are needed to elevate the quality of used products to the level of new products. Next is cannibalizing, which involves the recovery of a limited set of reusable parts from return products. These retrieved parts are then reused in repair, refurbishing or remanufacturing of other return products, modules and parts. Lastly is recycling. Recycle means that manufacturers will reuse materials from return products for other applications. Table 2.1 presents the types of recovery option based on disassembly level and quality requirements. Figure 2.1 simplifies the activities involved in reverse supply chain that show the flow of product return and recovery management.

Recovery Options	Level Of Disassembly	Quality Requirements	Resulting Product
Repair	To product level	Restore product to working order	Some parts repaired or replaced
Refurbishment	To module level	Inspect and upgrade critical modules	Some modules repaired or replaced
Remanufacturing	To part level	Inspect all modules/parts and upgrade	Used and new modules/parts in new product
Cannibalization	Selective retrieval of parts	Depends on use in other product recovery options	Some parts reused, others disposed of or recycled
Recycling	To material level	Depends on use in remanufacturing	Materials used in new products

Table 2.1: Product Recovery Option Based on Disassembly Level Quality Requirements (Krikke et al., 1998)
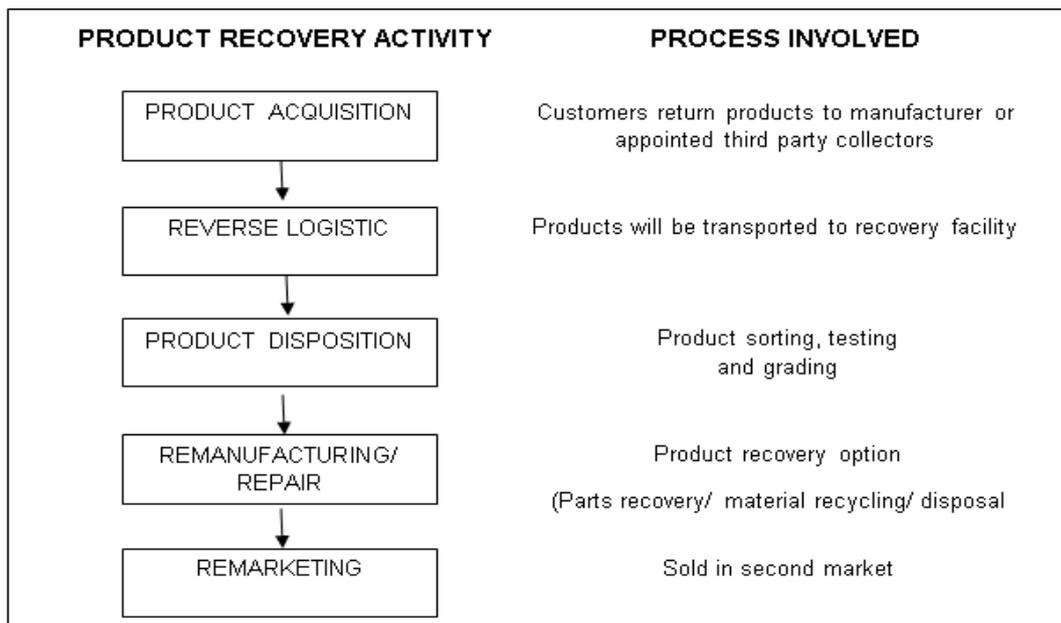
Figure 2.1: Product Recovery Activities (Guide and Van Wassenhove 2002)

To respond to valuable findings presented in high impact academic journal, policymakers and governments enacted numbers of environmental legislation that requires responsible parties' compliance. Examples of environmental legislation that are widely adopted in the US are Extended Producer Responsibility (EPR) and Product Stewardship (PS).

In addition to the framework and model that formulated for manufacturers and business organizations, scholars also came out with numbers of models related to consumers. Most of them are related to consumer behaviour. In explaining consumers' recycling behaviour, scholars normally used Theory of Planned Behaviour (TPB), the Value–Belief–Norm (VBN) model, and the Information, Motivation and Behavioural skills model (IMB) (Ajzen, 1991; Fisher et al., 1999; Seacat and Northrup, 2010; Stern, 2000). However, these models do not incorporate situational factors or structural and institutional considerations which could facilitate or restrict recycling behaviour. To overcome these weaknesses, Infrastructure–Service–Behaviour model has been formulated. The Infrastructure–Service–Behaviour model facilitates effective interventions without focusing only on individual choice as the behaviour models do, but also on external determinants exploring the relationships between internal and external factors (Timlett and Williams, 2011).

2.2.1   Return/Collect Methods

To achieve profitable recovery activity that results in revenue opportunity, manufacturers need to ensure the successfulness in product return program. As the core activity in product acquisition, product return program should gain commitment from all related parties; consumers, retailers and collectors. Insufficient resource commitment is cited as one of the biggest problems in developing successful product returns programs (Walsh, 2006).

In fact that numbers of the party involved in this activity, the word 'return' and 'collect' will be used interchangeably throughout this report. The word return will be used to convey the message that the action is taken by consumers and the word collect will be used when the action is taken by collectors or manufacturers. Both words convey means in acquiring used products from consumers so that the products can be recovered or properly disposed.

Collection activity or core acquisition is the first and a very important stage in the recovery process, where product types are selected and products are located, collected, and, if required, transported to facilities for rework and remanufacturing. Used products originate from multiple sources and are brought to a product recovery facility, resulting in a converging process (Srivasta and Srivasta, 2006). Three initial collection methods are normally used by manufacturers, namely mail delivery return, pick-up collection and customer drop off (Lamsali, 2013). Mail delivery return has also been mentioned by Canning (2005). In the other hand, Keramitsoglou and Tsagarakis (2013), suggest that there are three main collection methods, which are curbside collection, drop-off system at central points of town and neighbourhood drop-off system. To make the sorting process easier, different bins or

bags with distinct colours are being used in these collection methods. Based on these literatures, it can be concluded that they are three main categories of collection methods with four product return channels as presented in Table 2.2.

As for product return by consumers, they manage the waste differently according to the type of waste. Household generally will generate two types of recyclable waste, which are from durable and non-durable consumer goods. Durable goods are anything that is consumed over a long period and commonly the life cycle ends when they are broken and malfunction. Examples of durable goods are furniture, kitchen appliances, computers, mobile phones and office equipment. For non-durable goods, they are products that are consumed over a short period. Examples of non-durable goods are foods, beverage and cloth. In related to collection methods stated in the previous paragraph, curbside collection is commonly available for waste that has been generated from non-durable goods, such as food and beverages packaging, researchs and old clothes. Whereas, for waste that generated from durable goods, such as electronic waste (e-waste), need to be transported to the nearest drop-off site or collection centre or retail outlets. This is called a bring scheme (Srivasta and Srivasta, 2006). Additionally, for small size e-waste, such as mobile phone and modem, consumers can post it to specific product recovery address (Canning, 2005).

Collection Methods	Product Return Channel
Mail delivery	Mail delivery return to the specified address
Pick-up collection	Curbside collection (collectors performs door-to-door collection)
Customer drop off (Lamsali, 2013) / Bring Scheme (Srivasta and Srivasta, 2006)	Drop-off system at central points of town (collectors collect dropped off items from squares or supermarkets)
	Neighbourhood drop off system (collectors collect dropped off items from designated neighbourhood area)

Table 2.2: Collection Method

2.2.2 Stakeholders in PRRM

The supply chain comprises a variety of stakeholders, even more so than individual enterprises within the supply chain, especially when environmental issues are introduced (De Brito et al., 2008). This stakeholder identification research leads to the search of literature that investigates and identify the roles of various stakeholders within green practices. As a result, it was reported that Gunther and Scheibe, (2005) and De Brito *et al*.

(2008) use stakeholder theory to conduct the investigation. Stakeholder theory also found to be used in numbers of other research, such as specific stakeholder influences on green purchasing (Björklund, 2010; Maignan and McAlister, 2003), life cycle analysis in the supply chain (Matos and Hall, 2007), environmentally-oriented reverse logistics (Sarkis *et al.*, 2010), 'closing the loop' for greening supply chains (Zhu *et al.*, 2008), and green logistics practices (Chien and Shih, 2007; González-Benito and González-Benito, 2006).

In related to green practices throughout the product lifecycle, all these researches seem to agree that involved actors or stakeholders are as followed:

- **Designers**

Product designers are responsible to design recyclable products, as suggested by EPR/PS law. Other than focusing on sustainable management of post-consumer waste, EPR/PS law also provides a framework for Design for Environment (DfE) or Design for Recycling (DfR) practices. Calcott and Walls (2005) justify that EPR/PS has a potential influence on the adoption of source reduction at the pre-consumer stage for upstream wastes through DfE or DfR. Designing the recyclability of a product with consumer convenience in mind would have the potential to increase collection and participation rates (Wagner, 2012). This will require a change in the design of product from design to market to design to disassembly and design to remanufacture and reuse. Therefore, the larger the extended life of the product, smaller would be the use of new resources (Pokharel and Mutha, 2009).

- **Producers (Manufacturers)**

Manufacturers are responsible to restructure, reorganize, support and plan activities surrounding the return and processing of used products. Flexibility and efficiency in the present reverse supply chain are the outcomes of these activities (Madaan *et al.*, 2012). To do that, manufacturers basically can use Reverse Enterprise System (RES). The RES can help manufacturers to efficiently plan, manage and control relevant information from the consumption point to the starting point, to counter the overall production cost of the supply chain (Daniel and Guide 2000)

- **Consolidators**

Consolidators are usually a third party entity which collects, transport, recycle or arrange for the recycling of consumer waste following the local environmentally sound management guidelines (Bouvier and Wagner, 2011). Consolidators could be the entity appointed by a government agency, operated by the manufacturer, retailer, private company or non-government agencies (NGO). The involvement of private companies is proven in the 2006 study by the International Association of Electronics Recyclers (IAER, 2006), which reported that over 500 private companies employing 19,000 workers that annually processed 1.4 million tonnes of electronics, which included 65 million computer-related devices. These consolidators are operated on a profit or non-profit basis.

For profit-based consolidators, their main income comes from reimbursement that paid by producers. That means, producers will pay every single cent they spend on collecting, transporting and recycling the products. This type of consolidators also receives payment or reimbursement for orphan items (items where the producer cannot be identified or is bankrupt) on a pro-rata basis. In the US, except for California, the states rely on local governments and private companies as the collectors to collect e-waste in which the manufacturers have some financial responsibility (Bouvier and Wagner 2011). This means that the collection is led by the local government agency and private-for-profit e-waste recyclers which receive agreed amount of financial incentive from manufacturers.

For non-profit consolidators, they provide drop-off collection site for consumers to return their used products. For example, in the US, Goodwill Industries is a major player in collecting electronics, specifically computers. Goodwill Industries is a non-profit donation centre for a variety of household items. Goodwill has partnered with Dell Computer through Dell's Reconnect Program, a household computer recycling program, which allows individuals to drop off any brand of computer-related electronic item for free at some 1900 participating Goodwill locations.

- **Consumers (Users)**

In the context of Reverse Logistic, consumers are the source of waste, or who generate waste upon products consumption. In product return activity, consumers are responsible to sort and separate the waste, store it and then transfer or transport it to an offsite collection site to place it in specifically designated areas or containers.

In short, when looking into the entire spectrum of the waste management system, these stakeholders are responsible for different stages. According to (Ordoñez et al. 2015),

these stakeholders also have varying degrees of freedom to determine how to best perform their task. For example, private waste companies usually use technological means for disposal and municipal regulations provide specific infrastructures for collection. Finally, individual household owners decide how to organize their home to gather and dispose the waste that is generated.

Related to the idea of stakeholders have varying degrees of freedom to determine how to best perform their task, as mentioned in (Ordoñez et al. 2015), these stakeholders also need to be educated on how to modify their way of doing things. Here lies the motivation of this research to modify disposal behaviour among individual household owners or consumers.

2.2.3 Consumers' Drivers to Participate in Product Return Activity

Factors that could influence consumers to participate in returning the used products can be divided into two categories, which are socioeconomic and non-socioeconomic factors. There is extensive literature available on who recycles. Many studies focus on socio-economic factors (see, for example, Vining and Ebreo, 1990; Jakus et al., 1997; Ludwig et al., 1998; Ebreo and Vining, 2000; Domina and Koch, 2002; Sidique et al., 2010; Wagner, 2011; and Bouvier and Wagner, 2011).

Convenience of a waste collection and recycling program is one of the most important non-socioeconomic determinants in whether an individual will recycle, or more accurately if they will sort/segregate materials, which materials will be segregated, how much of the material will be segregated, how often segregation will be performed, and how much and often will the material be transported to a collection site (Peretz et al., 2005; Perrin and Barton, 2001). In addition to that, Abdelnaser *et al.* (2011), Ongondo and Williams (2011), Sidique *et al.* (2010) also highlight that separation and cleaning requirements, having sufficient time, storage demands, distribution of free containers, or collection frequency as measures of convenience.

For non-durable household waste, such as plastic, glass and research, the driver that increases consumer participation in recycling these items is the availability of blue bins. The implementation of Packaging Waste Directive practices the use of blue bins in a few urban centres since 2003 (HE.R.R.Co., 2012). Availability of return channel also implies to small size e-waste, such as mobile phone and modem. These small size e-wastes can be returned

to manufacturers by mail. Consumer needs to post it to specific recovery address so that manufacturer could decide further action (Canning, 2005). However, this kind of practice is not available for bulky and heavy e-waste. There is no specific at-home facility provided for consumers in dropping off their no longer in use electronic appliances. To tackle this issue, collectors may be able to consider conducting periodic curbside collection or special collection event that will encourage consumers to properly return this type of e-waste.

In discussing the socioeconomic factor that encourages consumer participation in product return, incentives play a significant role in influencing customers' willingness to return their products (Lamsali, 2013). Klausner and Hendrickson (2000), Guide and Van Wassenhove (2001), Guide et al. (2003), Choi et al. (2004), Yalabik et al. (2005), Wojanowski et al. (2007), Aras et al. (2008) and Liang et al. (2009) propose various kinds of financial incentives. Guide and Van Wassenhove (2001) and Aras et al. (2007) suggest offering attractive incentives to motivate the end-user to return the product to a designated place. This will positively influence the return volume. Apart from an increment in terms of product return quantities, the amount of incentives offered by the manufacturers influences the quality level of the returned products (Aras and Aksen, 2008). According to Aras et al. (2008), some manufacturers have been able to influence the quantity of returns by using buy-back campaigns and offering financial incentives to product holders. Apart from buy-back and financial incentives, the refundable deposit also could be considered. Wojanowski et al. (2007) have assumed charging a refundable deposit to ensure product returns that will directly affect manufacturers' profit and collection strategies. Thus, adopting a proactive approach and offering the appropriate incentives depending on the quality state of cores is crucial for a company engaged in product recovery (Aksen, 2009). Aksen (2009) also emphasized that government-subsidized and incentive-based acquisition mechanisms are best applied in end-of-use (EOU) products in profit-stream (high value) recovery systems. According to Flapper et al. (2005), EOU products still have useful life but are no longer wanted by their users. Typical EOU products are consumer electronics and computer hardware such as cell phones, laptops, copiers, printers, toner cartridges, PC monitors and keyboards.

However, there are still some individuals who willingly engage in inconvenient processes of product return, so that their waste can be efficiently treated. This group of individuals believe it is the right thing to do or they are doing that because of social norms (Hornik *et al.*, 1995). Yet as many latest literature argues that a recycling minded person is more likely to recycle, but the opportunity must be convenient and/or available. According to Best (2009), Wagner (2011), Sidique *et al.* (2010), positive attitudes towards recycling affect decision-making, but

less so than convenience factors such as knowledge requirements, distance to a collection site and the existence of standard. Therefore, it can be concluded that positive attitudes towards recycling are not as important as perceptions of convenience. Convenience is based on the cost to engage in an action or behaviour through time-utilization (Yale and Venkatesh, 1986). According to Baksi and Long (2009), the time and effort to participate in recycling is an intrinsic cost to the individual, a disutility; the magnitude of the intrinsic cost is unique to each individual. Householders who perceive minimal time expenditure to recycle are more likely to recycle (Hornik et al., 1995; Jakus et al., 1997).

Increasing consumer awareness on the issues of environmental preservation has made product take-back and recovery an important aspect to be dealt with. According to Fleischmann et al. (2000), customer expectations urge companies to reduce the environmental burden of their products. A 'green' image (environmentally friendly company) has also become an important marketing element (Rogers and Tibben-Lembke, 1999). Additionally, the implementation of manufacturers' corporate social responsibility within the reverse logistics context also plays an important role (Sarkis et al., 2010). Therefore, firms need to comply with the strict environmental regulations and produce 'green' products as well as demonstrate good corporate citizen practices to enhance their 'green image' and marketability (Jayaraman et al., 2003).

2.2.4 Consumers' Storage Behaviour

According to Sabbaghi et al. (2015), consumers often tend to store their used, old or un-functional electronics for some time before they discard them and return them to the waste stream. Numbers of previous research highlighted this issue. For instance, Saphores et al. (2009). Saphores et al. (2009), who presented the first survey-based (Milovantseva & Saphores 2013b) estimates of e-waste items stored by US households. They found that by the end of 2005, US households stored at least 470 million small and 277 million large e-waste items, which substantially exceeded 2008 official estimates (EPA, 2008). However, as acknowledged by Saphores et al. (2009), these figures are likely underestimates because it is burdensome for survey respondents to go through attics and garages to count partly forgotten e-waste items.

Tackling the same issue is, Milovantseva & Saphores (2013b), who found that US households stored approximately 84.1 million junk TVs at the end of 2009. These estimates are approximately 20 million lower than calculations made by EPA (2011) which conduct the

same nature of research on the same year, 2009. According to EPA (2011), 104 million broken or obsolete TVs in residential storage at the end of 2009. The difference in the calculation is assumed caused by the different methodology used. EPA (2011) used methodology which relies on an indirect approach that combines 1980–2009 sales data with assumptions about the useful life of TVs from available studies and industry experts opinions. Meanwhile, Milovantseva & Saphores (2013b) calculate the data collected from a random survey of households representative of the US population. Another assumption on the calculation differences is, perhaps more TVs were discarded (not recycled) annually.

Milovantseva & Saphores (2013b) also reported that consumers tend to retain their e-waste (television) between the range of 5 to 16 years. This research reported that particular range of retention period based on these demographic factors; educational level, the gender of household head, marital status, household income and geographic location.

The recent research which explored storage behaviour among consumers is (Sabbaghi et al. 2015). One of the findings, Sabbaghi et al. (2015) reported that consumers tend to store unwanted HDDs for 1.11 years on average. Sabbaghi et al. (2015) also found that household consumers tend to keep electronic waste longer in storage when they use them less than the normal time. Another reason is consumers may think that the electronic devices have not been sufficient enough and can be reused in future. This is especially for the devices most recent manufacturing years. Sometimes, the initial purchase price paid by consumers was high, therefore they tend to keep it in storage. However, solid findings in this research area are needed. The best way is to survey consumers' sustainability behaviour. This kind of survey will find out the actual reasons behind storage behaviour among consumers.

Storage behaviour also leads to numbers of problem. For instance, technology obsolences for product recovery, low-efficiency disposal treatment that could danger human health and uncertainty problem in product return and recovery inventory. Regardless of functionality, the obsolete used products are not likely to be reusable (Babbitt et al., 2016). This behaviour increases the obsolescence rate of used still-functional products which will directly affect the further treatments such as reuse, upgrade, and refurbishment. The obsolete waste then might be dumped in landfill sites or recycled with low efficiencies such as being burnt for valuable metals which results in releasing of hazardous toxins into the environment and harmful effects on human health (Jang and Townsend, 2003, Kolias et al., 2014). These are the reasons why immediate post-consumption return is vital. According to Guiltinan (2015), consumers need to know time delay in collecting and processing products makes them unusable, obsolete and even completely unsalvageable. This means that knowledge about

technological obsolescence should be transferred to consumers so that they will initiate immediate post-consumption return. Consumers need to know that the sooner a used product is processed, the higher value recovered. Additionally, recycling metals in e-waste would reduce the environmental footprint of metals extraction (Huisman et al., 2004). Optimal recovery value is no longer beneficial for businesses but also helps in minimizing the risk in human health. It is time to view this issue from a social-good point of view. Understanding the nature of the used electronics in terms of quality, quantity and timing will diminish the risk of the unprofitability of recovery system as well as avoiding hazardous disposal that could threaten our health (Sabbaghi et al. 2015).

In the context of uncertainty problem, storage behaviour caused problems in inventory management of sources for the recovery process. This is supported by the findings in Milovantseva & Saphores (2013b). One of the reasons for this uncertainty problem is growing stockpiling of electronic waste (e-waste) among consumers (Milovantseva & Saphores 2013b). Uncertainty in quality and quantity of EoL and EoU return has been acknowledged in literature since the 1990s (Pérez-Belis et al., 2015). The uncertainty problem caused by a high variety of type, quality, and condition of raw materials (returned products). The early research in closed-loop supply chain conducted by Thierry et al., (1995) identifies that businesses were facing a challenge in uncertainty related to timing, quantity and quality of the returned products, and the mismatch between the supply and demand of the returned and remanufactured product. The same problems then continually had been highlighted in research conducted by Gungor and Gupta (1998), Seitz and Peattie (2004), and Toffel (2004). These problems remain unresolved as Guide and Van Wassenhove (2009), Brown-West et al., (2010) and Jena and Sarmah (2015) also indicate that it still exists. Even though producers come up with numbers of strategy to respond to reverse logistic, such as product take-back policy, extending the scope of producer responsibility, incentive-based scheme (refund payment) to encourage more return, it still insufficient. Consumers' willingness to commit in immediate return after usage phase is necessary. Any kind of motivation and knowledge sharing could be one of the solutions to encourage willingness and participation. Additionally, (Sabbaghi et al. 2015) also suggested that manufacturers should play a vital role in motivating consumers to return their household waste, especially e-waste.

2.3 Information Sharing In Product Return and Recovery Management

The vitality of information availability in supply chain management (SCM), closed-loop supply chain, reverse logistic, and particularly product return and recovery management are unquestionable (Parlikad and MacFarlane, 2006). In supply chain management (SCM), information exchange is considered key to managing physical product flows and improving cost and service performance of enterprises (Wu et al., 2014). All discussions in previous literature reveal that accurate and available information of product identity is required in PRRM due to uncertainty problem. The uncertainty problem caused by high variety of type, quality and condition of raw materials (returned products). This type of information will help remanufacturers to decide the best recovery option for the products.

According to Appelhanz et al. (2015), there are two ways of conducting information sharing; Business-to-business (B2B) and Business-to-consumer (B2C). B2B explains that the information is being shared among business partners, or supply chain partners, whereas B2C explains that business organizations provide the information for consumers' reference. In Supply Chain Management (SCM) that encompasses the forward and backward supply chain, information sharing between supply chain partners or business-to-business (B2B) receives more attention compared to business-to-consumer (B2C) (Lai et al. 2014). According to Lai et al. (2014), this happens because the main concern in SCM is profit maximization and cost minimization. However, when scholars embedded SCM with environmental management, information sharing in SCM is seen to happen between businesses and customers.

For B2B-based information sharing in SCM, the communication and related information are accessible through business repositories and intraorganisational or interorganisational information systems. In B2B, information technology is used to facilitate logistics activities such as cargo tracking, warehousing, and shipment notice handling, in support of product movement in the supply chain (Gunasekaran and Ngai, 2012). Examples of information systems and technology used in businesses to supply chain management (forward and reverse) are Enterprise Resource Planning (ERP), Decision Support System (DSS) Reverse Enterprise System (RES) and Radio Frequency Identification Device (RFID). Information gathered by RFID is commonly used in businesses' inventory management and shared among business organizations (Ondemir et al., 2012). RES is typically a boundary-spanning process taking care of returns between enterprises or of the same enterprise (Madaan et al., 2012).

All these technologies are deployed to result in effectiveness and efficiency, thus, will maximizing business profit and minimizing operational cost. Lai et al. (2014) categorized these information systems as profit-driven technology.

For instance, deployment of RFID and RES in PRRM is to support inventory management and product return management, respectively. RFID was examined as a means of enabling availability of after point-of-sales product information in research conducted by Parlikad and MacFarlane (2006). As for RES, it supplies the means of efficient planning, managing and controlling relevant information from the consumption point to the starting point, to counter the overall production cost of the supply chain (Daniel and Guide, 2000).

The profit-driven technology deployment is presented in the next paragraph, by using the example of RFID.

RFID is a technology which allows remote interrogation of objects using radio waves to read data from RFID tags which are at some distance from an RFID reader. The core output of the so-called networked RFID systems (Harrison, McFarlane, Parlikad, & Wong, 2004) developed by the Auto-ID Centre is the ability to connect products tagged with RFID to a network and thereby carry complete information associated with it throughout its lifecycle and ensure the flow of this information between the various actors in the value chain. In reverse flow, the first thing to do is to book all the products into company's inventory database. There is the use of a unique identification number to help in storing related information and progress tracking. The unique identification number is assigned either on an individual product or batch basis. Around 40% of the companies provide unique identification numbers to each product received, whereas another 20% of the companies prefer to identify the products in terms of batches. The remaining 40% do not use any mechanisms for product tracking (Parlikad & McFarlane, 2004). Utilizing this technology, the content of each product and component conditions are known without disassembly and inspection. Life cycle information also makes it possible to estimate the remaining life of the components and enables the fulfilment of remaining lifetime-based demands (Ondemir et al. 2012). Therefore, businesses will gain advantages in terms of minimizing the cost for disassembly, inspection and new raw materials acquisition to produce new products. The low-cost production will directly increase the chance to gain optimum profit.

Additionally, B2B information sharing also supported by other frameworks called Traceability Systems (TSs) and Environmental Management Information (EMI). TSs and EMI is the latest

information-sharing framework proposed by scholars in supporting business operations and satisfying environmental quests.

Traceability systems (TSs) provide accurate, timely, and consistent information about material flows and processes through the supply chain (Lai et al. 2015). This information can reduce operating costs and increase the productivity of individual companies and the entire supply chain (Timpe, 2006; Uusijarvi, 2010). Several studies about TSs in the wood-based supply chains focus on the B2B area (Bajric, 2010; Holzmann, 2009; Kasturi, 2005; Timpe, 2006; Tribowski et al., 2009; Uusijarvi, 2010). A traceability system has resulted from enhancement in identification technologies. The research streams of identification technologies are twofold. Firstly, several studies focus on marking technologies such as ink printing and RFID (Erhardt et al., 2010; Korten and Kaul, 2008; Virtanen et al., 2013). Secondly, many studies investigate material signatures such as anatomical, genetic, and chemical wood fingerprints (e.g. Charpentier and Choffel, 2003; Chiorescu and Gronlund, 2004; Flodin et al., 2008). Additionally, the role of TSs in the respective supply chain is often considered (Kasturi, 2005; Timpe, 2006; Uusijarvi, 2010), examining the benefits of the traceability in B2B relationships.

As the environmental awareness of the business community increases, trading enterprises have begun to recognize the need for environmental management information (EMI) sharing with their supply chain partners to compete for performance. As environmental management requires efforts beyond individual firms to encompass supply chain partners, developing the capability on EMI is critical for enterprises to sustain their business with a balance on protecting the environment (O'Rourke, 2014). To reduce information asymmetry, firms should communicate their environmental management practices and performance to outside stakeholders including customers and suppliers to improve supply chain coordination (Ramanathan et al., 2014). In closing the supply chain loop of their products, firms need EMI sharing to work with their upstream suppliers and downstream customers to mitigate the environmental damages caused by their products (Lai et al., 2014). Based on this, recent work by scholars started to pay attention to B2C information sharing by using EMI, TSs and Environmental Product Information (EPI). However, the recent research leaves a gap, where not all industries of consumer goods have been covered.

2.3.1 Business-To-Consumer (B2C) Product Environmental Information Sharing

In the context of information sharing in product return and recovery management, the extant research studies (e.g. Lai et al., 2014; Madaan et al., 2012; Moyaux et al., 2007) focus on information sharing between business organisations or Business-to-Business (B2B) which means manufacturers share product environmental information with retailers and collectors. A number of research studies investigated the use of technology such as Radio-Frequency Identification (RFID) and RFID Enabled Solutions (RES) to support product return and recovery management (e.g. Madaan et al., 2012; Nakabi et al., 2012; Ondemir et al., 2012). Contribution of these technologies is to ensure profitable recovery effort by controlling the right timing and quantity of returned products with acceptable quality. This current practice shows that it is more towards amplifying the collection rate (by collectors) not amplifying the return rate (by consumers). As the environmental awareness of the business community increases, trading enterprises have begun to recognise the need for Environmental Management Information (EMI) sharing with their supply chain partners to compete for performance. As environmental management requires efforts beyond individual firms to encompass supply chain partners, developing the capability on EMI is critical for enterprises to sustain their business with a balance on protecting the environment (O'Rourke, 2014).

To reduce information asymmetry, firms should communicate their environmental management practices and performance to outside stakeholders including customers and suppliers to improve supply chain coordination (Ramanathan et al., 2014). In closing the supply chain loop of their products, firms need Environmental Management Information (EMI) sharing to work with their upstream suppliers and downstream customers to mitigate the environmental damages caused by their products (Lai et al., 2014). To share environmental information with consumers, scholars come out with numbers of concept, such as EMI, Traceability Systems (TSs) and Environmental Product Information (EPI). For example, Jungbluth et al., (2012) conducted the feasibility study in developing environmental product information and related products environmental impact to consumers' buying decision. However, the latter research focused on the environmental impact caused by the products during the usage phase. Another example is research conducted by Appelhanz et al., (2015) which developed a cost-benefit model of traceability information system for the capturing, processing, the provision on wood furniture product information based on information valued by consumers. Additionally, B2C information sharing has also been highlighted by Osburg et al., (2015), which noted that marketing should engage with the

transmission of the information to consumers and identifies QR-codes as young consumers' preferred method of information sharing.

Table 2.5 summarizes references for B2C information sharing in product return and recovery management.

Key Research	Method Used	Information Sharing Channel	Key Finding	Research Contribution
Feasibility of environmental product information based on life cycle thinking and recommendations for Switzerland (Jungbluth et al., 2012)	Life Cycle Assessment (LCA) Swiss ecological scarcity method	Environmental Product Information (EPI)	Relate products environmental impact to consumers' buying decision (during the usage duration of products) Feasibility study in developing environmental product information (EPI)	Introducing the "eco-time" unit as understandable environmental impact calculation unit for consumer reference
Sharing environmental management information with supply chain partners and the performance contingencies on environmental munificence (Lai et al., 2014)	Resource Dependence Theory (RDT)	Environmental Management Information	Generate theoretical implication that EMI sharing with suppliers and consumers is positively associated with cost performance. Provide empirical evidence on the connection between EMI sharing and cost.	This study has contributed to understanding the performance impact of EMI sharing from RDT perspective under high and low level of environmental munificence.
Traceability system for	Four-layer information	Traceability System (TS)	Capture and deliver all information	Cost-benefit model of traceability

capturing, processing and providing consumer-relevant information about wood products: system solution and its economic feasibility (Appelhanz et al., 2015)	system architecture		valued by consumers by using four-layer system architecture	information system for the capturing, processing, the provision of wood furniture product information
An empirical investigation of wood product information valued by young consumers (Osburg et al., 2015)	Online survey Cluster analysis		Wood product information has medium relevance with regard to purchasing decision and a lower relevance compared with most other considered factors determining purchase decision (i.e. product's quality, appearance, durability and price). Identify ten wood product information. Items are valued by the three identified consumer segments. Marketing should engage with the transmission of the	Contributes to a deeper understanding of providing young consumers with wood product information leading towards increased product trust and purchase intentions

			information to consumers- identifies QR-codes as young consumers' preferred method.	

Table 2.3: References for B2C Information Sharing in PRRM (2010-2015)

2.3.2 Business-To-Consumer (B2C) Information Sharing In EOU and EOL Return

In B2B information sharing, accurate, timely, and consistent information about material flows and processes through the supply chain can reduce operating costs and increase the productivity of individual companies and the entire supply chain (Timpe, 2006; Uusijarvi, 2010). In the other hand, for B2C information sharing, consumers value detailed product information, especially in pre-purchase processes, e.g. product origin, quality, sustainable characteristics (Regatteri et al., 2007) and post-consumption processes (Appelhanz et al. 2015). B2C information sharing can reduce consumers' information asymmetries and associated information costs (Hobbs, 2013; van Amstel et al., 2014), thereby increasing product trust and purchase intentions (Chen et al., 2012; Clemens, 2013; Ortega et al., 2014; Ubilava and Foster, 2012). The provision of these types of information enhances trust in products as well as preferences for eco-friendly and abstinence from non-eco-friendly materials (Gleim et al., 2013). Hence, it will result in consumer engagement in pro-environmental behaviour, such as sustainable consumption and disposal.

B2C information sharing, particularly in delivering information of immediate return after consumption as proposed by this research, can be considered as a valuable addition to existing pro-environmental messages and environmental labels. Currently, the existing pro-environmental message promotes a behaviour of not disposing electric and electronic household waste (e.g. small kitchen appliances, printer, toys, and batteries) to domestic bins, to solve various environmental issues. As an addition to environmental issues solutions through pro-environmental messages, highlighting immediate return after consumption seems necessary. Good pro-environmental messages not only draw the customers closer to pursuit long-term and profitable relationship (Bendapudi & Leone, 2003; Payne, Storbacka, Frow, & Knox, 2009), but it ultimately results in positive behavioural intentions from consumers (Viet & Cass 2013).

The inclusion of information about the immediate return after consumption in product return knowledge is expected to minimize storage behaviour among consumers. Storage behaviour is the act of retaining any used product for a very long time and obviously, this product will reach the disposal point in unacceptable quality for remanufacturing purpose. For example, in 2008, Americans recycled less than 14% of the 2.87 million metric tons of e-waste they generated, and they are storing larger volumes of e-waste than previously estimated by the EPA (Saphores et al., 2009). Not all household wastes are alike and electronic waste (e-waste; defined as all broken, obsolete, or out of fashion products containing a circuit board that reach the waste stream) has only received limited attention so far despite being the fastest-growing segment of household waste (U.S. EPA, 2009). Hence, it is necessary to supply additional information regarding this matter. Product return knowledge that consists of information like ideal timing of return, acceptable quality of return for remanufacturing purpose and adequate quantity of return should be constructed and available for consumers' reference.

Why products return knowledge with specific return information? It is expected to respond to the exponential growth of durable household waste, for example, e-waste. The exponential growth of durable household waste may further be intensified by a reduction of the useful life of existing devices driven by the ever faster release of products with new features (Saphores et al. 2012). It is easier to solve the exponential growth of e-waste by using the drop-off method, instead of the take-back program and curbside collection. By definition, drop-off recycling method means that consumers willingly drop their waste at the provided facilities. On the other hand, the take-back program and curbside collection are the collection method initiated by (re)manufacturers, government or other third parties. Drop-off recycling is easier to implement than take-back or other programs involving manufacturers and the required facilities are typically less expensive to operate than curbside collection programs (Saphores et al. 2012). To amplify the return initiated by consumers, awareness is vital. According to Jena & Sarmah (2015), to spread awareness among the consumers for returning their used products is a challenging issue for the (re) manufacturer. Nonetheless, this issue is challenging yet attainable. It is attainable with the support of adequate and accurate information throughout educational programs and campaigns, plus the familiarity of general environmental knowledge among consumers. Since today's consumers appreciate general environmental knowledge more than ever, the distribution of this type of specific environmental knowledge is possible. The specific environmental knowledge proposed by this research is based on Figure 2.2. Based on research conducted by Guide and Van Wassenhove (2009), who investigated the evolution of closed-loop supply chain, they come out with three sub-processes in the reverse supply chain which contains different information

respectively (as shown in Figure 2.2). They are product return management (front-end), remanufacturing operational issues and remanufactured products market development (back-end). All these sub processes carried valuable information that currently used to make strategic decision in implementing reverse supply chain. Figure 2.2 clearly shows that time, quality and quantity of return are the types of information required in product return management, as it will help remanufacturers to decide the best recovery option for the products.
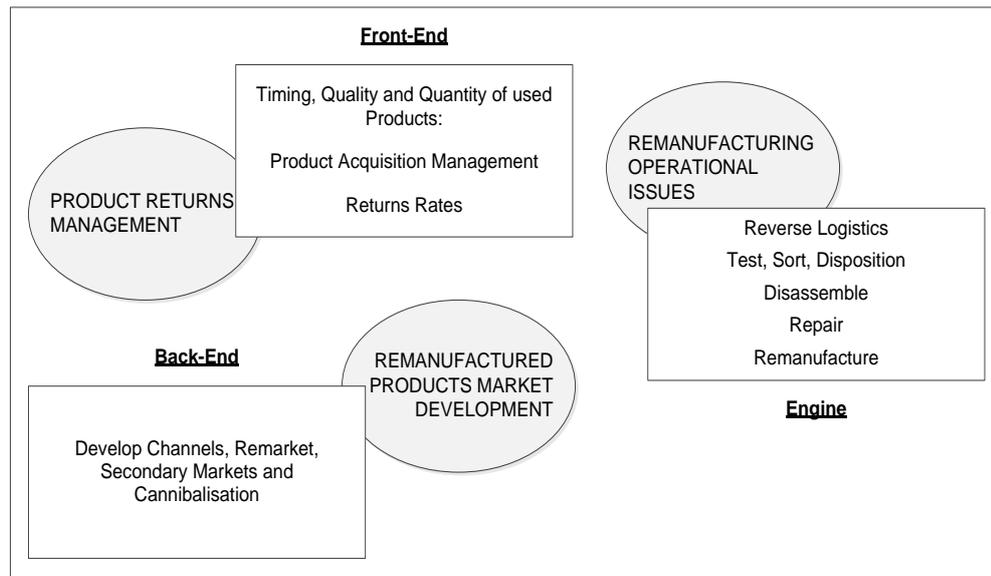
Figure 2.2: Sub Processes in Reverse Supply Chain (Source: Guide and Van Wassenhove, 2009)

Considering what it offers to manufacturers, these types of information also can be included in consumers' environmental education programme. For (re) manufacturers, this information is vital to ensure a profitable recovery process, but for consumers, this information will help them understand why they need to immediately return their durable household waste. For this case, consumers need to be educated that they can contribute to ensuring human health and social good.

2.3.3 Consumers and Convenience In Obtaining Necessary Information

The context of environmental information sharing presented in this research explains how producers should help consumers to obtain necessary information. This means that producers are responsible to provide relevant and accurate information for consumers'

preference to influence consumers' decision making in practising product return behaviour. As for the knowledge requirement concept, it explains consumers' expectation of information availability and presentation. Knowledge requirement is one of the convenience factors suggested by Wagner (2013). Therefore, convenience in seeking relevant information should be available and accessible to consumers. According to Wagner (2013), convenience is a highly influential factor affecting participation in recycling and convenience is a subjective construct. The subjectivity of convenience has been highlighted in earlier research conducted by Yale and Venkatesh (1986), which noted that 'convenience apparently is many things to many people and it may vary among, and within, individuals...'. Yale and Venkatesh (1986) also highlighted that convenience is highly dependent on the individual, influenced by a variety of factors, such as economic, temporal, spatial, psychological, sociological, philosophical, and situational. Convenience is based on the cost to engage in an action or behaviour through time-utilisation (Yale and Venkatesh, 1986).

The cost and time concept then has been expanded to the recycle behaviour subject by Boldero (1995); Hornik et al., (1995); Jakus et al., (1997) and Baksi and Long (2009). According to Boldero (1995), when the cost becomes too high, individuals will not recycle even when there is an environmental or community benefit. Householders who perceive minimal time expenditure to recycle are more likely to recycle (Hornik et al., 1995; Jakus et al., 1997). The time and effort to participate in recycling is an intrinsic cost to the individual, a disutility; the magnitude of the intrinsic cost is unique to each individual (Baksi and Long, 2009). Based on the subjectivity of convenience, Wagner (2013) noted that there is a need to better understand the multiple steps involved in participation to identify the specific elements that affect convenience. As a result, Wagner (2013) illustrated the steps as shown in Figure 2.3.

```
                    ┌─────────────────────┐
                    │  Obtain Necessary   │
                    │    Information      │
                    └─────────────────────┘
                              │
                    ┌─────────────────────┐
                    │  Segregate Material │
                    └─────────────────────┘
                              │
                    ┌─────────────────────┐
                    │ Store Segregated    │
                    │     Materials       │
                    └─────────────────────┘
                              │
               ┌──────────────┴──────────────┐
               ▼                             ▼
      ┌─────────────────┐          ┌─────────────────┐
      │    Curbside     │          │  Non-Curbside   │
      │   Collection    │          │   Collection    │
      └─────────────────┘          └─────────────────┘
               │                            │
      ┌─────────────────┐          ┌─────────────────┐
      │ Transfer        │          │  Load Vehicle   │
      │ Materials to    │          └─────────────────┘
      │ Curbside        │                   │
      └─────────────────┘          ┌─────────────────┐
               │                   │ Drive to        │
      ┌─────────────────┐          │ Destination     │
      │ Retrieve        │          └─────────────────┘
      │ Collection      │                   │
      │ Container       │          ┌─────────────────┐
      └─────────────────┘          │ Drop-Off        │
                                   │ Materials       │
                                   └─────────────────┘
                                            │
                                   ┌─────────────────┐
                                   │ Return to Origin│
                                   └─────────────────┘
```
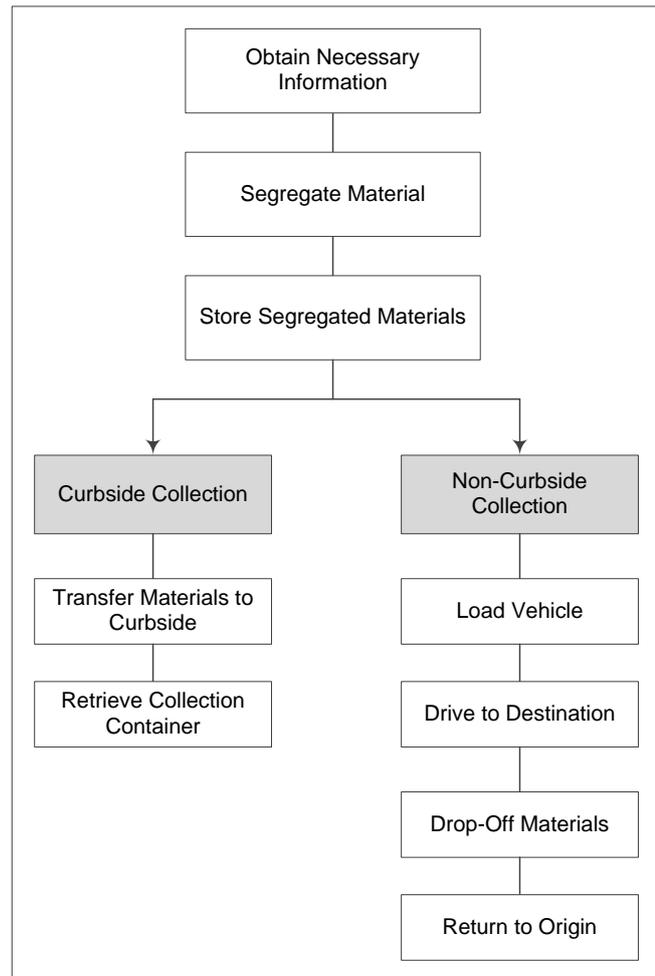
Figure 2.3: General Steps for Generators Handling Waste under EPR/PS Frameworks
(Source: Wagner, 2013)

Based on steps in participation illustrated in Figure 2.3, it evidently illustrates that obtaining necessary information is the decisive point influencing further action by individuals. In the case of encouraging consumers to participate in product return and recovery activity, consumers need to obtain knowledge about which materials that can be returned, if and to what extent separation is required; when collection occurs for curbside collection and for non-curbside collection programs; where, when, and how materials can be dropped off. Additionally, for drop-off site, consumers need to know and identify the process, site, and hours of operation for drop-off sites. Obtaining these kinds of information is time-consuming and could cause demotivation among consumers in practising their pro-environmental behaviour. According to Saphores et al., (2006), familiarity with recycling increases the willingness to drop-off e-waste because individuals do not have to invest time in determining requirements. An individual who must invest considerable effort and time to initiate the process will less likely do so (Wagner, 2013). Convenience in knowledge requirement is achievable when the necessary information is visible and understandable, or another word, it

must be presented and easy to understand. This goes the same to the case of product return knowledge which intended to initiate an immediate return after EoL and EoU phase among consumers. It is the producers' responsibility to ensure that this kind of information is available, accessible and understandable. To enhance the efficiency of translating these specific environmental information, it is better to consider consumers' acceptance of information content and information presentation (Raziuddin et al. 2016).

The discussion of translating specific information to an understandable message leads this research to explore the customer knowledge creation process. The knowledge creation process comes first before the knowledge can be shared. Customer knowledge is one of the domains in knowledge management and received relatively little attention (Khodakarami & Chan 2014). Khodakarami & Chan (2014) also highlights three categories of customer knowledge. The first one is knowledge for customers. This knowledge is provided to customers to satisfy their needs. Secondly is knowledge about customers that can be used for business processes segmentation, for example, sales and marketing. Lastly is knowledge from customers, which is the knowledge that customers possess that organizations can obtain by interacting with them. According to Winer (2001) and Garcia-Murillo & Annabi (2002), customer knowledge is a critical asset, and gathering, managing, and sharing customer knowledge can be a valuable competitive activity for organizations.

2.4   Message Framing- Cross-Disciplines Overview

In literature, message framing is a theoretically grounded persuasive communication strategy aimed at promoting perceptions, judgments, attitude and behavioural changes through the presentation of equivalent appeals, framed in terms of either the benefits gained or negative consequences incurred (Chang and Lee, 2009; De Velde et al., 2010; Gerend and Cullen, 2008; Krishnamurthy et al., 2001; Levin et al., 1998). Positively framed messages emphasize the benefits of engaging in the behaviour, whereas negatively framed messages highlight the adverse consequences of not engaging in the behaviour (Krishnamurthy et al., 2001; Levin et al., 1998; Gerend and Cullen, 2008).

Previous studies have found that positively and negatively framed messages can have different effects on individual behaviour. Rothman and Salovey (1997) extended the Prospect theory (Tversky and Kahneman, 1986), asserting that the efficacy of positive or negative messages depends on the perceived risk of the recommended behaviour. The degree of risk associated with a given behaviour depends upon whether the behaviour's goal is to detect or to prevent disease. For instance, the purpose of smoking cessation (Steward

et al., 2003), responsible drinking (Gerend and Cullen, 2008), and exercise behaviour (Jones et al., 2003) is to prevent disease and reduce health risks, individuals engaging in these behaviours typically view them as safe-behaviours that signal low risk. Therefore, positively framed messages are more effective than negatively framed messages. In contrast, individuals engaging in mammography screening (Banks et al., 1995) may detect illness, and entails a negative prospect of health, thus negatively framed messages are more effective than positively framed messages.

Levin et al. (1998), however, argue that as there are no clearly specified risk levels when a behaviour unrelated to disease is promoted, it is not possible to identify which action is perceived as riskier. For example, in the financial field, researchers want to understand whether positively framed messages are more effective at persuading customers when banks are promoting the use of credit cards (Ganzach and Karsahi, 1995; Thaler, 1980). Nevertheless, as this behaviour is unrelated to disease, using the viewpoint of Rothman and Salovey (1997), it is difficult to assess whether individuals adopt promotion focus or prevention focus in the face of the promotional behaviour or which type of message is more effective. Besides, the content of a message promoting a product or behaviour usually states the consequences of engaging in the behaviour, consequences which are born by the message recipient (i.e. if you exercise every day, it will benefit your mental and physical health). In contrast, when the purpose of the behaviour is altruistic (i.e. as with charitable donations or organ donations) (Reinhart et al., 2007; Chang and Lee, 2009), it is difficult to evaluate the perceived risk of the message recipient. Because the target stated in the message content is not the message recipient, people who experience the consequences of the behaviour are other people (i.e. if you donate, someone suffering from a serious disease will have the opportunity to recover).

2.5   Theories Related To Research

Environmental behavioural change has been discussed by using numbers of the theoretical framework. Since behavioural change is related to the intrinsic attribute of an individual and communication, this topic has been widely discussed in intrinsic-based and effective communication theoretical framework such as behavioural theory, cognitive theory, self-efficacy theory, change theory and transactional theory. Out of the twelve criteria presented in Table 1, five of them are the main aspects that have been considered in selecting an appropriate theoretical framework for this research. They are goal setting (social good), individual's intrinsic attribute (motivation), individual's ability (knowledge), social persuasion towards particular behaviour and complement strategic thinking (applicability in the top-level

decision-making process, for example, policymaker and governmental regulations). As for consumer orientation, segmentation and exchange, they are complementary aspects that will ensure the specific direction of research. The criteria list also includes methodological criteria which are operational method, intervention planning and implementation, materials pre-testing and program evaluation. The importance of all criteria is equal, but categorisation makes it easier to decide the right theory. The following discussion provides a brief explanation of other theories that seem relevant, but not fully complement the research objectives. The explanation covers behavioural, self-efficacy theory and Theory of Change (ToC), as examples of discussion.

Behavioural theory studies the relationship between stimulus and response. According to Watson (1913), thinking and intentions were internal processes that could not be observed and therefore should not be studied. Only observable behaviours are of interest to scientific study. Woolfolk (2001) quotes that, behaviour could be changed by events taking place before (antecedent) or after (consequence) the behaviour. Consequences can influence the association between a stimulus and behaviour. Consequences can be of two types: reinforcement or punishment. Reinforcement strengthens behaviour while punishment weakens behaviour, whereas, reinforcement can also be either positive or negative. An example of positive reinforcement is when a subject receives a reward for behaviour. An example of negative reinforcement is when an undesired stimulus is removed as a consequence of behaviour. There are also two types of punishment.

- Presentation punishment is when an undesired stimulus is presented for undesired behaviour; receiving detention (undesired stimulus) for being disruptive in class (undesired behaviour) is an example.
- Removal punishment is when the desired stimulus is removed for undesired behaviour; losing phone privileges (desired stimulus) for a week for being disruptive in class (undesired behaviour) is an example.

The concept of consequences and punishment is applicable in encouraging consumers' participation in product return activity, but it lacks in goal setting (social good) when it focuses more on individual gain.

Self-efficacy refers to an individual's belief in his or her capacity to execute behaviours necessary to produce specific performance attainments (Bandura, 1977, 1986, 1997). Self-efficacy reflects confidence in the ability to exert control over one's own motivation, behaviour, and social environment. These cognitive self-evaluations influence all manner of

human experience, including the goals for which people strive, the amount of energy expended toward goal achievement, and the likelihood of attaining particular levels of behavioural performance. Unlike traditional psychological constructs, self-efficacy beliefs are hypothesized to vary depending on the domain of functioning and circumstances surrounding the occurrence of behaviour. Self-efficacy theory seems to be relevant in encouraging consumers' participation in product return activity since it emphasizes the importance of understanding needs and motives and highlighting goal setting. However, it is not considering an individual ability (knowledge) in achieving the goal, solely depend on motivation.

Theory of Change (ToC) clearly emphasized the importance of the goal. Theory of Change emerged from the field of program theory and program evaluation in the mid-1990s as a new way of analysing the theories motivating programs and initiatives working for social and political change (Weiss, 1995). Theory of Change as a concept has strong roots in several disciplines, including environmental and organisational psychology, but has also increasingly been connected to sociology and political science (Stachowiak, 2010). ToC uses stakeholders value theories of change as part of program planning and evaluation because they create a commonly understood vision of the long-term goals, how they will be reached, and what will be used to measure progress along the way.

Criteria	Social Marketing Theory	Behavioural Theory	Social Cognitive Theory	Self-Efficacy Theory	Theory Of Change	Transactional Theory
Goal Setting	√		√	√	√	
Inclusion of Individual's Intrinsic	√	√	√	√		√
Inclusion of Individual's Ability	√	√	√			
Consumer Orientation	√	√		√	√	√
Segmentation Strategy	√					
Promote Voluntary Exchange	√					√
Intervention Planning and Implementation	√		√		√	√
Suggesting Materials Pre-Testing	√					
Inclusion of Program Evaluation	√	√	√	√	√	√
Social Persuasion	√		√	√	√	
Explaining what Methods it uses to be Effective *(Operational Methods)*	√	√		√	√	
Complement Strategic Thinking	√				√	√

Table 2.4: Justifying Theoretical Underpinning

2.6 Conclusion

Product return and recovery management encompass various activities within the reverse logistics network. The most important activity is the collection of returned products. Numerous studies have been conducted to highlight the importance of this activity. In this chapter, a survey of the literature has been carried out to identify gaps and potential research avenues to amplify collection of products (household small electric and electronic equipment) or commonly known as electronic waste (e-waste).

An important limitation in previous researches on e-waste acquisition activity was in terms of the research direction and focus. Previously, most studies treated acquisition activity as a cost minimization problem. Back then, the main motivation for companies engaged in acquisition activity was due to the legal requirements imposed by the government or authorities. For companies, it had more to do with obligations and legal compliance than profit endeavours. Hence, the aim was more on managing cost and improving efficiency. With the latest developments in recovery technology, the consumers' awareness of environmental issues and the growing demand for reused products, the focus should no

longer just about cost minimization. Thus, it is time that a study is carried out to look in this direction and to embark further.

Most of the researches into product return management addressed the collection of returned products from a wider perspective; whether the collection should be centralized or decentralized, and whether it should be handled directly or indirectly (Savaskan and van Wassenhove, 2006; Karakayali et al., 2007). Investigations into the activities between consumers and companies, in which the collection of unwanted products occurs, remain wanting. This refers to how products return can be initiated by consumers.

This thesis aims to focus in the consumer-initiated return activity and fill in the identified gaps such as Business-to-Consumer (B2C) information sharing, return product knowledge which emphasizes the availability of relevant information to initiate immediate return among consumers and presentation of the information. For return product knowledge, the translation of product return information which contains ideal timing and acceptable quality of return is proposed to be available to change consumers' disposal behaviour of e-waste. The objective of this proposition is to encourage consumers to immediately return their e-waste to increase the chance for formal treatment and disposal of the waste. For the information context or presentation, two environmental messages are developed conveying the importance of the immediate return of e-waste, to decide which message work for different segmentation of consumers. The next chapter will present the details of the thesis work.

3. CONCEPTUAL FRAMEWORK DEVELOPMENT

3.1 Introduction

Environmentally conscious consumer behaviour is getting progressive attention in marketing and consumer behaviour literature (e.g., Lin & Hsu, 2013; Vlaeminck et al., 2014). One of the relevant and emerging topics in this field is the role of environmental labels and their effectiveness in guiding the consumers (Testa et al., 2013). Primarily, environmental labels provide consumers with product-specific environmental information at the point of purchase to assist consumers in making an environmentally informed purchase decision (Thøgersen et al., 2010). Moreover, environmental labels reduce consumers' information search costs and effort as well as promote recycling behaviour. There is a growing empirical literature dealing with different aspects of environmental labels where most studies focus on the market impact of environmental-labelled products (e.g., Hornibrook et al., 2015; Sammer & Wüstenhagen, 2006; Thøgersen et al., 2010) and consumers' comprehension, perception, and misperception of environmental labels (e.g., Brécard, 2015; Steinhart et al., 2013; Thøgersen, 2000). Universal acceptance of environmental labels directs this research to explore a new side of this concept, which is the introduction of EoU and EoL return information on products. The introduction of the EoU and EoL return information is predicted to initiate consumers' immediate post-consumption return. This kind of environmental label is expected to be a good addition to the current practice of environmental labels that promote recycling behaviour among consumers.

The purpose of environmental labels is not just promoting environmental-labelled products, but also to promote other aspects of environment-friendly consumer behaviour (e.g., recycling behaviour) (Raziuddin et al. 2016). Other than treated as an element in differentiation strategy, environmental labels have also been recognized as a platform to distribute environmental knowledge to customers. The distribution of this kind of knowledge is expected to initiate environmentally responsible behaviour. In conjunction with the rise of consumers' environmental concern and preference for environmental-friendly products as mention in previous literature (for example Mohamed et al., 2014 and Ramly et al., 2012), this research attempts to explore the effect of supplying EoL and EoU return information on products towards consumers' intention to immediately return their durable household waste.

3.2   The Conceptual Framework Development

3.2.1   Product Return Knowledge

In previous studies, the importance of understanding consumer behaviour is always been discussed. Various empirical studies have investigated the households and corporates green behaviour and debated that these behaviours are influenced by both internal and external factors such as identities, social norms, religious, cultural beliefs, values, habits, socio-demographical characteristics, pro-environmental attitude, as well as mediating and moderating variables such as social pressure, rules, and behavioural imitation (Lin and Huang, 2014; Jansson, 2013; Jansson et al., 2015). Additionally, Milovantseva and Saphores (2013) propose a multinomial digit model to explain the disposal behaviour of household in discarding cell phones and TVs. They find that the presence of e-waste ban such as California's Cell Phone Recycling Act has a positive impact on disposal intention of households. In another study, Saphores et al. (2016) claimed that the socio-economic characteristics have the least effect on the consumers' willingness toward drop-off recycling. All these studies show that non-socioeconomic factors have a positive impact towards disposal attitude of household compared to socio-economic factors such as incentive. Based on the aforementioned findings, this research attempts to explore the effect of another non-socioeconomic factor which is product return knowledge.

Generally, return product knowledge is an individual's knowledge and familiarity about retuning the used products. It can be measured in terms of objective or subjective knowledge, which is very difficult to separate operationally (Rao and Monroe, 1988). Thus, a composite multiple-scale knowledge on subjective and objective analysis is used to measure the return product knowledge as quality, performance and price (Rao and Monroe, 1988). To fit in the research context, return product knowledge is reworded to measure the idea of returning, location to conduct return activity and importance of the return activity.

In the context of this research, product return knowledge is the result of translating information from product return management in the reverse supply chain. In the reverse supply chain, product return management is the front-end subprocess. All this information is derived from Guide and Van Wassenhove, 2009. Product return knowledge that highlighting specific information about ideal timing and quality of return is considered to be important in influencing consumers' further action towards their durable waste.   Therefore, for this research, return product knowledge is extended by considering some special features of returned product knowledge like availability of collection of used products centre, recovery

process and existence of toxic material in electric and electronic equipment. These special features are related to information derived from Guide and Van Wassenhove (2009), which highlighting time and quality of return. Specifically, the knowledge about the existence of toxic material in electric and electronic equipment reflects the importance of returning electronic waste as soon as possible (ideal timing of return). It goes the same to the knowledge about the recovery process of electronic waste, which implicitly conveys the aspect of acceptable quality of return.

There is evidence that general environmental knowledge is not always a sufficient condition to predict environmentally conscious consumer behaviour (e.g., Laroche et al., 2001; Polonsky et al., 2012). This suggests that product-specific environmental knowledge such as environmental labels providing appropriate and accurate information is also an important requirement to allow consumers for making environmentally conscious and reasoned decisions (Polonsky et al., 2012; Testa et al., 2013). For this, consumers must know about the existence of environmental knowledge, understand their meaning, and trust the information presented (Thøgersen, 2000). Bougherara and Combris (2009, p. 321) define environmental knowledge as information tools that "aim to internalize the external effects on the environment of the production, consumption, and disposal of products". Based on these findings, this research attempts to highlight the usage of specific environmental knowledge, which is product return knowledge as a tool to affect consumers' action in products disposal.

As it is mentioned in the introduction, there has been growing research on the market impact of environmental knowledge, but most past studies focused on consumers' appraisal and purchase of products (e.g., Sammer & Wüstenhagen, 2006; Steinhart et al., 2013). Hence, attention requires putting on an overlooked issue of whether the specific environmental knowledge helps consumers to adopt environmentally conscious consumer behaviour (Testa et al., 2013). Here, the construct 'knowledge' is meant to measure consumers' familiarity with the functional aspects of environmental message (Taufique et al., 2014) and the meaning of different terms used in. Based on this discussion, the following hypothesis is proposed:

H1: Product return knowledge is positively related to attitudes towards return information.

3.2.2 Immediate Return Attitude

Many studies establish attitude as one of the strong antecedents influencing behaviour (e.g., Ballantyne & Packer, 2005). In most models of pro-environmental behaviour, attitude is placed as the central variable between environmental knowledge and behaviour (Davies et al., 2002; Polonsky et al., 2012) where environmental knowledge and pro-environmental attitudes are highly interconnected (Bamberg, 2003). For environmental knowledge, this research will focus on product return knowledge. For pro-environmental attitude, this research focuses on immediate return attitude. Immediate return attitude seems necessary to solve storage behaviour among consumers. Consumers often keep the electronics in storage and do not return them immediately to recyclers after stopping usage (Sabbaghi et al. 2015). In this research, attitude towards the environment is measured in terms of consumers' degree of agreement in the inclusion and availability of relevant information of EoL and EoU return.

The main objective of this research is to investigate the trend of consumer attitude toward the storage of used household durable waste and link this attitude to the products return knowledge. Since the focus of this research is in consumers' storage behaviour, the immediate return attitude will be measured in terms of consumers' respond to importance of communication which highlight and provide relevant information for the immediate return of electronic waste. The proposed relevant information is the ideal timing and acceptable quality of return. In the context of this research, immediate return attitude is defined as an individual's overall behaviour of performing to return their used products. To the best of my knowledge, the end-of-use reaction of consumers to products return knowledge has not been studied in the literature so far.

3.2.3 Immediate Return Intention

Intention is an individual's planning of action to perform the behaviour, and also captures the motivational factors that influence the behavioural attitude. A person's behavioural intention is conjointly determined by attitude and subjective nor norm, which assists to measure the actual behaviour of a person (Fishbein and Ajzen, 1975; Wang et al., 2013). Return intention has been in discussion, for example in Jena & Sarmah (2015), which highlight numbers of construct that affect return attitude and intention. Examples of construct that derived from qualitative literature reviews are perceived benefit, perceived risk, return product knowledge, social awareness, subjective norm and market characteristic. Based on the finding from qualitative literature reviews, this research adopts two of the constructs; return product knowledge and social awareness. Return product knowledge for this research covers

extended features from previous literature. Previous literature covers the features like availability of collection centres and energy saving. Additionally, this research covers the extended features like recovery process. Depth discussion about return product knowledge has been presented in section 3.2.1.

Therefore, the following hypothesis is proposed:

H2: Attitudes towards return information positively related to immediate return intention

For this research, social awareness is another construct that can influence immediate research intention. In this research context, social awareness is defined to assess the information about immediately return the used products through different sources. Consumers' assessed this information from various sources such as friends, advertisement and education (Raziuddin et al. (2016); Chang & Wu (2015); Lai et al. (2014)). Based on this, social awareness is implicitly presented in the message framing part of this research. Relevant information and different information presentation play an important role in making awareness among the consumers about the return of used products (Jungbluth et al. 2012).

Discussion of social awareness leads to the selection of social marketing theory as the fundamental theory for framework development and lead to the discussion of message framing application in product return knowledge, as presented in the section 3.2.4.

3.2.4 Message Framing In Product Return Knowledge

Literature presents two methods of presenting environmental information and knowledge, such as *environmental labels* (Mackenzie, 1991; Harris and Cole, 2003; Horne, 2014), and *message framing* (Avineri and Owen, 2013; Chang and Wu, 2015). An environmental label is visual method companies and manufacturers use to display the environmentally preferable features of a product in the marketplace (Goggin, 1994). As for message framing, scholars define it as a theoretically grounded persuasive communication strategy aimed at promoting perceptions, judgments, attitude and behavioural changes through the presentation of equivalent appeals, framed in terms of either the benefits gained or negative consequences incurred (Chang and Lee, 2009; De Velde et al., 2010; Gerend and Cullen, 2008; Krishnamurthy et al., 2001; Levin et al., 1998). There are two types of message framing, which are positively and negatively framed messages. Positively framed messages emphasize the benefits of engaging in the behaviour, whereas negatively framed messages

highlight the adverse consequences of not engaging in the behaviour (Krishnamurthy et al., 2001; Levin et al., 1998; Gerend and Cullen, 2008).

It is also the same as the presentation of end-of-use and end-of-life return in environmental product information. The message used in communicating environmental impact of particular products when they are not properly treated and disposed could be presented in positive and negative ways. In this study, consumers' participation in product return activity can be promoted by emphasizing the positive consequences of doing so (for example, *"if you decide to return your no-longer-used appliances for proper treatment and disposal, you will help the environment"*) or the potential negative consequences of not doing so (for example, *"if you decide not to return your no-longer-used appliances for proper treatment and disposal, you will harm the environment"*). These two approaches have the same goal, which is encouraging participation in product return activity.

The rationale of having these two ways of information presentation is both of them having different effects on individual behaviour. It signifies that positively framed message may effective to promote product return behaviour in Group A, but not for Group B. Group B finds that negatively framed message works better for them, which is different in Group A. Group B may find that negatively framed message drives action, but not for Group A. These different effects are caused by several factors, such as perceived risk, behaviour's goal and altruistic factor. Efficacy of positive or negative messages depends on the perceived risk of the recommended behaviour (Rothman and Salovey, 1997). As for behaviour's goal, it is about the desired outcome of promoted behaviour. For example, to encourage engagement in exercise behaviour, Jones et al., (2003) noted that positively framed message is more effective than negatively framed message since typically people view it as disease prevention and can lower down health risk. The last factor that could result in a different effect on individual behaviour is the altruistic nature of promoted behaviour. Considering this fact, marketers design different advertising methods and products to tackle different segmentation in their commercial marketing. Segmentation aims to identify whether unique groups (segments) exist along with key needs and motives that distinguish each group to inform different marketing and promotion mixes accordingly (Andreasen, 1995).

The promotion of environmental protection is likewise affected by altruistic factors and even social dilemmas. For instance, Avineri and Waygood (2013) examined the message framing of transport-related carbon dioxide (CO_2) emissions to determine which could increase travellers' decisions to use a travel program that benefitted the environment. They indicated that social dilemmas exist in information about climate change and environmental issues.

The social dilemma is that of an individual who must choose between collective and individual interest. Individuals who do not engage in environmentally friendly behaviour (e.g. cycling, taking public transportation) influence collective interests; in the long run, air pollution will become increasingly serious, but will not directly influence individuals. Conversely, if individuals choose an environmentally friendly form of transportation to protect public interests, they will be inconvenienced, sacrificing personal interests. Therefore, choosing to engage in environmentally friendly behaviour is not only altruistic but has the possibility of loss. Tversky and Kahneman (1986) indicated that when people are in a situation of loss, they will be inclined to pursue risk. In other words, when we attempt to persuade people to engage in environmental behaviour, they are already in a situation of loss, and thus, negative messages are more convincing.

The viewpoint of Rothman and Salovey (1997) is appropriate for use in the research of health-related fields but is not necessarily applicable to other fields of research. Immediate return of e-waste promotion can appeal to consumers by focussing on health and the environmentalism. When a message appeals to health, the message content will convey the idea that the immediate return of e-waste can reduce health risks. Therefore, according to the concept by Rothman and Salovey (1997), the immediate return of e-waste is a form of disease preventive behaviour by the consumer, who perceived risk is low. Here, positive messaging is more persuasive than negative messaging. However, the message content used in this study appealed to the environmental aspect of e-waste immediate return promotion. Therefore, the theory of Rothman and Salovey was inapplicable. In the study of charitable activities and environmental protection, scholars tend to be inclined to believe that a negative message is more influential, as there is a negativity bias when processing information (Chang and Lee, 2009; Davis, 1995; Levin et al., 1998). Taylor (1991) indicates that negatively framed messages are more direct, differentiated, and contagious than positively framed messages, and make people feel fear, anxiety, unhappiness, and strong and rapid physiological, cognitive, emotional, and social responses. These reactions, however, are not created in the same intensity by the positive message framing (Banks et al., 1995; Van't Riet et al., 2010). Besides, from a practical perspective, to explain the possibility of occurrence of the negativity bias, marketing proprietors will usually promote their products by providing a positively framed message, with the result being that consumers become accustomed to the promotion of positive messages. When proprietors provide a negatively framed message, however, the consumer's emotions are aroused because the messages contain information regarding potentially negative consequences (Chang and Lee, 2009; Mayer et al., 1992).

Hence, based on the aforementioned discussions the following hypothesis is proposed:

H3: Different message framing has different effect on immediate return intention

3.2.5 Negatively Framed Message: The Rationale

Threatening messages (negatively framed message) about large-scale problems with irreversible consequences are also used often in environmental appeals (Weinstein et al., 2015). Work focusing on threatening messages in the conservation domain suggests they are frequently employed to raise awareness and encourage support (Weberling, 2012). Many advertisement campaigns by pro-environmental, nature conservation organisations use threatening messages to elicit conservation behaviours and to gain support for the organisation (Weinstein et al., 2015). For example, the World Wildlife Fund for Nature's (2012) 'Text for Tigers' campaign advertisement uses messages such as "*wild tiger numbers have dropped to as few as 3200*" and "*more than 90% of tiger habitat has been destroyed*". These messages represent a form of 'fear appeal' and aimed to elicit a sense of immediacy and urgency (Williams, 2012).

The rationale of negatively framed message in presenting EoU and EoL return in environmental product information can be supported by an individual's observed behaviour called loss–gain asymmetry or loss aversion. Loss aversion refers to the fact that people tend to be more sensitive to losses than gains (Kahneman and Tversky, 1979). Prospect theory proposed by Kahneman and Tversky, (1979) suggests that losses have a larger effect than gains on subjective evaluations of choices. Additionally, losses increase the allocation of attentional resources to the task (Yechiam and Telpaz 2013). Tversky and Kahneman (1991) summarised findings that the coefficient of loss framing (negatively framed message) was greatest for personal safety, followed by money, and then leisure. This observed behaviour that has a high tendency in avoiding losses support the relevancy of providing negative information of EoU and EoL return. Across many contexts, the impact of negatively framed information has consistently been found to be stronger than the impact of the same information framed in positive terms of the same magnitude (Avineri and Owen 2013). This means that, rather than emphasizing the benefit of EoU and EoL return in protecting the environment, producers also can consider highlighting the negative impact if consumers not actively participate in product return activity according to specified time and quality.

3.2.6 The Moderators

This research presents the framework that present product return knowledge in two types of message framing; positively and negatively framed. This framework investigates the relationship between product return knowledge and consumers' EoL/EoU return attitude. The framework highlights two moderator roles – *environmental motivation* and *environmental knowledge*. These two moderators will be used to define consumers' segmentation. Previous literature defines environmental motivation as individual's level of motivation toward environmentally friendly behaviours (see e.g., Osbaldiston and Sheldon, 2003; Pelletier et al., 1998; Villacorta et al., 2003). Deci and Ryan (1985) noted that the concept of environmental motivation stems from the innate psychological needs for competence and self-determination. Individual practices pro-environmental behaviour for different reasons. Pelletier et al., (1998) identify these reasons; dissatisfaction with the state of the environment, thinking the environmental problem is important, or feeling the need to do something about it. These reasons are differentially related to various psychological consequences (Deci and Ryan, 1985; Pelletier et al., 1998). Therefore, motivation has been proposed as a means to gain insight into varieties of behavioural persistence (De Young, 1986; Pelletier et al., 1998).

Another moderator is environmental knowledge. As for environmental knowledge, scholars define it as general knowledge about environmental issues or problems, such as the problems the earth is now facing (Benton, 1994; DeChano, 2006; Martin and Simintiras, 1995). Additionally, Petty and Cacioppo, (1986) noted that environmental knowledge can be defined as an individual's ability to interpret and process information. A lack of ability implies that the individual has limited knowledge of or little familiarity with the object of the message or that the message itself is too difficult to understand (Frías et al., 2008; Yalch and Elmore-Yalch, 1984). Consequently, the knowledge structures necessary to comprehend a message are either not available or not currently accessible (Frías, et al., 2008; MacInnis et al., 1991). The selection of moderators, which are environmental motivation and environmental knowledge, is based on attributes of intrapersonal level in an individual. According to Frias et al., (2008), individual motivation and ability affect the outcome of message processing. Ability is another definition of environmental knowledge as noted by Petty and Cacioppo (1986). Fewer studies have investigated whether the differences in personal motivation and ability interfere with the emotional reaction of the individual when reading positive and negative messages, and subsequently influence behaviour (Chang and Wu 2015).

Environmental motivation and environmental knowledge are selected as moderators based on the following assumption:

Where there is a sense of environmental motivation and environmental knowledge (even at very low level), consumers will spend time to read environmental information about products.

According to the heuristic systematic model (HSM; Chaiken, 1980), individuals process information in two different ways, systematically and heuristically. The degree of message elaboration, which conditions the route of processing, is in turn influenced by motivation and ability (Frías, et al., 2008). When an individual has high environmental motivation, she or he will use a systematic thinking model to deal with the message (Suri et al., 2003). In contrast, when motivation is low, the individual will choose a heuristic processing model to assess a message, depending only on the clues that are easy to deal with and expending less effort (Suri et al., 2003). This is due to the fact that an individual in a low motivation situation neither takes any special interest in the information offered and nor needs to engage all cognitive resources (Frías et al., 2008). Hence, when the individual exhibits a low degree of environmental motivation, the effects of the negativity bias will be much more limited than when he or she displays a high degree of environmental motivation. In this case, regardless of whether the message is framed positively or negatively, the individual simply and intuitively read the message (Frías et al., 2008; Petty and Cacioppo, 1986). These heuristic rules also lead to an attitude which is less durable and less indicative of future behaviour (Frías et al., 2008).

However, when motivation is high, the individual will need to employ a greater proportion of cognitive resources to assimilate the message. Furthermore, if the individual received a negatively framed message, he or her emotions will generate an additive effect, because people have more motivation to avoid a loss than to attain a gain of equal magnitude (Krishnamurthy et al., 2001; Meyerowitz and Chaiken, 1987). Therefore, they will prefer information about potential negative consequences and ways to avoid their occurrence (Chang and Lee, 2009). Consequently, he or she will be more concerned over the message content, and relevance to environmental protection will be processed in more detail when a message is negatively rather than positively framed (Kanouse, 1984; Maheswaran and Meyers-Levy, 1990; Steward et al., 2003). Hence, the negativity bias will exert its influence. Based on this discussion and to achieve the aforementioned objectives of this research; to examine the two-way interaction effect between message framing and environmental motivation, the following hypotheses are proposed:

H4: Message framing affects immediate return intention differently in different segmentation of environmental motivation

H4a: Message framing affects immediate return intention differently in high environmental motivation group

H4b: Message framing affects immediate return intention differently in low environmental motivation group

In addition to environmental motivation, this study also considering environmental knowledge as the moderator. Therefore, this study attempts to achieve this objective; to decide whether positively or negatively framed message is more effective in appealing for electronic waste immediate return (controlled by environmental motivation and environmental knowledge).

When an individual with high motivation and more knowledge performs a behaviour, he or she prefers engaging in environmental goals and also has the ability to select information with higher relevance to his or her needs, and so understanding will be more efficient and with less effort. Hence, the individual will have confidence in his or her ability to perform the specific behaviour (Ajzen and Madden, 1986; Frías et al., 2008; Kidwell and Jewell, 2008), and be more likely to rely on internal confidence and make decisions heuristically, as opposed to systematically, which is how those with less experience make decisions (Kidwell and Jewell, 2008). In such a situation, the likelihood of the negativity bias being triggered will be smaller. Because the individual already has relatively high environmental knowledge, he or she can effectively deal with the message. Therefore, there is not much difference in pro-environmental behaviour intention whether the message is framed positively or negatively.

On the contrary, an individual with high motivation and low environmental knowledge is likely to systematically or thoroughly process the given information. Because they concern environment and have high environmental motivation, therefore, he or she carefully attends, evaluates, elaborates, and integrates task-relevant environmental informational inputs, and base their environmental awareness on their understanding of such information. Therefore, the effect of the negativity bias is proposed on the persuasive effectiveness of immediate return intention occurs in situations with high environmental motivation when the individual has little ability to interpret the information. In another word, the negatively framed message is more effective for individual who has high environmental motivation and low environmental knowledge.

Hence, the following hypotheses are proposed:

H5: Message framing affects immediate return intention differently in different segmentation of environmental knowledge

H5a: Message framing affects immediate return intention differently in high environmental knowledge group

H5b: Message framing affects immediate return intention differently in low environmental knowledge group

Based on the aforementioned findings, the effect of message framing; positive and negative framed message, will be assessed in these four subsets:

- High environmental motivation
- Low environmental motivation
- High environmental knowledge.
- Low environmental knowledge.

Finally, in a condition where environmental motivation is low, no matter whether there is high or low environmental knowledge, there are no differences in immediate return intention of individuals who have received a positively or negatively framed message.

3.2.7   Social Marketing Theory

The proposed framework is underpinned by using theoretical framework suggested by social marketing theory (Andreasen, 1995), considering the application of marketing techniques and social change. The main focus of social marketing is on the application of well-known marketing tools and techniques (i.e. marketing mix) to foster social change (Wymer, 2011). European Social Marketing Association (ESMA) and the Australian Association of Social Marketing (AASM) adopted a consensus definition of social marketing and define it as "social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good" (French and Gordon, 2015) This definition shows that the main focus of social marketing theory is social good. Social marketers, both scholars and practitioners, have come to accept that the fundamental objective of social marketing is not promoting ideas as Kotler and Zaltman (1971) suggest but influencing behaviour (Andreasen, 1994). Initially proposed

by Andreasen (1995), social marketing benchmark criteria offers useful guidelines to ascertain the extent that social marketing is employed within a change intervention (Kubacki et al., 2015). Andreasen (2002) advocates six benchmark criteria, which are *behavioural change*, *formative research*, *segmentation*, *exchange*, *marketing mix* and *competition*.

Andreasen (2002) defines behavioural change as the key objective of social marketing interventions. However, Donovan and Henley (2010) argue that the sole focus on attitude change is not a sufficient social marketing goal. The ultimate goal of social marketing should be to change people's behaviour, not only to inform or educate them about social problems.

Formative research aims to investigate the consumers' needs and provide an understanding of motives that can be influenced to achieve desired behaviour change goals (Andreasen, 2002; French and Blair-Stevens, 2006). French and Blair-Stevens (2006) also mention that this stage of social marketing aims to "drill down from a wider understanding of the customer to focus on identifying key factors and issues relevant to positively influencing particular behaviour." (p. 1). Formative research informs the development of interventions, the product design, availability, pricing and communication methods (Donovan and Henley, 2010).

For segmentation, Andreasen (2002) states that it aims to identify whether unique groups (segments) exist along with key needs and motives that distinguish each group to inform different marketing and promotion mixes accordingly. In commercial marketing, different people may respond differently to different advertising methods and products. Similarly in social marketing, segmentation can help campaign designers to better develop the marketing mix in order to satisfy different groups of the target audience (Donovan and Henley, 2010). There are three aspects of the exchange, namely: benefit offered by the social marketer; effort the target audience has to make; and the intermediary (Donovan and Henley, 2010). Therefore, the main purpose of social marketing exchange is to lower the effort and maximise the benefit on the consumer side. According to Stead et al., (2007), an exchange is "what would motivate people to engage voluntarily with the intervention and offer them something beneficial in return".

The marketing mix includes its concept which is most commonly referred to as product, place, price and promotion. Similar to commercial marketing, product refers to the bundle of benefits received by the target audience following exchange (Elliot et al., 2014). Price is a transactional concept outlining what a consumer has to exchange to receive the bundle of benefits (product or service experience) (Elliot et al., 2014). Place refers to where and when the target audience changes behaviour (Elliot et al., 2014). Promotion is the most widely

adopted aspect of the marketing mix in social marketing. Social marketing interventions need to incorporate more than promotion or the efforts are simply social advertising. Lastly is the competition. Donovan and Henley (2010) state that competition in social marketing refers to two levels; at the product level, competition could be harmful behaviours or any temptations that will lead to this behaviour; at the broader level, competition could be "any behaviour, product or idea that impacts negatively on health and wellbeing" (Donovan and Henley, 2010 p. 219).

Towards developing the conceptual framework for this research, only two criteria are used. The framework is formulated by using formative research and segmentation criteria. Formative research as described earlier offers guidelines in understanding consumers' need. As for this research purpose, formative research will be used to understand consumers' need in terms of information types and information presentation. By identifying these key factors, it is expected to encourage consumers' participation in immediate product return activity. As for segmentation, the target audience will be categorised according to subsets suggested in the moderator matrix. There will be four segmentations of consumers:

- Consumers with high environmental motivation
- Consumers with low environmental motivation
- Consumers with high environmental knowledge.
- Consumers with low environmental knowledge.

These different groups of target audience with different level of environmental motivation and environmental knowledge are assumed to prefer different kind of information presentation. As for this research purpose, either they prefer positively or negatively framed message.

The formative research and segmentation criteria applied to the proposed conceptual framework are significant to learn what people in a specific target group want and need rather than trying to persuade them to adopt what we happen to be offering.

3.3 Proposed Conceptual Framework

The proposed conceptual framework covers the aspects of information content (types of information) and information context (the way information is being presented). These aspects belong to two levels of supply chain communication, which are from point of origin (producers or manufacturers) to point of consumption (consumers). At the manufacturer level, the PRRM takes place in order to achieve one ultimate goal; profitable return and

recovery operation. Profitable return and recovery mean that the operation achieves operational cost minimisation and profit maximisation. The total cost of reverse logistics includes the costs of collection, inventory, transport, and storage (Hu et al., 2002; Srivastava and Srivastava, 2006), while profit maximisation comes from recovery value and customer purchase. The recovery value from used products may provide a good return on investments (Hillergersberg, 2001). At consumers' level, environmental knowledge and environmental motivation are selected to be the additional contributing factor to modify their current return practice. This means that consumers willing to commit in immediate return, instead of storing the used products.

In the context of the proposed conceptual framework, the process of translating return and recovery information (information content) into persuasive and understandable context (presentation) is to promote the action of immediate EoL and EoU return among consumers. The identified research gap in this translation process is regarding the right timing of return and acceptable quality of return. These kinds of information are not previously presented in the environmental product information. At present, environmental product information available for consumer covers only the environmental effects caused by the products in the phase of manufacturing and use (Jungbluth et al., 2011a). Immediate EoL and EoU return is expected to be attainable if consumers are provided with the correct and clear information of product return and recovery. The correct and clear information is expected to encourage consumers' willingness to return their used products to the provided drop-off sites, not in domestic waste bins. Consumers need to be educated that used products could have a second life (Jungbluth et al., 2012). When the product return is initiated by consumers, recyclers (manufacturers) can cut the cost of curbside collection and minimise the transportation frequency.

The benchmark criteria, formative research, as suggested by social marketing theory (Andreasen, 2002), is used to identify consumer preference towards return and recovery information (time and quality of return) in product return creation. The identification of relevant product return and recovery information, then, will lead to the process of translating the information into an understandable environmental message format. The rationale of understanding the types of information valued by consumers is to avoid information overload. It has been noted that providing a huge number of product information items might result in an information overload; it, therefore, becomes necessary to identify the items consumers especially value (Kehagia et al., 2007; Pieniak et al., 2013; Salaün and Flores, 2001; Verbeke, 2005, 2008). As the information consumers demand might vary between consumer segments, the valued information items also should be determined for different

target groups (Dimara and Skuras, 2003; Verbeke, 2005, 2008). Based on this, the proposed framework is considering the segmentation, as one of the fundamental elements suggested in social marketing theory.

Formative research also used in identifying consumers' preferred information presentation. The information presentation is required to influence and convince consumers to take further action in product return activity. Considering the fact of interpretation difference, two presentation methods and two personal moderators are included in the framework. The positively and negatively framed messages are the presentation methods suggested by message framing concept. The aforementioned moderators, environmental motivation and environmental knowledge are derived from previous environmental behavioural studies (Chang and Wu (2015), Weinstein et al., (2015), Lois et al., (2015)), which considering the wide range of behavioural related aspects, such as loss aversion, altruistic factor, negativity bias and intention.
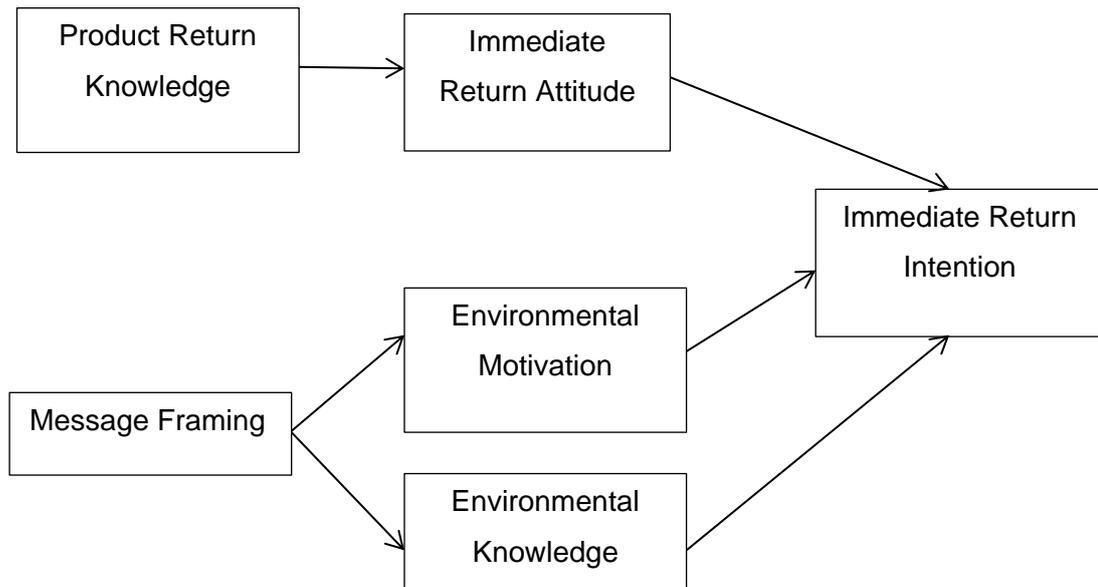
Figure 3.1: Proposed Conceptual Framework

3.4   Conclusion

This research has pursued to bridge the literature void in terms of B2C information sharing that is expected to influence consumers' participation in product return activity. This research aimed to develop a theoretical framework to study how the presentation of environmental product information influence the information processing at consumers level so that it is understandable and influential to encourage participation in returning used products after end-of-use and end-of-life phases. The framework will be empirically validated and hypotheses will be tested by using survey methodology. The significant contribution of this research as follows, first, this study will identify which message framing presentation (positively or negatively framed message) is effective in influencing consumers' EoU and EoL product return behaviour. The second contribution is to provide guidelines in how to communicate product return and recovery information (time, quality and quantity) to ensure that consumer can process it heuristically (provided information is clear and understandable and requires no time or much effort at the consumer level). For that, this study is a unique contribution to the literature. The managerial insights of this work can be implemented in products such as laptop, television, toner cartridge, single-use camera, computer, toys, furniture and other durable household waste.

The intended findings of this research are expected to contribute new definition of segmentation. Instead of just using geographic (e.g. cities, countries) or demographic (e.g. sex, age, education), respondents used for this research will be categorised based on their environmental motivation and knowledge. These intrinsic elements (motivation) and ability (knowledge) are measurable and they are relevant to be used as the basis of segmentation.

It is expected that this research may contribute with new insights on product return knowledge development by suggesting the inclusion of important information of product return and recovery management (time and quality of return), which most valued by businesses organisations (manufacturers and remanufacturers) for consumers' reference. It will be useful for designers to prepare post-purchase documentations. Furthermore, it may help businesses to develop specific communication genres to communicate with their customers, for example, the introduction of approved and standardise eco-label. This eco-label can be composed by employing consistent use of phrases and organisations to reach consumers' genre conformity, over time. Like any other standardised documents, consumers will accustom to this conformity genre as heuristic cue for authenticity. The operational social marketing approach suggested in this research (i.e. product return knowledge creation and distribution) is seen to have potential in influencing the strategic social marketing strategy and development, which requires strong customer understanding and insight to inform and guide effective policy and strategy development.

Research limitations are revolving around the research scope. The product return activity will be discussed based on these scopes:

- Type of product return:

  This research will only discuss on EoL and EoU return. Not any other return such as commercial return and warranty return

- Type of product:

  This research is limited to certain types of household durable waste such as broken and obsolete small electronic appliances, office equipment and toys. This kind of waste usually referred to as S-WEEE (small waste of electric and electronic equipment).

- This research focuses on return activity that is initiated by consumers, not by curbside collection initiated by collectors (local government agencies, industrial collectors, third party recyclers).

4. RESEARCH METHODOLOGY

4.1   Introduction

This chapter discusses the chosen methodology to acquire knowledge about the proposed research area. Methodology outlines action plans from the onset of the research in the form of research questions and then their answers in the form of discussions and conclusions (Yin, 2003). It will outline the action plan from the question (start) to a set of answers (finish) (Yin, 2003). Two common research methodologies are qualitative and quantitative. Hennick et al. (2011) reported that research methodology is classified based on these aspects; the traits of the research methodology, the study object and how it is perceived, and how the knowledge will be acquired and analysed.

The chapter commences with the discussion of the research paradigm, followed by, research approach, research design and method, data collection and data analysis. The discussion includes the process in constructing research instrument, plan for the pilot study and sample population. Finally, the chapter concludes with an explanation of the diverse statistical tools and techniques used in the analysis.

4.2   Research Design

The research design used to assist in setting the limits for the research (Hair *et al.,* 2003). It comprises expressing study settings, the types of examinations that should be done, the analysis unit and different issues with the research. A research design is the research objectives' function. It is referred to as an advance decision set that forms the master plan, indicating the procedures and methods for gathering and analysis of the required information (Burns and Bush, 2002). Hair *et al.* (2003) said that the research design is important because it decides the type of data, the technique employed to collect the data, the methodology of sampling, the timetable and the financial plan. Fundamentally, it enables aligning the methodology with the research problems (Churchill and Iacobucci, 2004; Hair *et al.,* 2003). On reviewing the literature, the following three types of research designs were identified: exploratory, descriptive, and casual or explanatory (Cooper and Schindler, 2001). These research designs applied to achieve the research objectives.

To achieve this research's objectives, the discussion of research methodology will be divided into two phases, which are pre and post framework development.

4.2.1 Pre framework development

This phase was carried out to derive chosen variables from theoretical and literature standpoint. The exploratory research design was utilised in the primary stage of this research to set the foundations of the information concerning the research problem and generate hypotheses via investigating the literature, as recommended by Churchill (1995). At this stage, this research was using inductive exploration approach. Induction reasoning in exploratory research is defined as the reasoned derivation of a generalised conclusion from the observation of particular instances (Remenyi *et al*, 2000:284). Inductive exploration is not reductionist but holistic (Remenyi *et al*, 2000:36). It allows for more complicated situations to be examined. It can involve itself not only with many ways of studying variables but also the context of a study. Orlikowski and Baroudi (1991) stated that inductive exploration is beneficial to increase understanding of phenomena within social and cultural context. In this 'bottom-up' approach, it begins with specific observations and looks for patterns and regularities to formulate some tentative hypotheses that can be explored, and finally end up developing some theories. As for specific observation, this research started with reviews on product return and recovery management (PRRM) subject. From the reviews, it allows for the examination of phases in PRRM. At this point, it gives a clear idea on what phase of PRRM that researcher need to focus on. The researcher decided to pursue the investigation in the acquisition phase of PRRM. Then, the researcher found pattern and regularities where most of the literature emphasized on impediments of PRRM.

Previous literature highlighted numbers of impediments in Product Return and Recovery Management (PRRM). Literature also emphasize that there are two main categories of impediments or barriers; internal and external. According to Hillary (2004), internal barriers are the impediments that exist in the company itself that impede the adoption of environmental efforts, whereas external barriers involve hindrance from outside of firms that disrupt the adoption of green practices.

Based on qualitative content analysis, previous literature emphasizes that there are two main categories of impediments or barriers; internal and external. According to Hillary (2004), internal barriers are the impediments that exist in the company itself that impede the adoption of environmental efforts, whereas external barriers involve hindrance from outside of firms that disrupt the adoption of green practices. The analysis of structured content from

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38 high-quality academic journal researchs published between 2004 and 2015 in reputable outlets, such as Science Direct, Emerald Insight, Springer, Taylor & Francis, Wiley Online Library, and IEEE Xplore Digital Library, there are 15 internal impediments and 8 external impediments. Table 4.1 and Table 4.2 summarises the impediments, respectively. The qualitative content analysis of 38 literatures also shows that there are 153 references of internal impediment, whereas 68 references for external impediment.

The analysis shows that the ratio of external impediments exceeds that of internal impediments. In the context of impediments ranking, the qualitative content analysis reveals that the main impediment is customers' operational performance (CP) due to the difficulty in obtaining the right volume and timing of returned goods to support production. Analysing these impediments leads this research to explore the cause-effect relationship between customers' operational performance and certainty in returned products. The result from this impediments discovery research is needed to prove that products return uncertainty problem remains unresolved. Additionally, these impediments list also help in giving clear research direction and scope. The list, eventually, directs this research to explore what kind of contribution needed in consumer-level to achieve greater social good. The exploration in consumer-level leads to the content analysis of consumers' behaviour. The content analysis found regularities in the literature discussing knowledge and motivation.

In the context of impediments ranking, the quantitative content analysis of literature reveals that the two main obstacles of environmental actions in the literature are financial (FI) and resource constraints (RE), follow by organizational barriers (OR), lack of top management support (TS), and lack of support and guidance (SG).

In addition to quantitative content analysis of literature, impediments discovered from field interviews also been considered. Shaharudin et al. (2015) is an example of research that conducted a qualitative content analysis of field interviews to identify barriers in PRRM practices. Customers' operational performance (CP), customer's perception (PC), costly operations (CO) and limited materials usage (LM) are the type of barriers extracted from conducted interviews. These types of barriers then have been cross-referenced with internal and external barriers suggested in Table 4.1 and Table 4.2. The result is customers' operational performance (CP) is placed into uncertainty returned products (UP) category, customer's perception (PC) with market barriers (MK), costly operations (CO) with financial (FI) and limited materials usage (LM) with difficulty in implementation (DI).

Shaharudin et al. (2015) also reported that finding from field interviews shows that the ratio of external impediments exceeds that of internal impediments. In the context of impediments ranking, the qualitative content analysis of field interviews reveals that the main impediment is customers' operational performance (CP) due to the difficulty in obtaining the right volume and timing of returned goods to support production. The next most frequently occurring external barriers are customer's perception (PC) of inferior quality of remanufactured products. The ranking list followed by costly operations (CO) and limited materials usage (LM).

Analysing these impediments leads this research to explore the cause-effect relationship between customers' operational performance and certainty in returned products. The motivation to explore this issue also influenced by the impediments ranking established by Shaharudin et al. (2015). The result from this impediments discovery research is needed to prove that products return uncertainty problem remains unresolved. Additionally, these impediments list also help in giving clear research direction and scope. The list, eventually, directs this research to explore what kind of contribution needed in consumer-level to achieve greater social good.

Internal Barrier	Description
Employee attitude (EA)	Employees refuse to change their attitude towards environmental practices due to their concern for failure and fear of the unknown (Wooi and Zailani, 2010).
Top management support (TS)	Top management is reluctant and impartial in implementing environmental activities (Luthra et al., 2011). Top management's involvement and support are necessary for successful implementation of green initiatives because they control key resources of the firm (González-Torre et al., 2010).
Communication (CM)	Lack of communication capability prevents the information from being transmitted to the right place at the right time, impeding environmental commitment across all levels of supply chain. Informal network linkages with better communication can support organizations in implementing green activities (Yu Lin and Hui Ho, 2013).
Resources (RE)	One of the main barriers to green practices (for example

	reverse logistics) is the lack of human resources with the correct skill and capability because of insufficient training and education. In green supply chain practices (especially EOL and EOU return), consumers also considered as one of human resources, which also need to be educated (Sharma et al., 2014)
Wrong perceptions (WR)	Green practices are not perceived by the firm as a vital responsibility. Also, the firm fails to understand the benefits of being environmentally responsible, and there is a lack of confidence in the green solutions in the firm (Van Hemel and Cramer, 2006)
Difficulty in adoption (DI)	This includes all the difficulties in implementing green practices, such as complexity in handling product returns and recovery, and inaccuracy in forecasting and planning due to the huge variety of goods and complex flow of returns (Sharma et al., 2011).
Culture (CU)	This barrier involves a negative culture in the firm towards green practices or indifference towards environmental concerns (Hillary, 2004).
Organizational barrier (OR)	This type of barrier is related to the managerial and organizational obstacles in implementing green practices, such as distraction in green activity process, longer time to make decisions, assign low priority to green practices (Walsh and Thornley, 2012), and concentrating resources and focus on other activities to raise production and building market share (Shi et al., 2008).
Strategic capability (SC)	Barriers that obstruct the proactive nature of an organization's involvement in green practices and failure to adopt environmentally protective measures due to the lack of strategic capabilities (Murillo-Luna et al., 2012).

	Factors such as a shortage of funds, high cost, and low return on investment (Sardianou, 2008) are examples of financial barriers in green practices. Very often, investment in product returns and recovery or other green practices is not considered an important initiative to boost return on investment (Walsh and Thornley, 2012)
Financial (FI)	
Performance metrics (PM)	These are barriers that hinder the measurement of end-to-end performance of green practices due to the lack of proper performance metrics (Sharma et al., 2011).
Uncertainty of results (UR)	This barrier happens when a firm is doubtful about the intended results of their green practices, as well as the complexity in measuring environmental effects. This includes the challenge of defining the essential elements of green activities (Chan, 2012)
Technology (TC)	This barrier is due to the resistance of a firm to adopt green technology to promote its green practices (Luthra et al., 2011).
Risk (RI)	This is due to the risk of losing market share as green practices affect a firm's image. For example, customers may perceive that a firm's products are of lower quality or standards if it reuses recovered parts (Kumar and Malegeant, 2006).
Infrastructure (IF)	The absence of infrastructure to support the development of green practices, such as the lack of space and equipment adds to this barrier (Thiruchelvam et al.,20013)

Table 4.1: Internal Barriers in PRRM Adoption and Implementation

External Barrier	Description
Economics(EC)	The impediment of economics to the adoption of green practices is related to the external economic situation that is beyond the control of the firm but may affect its priorities,

	especially concerning environmental activities. The situation is even worse for firms that are uncertain of the value of green practices (Hillary, 2004).
Competitive pressure (CP)	This external barrier is due to the pressure from market competition, which forces firms to reduce their green commitment (González-Torre et al., 2010).
Regulations (RG)	These barriers are due to unclear government regulations and policies, which make it difficult for firms to decide on appropriate strategies (Liu, 2012).
Technical Information (TI)	This barrier relates to the complexity of getting and making use of green-related information due to the lack of competency in gaining access to external technical support (Shi et al., 2008).
Uncertainty of returned products (UP)	This impediment in the green practices of reverse logistics includes the uncertainty in the product recovery and replacement processes, such as quantity, timing, and quality of returns. It also includes uncertainty in the collection process of used products and packaging (Jayaraman and Luo, 2014).
Institutional weaknesses (IW)	Barriers that are derived from the institution's weakness, such as the lack of promotion of green practices and the absence of a central source of information governing the legislation of green practices (Hillary, 2012).
Support and guidance (SG)	These barriers originate from a lack of external assistance, such as consultants, trade associations, and business networks. The guidance and support can be in the form of information flow or assistance in clarifying evaluation criteria, process, or compliance (Sharma et al., 2014).
Market barriers (MK)	These are barriers that limit the market demand for reprocessing returned products through recycling, refurbishing, and remanufacturing (Geyer and Jackson, 2013)

Table 4.2: External Barriers in PRRM Adoption and Implementation

4.2.1.1   Generating Codes and themes

Two methods can be used to generate codes and themes, manual and computer-assisted methods. In conducting this research, the manual method was used as it allows more flexibility and also makes it easier to get the big picture from the data. To generate the codes, different colour highlighters and multiple folders were used. Also, multiple readings of the transcripts were undertaken to allow the development of principles and constructs regarding potential codes. In line with the "Hybrid Model" of Fereday and Muir-Cochrane (2006), this research combined both the deductive and inductive approach to extract and generate codes and themes. Initially, the deductive approach was adopted where the codes emerge from the literature and then these codes were used to develop the questionnaire. Later, the inductive approach was used to allow themes and to emerge from the interview data (Patton, 1990).

The code's list is divided into groups corresponding with the constructs investigated in this research. The process of literature reviews lead to the extraction of key themes. The key themes then correlated to the collected codes. Table 4.3 shows the extracted themes, codes and sub-themes.

Themes	Sub-themes	Codes
Product return knowledge	Behaviour	Storing behaviour
		Disposal behaviour
	Green production/manufacturing	Recycle
		Remanufacturing
		Material reuse
Attitude toward return information	Importance	Availability
		Objectivity
	Action	Participation
Message framing	Information presentation	Positively framed
		Negatively framed
Moderator	Knowledge	Proficiency
	Motivation	Responsibility
Immediate return intention	Decision making	Empowerment
		Willingness

Table 4.3: List of themes, sub-themes and codes

4.2.2 Post framework development

Seeking to gather and examine findings of the availability of relevant information on the intention to initiate return activity leads to a positivist study. Positivism is based on the existence of a fixed relationship within phenomena which is typically investigated with structured instrumentation (Orlikowski and Baroudi, 1991). Largely, these studies are conducted to validate theory and to increase the understanding of a phenomenon through formal propositions, quantifiable measures of variables and hypothesis testing. This philosophy assumes that human action is rational and observation of the under-investigated phenomena can be carried out objectively and rigorously (Galliers, 1991). The investigation is eventually concerned with the human ability and motivation settings that shape the entire process of decision-making.

According to Yin (1994) and Miles and Huberman (1994), positivism has remained the prevailing epistemology in information-related research. Baroudi and Orlikowski (1991) state that a study can be considered a positivist field if evidence of measurable variables, hypothesis testing, formal propositions, and drawing of inferences are founded. These findings then, being highlighted again in Conen et al (2000), which came out with the concept of determinism, empiricism and generality. Determinism concept according to Conen et al., (2000) and formal propositions concept proposed by Baroudi and Orlikowski (1991) means that events are caused by other circumstances; and hence, understanding such causal links is necessary for prediction and control. In the context of this study, the event of the immediate return of used electric and electronic products are caused by the circumstance of relevant information availability. Hence, a prediction could be made, which lead to hypothesis testing and empiricism. This study presents a collection of verifiable empirical evidence, for example, information content and information context (independent variables), environmental knowledge and motivation (moderator variables) and immediate return intention (dependent variable). All these empirical evidence are supported by theory (social marketing theory) and numbers of hypothesis to examine their causal links. Findings from tested hypotheses then will apply the concept of generality. 'Generality' is the process of generalizing the observation of the particular phenomenon to the world at large (Conen et al., 2000). In Baroudi and Orlikowski (1991), this concept is visualized as drawing inferences. Generality and inferences allow this research to study one target population and the findings could represent the entire population.

The other reason of choosing positivism as the research paradigm is, it systematizes the knowledge generation process with the help of quantification, which is essential to enhance precision in the description of parameters and the judgement of the relationship among proposed variables. Galliers (1992) adds that positivism means that observations of phenomenon can be made accurately and objectively. Table 4.4 justifies selecting the positivists approach in this research as the categorisation adapted from Orlikowski and Baroudi (1991) and Conen et al. (2000).

Positivism evidence	Applicability
Formal proposition / Determinism	Literature reviews defined propositions of the relationship between return product knowledge and return intention and behaviour
Quantifiable variables / Empiricism	• 2 independent variables (information content and information context) • 2 moderators variables (environmental knowledge and environmental motivation) • 1 dependent variable (immediate return intention)
Drawing inferences / Generality	Probability sampling randomly select household that uses small electrical and electronic equipment as the target population

Table 4.4: Justification for Selecting Positivism Approach (Adapted from Orlikowski and Baroudi (1991) and Conen et al. (2000))

4.2.2.1 Research Approach

This research applies deductive approach where theory and related hypotheses are developed, and research plan will be in action to test these hypotheses. The research approach is determined based on this definition:

The deductive approach means the research has to develop a theory and related hypotheses and develops a research plan to test these hypotheses. The inductive method means the researcher has to collect data and develop a theory or a framework due to the ensuing analysis (Saunders et al., 2009).

The deductive approach suggests researcher to follow existing theories on the same subject to create a basis for the study. Furthermore, researchers will design questions to collect empirical data. Since this research is using quantitative method, the questionnaire survey is used to collect empirical data. The results obtained from the empirical data are further analysed in light of the current knowledge in the literature to draw conclusions (Hyde, 2000).

This research meets the following features in deductive approach as suggested by Saunders *et al.,* (2009):

- Scientific principles.
- Shift from theory to data.
- Explanation of causal relationships among variables.
- Collection of quantitative data.
- Application of controls in order to ensure data validity.
- Concept operationalization to ensure clarification.
- Highly-structured approach.
- Researcher remains independent of research.
- Selection of enough samples to generalise conclusions.

Based on the above discussions, the current research opts for the deductive approach forming the hypotheses based on the literature review. The research hypotheses are then investigated by appropriate statistical tools to be validated.

4.2.2.2 Research Design

At this stage, a descriptive research design utilized to characterize the respondents' qualities and to ascertain the frequencies, rates, mean and standard deviation of the framework that this research utilized. Descriptive research was used to explain the relationship between the research framework variables (Zikmund, 2000).

Previous literature observed that descriptive research designs were generally quantitative (Burns and Bush 2002; Churchill and Iacobucci 2004; Hair 2003). There are two fundamental descriptive research techniques, namely, cross-sectional and longitudinal (Hair, 2003). In studies using the cross-sectional technique, data are gathered from a given population's sample at only one point of time. The cross-sectional study is also defined as a "sample survey in which chosen individuals are requested to respond to a set of structured and standardized questions concerning what they feel, think and do" (Hair *et al.,* 2003). Conversely, longitudinal research manages the sample's population units over a timeframe (Burns and Bush 2002).

A cross-sectional technique used due to the purpose of this research. Data are collected from a given population's sample for only one period. It was the fitting technique because of the limited available time and because this research did not aim to examine patterns. The

survey method utilized because, particularly when gathering data concerning behaviour, it intended to address the respondents' feelings and points of view more specifically (Yin, 1994; Zikmund, 2003). Additionally, the survey method assesses the sample data more precisely and empowers to reach conclusions about generalizing the discoveries from a sample to the population (Creswell, 1994). Besides, the survey technique is considered faster, cheaper, more effective, and can be directed simply to a massive sample (Churchill, 1995; Sekaran, 2000; Zikmund, 2003). This research study utilized a two-stage approach to analysing the data using structural equation modelling (SEM) analysis. In the initial step, the study undertook the evaluation of the measurement model and analysed the factor loading, reliability, and validity of the latent constructs by utilizing confirmatory factor analysis (CFA). In the second step, this research utilized the SEM model process to examine the research hypothesis connections between the research model's latent constructs. In the following sections, explains in detail the rationale for using a quantitative approach and the justification for using surveys.

4.2.2.3 Justification: Survey

Several techniques are recognized in the literature for gathering research data, for example, mail, email, face-to-face, phone, and a mix of these techniques (Cooper and Schindler, 2001; Sekaran, 2000; and Zikmund, 1997). The choice of using a survey strategy is based on various reasons, including examination, population type, question format and content, rate of response, the period of data collection, and cost (Aaker *et al.,* 2000). According to Webber (2004), the choice of various research methods depends upon several factors, for example, the type of preparation and training given to the Scholar, social pressures connected with colleagues and advisor, and performance to gain certain sorts of understanding during the research process. In studies about individual clients or customers, the survey method is preferred (Dwivedi, 2005). This method is useful for many reasons, for example, cost, comfort, time and availability (Gilbert, 2001). In this research, an online and self-administered survey utilized because it had the benefits of flexibility and speed. The main qualities of a self-administered survey are accuracy and cost (Kumar and Day, 1998). A self-administered survey is administrated and designed easily. Respondents can be found to be asked many questions concerning their attitudes, feelings, behaviours, demographics and lifestyle characteristics (Malhotra, 1999). Also, Kassim (2001) identified certain benefits when utilizing a self-administered survey:

- • Answering the questions by circling the response format of the survey with an interviewer present helps respondents to meet the consistent objectives of the questions (Aaker *et al.,* 2000).

- A higher response rate, as high as 100%, can be guaranteed because the surveys are gathered promptly once they are completed (Sekaran, 2000).
- This technique offers the most complete level of control over the target sample (Burns and Bush, 2002).

The conceptual framework in the previous chapter incorporates various research hypotheses that required testing before completed this research. This testing demanded that the study gather quantitative data and conduct a statistical investigation to test the research framework's hypotheses (Straub *et al.,* 2005). Moreover, the study aim was to examine the relationship between the main constructs of this research. Collecting data from a vast number of participants was required to gain an overall picture of the research problem. Based on the literature review previously mentioned, this research concluded that the survey was amongst the most suitable and possible research approaches to be employed.

4.2.2.4   Research Populations

One of the most essential characteristics of quantitative research is the sample requirement employed that reflects the targeted population's attributes (Sarandakos, 1998). In other words, the conclusions drawn by the study apply to the entire population. These social research attributes are defined as representativeness (Sarandakos, 1998).

It is commonly believed that scholars attempt to gain representativeness in their studies because such studies permit generalization. This attribute shows that their findings can be considered valid for the entire examined population. As the representativeness increases, the generalizability of the findings also increases, indicating that the quality of the study increases (Sarantakos, 1998). Additionally, statistical techniques have been developed to assist with this process, for example, that can help with achieving a sample size that permits the study to assert representativeness.

Choosing whom and what to study is of immense significance because it decides the entire study's feasibility. As indicated by Czaja and Blair (2005), the population for a study is the gathering or collection of components that a researcher wishes to concentrate on, the group about which must make inferences and generalize the study's results. It is occasionally impossible to examine the entire population due to time and resource limitations. Indeed, time is frequently more significant. Data collection requiring a long time would render small amounts of data in any one period (Singleton and Straits, 2005).

The selected population of this research comprised household who own small electric and electronic equipment such as rice cooker, phones, printer, blender, radio, as well as battery-operated toys.

4.2.2.5 Justification: Convenience Sampling

Non-probability sampling chose to use in this research and convenience sampling as the specific technique due to the unavailability of a sampling frame (Malhotra *et al.,* 1996; Reynolds *et al.,* 2003; Saunders *et al.,* 2012). According to Hair *et al.* (2014, p.217), convenience sampling is one of the most commonly employed non-probability sampling methods. Essentially, the use of convenience sampling is prevalent in marketing, as in the following studies (e.g. Andreasen, 1984; Gallarza and Saura, 2006; Ismail, 2010; Jamal and Al-Marri, 2010; Keillor *et al.,* 1996; Kim *et al.,* 2011; Petruzzellis, 2010; Morgan- Thomas and Veloutsou, 2011).

Convenience sampling was ideal for this research. Convenience sampling is perfectly fitted to this research because it allows us to decide on the size of the available target population and the ease of data collection. This research targeted household who own small electric and electronic equipment such as rice cooker, phones, printer, blender, radio, as well as battery-operated toys. Moreover, there is a common problem presented concerning sampling because not all users of the Internet are in a central registry. This target group was nevertheless distinct because the Internet could not be considered a central geographical location. Thus, the researcher could face the challenge of surveying the participants. Therefore, in such a context, the research participants are consistently those who are easily accessible to the researcher. Furthermore, the method is ideal because can cope with the research's available resources.

4.2.2.6 Sample size

This research will use sampling size suggested by Cohen (1998). Compared to other sampling size method, for example, Krejcie dan Morgan (1970) and Cochran (1977), Cohen (1998) highlighted the used of Statistical Power (SP) and effect size (r). Meanwhile, Krejcie and Morgan (1970) is based on confidence level and Cochran (1977) is based on margin of error. According to Talib (2013), Krejcie and Morgan (1970) is suitable to be used when the researcher knows the volume of his or her research population and it is better to opt for the method that considers the statistical power and able to avoid Type 1 Error and Type 2 Error.

Type 1 Error (T1E) means rejecting the right hypotheses and Type 2 Error (T2E) means accepting the wrong hypotheses (Talib, 2013).

Suggested value of statistical power based on literature is 80%. 80% is the common value of SP in social science research, two-tailed (α=.05). α=.05 is the common value for the margin of error in social science research. These values of SP and α are used to balance the Type 1 error and Type 2 Error (Cohen, 1998).

According to Cohen (1998), the effect size in social science is moderate. Moderate effect size is around .30 to .40. Pearson table presented in Figure 4.6 shows the sampling size method which considered SP, α=.05 and r.

Power Tables for Effect Size r
(from Cohen 1988, pg. 102)

two-tailed α = .05 or one-tailed α = .025

r

Power	.10	.20	.30	.40	.50	.60	.70	.80	.90
.25	167	42	20	12	8	6	5	4	3
.50	385	96	42	24	15	10	7	6	4
.60	490	122	53	29	18	12	9	6	5
2/3	570	142	63	34	21	14	10	7	5
.70	616	153	67	37	23	15	10	7	5
.75	692	172	75	41	25	17	11	8	6
.80	783	194	85	46	28	18	12	9	6
.85	895	221	97	52	32	21	14	10	6
.90	1047	259	113	62	37	24	16	11	7
.95	1294	319	139	75	46	30	19	13	8
.99	1828	450	195	105	64	40	27	18	11

Figure 4.1: Pearson table

Based on the Pearson table, the suggested number of respondents for this research is 85. However, similar previous studies reported a greater number of respondents. For example, Jena & Sarmah (2015) reported analysis based on 329 respondents, Chang & Wu (2015) reported 429 respondents, and Raziuddin et al. (2016) reported 381 respondents. Based on this information, this research will work on the sample size of 85 to 400 respondents.

Additionally, as recommended by Saunders *et al.,* (2009), determining sample size was based upon confidence of data and error margin tolerance. For confidence of data, the data collection certainty level is normally 95% can be considered as representative of total population. As for the error margin, the recommended default confidence interval is 5%. The sample size for this research is based on the data presented in Table 4.5.

Population	Margin of Error			
	5%	**3%**	**2%**	**1%**

50	44	48	49	50
100	79	91	96	99
150	108	132	141	148
200	132	168	185	196
250	151	203	226	244
300	168	234	267	291
400	196	291	343	384
500	217	340	414	475
750	354	440	571	696
1000	278	516	706	906
2000	322	696	1091	1655
5000	357	879	1622	3288
10000	370	964	1936	4899
100000	383	1056	2345	8762
1000000	384	1066	2395	9513
10000000	384	1067	2400	9595

Table 4.5: Rough Computation of Sample Size Based on Population Size

In order to select a representative sample, household in Malaysia were considered the population of the sample. With the aim of selecting a representative sample of this population, the sample size was calculated in accordance with Bartlett et al. (2001) by using this formula:

$$n_0 = \frac{(t)^2 * (p)\,(q)}{(d)^2}$$

According to Bartlett et al. (2001), n_0 is the sample size, t is the z value (t = 1.96 for a 95% confidence level), p is the percentage of respondents who selected a specific choice (p = 0.50) and d is the confidence interval or margin of error (d = 5%). A sample size of 384 is obtained. Besides, according to Leedy and Ormrod (2005), a sample size of around 400 will be adequate if the target population size is beyond 5000, while Sekaran and Bougie (2013) also stated that sample sizes larger than 30 and lower than 500 are appropriate for most research. Therefore, the size of 384 respondents is considered adequate for this research.

4.2.2.7 Questionnaire development

This section describes the design of questionnaires that will be used for data collection purpose. The design of the questionnaire involves two-phase development. Firstly, two

environmental messages were developed. The second phase is the development of five influential measures. The seven influential measures, then, will be grouped into three categories. The questionnaire consisted of close-ended questions, with multiple choice and Likert-scale measurement.

One section of the questionnaire is intended to measure respondents' environmental knowledge. To do this, ten questions of environmental issues will be asked and respondents need to choose the best answer from the multiple-choice answer. The questions on basic environmental literacy are derived from the survey administered by the National Environmental Education and Training Foundation (NEETF) and the Roper Group. The close ended with multiple choices is the best way to calculate respondents' score (Coyle, 2004; DeChano, 2006). Their proficiency will be measures based on their score of the correct answer. Respondents' answer will be compared to the answer scheme provided by Roper Group. The environmental literacy assessment from the Roper Group is considered as the best way to measure respondents' environmental knowledge as it has widely used in environmental literacy literature. There were no modifications made on the questions. NEETF set the proficiency criterion at 75 percent correct. The 75 percent criterion level for proficiency is also used in this research.

From the seven influential measures, four of them will be measured on ordinal scales. Product return knowledge, attitude towards return information, environmental motivation and immediate return intention use seven-point Likert scale. The scaled-response format allows respondents to measure their degree of agreement to constructs (Alreck and Settle, 1995). A Likert scale is a technique that allows the survey to obtain widespread information from the survey's participants (Sekeran, 2000). The Likert answer scale is the most common and easily utilized in scaled questions. Hair *et al.* (2014) suggested that when using self-administered surveys or online surveys to gather data, the best design was Likert scales. The Likert scale is an interval utilized by to ask the study's participants if they agree or disagree about an identified study topic by rating a series of behavioural belief statements and mental beliefs (Hair *et al.,* 2014). Generally, a Likert scale with 7 options was rated as the best when seeking higher reliability. It was noted that a 7-point scale illustrated the highest test reliability (Oaster, 1989). The lowest test-retest reliability was revealed as two to four categories, whereas the highest test-retest reliability was a scale of seven or more categories (Preston and Colman, 2000).

4.2.2.7.1 Framing Message Development

The first thing that will take place to collect primary data for validation purpose is designing the framing message. Briefly, there will be two short messages of approximately 150 words, conveying the advantages (message 1: positive frame) and disadvantages (message 2: negative frame) of returning the acceptable quality used products at the right time. In order to ensure validity of these messages, a pilot study will be conducted by using focus group. The purpose of the pilot study is to identify how respondent will interpret the message; either it is positively framed or negatively framed. The result then will be compared to the intended outcome. If respondents agree that message 1 is positively framed and message 2 is negatively framed, the validation objective is achieved. In addition of validation objective, the focus group also will be asked to indicate whether the two messages are ''about the same,'' ''slightly different,'' or ''much different''. The highest percent in "much different" indicator will indicate that the messages are valid to be used for the online survey. Messages post-validation phase will include the design of survey that completed by six influential measures; demographic, product return knowledge, informative measure, immediate return intention, environmental motivation and environmental knowledge.

4.2.2.7.2 Influential Measures

Seven influential measures will be used in this questionnaire. There are demographic, informative measure, immediate return intention, environmental knowledge and environmental motivation. These five influential measures are grouped into three categories as presented in Table 4.6.

Categories	Influential Measures	Scale of Measurement
Respondent's profile	• Demographic	Nominal
Respondent's environmental profile	• Environmental knowledge	Interval
	• Product return knowledge	Ordinal
	• Environmental motivation	Ordinal
Post-manipulation measures	• Informative measure	Nominal
	• Immediate return attitude	Ordinal
	• Immediate return intention	Ordinal

Table 4.6: Influential measures

- **Demographic**

   According to Chang and Lee (2009), these factors may influence the likelihood of green initiatives; age, gender and educational level. For example, women have altruistic motives to help others (Newman, 2000), which might increase their

tendency to support EoU and EoL product return activity. These related demographics were deliberated as potential variables that might influence the survey's results.

- **Environmental Knowledge**

  Environmental knowledge is an individual's skill or proficiency in interpreting the information contained in a given stimulus (Frías et al., 2008; MacInnis et al., 1991). Hence, broad-based environmental knowledge questions will be developed to measure the respondents' environmental knowledge. To do this, the Roper Group assessment on basic environmental literacy (Coyle, 2004; DeChano, 2006) and scale from the 1997 survey administered by the National Environmental Education and Training Foundation (NEETF) are referred. As suggested by the Roper Group, this environmental knowledge section will cover four subcomponents: human activity questions; questions relating to the atmosphere; biodiversity and ecosystems questions; and questions relating to water (Coyle, 2004; DeChano, 2006). To measure respondents' proficiency, the proficiency criterion at 75 percent correct will be used, as suggested by NEETF.

- **Product Return Knowledge**

  Product return knowledge will be assessed based on six items which cover the idea of storing e-waste, the harmful effect of e-waste, respondent's familiarity with an immediate return, proper disposal of e-waste, respondent's knowledge about recycle, remanufacturing and material reuse. The six items use a seven-point Likert-style scale. The items adapted from Hazen et al (2012) and Jimenez-Para et al. (2014). The items were reworded to meet the context of this research.

- **Environmental Motivation**

  Environmental motivation assessment will be conducted by using six subscales of motivation toward environmentally friendly behaviours as suggested by Osbaldiston and Sheldon, (2003), Pelletier et al., (1998), and Villacorta et al., (2003). The six subscales are as follows:
  - intrinsic ("for the pleasure I experience when I find new ways to improve the quality of the environment")
  - integrated ("because being environmentally conscious has become a fundamental part of who I am")

- identified ("because I think it's a good idea to do something about the environment")
- introjected ("because I would feel bad if I didn't do anything")
- externally regulated ("to avoid being criticised")
- amotivated ("honestly, I don't know; I truly have the impression I'm wasting my time doing things for the environment")

On a seven-point scale, respondents will be asked to rate the degree to which they agree with the elements. The scale and all elements are derived from Pelletier et al., (1998). The intended outcome for this section is an environmental motivation index. The index will be developed based on score of each six subscales. At that point, each subscale will be assigned with the weight of +3, +2, +1, −1, −2, and −3, respectively (Deci and Ryan, 1985; Villacorta et al., 2003). The index is expected to help in exhibiting two levels of environmental motivation, which are high and low. The most probably standard deviation of 0.5 (above and below the average) will be used to distinguish these two levels.

- **Informative Measure**

  The positive and negative message should not differ in terms of amount and quality of information the participants perceived (Avineri and Owen 2013). Participants indicated which message is true, objective, convincing, relevant, believable, useful, and interesting to them. Respondent's preference for positively or negatively framed message will be based on the count of indication they made for each message (Chang and Lee, 2009; Van't Riet et al., 2010).

- **Immediate Return Attitude**

  In this study, immediate return attitude is inspired by the use of attitudes toward pro-environmental behaviour and attitudes toward the environment in previous literature. Attitude towards environment is the centre of our model which is viewed as "cognitive and affective evaluation of the object of environmental protection" (Bamberg, 2003, p.21). Many studies establish attitude as one of the strong antecedents influencing behaviour (e.g., Ballantyne & Packer, 2005). In most models of pro-environmental behaviour, attitude is placed as the central variable between environmental knowledge and behaviour (Davies et al., 2002; Polonsky et al., 2012) where environmental knowledge and pro-environmental attitudes are highly interconnected (Bamberg, 2003). In this study, attitude towards immediate return information is measured based on four items that were developed by Lee (2011) on a seven-point

Likert-style scale. Adapted items were reworded, where necessary, to maintain the semantic properties of the context of the study.

- **Immediate Return Intentions**

  Understanding how the different types of pro-environmental behaviour are shaped and interrelated can be helpful for organisations in developing business policies and establishing marketing communication strategies (Ham and Choi, 2012). Assessment for immediate return intentions covers the respondents' likelihood of deliberately checking and reading return information in products, deliberately checking the ideal timing of return on products' environmental labels and initiate self-drop-in activity even there is cost associated with it, for instance, transportation cost. The five-point scale of "always willing", "sometimes willing", "unsure", "rarely willing", and "never willing" (Kilbourne and Pickett, 2008) will be used for this assessment. This could be used to derive a composite rating to quantify the persuasion effectiveness (Chang and Wu, 2015). Higher numbers indicated a higher pro-environmental behaviour intention, resulting in higher persuasive effectiveness.

4.3   Operationalisations

A conceptual framework is composed of key variables, factors or constructs (Jabareen, 2009). This research is composed of three independent variables; product return knowledge, attitude toward return information and message framing, two moderators which are environmental knowledge and motivation and one dependent variable, which is immediate return intention.

Constructs	Definition	Number of items	Resources
Independent variables			
Product return knowledge	Explicit knowledge integrating ideal timing and acceptable quality of end-of-life return	6	Jena and Sarmah (2015)
Attitude towards return information	Collective awareness and participation in appreciating specific return information	4	Wu *et al.*, (2014)
Message framing	A theoretically grounded	7	Chang and Lee,

	persuasive communication strategy aimed at promoting perceptions, judgments, attitude and behavioural changes through the presentation of equivalent appeals, framed in terms of either the benefits gained or negative consequences incurred		(2009) De Velde et al., (2010) Gerend and Cullen, (2008) Krishnamurthy et al., (2001) Levin et al., (1998)
Dependent variables			
Immediate return intention	Individual's level of intention to immediate return e-waste according to the concept of ideal timing and acceptable quality of end-of-life return	4	Parajuly *et al.,* (2017)
Moderator			
Environmental knowledge	General knowledge about environmental issues/problems, such as the problems the earth is now facing	10	Benton, (1994) DeChano, (2006) Martin and Simintiras, (1995)
Environmental motivation	Individual's level of motivation toward environmentally friendly behaviours	6	Pelletier et al., (1998) Villacorta et al., (2003)

Table 4.7: Operationalisation Table

4.4 Pre-test

To confirm the questionnaire design, a two phase pre-test was conducted. In the first stage, a focus group of 10 participants were participating to review information quality presented in two messages. This focus group was invited to review the clarity of information content part of the survey, Part C.

First, the researcher invited the focus group to informal gathering that took place at researcher's house, and the session started with short briefing on the purpose of the study. To start the review process, all participants were given two messages that have been framed differently, followed by closed-ended questions. The first stage of pre-test is intended to ensure that the two messages contain the same quality of information with different presentation. The purpose of this pre-test is to identify how respondent will interpret the

message; either it is positively framed or negatively framed. The result then will be compared to the intended outcome. If respondents agree that message 1 is positively framed and message 2 is negatively framed, the validation objective is achieved. In addition of validation objective, respondents also will be asked to indicate whether the two messages are "about the same," "slightly different," or "much different". The highest percent in "much different" indicator will indicate that the messages are valid to be used for the face-to-face and online survey.

Next, the second phase of pre-test was conducted. After achieving the validation objectives on the framed message, the questionnaire was distributed to for further testing on overall content appropriateness and clarity. This pre-test used convenience sampling. Respondents for this pre-test were among researcher's contacts and friends. Based on this pre-test, some minor amendments were made. The amendments made were the inclusion of example for small e-waste (rice cooker, kettle) and replacing the word 'end-of-life' with 'post-consumption' in the attitude section of Part A. The pre-test session lasted for two hours to cover the process of reviewing and feedback. The session was administered by the researcher.

4.5   Pilot Study

Before distributing the real questionnaires to the selected sample, it is important to conduct pilot study. It is important to ensure confirmation of collected data representation with the real world (Straub *et al.*, 2004). As to validate the questionnaire constructs and analysis methods, the pilot study is used to identify vague questions, test adequacy of the research instruments, as well as testing the techniques used in data collection and measurement. Pilot study for this research used convenience sampling where researcher randomly selected thirty young adults around Coventry. Aforementioned research suggests that young adults are more knowledgeable and have information about the return of used products than older adults because of environmental consciousness and availability of remanufactured products such as mobile, and personal electronic goods (Ko and Hwang, 2009; Hazen et al., 2012). Hazen et al. also suggested that university students may have ample experience in returning used products. From the aforementioned research, it is analysed that they may have more idea about the return of used products than older adults. Therefore, this group is considered ideal to identify potential sources of error, for example, in identifying poorly expressed items, hard to understand questions and confusing sentences. Based on this, the pilot study was conducted by using sample among undergraduate,

postgraduate students and other young adults within the age group of 20-40 years. Taking the suggestion of the participants, the final questionnaire was prepared for the data collection. This allows the definitive version of the questionnaire to be drafted. The structured closed-ended questionnaire was designed based on the objective of the work. The instrument was designed to develop the final questionnaire and divided the study into four parts. The first part of the questionnaire consists of the questions related to respondents' profile information such as sex, age, education, knowledge in returning the used products and attitude towards post-consumption immediate return information. The second part will be about respondents' environmental profile which measures their current environmental knowledge and motivation. The third part includes the question on which message, either positively or negatively framed message, influence them better to immediately return their post-consumption waste. The information measures in Part C related to how true, objective, convincing, relevant, believable, useful and interesting the messages are to them. Additionally, the last part also includes the five-point scale, ranging from "always willing" to "never willing", related to participants' intention to participate in post-consumption return if the proposed information is available in the future.

4.6   Main Data Collection

This research utilised the application of online survey by using Google Drive software. It is an Internet-based questionnaire/survey application that provides research scientists with the ability to produce extensive surveys for academic and educational purposes.

This application was used to develop the questionnaire and it will provide a special URL. The URL then can be easily shared on social media accounts and emails. The URL was shared on the researcher's page on Facebook and Instagram, and the link widely shared by researcher's online connection. For emails, respondents received an e-mail message containing an information letter and an active link to the Google form. The respondents need to click the hyperlink to record their answers. To maximize the response rate, the survey sent to several online groups on Facebook with the authorisation from the administrator.

Social media has become the online community not only because it provides interesting chances for communication but also because it allows scholars to send online questionnaires over social network platforms (Matute *et al,* 2016). Many academic studies use social media to conduct online surveys (Matute *et al,* 2016, Culnan *et al,* 2010). The benefits of using surveys on social media platforms are numerous:

- Typical demographic models can be used, including gender, age, education, and other factors.
- The models can be used to direct questionnaires to the target participants.

Considering the ethical issue, the questionnaire was completed with a participant information sheet that outlines the goal of the study, the clause stating about data confidentiality, participation is totally anonymous and voluntarily. Participants have the right to cancel their participation at any time. The participant information sheet also contains the researcher's contact information if they have anything to ask about the study.

There are four advantages of using online surveys. The first advantage is that they are an effective and efficient means of reaching respondents. Van Selm and Jankowski (2006) observed that in the Internet environment, only forums existed. Similar previous studies utilized web-based surveys to reach a group of users who discussed the same topics of customer behaviour-related interests in online communities (Chan and Li, 2010; Cheung and Lee, 2012; Sun, Fang, and Lim, 2012). The second advantage is the geographical coverage. The Internet is distinctive because it allows the study to reach the target population irrespective of geographical boundaries (Evans and Mathur, 2005; Van Selm and Jankowski, 2006). This research utilized a web-based survey to collect data from a relatively large population of respondents who resided in Malaysia. The third advantage is the speed of delivery and response. Lefever *et al.* (2007) articulated that a web-based survey could be managed effectively and promptly. Subsequently, following the participants' completion and submission of online surveys (Evans and Mathur, 2005), the process of gathering responses was rather fast (Berrens, *et al.,* 2003; Duffy, *et al.,* 2005). The fourth advantage is cost-effectiveness. Tourangeau (2004) stated concisely that compared with traditional surveys, online surveys had lower costs. The cost-effectiveness is significant where it cuts the cost for printing and postage. (Deutskens *et al.,* 2006; Ilieva *et al.,* 2002). Moreover, when using the Internet, the process of administering the survey is made cheaper; data analysis is easier because the gathered data are transferred automatically to the data analysis software (Evans and Mathur, 2005). As the suggested sampling size should be at least 384 respondents, it is cost-effective to employ an online survey.

4.7   Conclusion

This chapter generally focuses on how data collection will be implemented. Discussion of related matters such as questionnaires development, sampling size, research paradigm and approach are presented in previous sections.

The selected data collection method aims to collect primary data that will be used to validate the proposed conceptual framework. All the validated data will either support or reject the proposed hypotheses and to make sure that abovementioned objectives are achieved.

5. DATA ANALYSIS AND HYPOTHESES TESTING

5.1 Introduction

The focus of the study is to understand the influence of information content and information context on immediate post-consumption return intention among consumers. Hypotheses related to consumers' product return knowledge, attitude towards return information, message framing and immediate return intention have been formulated and analysed.

This chapter presents analysis procedures that have been conducted on data gathered in the data collection process. This chapter includes the discussion of statistical analysis on all hypotheses formulated in the previous chapter. The pilot study and full-scale questionnaires had been analysed by using quantitative analysis.

5.2 Qualitative data analysis

Before this chapter explains the further analysis of quantitative data from the survey, this section is intended to simplify the processes involved in identifying all variables used in the conceptual framework. In pre-framework development phase, this study used qualitative content analysis. Based on qualitative content analysis, extent research emphasizes that there are two main categories of impediments or barriers for PRRM; internal and external. According to Hillary (2004), *internal barriers* are the impediments that exist in the company itself that impede the adoption of environmental efforts, whereas *external barriers* involve hindrance from outside of firms. The analysis of structured content from 38 high-quality academic journal research published in reputable outlets, 15 internal impediments and 8 external impediments were identified. The qualitative content analysis of 38 studies presented 153 references of internal impediment, whereas 68 references for external impediment. The analysis revealed that the ratio of external impediments exceeds that of internal impediments. In the context of impediments ranking, the qualitative content analysis reveals that the main impediment is consumers' operational performance due to the difficulty in obtaining the right volume and timing of returned goods to support production. Analysing these impediments leads to explore the cause-effect relationship between consumers' operational performance and certainty in returned products. The results from this impediments discovery research was needed to prove that products return uncertainty problem remains unresolved.

The analysis shows that the ratio of external impediments exceeds that of internal impediments. In the context of impediments ranking, the qualitative content analysis reveals that the main impediment is customers' operational performance (CP) due to the difficulty in obtaining the right volume and timing of returned goods to support production. Analysing these impediments leads this research to explore the cause-effect relationship between customers' operational performance and certainty in returned products. The result from this impediments discovery research is needed to prove that products return uncertainty problem remains unresolved. Additionally, these impediments list also help in giving clear research direction and scope. The list, eventually, directs this research to explore what kind of contribution needed in consumer-level to achieve greater social good. The exploration in consumer-level leads to the content analysis of consumers' behaviour. The content analysis found regularities in the literature discussing knowledge and motivation.

In the context of impediments ranking, the quantitative content analysis of literature reveals that the two main obstacles of environmental actions in the literature are financial (FI) and resource constraints (RE), follow by organizational barriers (OR), lack of top management support (TS), and lack of support and guidance (SG).

In addition to quantitative content analysis of literature, impediments discovered from field interviews also been considered. Shaharudin et al. (2015) is an example of research that conducted a qualitative content analysis of field interviews to identify barriers in PRRM practices. Customers' operational performance (CP), customer's perception (PC), costly operations (CO) and limited materials usage (LM) are the type of barriers extracted from conducted interviews. These types of barriers then have been cross-referenced with internal and external barriers suggested in Table 4.1 and Table 4.2. The result is customers' operational performance (CP) is placed into uncertainty returned products (UP) category, customer's perception (PC) with market barriers (MK), costly operations (CO) with financial (FI) and limited materials usage (LM) with difficulty in implementation (DI).

Shaharudin et al. (2015) also reported that finding from field interviews shows that the ratio of external impediments exceeds that of internal impediments. In the context of impediments ranking, the qualitative content analysis of field interviews reveals that the main impediment is customers' operational performance (CP) due to the difficulty in obtaining the right volume and timing of returned goods to support production. The next most frequently occurring external barriers are customer's perception (PC) of inferior quality of remanufactured products. The ranking list followed by costly operations (CO) and limited materials usage (LM).

Analysing these impediments leads this research to explore the cause-effect relationship between customers' operational performance and certainty in returned products. The motivation to explore this issue also influenced by the impediments ranking established by Shaharudin et al. (2015). The result from this impediments discovery research is needed to prove that products return uncertainty problem remains unresolved. Additionally, these impediments list also help in giving clear research direction and scope. The list, eventually, directs this research to explore what kind of contribution needed in consumer-level to achieve greater social good.

5.2.1 Generating Codes and themes

Two methods can be used to generate codes and themes, manual and computer-assisted methods. In conducting this research, the manual method was used as it allows more flexibility and also makes it easier to get the big picture from the data. To generate the codes, different colour highlighters and multiple folders were used. Also, multiple readings of the transcripts were undertaken to allow the development of principles and constructs regarding potential codes. In line with the "Hybrid Model" of Fereday and Muir-Cochrane (2006), this research combined both the deductive and inductive approach to extract and generate codes and themes. Initially, the deductive approach was adopted where the codes emerge from the literature and then these codes were used to develop the questionnaire. Later, the inductive approach was used to allow themes and to emerge from the interview data (Patton, 1990).

The code's list is divided into groups corresponding with the constructs investigated in this research. The process of literature reviews lead to the extraction of key themes. The key themes then correlated to the collected codes. Table 5.1 shows the extracted themes, codes and sub-themes.

Themes	Sub-themes	Codes
Product return knowledge	Behaviour	Storing behaviour Disposal behaviour
	Green production/manufacturing	Recycle Remanufacturing Material reuse
Attitude toward return information	Importance	Availability Objectivity

	Action	Participation
Message framing	Information presentation	Positively framed
		Negatively framed
Moderator	Knowledge	Proficiency
	Motivation	Responsibility
Immediate return intention	Decision making	Empowerment
		Willingness

Table 5.1 : List of themes, sub-themes and codes

Figure 5.1 explains the research design in pre-framework development phase that uses qualitative content analysis method in identifying this study's variables. All variables then were used in formulating the hypotheses.
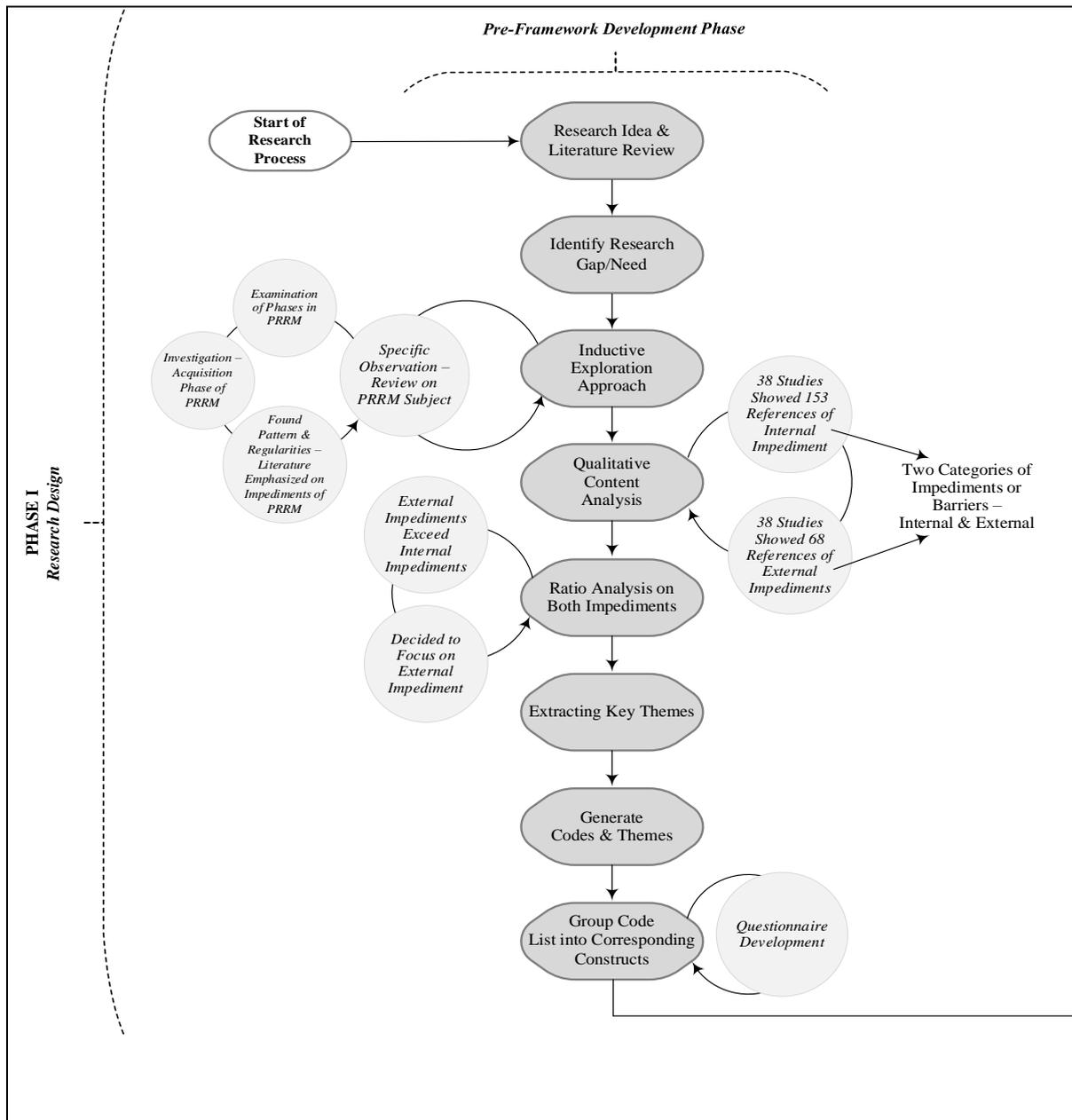
Figure 5.1: Qualitative research design

5.3 Sampling approach

As an exploratory study, this study uses convenience sampling in order to investigate relationship between information content and presentation with immediate post-consumption or end-of-life return intention. According to Swanson and Holton (2005), information obtained from convenience sampling still provide some fairly significant insights, even could represent useful source of data in exploratory research. Additionally, this non-probability sampling was used as it helps in obtaining basic data without the complication of using randomized sample (Black, 1999). This non-probability method is often used during preliminary research efforts

to get a gross estimate of the results, without incurring the cost or time required to select a random sample (Maheshwari, 2017). Therefore, at this stage, in exploring the possible relationship between the proposed variables, it is acceptable to use this sampling technique. In convenience sampling for this study, the researcher used subjective judgement when selecting respondents from the population to be included in the sample. The subjective judgement involves the combination of theory, experience and insights from the research process that most of respondents own at least one small e-waste (mobile phones, battery operated toys or kettle) at home. The convenience sampling also offers the advantages of convenient accessibility and proximity to the researcher, where most of respondents come from researcher's social media contacts, which mostly fulfilled the age criteria suggested by existing literature in behavioural study of product return.

5.4 Pilot Study

Before distributing the real questionnaires to the selected sample, it is important to conduct pilot study. It is important to ensure confirmation of collected data representation with the real world (Straub *et al.*, 2004). As to validate the questionnaire constructs and analysis methods, the pilot study is used to identify vague questions, test adequacy of the research instruments, as well as testing the techniques used in data collection and measurement. As for content validity, this research used face content validity. Face content validity was performed to ensure that the developed questionnaire asks items that reflect research scope, theories, objectives and hypotheses.

In addition to content validity, there is reliability test. In the reliability test, the aim is to check the degree of consistency between items and attributes that will be measured in the questionnaire. To do that, this research uses the Cronbach's Alpha Coefficient test. According to Hinton et al. (2004), reliability coefficient of 0.7 and above is recognised satisfactory. The nearer the value to 1.0 is better because it reflects a higher consistency. Table 5.1 presents the coefficient values of the three parts of the questionnaire. Table 5.1 shows coefficient values which are greater than 0.7.

Part	Cronbach's Alpha
Product return knowledge	0.8153
Attitude towards EoL information	0.7961
Immediate return intention	0.8125

Table 5.1: Cronbach Alpha's Coefficient of pilot study

5.5 Descriptive Analysis

In total, 417 valid responses were collected. Due to incomplete responses, the number of usable questionnaires was reduced to 392. Table 5.2 displays the detailed demographic information for the sample. There were 156 males and 236 females. Age of the respondents is classified as 20-29 years, 30-39 years, 40-49 years and 50+ old years. The majority of the sample (57.9 percent) was between 30 to 39 years old. Education was grouped into three categories: high school, college/university, and graduate school; approximately 43.1 percent of the respondents were graduated from college or university.

Socio-demographics/items	Total n=392	%
Gender		
Male	156	39.8
Female	236	60.2
Age		
20-29 years old	104	26.5
30-39 years old	227	57.9
40-49 years old	43	11
50+ years old	18	4.6
Qualification		
High school	98	25
College/university	169	43.1
Graduate school	125	31.9

Table 5.2: Respondents' Demographic Information

5.6 Analysis and Hypotheses Testing

This section presents the reliability analysis results for the questionnaire used to collect the data from the targeted respondents. The coefficient values reported in Table 5.1 and Table 5.3 is comparable and can be concluded that the full-scale questionnaire has a good level of internal consistency, thus reliable to be used for the data collection process.

Part	Cronbach's Alpha
Product return knowledge	0.8052
Attitude towards return information	0.7898
Immediate return intention	0.8117

Table 5.3: Cronbach Alpha's Coefficient of the full-scale questionnaire

As for other parts of the questionnaire, environmental motivation and informative measures are adopted from the previous study. Environmental motivation's elements and scale is adopted from Motivation Towards Environmental Scale (MTES) by Pelletier et al. (1998).

The internal consistency of the MTES subscales appears adequate (.79 < Cronbach's a .89) Pelletier et al. (1998). For informative measure, the elements and seven-point scale is derived from Chang and Lee, (2009) and Van't Riet et al. (2010). The other part of the questionnaire is environmental knowledge. In this part, respondents need to answer 10 broad-based environmental questions that derived from Roper Group assessment on basic environmental literacy (Coyle, 2004; DeChano, 2006) and scale from the 1997 survey administered by the National Environmental Education and Training Foundation (NEETF).

In analysing the data, the four-step approach was adopted. Firstly, Exploratory Factor Analysis (EFA) was carried out to find out the most significant components (constructs) from the manifest variables. EFA also conducted to know whether the constructs are explained fully or not by the respective indicators. Most of the variables used in this study are derived from earlier studies. EFA was conducted using IBM SPSS 20 software. In the second step, confirmatory factor analysis (CFA) is conducted to measure the convergent and discriminate analysis. Third, the structural model is constructed to investigate the model fit and to test the hypotheses. Both second and third measurement models and structural model are assessed by maximum likelihood parameter estimator Amos 26.

5.7   Exploratory Factor Analysis (EFA)

Before starting the EFA, a Bartlett sphericity test was conducted to determine the appropriateness of the data for factor analysis and for that, the value of KMO (Kaiser-Meyer-Olkin) had been used for measuring adequacy. The value of KMO was found as 0.68, and a significance level of 0.00 was obtained using Bartlett's sphericity test and it suggests the inter-correlation matrix contains sufficient common variance to make the factor analysis worthwhile. It is important to note that the minimum acceptable value of KMO is 0.5 (Nunnally, 1978). For EFA, the Principal Component Analysis, with varimax rotation and Eigen value greater than 1 and factor loading greater than 0.4 was used (Kiser, 1958). For the analysis of items, the adjusted indicator total correlation coefficient less than 0.4 were used as the criterion to delete indicators. From the result, it is found that PRK_Quality has the value of indicator-total correlation coefficient 0.215, which is less than 0.4). All items loaded on their respective factors with most of them loading above 0.70 are shown in Table 5.4. The cumulative percentage of variance explained (CPVE) experienced by nine factors is 66.16 percentage. To test the normality assumptions underlying the maximum likelihood procedure, all the constructs were tested individually through both box plot and multivariate normality test. The results indicated that the data were normally distributed.

Construct/indicator	Item	Mean (SD)	Factor loading	CPVE
Product return knowledge (PRK)	PRK_store	5.67(1.11)	0.725	55.77
	PRK_harm	4.20(1.75)	0.844	
	PRK_return	5.56(1.35)	0.800	
	PRK_dispose	4.91(1.52))	0.542	
	PRK_recycle	4.44(1.71)	0.817	
	PRK_effort	5.38(1.46)	0.625	
Attitude toward return information (ATT)	ATT_important	5.59(1.37)	0.799	36.07
	ATT_support	5.67(1.29)	0.768	
	ATT_promote	5.60(1.38)	0.713	
	ATT_check	4.33(1.77)	0.724	
Message framing (MF)	MF_true	5.65(1.32)	0.682	66.16
	MF_objective	5.22(1.57)	0.650	
	MF_convince	5.56(1.30)	0.744	
	MF_relevant	5.26(1.49)	0.970	
	MF_believable	5.46(1.51	0.959	
	MF_useful	5.04(1.70)	0.957	
	MF_interesting	5.50(1.49)	0.514	
Immediate Return Intention (IRI)	IRI_choose	5.54(1.64)	0.644	61.54
	IRI_retain	6.03(1.27)	0.600	
	IRI_effort	5.51(1.57)	0.670	
	IRI_willing	6.10(1.11)	0.725	
Environmental Motivation (EM)	EM_intrinsic	5.87(1.05)	0.820	49.75
	EM_integrated	5.43(1.45)	0.949	
	EM_identified	5.89(1.28)	0.946	
	EM_introjected	5.78(1.31)	0.949	
	EM_externally	5.63(1.65)	0.948	
	EM_amotivated	5.47(1.46)	0.820	
Environmental Knowledge (EK)	EK1	5.03 (1.69)	0.721	57.24
	EK2	5.72 (1.27)	0.623	

Table 5.4: Exploratory analysis

5.8 Confirmatory Factor Analysis (CFA)

The reliability and validity of the measurement variables have been done by using program IBM SPSS 19 and also multicollinearity tests were performed (Henseler et al., 2009). This research uses Cronbach's scores (a) and Composite Reliability Index (CRI) of each sub-construct to conduct CFA, as recommended by Fornell and Larcker (1981). From Table 2, it is observed that the CRI of all the six constructs exceeds the threshold value of 0.6 (Bagozzi and Yi, 1988) and Cronbach's alpha exceeds the recommended value of 0.7 (Nunally and Bernstein,1994). This indicates acceptable internal consistency of the data.

As for convergent validity, the Average Variance Extracted (AVE) was used to analyse the measurement scales of constructs. The AVE values of construct exceed the recommended value of 0.5 (Fornell and Larcker, 1981). Standardized item loadings for all were greater than 0.5 and significant <0.001, indicates good convergent validity (Bagozziet et al., 1991; Carbonell &Rodriguez, 2006) as given in Table 5.5. Here, squared multiple correlations indicated that the percentage of construct variable is explained by the indicators.

Construct	Item	Standardized loading/ weight	t-value	Squared multiple correlation	Composite Reliability	AVE	Cronbach's α
Product return knowledge (PRK)	PRK_store	0.673		0.715	0.647	0.615	0.8052
	PRK_harm	0.729	9.163***	0.613			
	PRK_return	0.751	7.482***	0.342			
	PRK_dispose	0.735	8.290***	0.543			
	PRK_recycle	0.421	13.732***	0.751			
	PRK_effort	0.462	16.772***	0.736			
Attitude toward return information	ATT_important	0.783		0.379	0.761	0.580	0.7898
	ATT_support	0.619	15.355***	0.572			
	ATT_promote	0.451	9.725***	0.734			
	ATT_check	0.698	12.190***	0.651			
Message framing	MF_true	0.711		0.521	0.779	0.654	0.7661
	MF_objective	0.782	7.419***	0.748			
	MF_convince	0.725	16.014***	0.629			
	MF_relevant	0.719	6.514***	0.492			
	MF_believable	0.751	9.221***	0.751			
	MF_useful	0.693	6.612***	0.313			
	MF_interesting	0.641	6.518***	0.686			
IRI	IRI_choose	0.571		0.319	0.885	0.795	0.8117

	IRI_retain	0.613	13.715***	0.270			
	IRI_effort	0.827	7.228***	0.911			
	IRI_willing	0.812	10.019***	0.754			
EM	EM_intrinsic	0.512		0.529	0.869	0.519	0.8143
	EM_integrated	0.694	10.533***	0.535			
	EM_identified	0.723	36.228***	0.795			
	EM_introjected	0.614	9.705***	0.818			
	EM_externally	0.608	10.881***	0.947			
	EM_amotivated	0.812	16.650***	0.916			
EK	EK1	0.632		0.795	0.763	0.593	0.7397
	EK2	0.526	9.528**	0.843			

Table 5.5: Convergent validity and construct reliability

Finally, the discriminate was evaluated in terms of the average variance extracted (AVE) as shown in Table 5.6. It is observed that AVE for each construct or latent reflective constructor (average variance shared between the shared construct and its indicators) was greater than the square of the estimated correlation between constructs indicating discriminate validity (Fornell and Larcker, 1981; Hair et al., 2010). All the diagonal values exceeded the inter-constructed correlations and therefore, the results confirm that the instrument was satisfactory to construct validity.

	PRK	ATT	MF	IRI	EM	EK
PRK	0.948					
ATT	0.358	0.642				
MF	0.197	-0.397	0.491			
IRI	0.079	0.153	0.256	0.849		
EM	0.282	-0.092	0.317	0.632	0.805	
EK	0.175	-0.251	0.503	0.429	0.793	0.930

Table 5.6: The analysis of discriminant validity

5.9   Structural Equation Analysis

After confirming adequate fit for the measurement model, the structural model is evaluated and the hypotheses are tested as shown in Fig. 2. The result of the overall goodness-of-fit was evaluated by applying the x^2 test. The measurement model yielded x^2 value of 798.5 with 341 degree of freedom. The ratio of x^2 to df was 2.342 which is lower than the

suggested cut off value 5 (Bagozzi et al., 1991; Hair et al., 2006, 2010). In addition, the results of the goodness of fit measure support the proposed model (IFI= 0.921, CFI=0.920, x^2/df=2.342; RMSEA=0.62). RMSEA, CFI and IFI are also satisfied the recommended value. RMSEA is a more effective measure in evaluating the overall fit and the proposed value of RMESA supports the recommended value. Therefore, there is an acceptable fit between the model and the observed data.

5.10 Test of hypotheses

5.10.1 Product Return Knowledge (PRK) and Attitude towards Return Information

As discussed in Chapter 2, product return knowledge is a socioeconomic factor that may have a positive impact towards individual's pro-environmental behaviour. The construct 'knowledge' is meant to measure consumers' familiarity with the functional aspects of environmental message (Taufique et al. 2014) and the meaning of different terms used in. Based on this, for this research scope, return product knowledge is an individual's knowledge and familiarity about retuning the used products.

H1: Product return knowledge is positively related to attitudes towards return information.

The independent variable for this hypothesis is PRK, with its components, which are ideal timing and acceptable quality. The dependent variable for this hypothesis is the mean of ATTITUDE. Table 5.7 presents a regression analysis between PRK and its components with attitude towards return information (ATTITUDE). The regression results support H1.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimation	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.789[a]	.617	.606	1.04347	.617	459.835	1	392	.000
2	.783[b]	.613	.610	1.03832	.006	3.964	1	391	.000

a: Predictors: (Constant), PRK_Time
b: Predictors: (Constant), PRK_Quality
Table 5.7: Model summary for H1

- **Model 1** indicates ideal timing as a significant predictor of attitude towards return information, $R^2 = .617$, R^2 adj. $= .606$, $F(1,392) = 459.835$, $p < .001$. This model accounted for 61.7% of the variance in attitude towards return information.

- **Model 2** indicates ideal timing and acceptable quality as significant predictors of attitude towards return information, $R^2 = .613$, R^2 adj. $= .610$, $F(1,391) = 3.964$, $p < .001$. This model accounted for 61.3% of the variance in attitude towards return information. Table 5.5 presents the bivariate and partial correlations coefficient between predictors and the dependent variable.

Model*		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.594	.137		4.327	.000
	PRK_Time	.960	.045	.779	21.444	.000
2	(Constant)	.543	.139		3.903	.000
	PRK_Time	.808	.089	.655	9.125	.000
	PRK_Quality	.172	086	.143	1.991	.047

Dependent Variable: Attitude

Table 5.8: Coefficients for H1 Models

The result shows in Table 5.8 indicates that consumers with good product return knowledge will positively respond to any available information regarding the immediate return. In line with the initial prediction, both type of information, the ideal timing of return and the acceptable quality of return should be included to spread the knowledge of immediate return. The timing and quality of return are found to be the good predictors and accounted for 61.3% of the variance in attitude towards return information.

5.10.2 Attitude towards Return Information (Attitude) and Immediate Return Intention (IRI)

H2: Attitudes towards return information positively related to immediate return intention

For the relationship between ATTITUDE and IRI, the analysis has been conducted by using stepwise multiple regression analysis. This analysis method is used to identify which constructs that affect consumers' immediate return intention. The independent variable for this relationship is all the construct of attitude towards return information. The dependent

variable is the statistical mean of immediate return intention variable. Table 5.9 shows the regression result of four predictive models that clearly support H2.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimation	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.914[a]	.844	.845	.60703	.036	74.233	1	392	.000
2	.921[b]	.857	.856	.57889	.014	30.600	1	391	.000
3	.924[c]	.861	.859	.57168	.004	8.507	1	390	.004
4	.925[d]	.864	.862	.56666	003	6.257	1	389	.013

a: Predictors: (Constant), ATTITUDE_importance
b: Predictors: (Constant), ATTITUDE_importance, ATTITUDE_support
c: Predictors: (Constant), ATTITUDE_importance, ATTITUDE_support, ATTITUDE_promotion
d: Predictors: (Constant), ATTITUDE_importance, ATTITUDE_support, ATTITUDE_promotion,ATTITUDE_willing
e: Dependent variable: Immediate Return Intention

Table 5.9: Models summary for H2

- **Model 1** indicates that consumers appreciate the importance of return to be available in order to encourage the intention of immediate return. The statistical result shows $R^2=.844$, R2 adj. = .845, F (1,392) = 74.233, $p<.001$. This model accounted for 84.5% of the variance in immediate return intention.

- **Model 2** indicates that consumers support the idea to make the return information available for consumer reference in order to encourage the intention of immediate return. The statistical result shows $R^2=.857$, R2 adj. = .856, F (1,391)= 30.600, $p<.001$. This model accounted for 85.6% of the variance in immediate return intention.

- **Model 3** indicates that importance to promote immediate return practice through by using relevant information. The promotion of the practice can be used to amplify the intention of immediate return. The statistical result shows $R^2=.861$, R2 adj. = .859, F (1,390) = 8.507, $p<.001$. This model accounted for 85.9% of the variance in immediate return intention.

- **Model 4** indicates that consumers' willingness to check for return information as a strong indicator for their immediate return intention of used electric and electronic appliances. The statistical result shows $R^2=.864$, R2 adj. = .862, F (1,389)= 6.257, $p<.001$. This model accounted for 86.2% of the variance in immediate return intention.

Based on the multiple regression results, the null hypothesis (H2=null) is rejected. The analysis of H2 shows that positive attitudes towards return information will affect the immediate return intention among consumers. The regression analysis identifies the appreciation of the importance of return information availability, supporting the introduced idea, the promotion of immediate return through relevant information and consumers' willingness to check for the information as strong indicators to immediate return intention, which accounted for 86.2% of the variance of immediate return information.

5.10.3 Message Framing Effect on Immediate Return Intention

H3: Different message framing has different effect on immediate return intention

The next hypothesis is H3. It is to investigate the persuasive effect of message framing consumers' immediate return intention. As shown from Table 5.10, statement (a), no significant difference in scores responding to the positively framed message and negatively framed message sig. (2-tailed) column is equal to 0.078>a; t(390)=1.617, two-tailed) and the level of difference in the means (mean difference=-0.703, confidence interval =-1.631 to 0.115) is very small (0.03). No significant difference in scores is also found for respondents responding to the positively framed message and negatively framed message for statement (b). Indeed, the value of the sig. (2-tailed) column is equal to 0.451 (>a). (t (390)=-0.498, two-tailed), and the level of difference in the means (mean difference=-0.116, confidence interval =-0.832 to 0.401) is very small (0.004). Statement (c) results show that the value of sig.(2-tailed) is equal to 0.265 (>a) and the level of difference in the means (mean difference=-0.431, confidence interval =- 1.195 to 0.332) is very small (0.014). Consequently, no significant difference in scores is found for respondents responding to the positively framed message and negatively framed message (t (390)=1.122, two-tailed). As for statement (d), sig.(2-tailed) value is 0.067 (>a). Subsequently, no significant difference in scores for respondents responding to the positively framed message and a negatively framed message is found (t (390) =1.687, two-tailed). Moreover, the level of difference in the means (mean difference=-0.603, confidence interval =-1.385 to 0.068) is very small (0.014).

Immediate return intention statement	Framed message	M	SD	Mean differences	95% of Confidence interval of the Difference		Sig.(2-tailed)	t(390)
					Lower	Upper		
When there is a choice, I always choose to properly dispose my e-waste	Positive	4.65	2.389	-0.703	-1.631	0.115	0.078	1.617
	Negative	5.45	1.803					
I no longer want to retain the e-waste in my house	Positive	3.68	1.832	-0.116	-0.832	0.401	0.451	-0.498
	Negative	3.00	1.348					
I will make every effort to immediately return my e-waste	Positive	3.90	1.921	-0.431	-1.195	0.332	0.265	1.122
	Negative	4.33	1.748					
I am willing to drop small e-waste (such as rice cooker, kettle) in designated recycling center	Positive	3.73	1.830	-0.603	-1.385	0.068	0.067	1.687
	Negative	3.73	1.830					

Table 5.10: Statistical result for message framing and Immediate Return Intention

These results provide evidence that H3 is not supported. Null hypothesis (H3=null) is retained, which is message framing has no differences in persuasiveness effect for an immediate return.

5.10.4 Message Framing on Immediate Return Intention: Environmental Motivation Segmentations

This section presents the statistical analysis for H4a and H4b. Both hypotheses are formulated to investigate whether or not different message framing has different effect on immediate return intention among consumer, moderated by consumers' environmental motivation. To conduct this analysis, respondents are divided into two groups according to the environmental motivation index. The environmental motivation index is calculated based on the score of all six subscales in Motivation towards Environment Scale (MTES) found by Pelletier et al. (1998). Respondents were assigned to high environmental motivation group if their score is 0.5 standard deviation above the mean. Respondents were assigned to low environmental motivation group if their score is 0.5 standard deviation below the mean.

H4: Message framing affects immediate return intention differently in different segmentation of environmental motivation

The independent sample t-test statistical test was conducted to investigate any difference of message framing effects on immediate return intention when it is measured in two groups of environmental motivation, high environmental motivation and low environmental motivation. The analysis result for high environmental motivation group is presented in Table 5.11 and Table 5.12. For low environmental motivation group, the analysis result is presented in Table 5.13 and Table 5.14.

5.10.4.1 Message framing on immediate return intention in high environmental motivation segmentation

H4a: Message framing affects immediate return intention differently in high motivation group

Table 5.11 presents group statistics for respondents with high environmental motivation score with N=291.

	Message Framing	N	Mean	Std. Deviation	Std. Error Mean
Immediate Return Intention	Positive	144	69.44	9.856	0.068
	Negative	147	56.32	7.491	0.051

Table 5.11: Group statistics for Respondent with High Environmental Motivation

		Levene's Test for Equality of Variances		t-test for Equality of Means							
										95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		Lower	Upper
Immediate Return Intention	Equal variance assumed	2.62	.012	2.093	99	0.038	-0.215	0.102		-0.422	-0.012
	Equal variance not assumed			2.104	85.627	0.037	-0.215	0.102		-0.421	-0.013

Table 5.12: Independent Sample Test

The result in Table 5.12 indicates that there was a significant difference in immediate return intention between positively framed message and negatively framed message for consumers who have high environmental motivation t (291) = 2.093, p-value = .038.

5.10.4.2 Message framing on immediate return intention in low environmental motivation segmentation

H4b: Message framing affects immediate return intention differently in low environmental motivation group

Table 5.13 presents group statistics for respondents with low environmental motivation score with N=101.

	Message	N	Mean	Std.	Std. Error

	Framing			Deviation	Mean
Immediate	Positive	53	63.47	10.653	0.201
Return Intention	Negative	48	53.82	8.961	0.186

Table 5.13: Group statistics for Respondent with Low Environmental Motivation

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		Lower	Upper
Immediate Return Intention	Equal variance assumed	5.621	.015	-1.472	99	.012	6.904	2.776		1.351	12.457
	Equal variance not assumed			-2.219	25.673	.009	6.904	2.812		1.256	12.552

Table 5.14: Independent Sample Test

The result in Table 5.14 indicates that there was a significant difference in immediate return intention between positively framed message and negatively framed message for consumers who have low environmental motivation t (101) = -2.219, p-value = .009.

5.10.5 Message Framing on Immediate Return Intention: Environmental Knowledge Segmentations

This section presents the statistical analysis for H5a and H5b. Both hypotheses are formulated to investigate whether or not different message framing has different effect on immediate return intention among consumer, moderated by consumers' environmental

knowledge. To conduct this analysis, respondents are divided into two groups according to their score in answering broad-based environmental questions derived from Roper Group assessment on basic environmental literacy (Coyle, 2004; DeChano, 2006) and scale from the 1997 survey administered by the National Environmental Education and Training Foundation (NEETF). Respondents who score less than 70% (less than seven correct answers) are assigned to low environmental knowledge group. Respondents who score 70% and more (has seven and more correct answers) are assigned to high environmental knowledge group.

H5: Message framing affects immediate return intention differently in different segmentation of environmental knowledge

The independent sample t-test statistical test was conducted to investigate any difference of message framing effects on immediate return intention when it is measured in two groups of environmental knowledge, high environmental knowledge and low environmental knowledge. The analysis result for high environmental knowledge group is presented in Table 5.15 and Table 5.16. For low environmental knowledge group, the analysis result is presented in Table 5.17 and Table 5.18.

5.10.5.1 Message framing on immediate return intention in high environmental knowledge segmentation

H5a: Message framing affects immediate return intention differently in high environmental knowledge group

Descriptive analysis has been conducted to calculate how many respondents with the score of environmental knowledge more than 70% shows the value N=265. Table 5.15 presents group statistics for respondents with high environmental knowledge score.

	Message Framing	N	Mean	Std. Deviation	Std. Error Mean
Immediate Return Intention	Positive	129	73.47	12.966	0.100
	Negative	136	66.56	8.5583	0.063

Table 5.15: Group statistics for Respondent with High Environmental Knowledge

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Immediate Return Intention	Equal variance assumed	7.205	.009	2.478	263	.016	6.904	2.776	1.351	12.457
	Equal variance not assumed			2.455	49.852	.018	6.904	2.812	1.256	12.552

Table 5.16: Independent Sample Test

The result in Table 5.16 indicates that there was a significant difference in immediate return intention between positively framed message and negatively framed message for consumers who has high environmental knowledge t (265) = 2.455, p-value = .018.

5.10.5.2 Message framing on immediate return intention in low environmental knowledge segmentation

H5b: Message framing affects immediate return intention differently in low environmental knowledge group

Descriptive analysis has been conducted to calculate how many respondents with the score of environmental knowledge less than 70% shows the value N=127. Table 5.17 presents group statistics for respondents with low environmental knowledge score.

	Message Framing	N	Mean	Std. Deviation	Std. Error Mean
Immediate Return	Positive	71	31.31	24.292	0.342
	Negative	56	53.54	17.873	0.319

Intention					

Table 5.17: Group statistics for respondents with low environmental knowledge

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Immediate Return Intention	Equal variance assumed	6.562	.016	-2.746	125	.011	-22.226	8.093	-38.832	-5.620
	Equal variance not assumed			-2.835	26.784	.009	-22.226	7.839	-38.317	-6.135

Table 5.18: Independent Sample Test for low environmental knowledge group

The result in Table 5.18 indicates that there was a significant difference in immediate return intention between positively framed message and negatively framed message for consumers who has low environmental knowledge t (127) = -2.835, p-value = .009.

5.10.6 Conclusion for hypotheses testing

In conclusion, six out of seven hypotheses proposed in this research are supported. Only one hypothesis is not supported, which is H3. H3 is to investigate the persuasive effect of message framing consumers' immediate return intention. No significant difference in scores responding to the different message framing; positively framed message and negatively

framed message. Analysis result reported that scores for each statement is very small. However, the analysis showed different result for other hypotheses of message framing. The analysis result for IRI when jointly predicted by message (MF) framing and environmental knowledge (EK), as well as jointly predicted by message (MF) framing and environmental motivation (EM) show significant result. Table 5.19 concludes the analysis results.

As for H1 and H2, the analysis results support the proposed hypotheses.

Hypotheses	Result
H1 PRK → ATT	Supported
H2 ATT → IRI	Supported
H3 MF → IRI	Not supported
H4a MF→HEM→ IRI	Supported
H4b MF→LEM→ IRI	Supported
H5a MF→HEK→ IRI	Supported
H5b MF→LEK→ IRI	Supported

Table 5.19: Hypotheses testing results

5.11 Conclusion

Data analysis and hypothesis chapter present an in-depth analysis of the quantitative analysis that has been conducted to analyse data from the full-scale questionnaire. Main results and findings of nine hypotheses show that eight hypotheses (H1, H2, H4, H4a, H4b, H5, H5a and H5b) are supported and one hypothesis is not supported, which H3. These findings provide statistically significant evidence that there are positive correlation and relationship between product return knowledge (PRK), attitude towards return information, environmental knowledge, environmental motivation and immediate return intention. The result also shows that relationship between message framing and immediate return intention is not significant. It means that message framing not really influence the consumers' immediate return intention. However, the case changes when the relationship moderated by environmental motivation and environmental knowledge.

6. RESEARCH FINDINGS

6.1 Introduction

This chapter discusses further explanation and interpretation of the research findings for each hypothesis formulated in Chapter 3. This chapter provides an overview on how product return knowledge (PRK) which emphasized ideal timing and acceptable quality of return, message framing, environmental knowledge, and environmental motivation affect attitude towards return information and immediate return intention. Supported by the statistical analysis result in chapter 5, this chapter presents the interpretation of the findings in the context of relevant literature.

Initially, this chapter will discuss the result of hypothetical relationships between identified constructs for each independent and dependent variables. Interpretation and cross-referencing to relevant literature is included to validate the research result and findings.

The last section of this chapter will discuss the revised research model with the validated significant value of identified variables.

6.2 Discussion

This section discusses all nine hypotheses that have been analysed in Chapter 5. Further explanation and interpretation are presented in the following sections.

6.2.1 Product return knowledge (PRK) on attitude towards return information

H1: Product return knowledge is positively related to attitudes towards return information.

A statistical result from the analysis of H1 shows a positive relationship between product return knowledge and attitude towards return information. The inclusion of ideal timing of return and quality of return in product return knowledge contribute 61.3% of the variance in attitude towards return information. Based on this statistical result, it is relevant to include the very specific type of information (ideal timing of return and quality of return) to initiate positive attitude towards return information. In another word, this specific information can influence consumers to be alert of the importance of immediate return, support the idea and join the promotion of immediate return and eventually willing to check and read the

information and act accordingly. The findings on this relationship are consistent with the findings of Raziuddin et al. (2016) who found that accurate information and specific information can positively affect an individual's pro-environmental intention and behaviour. Raziuddin et al. (2016) found that the effect of eco-label knowledge is better than the effect of general knowledge to influence someone to perform pro-environmental behaviour.

This investigation illustrated that using a more specific indicator of product return knowledge could facilitate the attitude towards the related information. Moreover, the analysis of the relationship between timing and quality of return included in the product return knowledge indicated a strong association with the capability in performing tasks such as checking out any environmental information on the products. Apart from the inclusion of specific information about immediate return, the product return knowledge formulated for this research also emphasized environmental issues. These environmental issues explicitly translated into six statements, which cover the issues of consumers' storing behaviour of used electric and electronic appliances, improper disposal of e-waste and remanufacturing. These issues were highlighted because findings are showing that the amount of knowledge (i.e. system knowledge) alone cannot predict responsible environmental behaviour (e.g. Hwang, Kim, and Jeng 2000; Kaiser and Fuhrer 2003). Finger (1994) explained, however, that knowledge about environmental issues – despite its limited impact on environmental behaviour – can be used to combat fear and anxiety and can lead to protest actions.

As one of the main objectives of this study, this hypothesis revealed the result that product return knowledge supplements general environmental knowledge in shaping consumer attitudes towards the environment. This study contributes to the existing literature by confirming that in addition to general environmental knowledge, issue-specific environmental knowledge (i.e., product return knowledge) also positively influences environmental attitudes and pro-environmental consumer behaviour. The analysis results in Chapter 5 indicates that timing of return shows a higher percentage of variance in attitude towards return information compared to the quality of return, 61.7% and 61.3% respectively. Figure 6.1 summarised the findings.
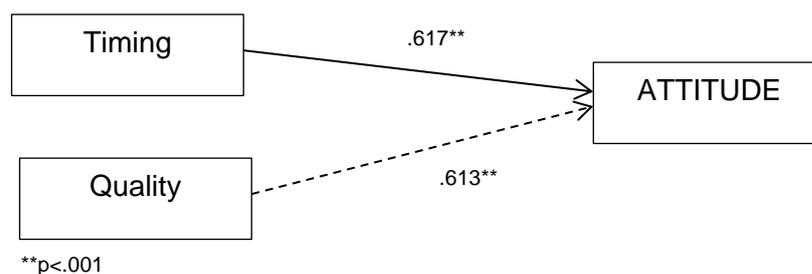

Figure 6.1: Model summary for H1

6.2.2   Attitude towards return information and immediate return intention

H2: Attitudes towards return information positively related to immediate return intention

In the second hypothesis of this research, the hypothesis is formulated to analyse the relationship between attitude towards return information and immediate return intention. To predict and understand behavioural intentions, the first step is to measure the attitude (Ajzen & Fishbein, 1980). What is important when using a measure of attitude to predict and understand intentions is to make sure that the measures of attitude and intention correspond to each other. It means that corresponding to the intention to immediately return the used electrical and electronic appliances is the attitude towards immediate return. This is the fundamental reason for investigating the relationship between attitude towards return information and immediate return intention in this study.

The analysis of this relationship shows that positive attitudes towards return information will affect the immediate return intention among consumers. The regression analysis identifies the appreciation of the importance of return information availability, supporting the introduced idea, the promotion of immediate return through relevant information and consumers' willingness to check for the information as strong indicators to immediate return intention, which accounted for 86.2% of the variance of immediate return information.
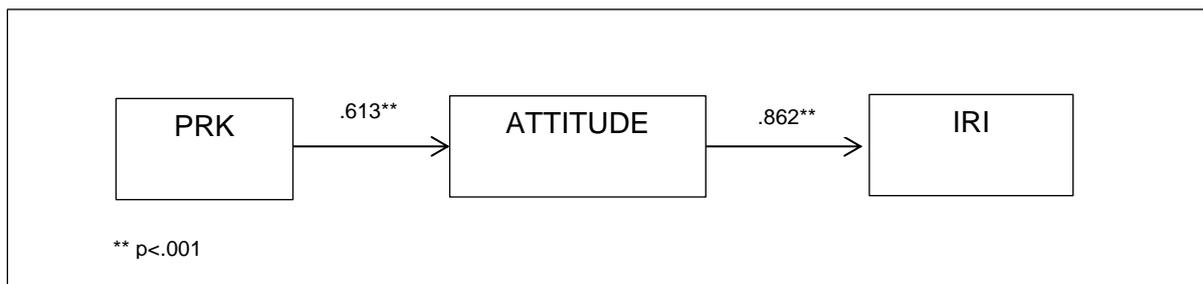

Figure 6.2: Model for H1 and H2 with significance value

6.2.3   Message framing and immediate return intention

H3: Different message framing has different effect on immediate return intention

The statistical result for this hypothesis shows that there is no significant difference between two types of message framing on consumers' immediate return intention. This result can be

interpreted that environmental messages can be designed in any framing to disseminate information on certain issues.

Based on the statistical result mention above, the need for the investigation of message framing in immediate return intention may seem unnecessary. However, the possibility of message framing impacting immediate return intention in different situations cannot be neglected. In the context of this research, the problem of delayed return activity among consumers can be considered a social dilemma as people would feel that there is no personal benefit, while the benefits of the return activity grow to the society as a whole.

Additionally, most of the studies of message framing effects reported in the literature deal with situations in which information is directly relevant and familiar to the individual, and it can be conjectured that the framing effect is mediated by positive–negative associations of gain (or hedonic) goals. However, it is unclear whether gain–loss effects can be associated with the perception of immediate return information by consumers with different environmental knowledge and motivation. For consumers, immediate return information is a relatively new concept; consumers have little direct experience with its measurement and effect and have difficulty in interpreting it. However, there is still a potential that message framing would affect immediate return intention as it activates positive or negative associations of the environmental effects.

To summarize, the magnitude of message framing impact could potentially be increased when it is investigated in different situations, such as with the intervention of an individual's environmental motivation and knowledge. Based on this, this research initiates a further investigation of message framing as described in H4 and H5. H4 and H5 investigate whether positive or negative framing message would affect consumers' intention of the immediate return of used electrical and electronic appliances. This further investigation may contribute to the building of more effective communication tools as it applies the concept of segmentation.

6.2.4 Message framing and immediate return intention in environmental motivation segmentation

H4: Message framing affects immediate return intention differently in different segmentation of environmental motivation

H4a: Message framing affects immediate return intention differently in high environmental motivation group

H4b: Message framing affects immediate return intention differently in low environmental motivation group

In the analysis chapter for H4, H4a and H4b, the statistical result shows there is a significant difference between the use of positively and negatively framed message in influencing consumers' immediate return intention. Positively and negatively framed message reported the *t* value of 2.903 and -2.219 for high and low environmental motivation respectively.

From the results, it can be concluded that environmental motivation mediates the relationship between message framing and immediate return intention. Based on Motivation towards Environment Scale (MTES) by Pelletier et al. (1998), respondents were asked on how sensible, enjoyable and remorseful they can be in protecting the environment. After the analysis results have been conducted, the results can be interpreted that when an individual believes engaging in environmental behaviour is enjoyable, sensible, and enables contribution, and even feels guilty and remorseful when not being pro-environmental, the individual deeply cares about environmental protection and is willing to read and understand messages pertaining to environmental protection. Conversely, when individuals have low environmental motivation, they are unimpressed by environmental messages. These situations are assumed to contribute to the significant differences in H4, H4a and H4b.

6.2.5 Message framing and immediate return intention in environmental knowledge segmentation

H5: Message framing affects immediate return intention differently in different segmentation of environmental knowledge
H5a: Message framing affects immediate return intention differently in high environmental knowledge group
H5b: Message framing affects immediate return intention differently in low environmental knowledge group

In the analysis chapter for H5, H5a and H5b, the statistical result shows there is significant different between the use of positively and negatively framed message in influencing consumers' immediate return intention. Positively and negatively framed message reported the *t* value of 2.445 and -2.835 for high and low environmental knowledge respectively.

The findings from H5, H5a and H5b match the findings of previous literature. Early models explain that knowledge impacts attitude, which in turn leads to pro-environment behaviour

(Burgess, Harrison, and Filius 1998; Kollmuss and Agyeman 2002; Maloney and Ward 1973). In their meta-analysis, Hines, Hungerford, and Tomera (1987) found that environmental knowledge about issues (i.e. system knowledge) significantly influenced environmentally responsible behaviour. Kaiser, Wölfing, and Fuhrer (1999) further reported that environmental knowledge and values together significantly explained ecological behavioural intention. Tanner and Kast (2003) argued that some sort of appropriate knowledge was necessary for behaviour to occur and that knowledge is critical to understanding consumer behaviour.

The results clearly show that message framing does have significant differences in immediate return intention when it is mediated by environmental motivation and knowledge. The analysis of H4, H4a, H4b, H5, H5a, H5b formulated in this research found that no matter how environmental messages are framed, they would not change consumers' intention towards immediate return activity. The findings support the idea that segmentation is vital to effectively disseminate information and knowledge. The segmentation can be segmented in socio-demographics (age, education level, income status, gender) or measurable intrinsic attributes, for example in this research context, environmental knowledge and motivation. Therefore, it is obvious that environmental messages dissemination should consider the concept of segmentation. This research strongly suggests that environmental messages should be designed specifically for different segmentations of consumers.

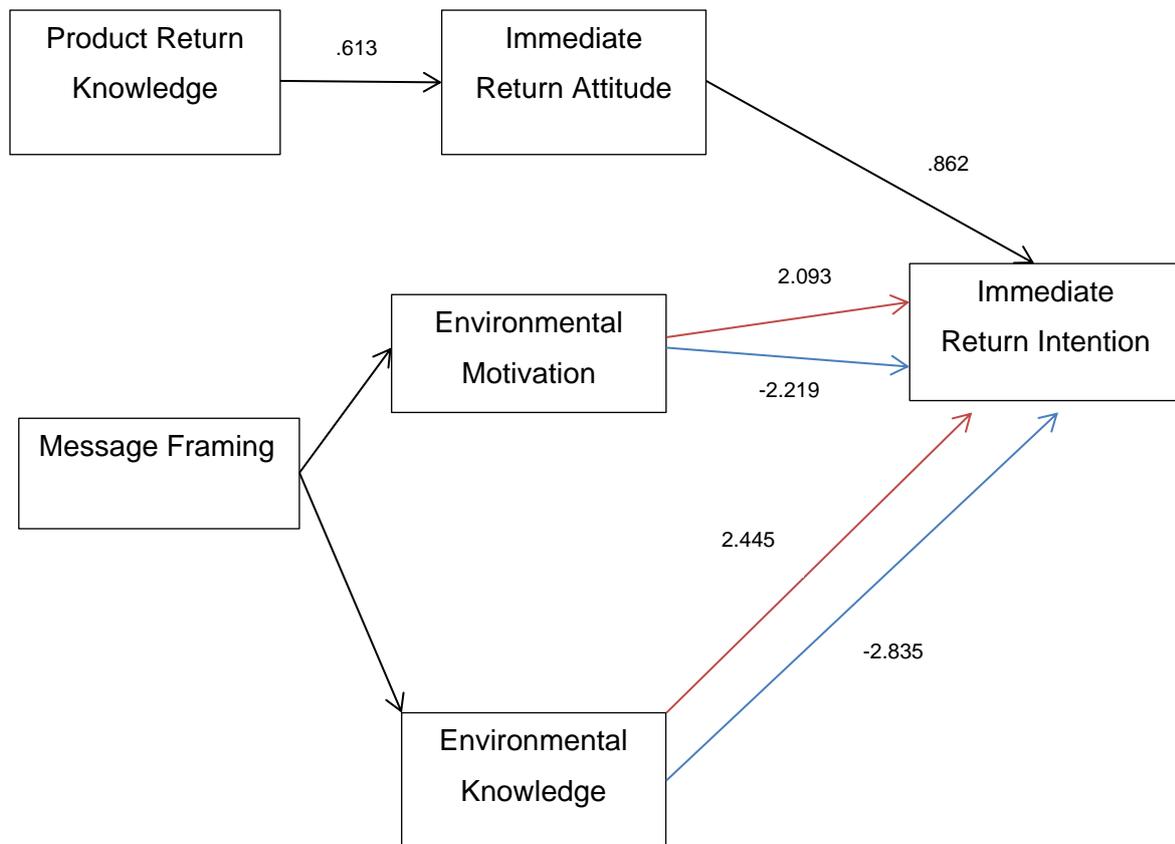## 6.3 Revised research model

Figure 6.1: Revised research model

6.4   Conclusion

The main objective of the study was to examine whether knowledge ideal timing and acceptable quality of return supplements general environmental knowledge and environmental motivation in shaping consumers' immediate return intention. The findings suggest that both the ideal timing and quality of return have positive effects on consumers' IRI. Many past studies found that general environmental knowledge and eco-label knowledge have positive effect on attitudes towards the environment, where no study examined the effect of this specific information of end-of-life return. For example, Polonsky et al. (2012) reported that greater environmental knowledge leads to greater environmental attitudes and behaviour. Some studies claim that the effect of environmental knowledge on pro-environmental behaviour is mediated through environmental attitudes (e.g., Arcury, 1990; Barber et al., 2009; Flamm, 2009).

This research confirming that in addition to general environmental knowledge and eco-label, producers also need to consider conveying specific environmental information for consumers' reference.   This is, indeed, important because this specific information is an environmental communication tool that aims to promote one of the ecologically conscious consumer behaviours, which is immediate return of e-waste. As this study finds a significant positive impact of product return knowledge consumers' intention to immediately return their e-waste, the producers must consider including this kind of information in the product's eco-label. Marketing communication needs to aim at teaching consumers about end-of-life information. This could be done, for example, by advising consumers to read and know the eco-label when purchasing and disposing the product. Company's regular advertising could be one of the best channels to disseminate this information.

7. CONCLUSION, CONTRIBUTION, FUTURE RESEARCH AND LIMITATIONS

7.1 Conclusion

Several insights drawn from the results of this study can be summarised as follows:

- First, consumers' immediate return intention (IRI) is influenced by their product return knowledge and attitude towards the return information.
- Secondly, consumers will return their used products if they are aware of relevant return information from manufacturers and the government. Manufacturers can educate consumers in terms of material used in products and how the materials affect human health. Meanwhile, government and policymakers can take action in making sure that information regarding where they can return the used products is available. Return product knowledge can be one of the biggest sources for returning used products. Consumers should be provided with the knowledge of different benefits such as natural resources preservation, social and economical benefit, for returning their used products.
- Third, the IRI of used products is influenced by the perceived risk that can be conveyed in environmental messages or environmental labels in products. The risk that consumers perceive in deciding to return the used product comes from their fear and loss aversion. Health risk, environmental risk and social risk, all emerge as negative indicators that can be used to encourage consumers' IRI.

The above insights about consumers' attitude and IRI of used products will help business organizations in adopting a circular business model. Consumers' attitude and IRI set a strong indicator for the possible return of investment. Willingness and awareness in this behavioural change could economically beneficial in moving towards sustainable manufacturing of products. Ilgan and Gupta (2011) and Zhou and Disney (2006) provide some evidence that consumer participation in EoL management can bring benefit in term of the bullwhip effect, inventory variance and product cost.

The industry and government must make policy jointly and both parties play a crucial role in motivating the consumers towards retuning the used products. Government and OEM/remanufacturer should work together to build a positive image on consumers for returning the used products. They should strengthen the publicity regarding the concept of retuning used products, for instance, by informing the social risk and how human health could be affected by untreated waste. These examples could be used as an addition to the

publicity of benefits, and environmental and economic advantages of returning used products.

OEM and government together should develop a green marketing strategy and published the environment-friendly application of used products. As return product knowledge has a significant impact on IRI, the government and OEM should work jointly to set up collection network or collection distribution channel for the used products. In this survey, it is found that many consumers do not know where to return the used products. Therefore, it is suggested that more promotions for returning of the used products should be conducted by setting up exclusive counters or creating business opportunities for the used products. The government should provide adequate knowledge about returning the used products as well as the benefit of using remanufactured products to peoples through education. There is a need to eliminate the inferiority towards the use of remanufactured products. Creating awareness and emphasising the environmental impact can encourage familiarity and avoid misconception towards products that re-enter the market (Van Weelden et al., 2016). Therefore, it will have a significant impact on marketing and CLSCs. The existence of market for remanufactured products supports the establishment of the circular economy.

Discussion about the consumer's IRI of the used products is considered as the strongest predictors for the willingness of consumers is absent in the existing literature. This research aims to develop a conceptual model to examine the intention of consumers to immediately return their used products and to find out various cues that consumers use for returning the EoL and EoU products. The research model is validated empirically by using survey method. The significant contribution of this research to the existing literature as follows, first, this study identified dimensions of IRI by conducting theoretical analysis in EoL and EoU context. Second, this study explores the relationships of different identified constructs with IRI by adding the new factor of information content and information context. Finally, based on the insights, some managerial insights are provided such as the inclusion of ideal timing and acceptable quality in product return information, and formulation of relevant marketing communication regarding the immediate return of electric and electronic waste. In another word, this study informs consumers' decision making in altering their product return activity, from return the used products to immediately return their used products. Mugge et al. (2017) reported that providing consumers with information has a positive impact on their decision making. This informed decision-making process would be fundamental in the circular economy as an immediate return by consumer contributes a better inventory of product for post-EoL treatment, in terms of volume and quality.

As the study has proven there is a positive relationship between relevant information in product return knowledge, consumers' attitude towards the information and consumers' immediate return intention, it is theoretically promising to move towards the circular economy. This relationship shows information sharing is an efficient method to establish collaboration. Information sharing is considered as a high-level concept of collaboration effort and significant in influencing supply chain performance at different magnitudes (Wu et al. 2014). The positive acceptance towards the inclusion idea of ideal timing and acceptable quality of return in product return knowledge and the introduction of immediate return idea, consumers now open to the concept of better quality products that ready reuse, refurbishment, remanufacturing and recycling processes. This is a good remark in moving towards circular business model adoption where consumers willing to immediately return their used products and intent to purchase remanufactured products.

It can be noted that one of the unique findings of this study is that consumers are interested to return their used products if consumers get all the information. This study has also highlighted that environmental motivation and knowledge of consumers can be the key factors in designing environmental messages and labels. Additionally, this research initiates the exploration of Business-to-Business (B2B) related information; ideal timing and quantity of return, into B2C communication and its potential to amplify drop-off recycling. Last but not least, this research contributes to introducing the concept of Immediate Return Intention, which based on behavioural change, one of the benchmark criteria suggested in the social marketing theory.

This research suggests evidence that consumers' IRI is positively influenced by product return knowledge. The effect is strongest for consumers with high environmental knowledge and motivation. These results may promote the potential revenue of product with end-of-life return eco-label among producers and marketers.

7.2   Contribution

The vitality of information availability in Supply Chain Management (SCM), closed-loop supply chain, reverse logistic, and particularly product return and recovery management are unquestionable (Parlikad and MacFarlane, 2007). In SCM, information exchange is considered key to managing physical product flows and improving cost and service performance of enterprises (Wu et al., 2014).

The outcome of this research is expected to amplify the rate of spontaneous collection by the public. According to Shi et al. (2012), there are three collection models; industry-led collection, government-led collection and spontaneous collection by the public. It is better to have this public spontaneous collection compared to other collection models, specifically the industry-led collection. The common drawback of industry-led collection models is that cost of the collection will eventually be transferred to consumers (Shi et al. (2012). This obviously will cause the increment in products retail price which could badly affect consumers' buying power. To avoid the transferred cost, it is way better for consumers to know how they should respond and take action in product return activity to ensure that there is no hidden cost in their purchases.

The contribution of this research also will be discussed in the context of reverse logistic information flow. Daugherty et al. (2005) suggest that transparent information flow will promote the desirability of repeat purchase among consumers which will give enormous advantage for businesses. Furthermore, the action of sharing relevant information improve the processing speed of the return to achieve the shortest possible time and save a lot of inventory costs and transportation costs (Deng, 2004). Taking all these benefits into account, finding from this research area are believed can be used as businesses' investment reference. This will strengthen the need for deploying the right information technology that specifically can support information flow between manufacturers and consumers. It is the time now for businesses to consider the 'business-to-consumer' well-configured platform for information sharing purpose, as an addition to the existing deployment of matured information technology that currently used to support interorganisational decisions such as Radio Frequency Identification (RFID), Electronic Data Interchange (EDI), and Decision Support System (DSS). Additionally, as the social networking era emerges, the expected finding also could help businesses in considering social commerce as the new platform for product return information sharing purpose.

In achieving sustainable development goal, findings from this research imply that specific post-consumption information should be available for consumers' reference. Specifically, manufacturers should consider in putting the right information that will educate consumers to immediately return their e-waste, meaning no longer storing the e-waste without proper disposal. The inclusion of immediate post-consumption return information will bring more insights on how to control the storage time and optimize the end-of-life recovery system in terms of sustainability, as well as profitability for the manufacturers. The findings suggest that there is a need to inform and to provide specific information for consumers about immediate return of electrical and electronic waste at their end-of-life, in order to support

sustainable manufacturing. Additionally, sustainable development goal also should be promoted by producers (manufacturers) and companies through an effective business-to-consumer communication. The findings can be used to help manufacturers develop their communication strategies that include information valued by consumers. The communication strategies should be made clear that immediate return of e-waste will lead to the material recovery that can be used to produce high quality products. Both information content and context were found to have a significant influence on immediate return intention, implying that consumers value the needs for natural resources preservation, which is achievable by practicing sustainable manufacturing.

In sustainable manufacturing, manufacturers need certainty in product return management to enhance operation. This study explores how business-to-consumer communication could encourage the intention, and perhaps the action of immediate return of e-waste, via assessing the specific information inclusion and presentation that will help consumers make informed decision on ideal timing to return. Findings of this study led to two conclusions; first, manufacturers are yet to exploit the full potential of immediate return information to support their sustainable practices, thereby discouraging certainty in product return inventory. Second, consumer readiness and relative advantages of immediate return are influenced by availability of the specific information on good communication channels.

The business-to-consumer information sharing framework proposed by this research should be explored by manufacturers, specifically to share the specific information about e-waste immediate return after consumption. It is necessary for the manufacturers to share this specific information for consumers' reference. It is a good initiative to exploit the information that used to be available only on business-to-business channel.

7.2.1   Theoretical contribution

Andreasen (2002) developed the original benchmark criteria for social marketing which are behavioural change, consumer research, segmentation and targeting, marketing mix, exchange and competition. Based on the findings, this research manages to validate significant development in social marketing. This research contributes to initial close identification with the marketing of products involved in social change to a broader conception of its potential areas of application. This research applies the marketing strategy of products to a social behavioural area, which is the immediate return intention of e-waste after consumption.

In behavioural change, this research proposed and validated the need for an orderly, organized approach to encourage immediate return intention (IRI) for social goods. The orderly and organised approach that started with the translation process of product return and recovery information into the understandable format of product return knowledge is validated to be one of the factors for the intended social change, which is immediate return intention. The translation process also considers the criteria of consumer research, which is message framing. This research contributes to the inclusion of message framing as one of the factors to identify consumer characteristics and needs.

As the framework developed, this research is expected to contribute to the inclusion of a new variable of segmentation and targeting. According to Andreasen (2002) segmentation and targeting is using different segmentation variables and there is a need for the strategies to be tailored to the segments. Instead of just using geographic (e.g. cities, countries) or demographic (e.g. sex, age, education), respondents used for this research were categorised based on their environmental motivation and knowledge. For environmental motivation, the high and low levels were measured based on an index. The index is developed based on the score for six subscales. As for consumers' environmental knowledge, the high and low levels are measured based on their proficiency in answering environmental literacy questions. These formulas show that intrinsic elements (motivation) and ability (knowledge) are measurable and they are relevant to be used as the basis of segmentation. Varieties in segmentation contribute to the addition of the promotion element in social marketing theory 5P's techniques. In the promotion of social marketing product, it relies on the interaction between mass media and interpersonal channel (Meischke, 2018). Good segmentation strategy may help in promoting a product (or behavioural change) in social marketing campaigns. It is because segmentation provides a better basis in reaching out interpersonal channel.

It is expected that this research could contribute new insight in environmental product information development by suggesting the inclusion of important information of product return and recovery management (time and quality of return), which most valued by businesses organisations (manufacturers and remanufacturers) for consumers' reference. It will be useful for designers to prepare post-purchase documentations.

7.2.2 Practical contribution

This research contributes to the practice in remanufacturing and closed-loop supply chain management. The introduction of Immediate Return Intention (IRI) concept is believed to be

beneficial in supporting the remanufacturing industry and circular economy. The awareness among consumers on the need to immediately return their e-waste might be a small contribution to solve the uncertainty problem faced by Original Equipment Manufacturer (OEM) and remanufacturers. When there is an effort to immediately return the e-waste, the remanufacturing industry can be beneficial in terms of having good quantity and quality resources to remanufacture the waste and bring it back to the secondary market.

The Immediate Return Intention (IRI) concept also purposely to minimize unnecessary storage behaviour among consumers. Minimizing unnecessary storage behaviour will then lead to the benefit of amplifying the rate of immediate drop-off (return) activity initiated by consumers. Immediate drop-off activity initiated by consumers creates an economic benefit for consumers, compared to other WEEE collection models; industry-led collection and government-led collection. The common drawback of industry-led collection models is that cost of the collection will eventually be transferred to consumers. This obviously will cause the increment in products retail price which could badly affect consumers' buying power. To avoid the transferred cost, consumers should know how they should respond and take action in product return activity to ensure that there is no hidden cost in their purchases.

The inclusion of ideal timing and acceptable quality information suggested in this research possibly results in an enormous advantage for businesses. Finding from this research area is believed can be used as businesses' investment reference. This will strengthen the need for deploying the right information technology that specifically can support information flow between manufacturers and consumers. It is the time now for businesses to consider the 'business-to-consumer' well-configured platform for information sharing purpose, as an addition to the existing deployment of matured information technology that currently used to support inter-organizational decisions such as Radio Frequency Identification (RFID), Electronic Data Interchange (EDI), and Decision Support System (DSS). Additionally, as the social networking era emerges, the expected finding also could help businesses in considering social commerce as the new platform for product return information sharing purpose. The action of sharing relevant information promotes the desirability of repeat purchase among consumers.

Many past studies found that general environmental knowledge has positive effect on attitudes towards the environment, where no study examined the effect of specific end-of-life return knowledge on consumer attitudes towards the environment. For example, Polonsky et al. (2012) reported that greater environmental knowledge leads to greater environmental attitudes and behaviour. Some studies claim that the effect of environmental knowledge on pro-environmental behaviour is mediated through environmental attitudes (e.g., Arcury,

1990; Barber et al., 2009; Flamm, 2009). This study contributes to the existing literature by confirming that in addition to general environmental knowledge, issue-specific environmental knowledge (i.e., product return knowledge) also positively influences environmental attitudes and pro-environmental consumer behaviour. This is, indeed, important because product return knowledge is an environmental communication tool that aims to promote ecologically conscious consumer behaviour. As this study finds a significant positive impact of product return knowledge along with general environmental knowledge on attitudes towards end-of-life return, consumers must be educated with return knowledge that would enhance forming a positive attitude towards the environment and subsequently result in more favourable ecologically conscious consumer behaviour. Therefore, marketing communication needs to aim at teaching consumers about end-of-life information. This could be done, for example, by advising consumers to read and know the end-of-life information when purchasing and disposing the product. This kind of advice can be supplemented in company's regular advertising. Such advertising campaigns can also be initiated by the government, NGOs, and other environmental groups, which can further enhance the credibility of end-of-life information.

Furthermore, it may help businesses to develop specific communication genres to communicate with their customers, for example, the introduction of approved and standardise eco-label. This eco-label can be composed by employing consistent use of phrases and organisations to reach consumers' genre conformity, over time. Like any other standardised documents, consumers will accustom to this conformity genre as a heuristic cue for authenticity. The operational social marketing approach suggested in this research is seen to have potential in influencing the strategic social marketing strategy and development, which requires strong customer understanding and insight to inform and guide effective policy and strategy development. It will be useful for designers to prepare post-purchase documentation, as well as for organisations, activist and environmental agencies to design environmental message regarding End-of-Life (EoL) and End-of-Use (EoU) return.

In conclusion, the information-sharing framework not only makes a significant theoretical contribution in CLSC and consumer disposition literature, but also is beneficial for those firms that have CLSC operations. For example, the challenge for the remanufacturing industry today is core management, as discussed by Subramoniam et al. (2018). Lack of cores results in the inability of the company to make a low cost remanufactured product available for the consumer. This research provides companies with a framework to review their existing end-of-life returns policies, processes and technology to accelerate, incentivize

the returns process, thereby increasing their revenue and profitability along with establishing a strong brand because of green corporate image and corporate social responsibility (CSR).

7.3 Future research direction

In future, a longitudinal study that tracks actual purchase behaviours over an extended time would be beneficial for observing and comparing the evolution of the intention – behaviour relationship, given the growing importance of environmentally and socially sustainable practices. Additionally, this research is limited to product return activity of small electric and electronic equipment such as router, rice cooker, printer, battery-operated toys, kettle and blender. For future recommendation, this scope could be expanded to bigger electric and electronic equipment used in household and business premises. Extended research in product return activity from business premises could significantly affect the quantity of returned items.

This research may contribute with new insights on product return knowledge management by suggesting the inclusion of important information about product return and recovery management (time and quality of return). In the current practice, these kinds of information are available within businesses organisations (manufacturers and remanufacturers), not for consumers' reference. It will be useful for designers to prepare post-purchase documentation, as well as for organizations, activist and environmental agencies to design environmental message regarding End-of-Life (EoL) and End-of-Use (EoU) return. the future research direction could be the research that investigates the relevancy of improved recycle environmental label as shown in Figure 7.1. Figure 7.1 is intended to show the advancement that could take place in future. The newer version of the environmental label conveys the message that the equipment is best to be returned/recycled within six months after its consumption period ends. The image shown in Figure 7.1 is used only for explanation purpose. It is an example of what could happen in future if findings from this research are developed into advancing knowledge.
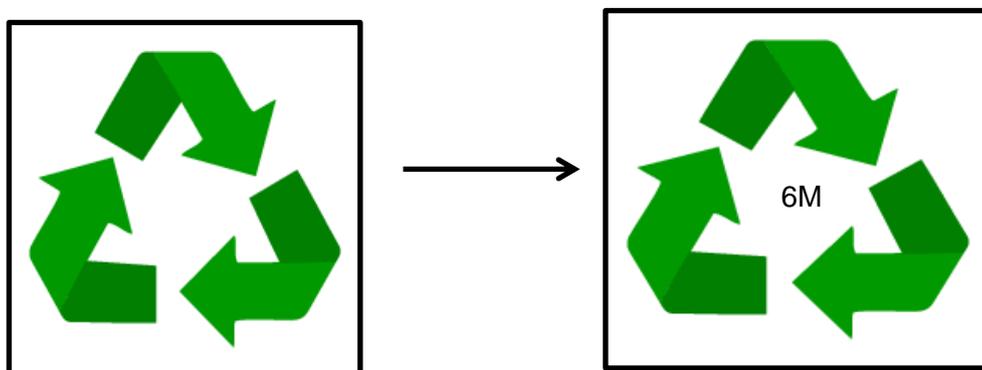

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Figure 7.1: Improved Recycle label

Additionally, this research has big potential in the area of the circular economy. The introduction of immediate return idea could be a small piece in a circular economy puzzle, especially in addressing the issue of natural resources depletion and remanufacturing practices.

7.4   Research limitation

The author fully acknowledges that this study has some limitations, and readers and future academics and researchers should be aware of it and indeed interpret the material presented in this research within the context of the limitations. In this research, the limitation for this research can be discussed in data collection method. This research uses convenience sampling approach, which was not completely random. This perhaps reduces the generalisability of the findings. However, this should motivate additional research to examine additional sample frames and consumer populations to test and extend the results of this study.

Limitation of this research also revolve around the number of respondents. The sample is from a limited population. An ideal study population would contain all potential household with small e-waste. Hence, the household sample used serves only as an approximation. However, selecting a sample comprising all potential household is conceptually difficult. An alternative is to sample from a survey population that is representative of a country's population. The first draw-back is that people who would not consider returning a certain product may be included.

A second drawback is that a general population survey is likely to contain consumer segments whose returning behaviour varies systematically. For instance, it is argued that older people are less concerned about the environment, whereas—simultaneously—they have greater buying power to purchase electric and electronic equipment.

The other major limitation of the study is the use of correlational data. This research cannot claims about the causal relationships among the variables. This opens the avenue for further experimental research to examine the causal relationships among the variables of interest.

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9. APPENDIX

Participant Information Sheet

Title of Study: "Towards Sustainable Manufacturing: Information Sharing Framework of End-of-Life Immediate Return"

You are being invited to take part in this PhD research study. Before you decide, it is important for you to understand why this research is being done and what it will involve. Please take your time to read the following information. If you have any question or would like additional information, please do not hesitate to ask the researcher at: cbpgrbm1@ brunel.ac.uk

What is the purpose of this research study?

The researcher is interested to evaluate the factors that will significantly affect consumers' behavioural intention to immediately return used/broken/un-functional small electronic. The information and knowledge gained from the survey will be used in PhD research dissertation, which will develop a conceptual framework and validate the model by conducting this survey.

Do I have to take part?

Participation is completely voluntary and you can change your mind about taking part at any time.

What I will be asked to do in this research?

You will be asked to take part in a questionnaires survey which is in related to your views as a consumer on immediate return of used/broken/un-functional small electronic products.

What will happen to the results of the research study?

The results of the research study will form as a part of the researcher thesis document, and also will be published in journals and conferences research. The raw data will be anonymised and stored securely until destroyed.

Can I withdraw from the research?

If you feel at any time to withdraw from participate in this research, you may do so. Any information that may have been provided will be immediately destroyed.

Contact details for further information:
Researcher details:
Name: Rosnida binti Mamat
E-mail: cbpgrbm1@brunel.ac.uk
Supervisor details:
Name: Dr Muhammad Mustafa Kamal
E-mail: muhammad.kamal@brunel.ac.uk

Thank you for your valuable time reading this information and participation in this research.

PART A: RESPONDENT'S PROFILE INFORMATION

1. **GENDER:**
   a. Male
   b. Female

2. **AGE:**
   a. 20-30
   b. 31-40
   c. 41-50

3. **EDUCATIONAL QUALIFICATION:**
   a. High school
   b. College/ University
   c. Graduate school

PART 2: End-of-Life (EoL) and End-of-Use (EoU) Product Return Knowledge

Please choose on how much you agree with the statements

Indicators:

1 Strongly disagree	4 Slightly agree
2 Moderately disagree	5 Moderately agree
3 Slightly Disagree	6 Strongly agree

	1	2	3	4	5	6
I know that we should not store our e-waste at home						
I know that storing e-waste will harm the environment						
I know that used electric and electronic appliances should be returned immediately						
I know that used electric and electronic appliances should be dispose properly						
I know that materials used in electric and electronic appliances can be recycled						
I know my effort in returning the used electric and electronic appliances can help in manufacturing good remanufactured appliances (refurbished TV, laptop)						

PART 3: ATTITUDE TOWARDS RETURN INFORMATION

Please choose on how much you agree with the statements

Indicators:

1 Strongly disagree   4 Slightly agree

2 Moderately disagree   5 Moderately agree

3 Slightly Disagree   6 Strongly agree

	1	2	3	4	5	6
It is very important to have information about immediate return of e-waste						
I strongly support the idea to make the post-consumption return information available for consumer reference						
It is essential to promote immediate return of e-waste						
I am willing to check the eco-label or any environmental information about the product if it is available						

PART B: RESPONDENT'S ENVIRONMENTAL PROFILE

NEETF/ ROPER QUESTIONS (1997-2000)

1. **There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? Is it...**
   a. Multiplicity
   b. Biodiversity
   c. Socio-economics
   d. Evolution
   Don't know

2. **Carbon monoxide is a major contributor to air pollution. Which of the following is the biggest source of carbon monoxide? Is it...**
   a. Factories and businesses
   b. People breathing
   c. Motor vehicles
   d. Trees
   Don't know

3. **How are most of the electricity generated? Is it...**
   a. By burning oil, coal, and wood
   b. With nuclear power
   c. Through solar energy
   d. At hydroelectric power plants
   Don't know

4. **What is the most common cause of pollution of streams, rivers, and oceans? Is it...**
   a. Dumping of garbage by cities
   b. Surface water running off yards, city streets, paved lots, and farm fields
   c. Trash washed into the ocean from beaches
   d. Waste dumped by factories
   Don't know

5. **Which of the following is a renewable resource? Is it...**
   a. Oil
   b. Iron ore
   c. Trees
   d. Coal
   Don't know

6. **Ozone forms a protective layer in the earth's upper atmosphere. What does ozone protect us from? Is it**
   a. Acid rain
   b. Global warming
   c. Sudden changes in temperature
   d. Harmful, cancer-causing sunlight
   Don't know

7. **Where do most of the garbage end up? Is it in ...**
   a. Oceans
   b. Incinerators
   c. Recycling centers
   d. Landfills
   Don't know

8. **Which of the following household wastes is considered hazardous waste? Is it...**
   a. Plastic packaging
   b. Glass
   c. Batteries
   d. Spoiled food
   Don't know

9. **What is the most common reason that an animal species become extinct? Is it because...**
   a. Pesticides are killing them
   b. Their habitats are being destroyed by humans
   c. There is too much hunting
   d. There are climate changes that affect them
   Don't know

10. **What is the primary benefit of wetlands? Do they...**
    a. Promote flooding
    b. Help clean the water before it enters lakes, streams, rivers, or oceans
    c. Help keep the number of undesirable plants and animals low
    d. Provide good sites for landfills
    Don't know

ENVIRONMENTAL MOTIVATION

Please rate the degree to which you agree with these statements:

STATEMENTS	Strongly disagree	Moderately disagree	Slightly disagree	Neutral	Slightly agree	Moderately agree	Strongly agree
It is a pleasure when I find new ways to improve the quality of the environment							
I like the feeling when doing things for environment							
Pleasure in contributing to environment							
Pleasure in improving quality of environment							
Being environmentally conscious has become a fundamental part of who I am							
Seems that taking care of myself and environment are inseparable							
Environmentally conscious has become a fundamental part of who I am							
Environmentally conscious is a part of the way I've chosen to live my life							

Protecting environment is a sensible thing to do						
Protecting environment is the way I've chosen to contribute						
Environmental protection is a reasonable thing to do						
It is a good idea to do something about environment						
I'd regret not doing something for the environment						
I would feel guilty if I didn't protect the environment						
I would feel bad if I didn't do anything for the environment						
I would feel ashamed of myself if I was doing nothing to help the environment						
Other people will be upset if I don't do something good for the environment						

I do good things for the environment to get recognition from others						
I do good things for the environment because **my** friends insist that I do						
I do good things for the environment to avoid being criticized						
I wonder why; the situation isn't improving						
Don't know; have impression I'm wasting time						
Don't know, can't see how my efforts are helping						
Don't know; can't see what I'm getting out of it						

PART C: INFORMATIVE MEASURES

Please read these two messages carefully and answer the following questions.

MESSAGE 1

Do you know? Materials in your electrical and electronic equipment have valuable raw materials that can be reused in producing new products. Recovery operation of the materials would process the potential toxic materials and reduce the environmental footprint of raw materials extraction.
If you practice immediate disposal of electronic waste, then …
You will contribute in formal recovery process which is good for our environment and natural resources preservation:

- *Immediate disposal decreases the risk of unprocessed toxic materials and hazardous chemical being released to the air, water and soil*
- *Immediate disposal leads to high-efficiency recycle process and the materials can be reused.*
- *Manufacturers can re-use the materials in order to produce new products instead of extracting new raw materials from the Earth.*

MESSAGE 2

Do you know? Manufacturers use natural resources to manufacture our household electrical and electronic equipment. The rapid technological change accelerates electronic waste generation. Storing or retaining electronic waste for a long term period of time can lead to landfill dumping and low efficiency recycle process (for example open burning) which results in releasing hazardous toxics into the environment.
If you not practice immediate disposal of electronic waste, then …
The products become unusable, obsolete and even completely unsalvageable. When this happen:

- *it intensifies the levels of toxic materials release to air, water and soil*
- *exposure to hazardous chemicals, which diffuse from low efficiency recycle process (for example open burning) develops cancer and non-cancer diseases*
- *uncontrolled extraction of raw materials threats preservation of natural resources*

PLEASE ANSWER THE FOLLOWING QUESTION BASED ON THE TWO MESSAGES PRESENTED ABOVE.

	Message 1	Message 2
Which message do you think is true and will influence you to immediately return your electric and electronic waste?		
Which message do you think meet the objective and will influence you to immediately return your electric and electronic waste?		
Which message that can convince and influence you to immediately return your electric and electronic waste?		
Which message do you think is relevant and will influence you to immediately return your electric and electronic waste?		
Which message do you think is belivable and will influence you to immediately return your electric and electronic waste?		
Which message do you think is useful and will influence you to immediately return your electric and electronic waste?		
Which message do you think is interesting and will influence you to immediately return your electric and electronic waste?		

Please indicate the degree of your willingness to participate in each action

	Always willing	Sometimes willing	Unsure	Rarely willing	Never willing
When there is a choice, I always choose to properly dispose my e-waste					
I no longer want to retain the e-waste in my house					
I will make every effort to immediately return my e-waste					
I am willing to drop small e-waste (such as rice cooker, kettle) in designated recycling centre					