**Reverse logistics: Its concept and drivers in New Zealand.
Case Studies**

By
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The real cure for our environmental problems is to understand that our job is to salvage Mother Nature. We are facing a formidable enemy in this field. It is the hunters ... and to convince them to leave their guns on the wall is going to be very difficult.

JACQUES YVES COUSTEAU

The researcher's thought

In moments like this, my inspiration came from the thought of seeing my family and friends again in my home country, Mexico. My grandparents Carlos and Lilia, my parents Rodolfo and Leticia, my brother Rodolfo and my sister Lilia. The idea of being there, having chats with my grandparents on an afternoon, going out with my parents for coffees, helping my mum with cooking, shopping with my sister and talking to my brother about our future careers. I have grown up in family-oriented tradition where if one member of the family is missing, it is not the same. I have learned that globalisation has made it possible for people to live, work and study in other countries for a better future. This was a great experience for me as it helped me value what I have been missing for the past 2 years: my family.

Besides being inspired by my family in Mexico, there was someone special in New Zealand who helped me kept going with writing this thesis. This person was the main reason for me living and studying in New Zealand. I am grateful for having an amazing husband, Ben Lavender, who supported me in this journey. Even though he had many career changes going on, he never let me down and for that I am happy of having him as my spouse and mate.

Doing research and writing a thesis is hard work and requires a lot of self-company and discipline. One year to write a Masters thesis may sound easy but it is not. It involves a lot of research, writing and mastering the content. At the end of the thesis, the researcher owns that content and knows it by heart.

I encourage future Masters students to do a thesis as it is a journey that is worthwhile. The benefits may not show up in the initial stages but later, towards the end, when companies look into recruiting students (well-prepared as my dad always used to say). Satisfaction may come towards the end as well when typing the last word as I have done now.

Thank you and enjoy!

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Lastly, to my husband, brother, sister and grandparents who have always care and been there for me... thank you!

Abstract

Companies have achieved cost-reduction, marketing advantage and attention for the natural environment as some of the benefits from their reverse logistics (RL) activities. Many companies have considered RL as a strategic goal because it is part of the supply chain that offers value. Such value relates to the ability to efficiently and effectively manage 'returns'. Returns in this thesis refer to used products, materials and packaging as well as waste.

The RL concept has gained increased attention by companies and government. Consumers are starting to be aware of this as an indispensable service after sales where they can have their used products retrieved and properly disposed. Only a few companies in New Zealand have been leaders in the RL area since they implemented it in the 2000's without being any regulation. It was found in the study that more and more companies are looking at implementing RL, no matter which industry they are in or their position in the supply chain. However, little is known about what factors promote RL practices for companies in New Zealand.

The broad objective of the study was to explore factors driving the implementation of RL for companies in New Zealand from an environmental perspective. There were seven main factors found in New Zealand: stakeholders, green sustainability, leadership, marketing, economic, regulations and information. Moreover it was aimed to achieve a clear understanding of the RL meaning as it was not commonly heard in New Zealand. Many companies in New Zealand refer to RL backward flow as a product stewardship scheme, extended producer responsibility (EPR) and resource efficiency.

Ten companies from different industries and a Ministry participated in this research, including manufacturing and retailers. For some companies, RL implementation was highly mature than others who were in the initial stages of implementation. The method used to collect data was semi structured interviews. All interviews were transcribed by the researcher and analysed

accordingly. Relevant themes were assigned along the transcripts to organise the study's content. Those themes included RL concept, main factors, resources, problems, benefits, strategies and greening perspective. Quotations from the interviewees were used in the findings to support information.

The findings from the research suggest that companies in New Zealand and Europe have similar factors influencing RL implementation. Alvarez-Gil et al., (2007) found that in Spain, stakeholders, environmental issues, regulations and change in strategic focus (also known as leadership) have encouraged activities such as returns, refurbish and recycle. The only factor that was not found in other studies was information. Furthermore findings show that New Zealand as a whole is leader in pro environmental practices but still there is room to improve on it.

Managerial implications are presented in the conclusions chapter. Those implications were deducted from the information obtained from findings based on the researcher's judgment. They are practical and logical so that any company or person wanting to implement RL can benefit by having some advice.

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Chapter 1: Introduction

Overview

This chapter presents a brief introduction to the subject under study: Reverse Logistics (RL). It includes the motivation, interest and background from the researcher as well as the research background. Next a short description of the research setting is presented. Last, the research structure with an explanation for each chapter is provided.

Brief introduction to RL

Reverse logistics (RL) is an area of increasing interest for many companies when seeking to the reduce costs of returns, increase profits and/or meet environmental standards (Visich *et al.*, 2007). It is a subject that has gained interest since the early 2000s when the European Union (EU) introduced more stringent environmental laws. Consciousness about the environment has increased further as seen with the recent documentaries such as ‘The Inconvenient Truth’ from Al Gore. Companies are seen to have adopted an attitude of supporting the environment by implementing effective and efficient RL practices.

RL deals with the backward flow of used products and materials from consumers to any point in the supply chain. This concept has been defined as a process that recaptures value from used products and materials (Breen, 2006). For instance, authors such as Lambert (1981), Stock (1998), Murphy (1989) and Poist (2003) have not included the benefits for the environment in their RL definition. The negative impacts to the environment are reduced when the company takes responsibility of the used products and materials, and has a strategy for proper disposal. There are many disposal methods for used products and materials as seen in the waste hierarchy which include reduction, reuse, recycling, remanufacture, refurbishment and landfill disposal. Reuse, recycling and refurbishment appear to be the most common in New Zealand.

RL studies help understand the whole supply chain, from virgin raw materials to disposal methods. Closed loop supply chains are of great importance to many companies as it involves forward logistics and RL. Forward logistics have been studied widely and there are systems in place to deal with the forward flow of products and materials. RL is a harder subject as the backward flow of products and materials is more uncertain in terms of timing, quality, routes, and usability. Nowadays, companies need to formulate strategies that include both forward and RL as they can no longer ignore the way their products will be disposed of once customers have used them. In RL, contingency plans are needed even if there is possibility of them not being used (Dibenedetto, 2007).

A current example of RL is seen with Mattel and their recall on toys which contain lead. A huge event like this could significantly reduce customers and alert people to the issue of returns. Public awareness on RL has slowly increased with many stakeholders such as large customers, government and shareholders now considering sustainability before doing business. As Rogers (2007) mention, sustainability has been considered by companies as a way to protect future generations and the environment. RL practices can lead to such sustainability and even competitive advantage. Furthermore, companies have to answer to their products' consequences as stakeholders increasingly put pressure on suppliers (Rogers, 2007).

As RL is a relatively new concept throughout the world, New Zealand companies seem to pursue only some activities which are part of RL. Some companies in New Zealand undertake 'product stewardship', where they take back products and recycling schemes are put in place. Such activities have been implemented voluntarily by these companies. Currently there is no legislation in New Zealand requiring take back product schemes and EPR as seen in the EU. Therefore it is interesting to assess the reasons why companies in New Zealand have adopted RL practices voluntarily.

This research thesis concentrates on analysing the factors driving the implementation of RL in New Zealand across a range of industries. The most frequent factors that have been published in journals are economic and

environmental (Chan, 2007) and stakeholders (Alvarez-Gil *et al.*, 2007). None of the studies related to RL have been undertaken in New Zealand. The majority of the studies have been done in United States, China and Europe. Thus it should help to enrich as this research thesis provides information from the Pacific region RL literature.

Research/Researcher Background

This research developed as the result of my exchange programme at the University of British Columbia in Canada and my interest in supply chains, RL, natural environment and strategy. In 2004, I went to the University of British Columbia to obtain a certificate in Logistics and Supply Chain Management. While studying in Canada, I learned about the importance of the supply chain in most companies worldwide. Most of the papers I took were on forward logistics, transportation, warehousing, technology and cost benefit analysis but RL was briefly covered.

Having completed by certificate in Canada, I started to work with General Electric (Mexico) in procurement. I was in charge of buying raw materials and products from United States for customers in Latin America. I had a theoretical knowledge of supply chains but with General Electric, I got practical knowledge. We used a technology system from Oracle which looks at the product from when it is manufactured until it is finished, transported and delivered to the customer. After 4 months of working with General Electric, I went to New Zealand to study a Masters degree in Management.

The first year of my Masters degree, I did coursework on subjects such as leadership, marketing, international business, strategic management and theory of constraints. When it was time to think for a thesis topic, I remembered questioning myself about how RL could operate effectively – like forward logistics but in opposite direction. Having that question in mind, I went back to my lecturers at the University of British Columbia to ask for further information about RL. They referred me to other academics and practitioners who had experience in the area and I contacted them through e-mail. I also contacted my

supervisors at Victoria University of Wellington and business people in New Zealand and Mexico.

I did some research on RL and I found there was only limited information on the subject. I read supply chain books and they only covered RL in a small section. My curiosity grew when I could not find substantial information on RL in comparison to forward logistics. I spoke to people from the Reverse Logistics Association in United States and they were kind enough to send me articles. I joined this association and got monthly newsletters with recent information on RL.

The natural environment has also been one of my interests for a long time. I did some courses in ecology when I was doing my bachelor's degree and perceived it to be very important for everyone. My intuition said that there was some kind of connection between RL and the environment. However, I did not know what connection was there and I feel it is important to recognise these underlying perspectives and influences that might shape this research and my analysis. Several months of thought with regards the environment and RL got me to the overall research's question: What factors drive the implementation of RL in New Zealand from an environmental perspective?

The research only covers New Zealand as it is now my home country. After a few meetings with my supervisors and business people in New Zealand, I found that RL and the environment was in fact a hot topic coinciding with the introduction by the New Zealand government of new policies on the environment and laws, the Ministry for the Environment's (MfE) collaboration with companies in New Zealand, and some company's programmes on product stewardship.

Research Setting

The research involved companies operating in New Zealand. Some companies were New Zealand - owned companies and others were owned internationally. This selection was made in order to understand RL in New Zealand and parent companies overseas. There were few barriers for gathering RL information. This

research is also interested in finding those factors which also influenced international companies in New Zealand to implement RL.

New Zealand is perceived as a green country and so finding out how companies act towards the environment was one of the advantages of selecting this country. Some companies promote product stewardship in New Zealand. Increased marketing materials have been exhibited in buses, buildings, street posters and shops, where take-back product programmes are explained. Other companies in New Zealand encourage consumers to participate in the take-back product activities, such as Vodafone and Telecom.

Research Structure

This research thesis is structured as follows:

- *Chapter Two* introduces the RL literature by presenting what other authors have written in the past.
- *Chapter Three* describes the research methodology used to obtain the data.
- *Chapter Four* presents each company's different context with regards its background, services, products and RL process.
- *Chapter Five* presents the data and findings.
- *Chapter Six* analyses and discusses the findings.
- *Chapter Seven* concludes the thesis with a summary of the research.

Chapter 2: Literature Review

Overview

The literature review chapter provides relevant information by broadly describing supply chains and narrowing down to the concept of RL with an environmental perspective. This chapter begins discussing closed loop supply chains which involves forward logistics and RL. Then it shows the structure of the literature review in order to understand the whole thesis topic. After that, RL information is provided by presenting and explaining its chronological map, definition, characteristics, activities, benefits, barriers and waste disposal hierarchy. As this thesis focus on RL from an environmental perspective, the environmental approach taken is discussed followed by green logistics, recycling, stewardship programmes and, European environmental legislation. Then a synopsis of a Spanish RL case study is presented to explain results obtained from their study. This chapter concludes with the gap in literature review, research objectives and research questions.

Introduction

A term that has captured the essence of integrated logistics is *Supply Chain Management* (SCM). This term first appeared in the literature more than twenty years ago (Gibson *et al.*, 2005). There are many definitions for SCM but for the purpose of this research, it is considered to manage all logistics interactions through relationships in order to achieve competitive advantage (Ballou, 2004). SCM is broader than logistics as it manages and controls all materials and information in the logistics process (Gibson *et al.*, 2005). The logistics processes include both forward logistics and RL.

Over the years companies have focused on their forward logistics to obtain benefits such as excellent service levels, customer satisfaction, efficiency and cost-effectiveness by integrating suppliers, manufacturers, warehouses and retailers. As defined by the Council of Logistics Management (2000), forward logistics is all about “*planning, implementing and controlling, cost-effective flow and storage of goods, in-process inventory, finished goods and related*

information from source to end-consumer for the purpose of fulfilling the consumer's requirements" (Simchi-Levi *et al.*, 2003). Moreover, forward logistics is the upstream channel in the supply chain.

Worldwide, companies are acknowledging that SCM does not reach a closed loop with the sole delivery of the product to the customer (Wyld, 2006). The reasoning behind this argument is that the used product is often dumped rather than recovered. There are questions as to what happens with the product after the consumer has used it. At present there has been significant interest in the movement of the used product from the end-consumer back to the distributor, manufacturer and/or supplier. This movement is referred to as RL.

In RL, the life of a product does not end with the sole delivery of the product to the consumer (Ballou, 2004). Once the products have reached their end-of-life (EOL), they may be recovered by collecting them and determining which products can be reused. Products can go through disassembling, segregating valuable parts from scrap, remanufacturing parts, recycling materials and disposing the residuals as municipal solid waste or hazardous waste (Toffel, 2004). Toffel (2004) does not discuss the process that used products go through once they are recovered in a country, like New Zealand, where there are limited facilities for reuse, remanufacture and recycle.

RL is becoming a critical aspect in SCM (Carter *et al.*, 1998). Leading-edge companies are starting to comprehend the strategic value of RL (Fites, 2000). It helps companies clear slow-moving products by finding them another use within the same or different industry. Andel (1997) confirms Fites's statement by mentioning that RL can be used to clear customer's obsolete products and to assist them in moving their slow inventories so that customers can continue purchasing more and newer products. Growing sensitivity towards sustainable development and environment has made it possible for RL to emerge (Weidong *et al.*, 2001).

In general, logistics is vital in environmental social responsible strategies because the decisions of logistics managers can affect the success or failure of these environmental strategies in their supply chains (Goldsby *et al.*, 2000).

Many companies all over the world are experiencing pressures from their governments, environmental bodies, employees and their own customers to perform and be conscious of the environment. Environmentalism has been considered as one of the key drivers impacting the economy as well as contemporary businesses (Murphy *et al.*, 2003). Furthermore, environmental implications of RL are vital for environmental conscious business practices (Sarkis *et al.*, 2004).

Closed loop supply chains

Traditionally, the supply chain used to start with the utilisation of new raw materials from the natural environment and conclude with the selling of the final product to the consumer. This traditional approach is called open loop supply chain since the product fails to return to its original or intermediate stage of the logistics network as showed in *figure 1*. The open loop logistics process flow starts from suppliers, followed by manufacturers, which then is followed by warehouse and distribution, and last to customers. It is worth noting that in each flow, transportation costs are always incurred as materials, work-in-process products and finished products are shipped through the supply chain. Manufacturers usually have costs related to materials and manufacturing while warehouses and distribution have costs related to inventory.

Modified and based on the work of Simchi-Levi et al (2003).

Source: Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E. (2003). *Designing & Managing the Supply Chain. Concepts, Strategies & Case Studies*. New York: McGraw-Hill, 2edition. pp. 2.

Figure 1. Common logistics network from a cost perspective

Simchi-Levi et al., (2003) do not include procurement costs by all members in the supply chain. Only manufacturers are shown as the only members with materials costs. Depending on the situation, procurement costs may be incurred by all members in the supply chain as they purchase raw materials, work in process products and finished products. For example, a supplier may outsource part of raw materials that a manufacturer is buying from them. For the purpose of showing open loops, no close loops flows were added.

The open loop is a one way flow where resources enter a system of transformation and leave the system. This approach of work has been the norm for the last century as natural resources were fully exploited and most of the times never replaced with anything else. Consequently, it has become harder to extract natural resources due to the fact that they have been diminishing over the past few years (Vogt, *et al.*, 2005). All these problems led to thinking about

ways of changing how companies' supply chains operate, leading into reverse supply chains and closing the loop.

Closed loop supply chains involve forward supply chain and reverse supply chain. In a closed loop, the supply chain receives its resources from used products and materials to produce goods of the original product type (Geyer *et al.*, 2004). Therefore virgin raw materials and used materials are supplied together or separately to manufacturers. Manufacturers then, make the product using either or both virgin raw materials and used raw materials. The typical forward logistics process flow continues with sending finished products to distribution and warehouses, then to retailers and last sold and used by consumers. As shown in *figure 2*, disposal streams are diverted to become new raw material or reuse in other forward logistics stages (King *et al.*, 2005).

Modified and based on the work of A.M. King et al (2005).

Source: A.M. King et al. (2005). Reducing Waste: Repair, Recondition, Remanufacture or Recycle? Sustainable Development. John Wiley & Sons, Ltd and ERP Environment.

Figure 2. Disposal streams diverted to be reused.

The recovered resources are mostly used through the most cost-effective alternative. This alternative may be reuse/repair, refurbish, remanufacture or recycle. As seen in *figure 2*, new raw materials and recovered resources may meet at some stage in forward logistics to close the supply chain cycle (Fleischmann *et al.*, 2000). Closed loops are the best way to explain the returns process in companies as their reverse flow explains the process which a recovered product goes through.

There are some used materials that cannot be reused, refurbished, remanufactured or recycled which are thrown away in landfills as waste. As seen in *figure 2*, the products and materials that can be introduced back into the supply chain are called recovered products. Recovered products always flow opposite direction from manufactured products.

According to Krikke *et al.*, (2004) the reverse chain of the closed – loop comprises five key businesses:

1. Product acquisition: retrieving and collecting product from the market.
2. Reverse logistics: transporting, testing and inspecting the product.
3. Sorting and disposition: determining the best channel for the product.
4. Recovery: recuperating components that can be reused in products.
5. Re-distribution and sales: selling of product with secondary resources.

There is a disagreement between Krikke *et al.*, (2004) and Rogers *et al.*, (2001) about whether RL is the complete process of retrieving and handling the used product or material. Krikke *et al.*, (2004) only see RL as the way of transporting returns and some of the previous stages to sortation and disposition. By reading Rogers *et al.*, (2001) RL definition, it may be implied that it only includes transportation as they refer to RL as “*movement of product or materials in the opposite direction*”. RL functions are similar as forward logistics functions but in an opposite direction (See *Appendix A*).

Closed loops can be analysed from three different perspectives (Van Nunen *et al.*, 2004):

- 1) *Process perspective*, which relates to the different types of recovery process for returned products and works together with the forward

supply chain in terms of sourcing, manufacturing, assembly and customisation.

- 2) *Customer perspective*, which relates to the information obtained through customer relationship management in order to find out what the specifications and requirements of the customers are.
- 3) *Product perspective*, which relates to the information about the product and its parts taken from the product directly or indirectly.

The process perspective obviously makes a straightforward linkage between closed loop supply chains and RL visible as the recovery activities and flow from RL closes the supply chain by supplying input into different stages of the forward logistics network (See *figure 3*). The customer perspective and product perspective also have a connection with RL in that both are needed to ensure the customer and product requirements are being met.

Source: Adapted from Jos van Hillegersberg, Rob Zuidwijk, Jo van Nunen, Diana Van Eijk. (2001). Supporting Return Flows in the Supply Chain. Communications of the ACM, 44/6 (June): 74-79.

Figure 3. Closed – Loop Supply Chain (including forward logistics and RL)

In *figure 3*, a closed – loop is illustrated by following the arrows upward that contains all of the activities in the forward logistics and the arrows downwards

that contains all of the activities in the RL. Starting from the used products, RL takes care of gatekeeping, collecting and testing, sorting and proper disposal depending on the status of the return that can be clean and repackage, repair, remanufacture, refurbish, cannibalise, recycle or incineration and landfill. After going through the process of proper disposal, returns (depending if they are materials, parts or products) go through the process of a typical forward logistics which is sourcing, manufacturing, assembling and customising. When the product is completed, consumers buy/acquire the good either from retailing or distribution. Now, it is possible that in assembling products errors can be made sending the manufacturer returns back to collection and testing. Furthermore, distribution returns may happen when there are product recalls, commercial returns, stock adjustments and redistribution of products (Van Nunen *et al.*, 2004).

Evidently, there is a difference between what King *et al.*, (2005) and Van Hillegersberg *et al.*, (2001) suggest as closed loops. As can be seen in *figure 1*, refurbishing takes place between the manufacturing process and distribution process and remanufacturing takes place in the manufacturing process. In contrast, as seen in *figure 2*, remanufacturing and refurbishing take place after assembly which in many cases it is not necessarily true. The activities of refurbishing and remanufacturing can be present from the manufacturing process or manufacture to distribution process or assembly. It all depends on the company's operations, and type and condition of the used product.

Structure of RL literature review

The structure of the RL literature reviews is explained in *figure 4* by looking at the shadowed boxes. It starts with a brief discussion of general subjects where RL fall under which are SCM and closed loops. Both SCM and closed loops were briefly explained before this section as the next section concentrates fully on RL followed by an environmental approach. The whole research thesis is about RL with an environmental perspective by doing case studies in New Zealand.

Most of the literature on RL suggests that it is part of SCM, marketing, environmental trends and government legislation. Therefore a structure of the

literature review was developed by the researcher to understand the relation of RL and SCM (See *figure 4*). As Ballou (2004) mentioned, SCM manages all logistics interactions. Those interactions can be found in open loops where products and packaging flow until the end-consumer or in closed loops where products and packaging flows back to any stage of the manufacturing of new products. Therefore forward logistics is directly associated with open loops as production and packaging flow from raw materials to end consumer. RL is associated with closed loops as it deals with exactly the same movement as forward logistics but in opposite direction recovering materials to replace scarce virgin raw materials in the initial supply chain.

Figure 4. Structure of RL Literature Review

As seen in *figure 4*, both forward and RL can be accomplished by following several approaches mutually such as environmental, economic and business-strategy. Such approaches may be contrasted in forward and RL as follows:

- An environmental approach

Forward Logistics: by using recycled materials for their new products and packaging.

RL: by recycling, reusing, reducing, remanufacturing or refurbishing returned products and packages to avoid sending them to landfills.

- An economic approach

Forward Logistics: by regularly coordinating all the logistics activities reducing extra expenditures.

RL: by focusing in the product-life cycle and designing the product for it. Recovering monetary value from products and technology (Blumberg, 2005).

- A business-strategy approach

Forward Logistics: by taking any of Porter's (1985) generic strategies such as cost-leadership, differentiation or focus strategies.

RL: by implementing any of Porter's (1985) generic strategies such as cost-leadership, differentiation or focus strategies.

All these supply chain related links are worthy of study in New Zealand as these areas have not been extensively researched. For the purpose of this research, RL with an environmental approach is studied.

Reverse Logistics (RL)

Emergence of RL

Logistics has its background from military strategies, as Simpson *et al.* (1989) trace its roots back to troop mobilisation in the war. After World War II, logistics began to be applied in private companies by managing transportation, distribution and warehousing. It was not until the 1980's when RL started to appear in a few companies worldwide and in some academic papers (Carter *et al.*, 1998) Much of the original interest of the subject was in narrow topics such as "computer technology, advanced office automation, and military and weapon systems logistics support" (Blumberg, 2005). As seen in figure 5, RL gained importance in late 1990s. This chronological table was developed in this research from the information available from different journals.

Time	Event
1940s	World War II logistics practices applied to private companies.
1960s	Extensive RL studies in military systems and electronic products.
1970s	Growing interest in recycling generated contributions to marketing.
1980s	RL publicly run in a few public and private companies and was limited to the movement of material against the primary flow.
1990s	Increase of environmental concerns by regulatory bodies and consumers.
1992	RL did not receive substantial attention until Stock (1992) published his paper on the subject.
1995	Environmental issues in logistics gain sufficient importance through journals.
1998	Stock (1998) redefined RL with a more environmental side of it.
2000	EU adopted the 'end-of-life vehicle directive'.
2003	Initial publications of Waste Electrical and Electronic Equipment (WEEE) directive in Europe.
2004	Stewardship programmes started to get adopted by companies in New Zealand.
2005	WEEE directive became law in Europe.
2006	Restriction of use of hazardous materials (RoHs) directive restrictions came into effect in Europe.
2007	Increase efforts to take-back products, recycling and reusing in New Zealand.

Figure 5. Chronological table of associated RL practices

The rationale for the emergence of RL is quite simple. Early in the 21st century, an increasing concern about energy and saving raw materials started to put pressure on companies. At the same time a liberal return policy aimed to enlarge customer bases started to increase competition, a position of competitive advantage was obtained by companies applying RL, and a sensitive topic related to the natural environment began to target customers worldwide (Weidong *et al.*, 2001). In addition, European countries introduced strict regulations to manufacturers to produce goods that enabled easy disposal and eco-friendly treatment. Furthermore, in 2000 the EU introduced an environmental policy called EPR where the producer is responsible for whatever happens to the product at the end of its life cycle (Seitz *et al.*, 2004).

As government companies and customers begin to pressure stakeholders along the supply chain to operate in a more environmentally friendly manner, companies are better off when incorporating RL practices (Goldsby *et al.*, 2000). Benefits from RL may take quite a long time as seen with the companies under study in New Zealand. Goldsby *et al.*, (2000) is somehow correct with regards companies being better off with RL but it may not always across industries. For some industries, like telecommunications, is easier to apply RL than other industries, like food and beverage. The reason for that is that in the case of the telecommunications product (i.e. mobile), the materials and components is made of are worth to recover than in the case of the food and beverage product (i.e. box of cereal), where cartons do not have the same value.

RL is obviously emerging as a critical part in the supply chain (Krumwiede *et al.*, 2002). Companies and people are becoming aware of what the past generations did with used products as seen in landfills that have reached their full capacity. This concept has also gained awareness in terms of profit and business strategy (Dowlathshahi, 2000). RL can assist companies to gain competitive advantage, not only environmentally but also financially when properly implemented. Furthermore, implementing RL can prevent dumping used products and use virgin raw materials. Dowlathshahi (2000) does not mention how companies need to be fully aware and understand RL for its implementation. Companies in New Zealand that were studied, showed awareness on product stewardship but not so much on RL.

RL definition

RL has been conceptualized in many different ways by different people and companies (Wee Kan Tan *et al.*, 2003). Academics have attempted to provide some structure to the RL definition by revising previous RL definitions. There are many definitions of RL provided by many authors:

“Going the wrong way on a one-way street because the great majority of product shipments flow in one direction” (Lambert et al., 1981)

“Movement of goods from a consumer towards a producer in a channel of distribution” (Murphy et al., 1989)

“The role of logistics in product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal and refurbishing, repair and remanufacturing” (Stock, 1998)

“... the process whereby companies can become more environmentally efficient through recycling, reusing and reducing the amounts of materials used” (Carter et al., 1998)

“... process of moving goods from their typical destination to another point for the purpose of capturing value that would be otherwise unavailable, or for other proper disposal of product” (Ross, 1998)

“... is the process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or for proper disposal” (The Council of Logistics Management, 2000)

“... is a process in which a manufacturer systematically accepts previously shipped products or parts from the point of consumption for possible recycling, remanufacturing or disposal” (Dowlatsahi, 2000)

All definitions presented are relatively new due to the novel concept of RL. Not surprisingly, there is a lack of consensus to what RL definition should be. Some RL definitions include the natural environment and others do not as some authors refer to green logistics when the natural environment is involved. There have been arguments in the past between what RL encompasses and what green logistics does not and vice versa. Authors like Lambert (1981), Stock (1998), Murphy (1989) and Poist (2003) do not mention anything related to how RL may be good for the natural environment. In contrast, authors like Carter (1998), Stock (1998), Dowlatsahi (2000) do to a lesser extent. The Council of

Logistics Management (2000) includes words in their definitions such as recycling, reusing, refurbishing, repairing, remanufacturing, environmentally efficient and proper disposal. In New Zealand, RL is often related to the flow of taking product back with environmental impacts as seen with the companies under study. In limited situations, RL was referred to a sole process of taking back products without an environmental side.

Objectively, RL deals with the backward flow of goods in the supply chain in order to go through a sorting process where each good could finish off in a diverse set of activities. As seen with the above definitions, all refer RL as moving products backwards in the supply chain. This process has the objective of recapturing value or properly disposing of the good and being environmentally conscious.

Other terms used to refer to RL are (Wyld, 2006):

- Reverse supply chain
- Aftermarket supply chain
- Aftermarket logistics
- Retrologistics

These other terms for RL are different from those terms mentioned by the companies under study in New Zealand. Common terms for RL in New Zealand included reverse supply chain, product stewardship, recycling, EPR, resource efficiency, product recovery and take back EOL product. Only the term 'reverse supply chain' was mentioned by Wyld (2006) and companies in New Zealand.

RL characteristics

There are some characteristics of RL that are important to consider (Blumberg, 1999):

1. Rapid timing for processing returns: critical in RL system to make the product available for reuse or proper disposal. The more time it takes to process a returned product, the more value it will lose.

2. Uncertain demand: little is known of returned quantities, quality and channels. It is hard to predict the time and status of a product is return because it highly depends on the consumer.
3. Flexibility in transportation, storage facilities and processing: a considerable capacity for returns is needed to process them efficiently. Planned facilities and mode of transportation may facilitate the process flow.
4. Multi-party coordination: synchronisation of several parties involved in the RL system ensures efficiency in processing. All parties need to understand how RL works and what their main role in it is.
5. Value improvement: recovery of value is fundamental in RL. Maximization of value can be obtained through scrap, reconditioning and resale amongst others.
6. Focus on customers requirements: a focus and comprehension on customers' specifications is required. Each returned product belongs to different costumers and needs a different course of action.

Some of Blumberg's (1999) RL characteristics depend on the industry and situation of the company. For example, value improvement and rapid timing is critical in the telecommunications industry where recovered electrical products loose value if they sit too long in a warehouse. So the first and fifth characteristic mentioned by Blumberg (1999) depends highly on what the recovered product is made of and the value of its materials. In relation to Blumberg's (1999) last RL characteristic, customer requirements are changing over time and can affect an organised RL system. As any other process, RL needs to be followed by continuous improvement.

Kearney (2004) included other characteristics of RL that occur in many companies worldwide:

1. Non-uniform quality of returned products and packages: the quality of returns is always unknown which makes it hard to test every single return and specify what process each needs.
2. Many alternative channels for returns: returns do not follow a linear channel. Depending on the condition returns of the, they should follow a different channel.
3. Complicated calculation of profit maximization: due to unexpected quantity and quality of returns, there are few calculation methodologies to accurately maximize profit.
4. Substantial details needed for negotiations: details on the returns are needed in order to negotiate with the retailer, customer, distributor or manufacturer, the price and guarantee.
5. Process with low budget and attention: the impression of RL as being waste and surplus to many managers is misleading. Companies may recover costs of their sold products if they invest enough.
6. No specific department responsible for RL: there is no single department within an company that handles RL. No one wants to be responsible for RL operations due to its complexity, novelty and lack of support.

Kearney's (2004) fourth RL characteristic, is not necessarily always applicable as seen with the companies under study in New Zealand. There were details when negotiating with recyclers and overseas companies for recovered products but not to a larger extent. Again, this characteristic may depend on the type of industry. Blumberg (1999) and Kearney (2004) RL characteristics reflect the uncertain process that companies may go through if implemented. Characteristics like, lack of ownership, low budget and attention, uncertain demand and complicated profit maximization comes with the novelty of the concept.

Some of the reasons why products are returned back into the supply chain include damaged products, seasonal inventory, warranty, restock, salvage, recalls and excess inventory (Rogers *et al.*, 2001). Also many companies have made it possible for customers to return products by extending guarantees and accepting returns with receipt if they were not satisfied. This is seen in New Zealand's telecommunications industry when consumers by mobiles and phones from a person selling them door-to-door. Consequently, customers have become used to this practise forcing every company to follow liberal return policies.

RL activities

The RL supply chain, as seen in *figure 6*, starts from consumer returns which is followed by a returns centre evaluation (or centralised returns centre also known as CRCs) where the products are tested, sorted and sent to various channels depending on which channel the company will obtain the most of value for the returned product (Blackburn *et al.*, 2004). Particularly in New Zealand, the companies under study did not mention to have any CRC even though it sounds logical to have one. There is limited sortation process in New Zealand.

Source: Blackburn, J.D., Guide, V.D., Souza, G.C. and Van Wassenhove, L.N. (2004). Reverse Supply Chains for Commercial Returns. California Management Review, 46 (2).

Figure 6. RL Supply Chain

In the CRC, one of the channels is scrap where products are sent if they have no use and need to be disposed of (usually recycled to a landfill). Another channel is remanufactured product or secondary market where the product is remanufactured, modified and sold again to secondary markets or outlets because they cannot sell in retail stores as new. Functional parts of products are also sent to the spare components channel where they can be reused as raw materials or for manufacturing new products. Last, returned products may go back to distribution if the product is new and never used.

RL affects activities such as network design, information flow, transportation, inventory, warehousing, material handling and packaging of products no longer needed by the end consumer (Ferguson *et al.*, 2001). These activities are the same as forward logistics but in the opposite direction and for the purpose of recapturing value from the returned product or material.

Schwartz (2000) and Rogers *et al.*, (1999) reveal four main functions covered by RL:

- 1) Gatekeeping: the starting point of the RL where it is decided if the product or material should enter into the system.
- 2) Collection: the gathering of products and materials to enter the RL system.
- 3) Sortation: the assessment of products and materials to decide which path to follow.
- 4) Disposition: the transferring of products and materials to a desired destination.

Similarly, Krumwiede *et al.*, (2002) state that RL activities include three aspects:

- 1) Retrieval: process of collecting and retrieving products and materials from customers.
- 2) Transportation: process of moving these products and materials from one location to another.
- 3) Disposition: process of deciding and following the fate of the product and materials.

The RL movement of products and services can start at the same time as forward logistics. This means that even in the first phase of production, RL may be applied by the manufacturer (Fassoula, 2005). Manufacturers, for example, can apply RL by organising waste and products that failed their quality control in order to properly dispose of them. It can also be applied by retailers when selling new products and recovering used products as seen with the companies

under study in New Zealand. However the main focus throughout this paper is RL of the returned products coming from end consumers (Ferguson *et al.*, 2001).

Intraorganisational factors such as commitment to environmental issues, implementation of ethical standards, and policy makers who are committed and responsible for the company affect RL activities (Carter *et al.*, 1998). These factors may affect the design and retrieval process of products and packages as well as transportation and warehousing. The companies under study in New Zealand showed commitment to environmental issues as one of the most influent factor to implement RL.

RL benefits

RL can offer benefits to a company in both manufacturing and retail. Recovering products may generate revenues at multiple times and in different markets (An *et al.*, 2005). Instead of having returned products thrown away for no added benefit, RL can actually offer monetary value. This is seen in some cases as few companies in New Zealand are not making money out of RL. Furthermore, companies can keep up with current and future regulations of their governments and environmental agencies. Effectively coordinating the returns process can maximise the value generated (An *et al.*, 2005).

A RL programme can positively increase corporate image and minimise the impact of government regulations (Carter *et al.*, 1998). Companies under study in New Zealand confirmed that RL can be used as a marketing tool by differentiating them from overseas companies. It offers the opportunity for the company to differentiate themselves and build consumer confidence in the company brand (Autry, 2005). Carter *et al.*, (1998) and Autry (2005) statements around a company's image and brand are similar to those statements from the companies under study in New Zealand. Premium RL services can provide longer term relationships with both buyers and sellers (Daugherty *et al.*, 2002).

Other benefits suggested by Daugherty *et al.*, (2002) include:

- Better customer service by processing their returns on time and with high quality.
- Improved customer satisfaction by exceeding their expectations on returns.
- Optimisation of inventory levels by identifying types and status of products required to enter into the manufacturing of new products.
- Resource reduction by reusing, recycling, remanufacturing or refurbishing materials from returns.
- Increased profitability by obtaining value on returns that otherwise would be lost.
- Being socially responsible from the public's perspective by proactively responding to environmental issues.

Having an enhanced information and supply chain may bring efficient routing planning that reduces transportation costs substantially. Nowadays there is a tracking device called Radio Frequency Identification (RFID) that can track products and materials from production until their end-of-life. The RFID provides a unique identifier for the product and can easily trace the product after being sold.

There are many factors that can easily affect the positive outcomes of RL specifically as it is such a new concept for companies. Nevertheless the negative factors, which will be discussed in the next section, affecting RL may be diminished if there is knowledge and commitment to it.

RL obstacles

For many companies it is not simple to apply RL as seen in some its characteristics of uncertain demand, complicated calculation of profit maximization, lack of ownership and, low budget and attention. Some companies find it difficult to understand the importance of RL and the benefits it may bring if successfully implemented. Moreover, some companies may need a specific department in charge of the RL activities and staff motivated and committed to work in the area as seen with the companies under study in New

Zealand. It can be an expensive and time consuming practice if not managed well.

According to Rogers *et al.*, (2001), there are quite a few barriers that can make it difficult for companies to execute RL programmes. Firstly, there is currently a low importance in RL compared to other issues in the company. Secondly, company policies may prevent RL from running smoothly and efficiently. Thirdly, lack of systems supporting RL may exist due to lack of automated information on the returns process. Fourthly, financial and personnel resources may impede RL from operating. Finally, legal issues may affect it if companies have not followed correctly government regulations or the pressures from environmental agencies. All of Rogers *et al.*, (2001) RL barriers were presented in the companies under study in New Zealand. The strongest barriers were low importance of RL, government regulations and, financial and personnel resources.

Typical issues found when developing RL distributions channels are the identification of sequential activities needed to process returns and assignation of these activities to key people (Ferguson *et al.*, 2001). Throughout the study, none of the RL issues related to identifying activities and assigning them to people were presented. These issues are assumed by the researcher to be presented in other circumstances which involves a company with complicated production lines, seasonal products, high employee turnover and lack of strategic goals.

A challenge for RL is not to mix new products with returned products (Kearney, 2004). This challenge, if not properly managed, may confuse production lines. Implementing both reverse and forward logistics within the same company, makes it more difficult to run both efficiently. If this challenge cannot be controlled by the company, then looking into outsourcing RL to a third party may be a wise decision to make as seen with the companies under study in New Zealand.

Another main challenge that has come up recently for RL and the supply chain as a whole, from a systems perspective, is the environmental considerations with regards products end of life. Companies have been producing at a fast rate keeping up with new technologies and satisfying customers, but what many have not realised is their impact into the natural environment. Most of RL programmes that have been implemented are due to government regulations and pressures from the environmental groups and customers with firms being reactive (Daugherty *et al.*, 2002). In New Zealand, the companies under study were aware of potential environmental legislations which made them react and apply environmental management systems. However, a proactive style is recommended by the researcher, to gain environmental sustainability. In order to be proactive in RL, from an environmental perspective, is necessary to understand the hierarchy of EOL products' disposal as levels of less polluting activities are represented from best to worse.

Hierarchy of disposal methods

An important decision in RL when handling returns is how the product will be disposed of (Rogers *et al.*, 2001). Material becomes waste for some after losing its primary function but for others it may be still raw material (Bontoux *et al.*, 1997). Some companies have always thought of EOL products as liabilities to the company. Therefore many companies want to dispose of the EOL product as cheaply as possible and in many cases it has been landfills that are seen as the easy way to go. Although the cost of landfills has been increasing worldwide, this is forcing companies to choose other methods of waste disposal.

The RL hierarchy proposed by Carter *et al.*, (1998) is shown in *figure 7*.

Source: Carter, Craig R. & Ellram, Lisa M. (1998). Reverse Logistics: A review of the literature and framework for future investigation. *Journal of Business Logistics*, 49 (1).

Figure 7. Hierarchy of disposal methods

The hierarchy refers to a ranking of RL management options according to environmental desirability. As waste reduction has become a huge concern in many countries, the best option for a company is resource reduction to avoid new raw materials coming into the supply chain. After this option is extensively used, then companies may look into reusing their products and materials. If there are some products and components that cannot be reused, then companies may want to use recycling. Obviously not all products and materials can be recycled so some of them need to be disposed by using effective means of energy recovery. From an environmental perspective, the last option a company should apply is landfill, but with the choice of incineration if possible. This hierarchy is supported by the statement that reused products or materials can lower the amount of purchases and costs of transportation and disposal methods (Carter *et al.*, 1998).

The RL hierarchy is supported by the European Commission where they interpret the waste hierarchy in prioritised order as followed (Pearce, 2005):

1. Source reduction
2. Reuse
3. Recycling
4. Composting
5. Incineration with energy recovery
6. Landfill with energy recovery
7. Incineration without energy recovery
8. Landfill without energy recovery

The hierarchy offers recommended options of returned products disposal that most companies should follow. It is not an absolute truth that the ranking options will provide the best outcome for any company, for some of them it might but not necessarily for all. This statement is supported by some economic studies showing that in some cases recycling costs are higher than the benefits and incineration may cost more than landfill in European countries (Rasmussen *et al.*, 2005).

RL from an environmental approach

Conserving for the natural environment is important for RL goals (Vogt *et al.*, 2005). To be more precise, the word *natural environment* throughout this research thesis refers to the daily interactions between the human beings and all living and non-living resources in nature (Abukhader *et al.*, 2004). Many companies worldwide have been looking at ways of reducing environmental issues caused by their products and packages. European companies have shown greater sensitivity towards environmental issues (Murphy *et al.*, 2003). These companies have been more proactive than other companies outside Europe. New Zealand has been thought as a clean and green country, environmental issues are not necessarily always a primary business concern.

Competitiveness can be gained by creating good quality products that are designed for dis-assembly and cost-effective (Van Hoek, 1999). This can

sometimes create a conflict with marketing as products may not meet marketing expectations with regards a more environmental product design. Even if products are environmentally designed, the materials may not be cost effective. Other means to gain competitiveness are adequate use of transportation and routes, planning for storage facilities and designing for easily disposed packaging. Environmental performance may be a competitive factor through environmental policy making, socially responsible investment and environmental conscious customers (Geyer *et al.*, 2004).

Having consideration of the environment in RL can lead to environmental improvement because the retrieved products are evaluated to follow the right channel rather than just leaving them unused or inappropriately disposed of (Knemeyer *et al.*, 2002). For many years, some business people have not reflected on their action's consequences until few years ago when media released news on damages to the environment. Nowadays, RL benefits can be seen in consumers, manufacturers and the environment as consumers will pay less for the product and manufacturers and the environment will earn more due to the use of fewer new resources (Seitz *et al.*, 2004). In addition, companies are beginning to integrate environmental management into corporate strategic planning thus maximising benefits for both companies and environment (Van Hoek, 1999). Certainly, there is a logistics area that concentrates more in relation to environmental management that is discussed in green logistics.

Green Logistics

Green logistics is a term frequently used when relating logistics and environment. More specifically, green logistics may be defined as "*the efforts to measure and minimise the environmental impact of logistics activities*" (Rogers *et al.*, 2001). It is worth to differentiate between RL and green logistics to avoid confusion. In a broad view of RL, it includes green logistics. There are some activities in RL that are the same for green logistics, such as reuse, recycle and remanufacture (Rogers *et al.*, 2001). What green logistics does not involve is activities such as product returns, marketing returns and secondary markets. This is because RL can perform these without considering the environment.

RL may evolve by including the natural environment as green logistics in some firm's operations do. There are changes that need to happen in order for this evolution to take place (See *figure 8*). Firstly, companies need to change the way they operate if they are operating the way they are to comply with regulation. The change means complying with regulation but also being proactive by taking the initiative of starting further practices in the area, which can potentially become regulated. Secondly, RL needs to be seen as a source of competitive advantage rather than a problem that needs to be solved. RL can be a problem if not properly implemented. Thirdly, people's mind need to be change with regards a product. A product does not last until it is been sold to the customer. The product may last until been reused, recycled, remanufactured, refurbished or landfill. Fourthly, similar to the third point, logistics operations do not end when products are sold. Logistics operations continue after a product is sold in order to recover the used product. Fifth, logistics strategies need to consider the whole supply chain rather than the company itself. All stakeholders in the supply chain of a product need to be considered.

Source: Van Hoek, Remko I. (1999). From reversed logistics to green supply chains. *Supply Chain Management*, 4 (3). p 129-134.

Figure 8. Evolution of RL to green logistics

RL alone is not enough to treat the natural environment as deserved (Van Hoek, 1999). A holistic view of the supply chain including forward logistics and RL is essential. RL is the portion missing to close the supply chain and green logistics is the portion that supports RL with regards to environment outcomes. This is mainly seen in the different ways used products are recovered and disposed of. As seen with the companies under study in New Zealand, recycling was a disposal method frequently used.

Recycling

The recycling of used products is one way to process returned products into the supply chain. It forms an important part of the RL operation as recycled materials can be used in the production of new products (Vogt *et al.*, 2005). Mandatory recycling and RL can affect logistics functions considerably. This is true as manufacturing companies in the European Community need to take back packages and obsolete products and recycle most of the components.

A win-win situation is achieved when both companies and citizens recycle what they have purchased. On one hand, recycling allows companies to capitalize on returned products and packages and carry out environmental marketing strategies (Melbin, 1995). On the other hand, recycling offers citizens a cleaner environment. Recycling allows to save scarce virgin raw materials and prevent them from becoming exhausted (Vogt *et al.*, 2005). Waste must be managed in a way to avoid the mis-use or incorrect disposal of many recyclable materials. Otherwise, pollution may be created affecting the environment negatively.

These days, all products seem to be easily disposed in the rubbish bins without thinking of what happens when they are picked up from companies or households. Millions of people in the United States have realized that used products, considered as waste, should be given a second chance by recycling (Melbin, 1995). In Europe, citizen awareness on recycling is at an all time high. Furthermore, in New Zealand, people have embraced recycling to a certain degree but there are still a lot of recyclable products being thrown into landfills (Cumming, 2007).

Specifically, New Zealand recycles 2.2 million to 2.5 million tonnes every year compared to 300 million tonnes added to landfills (Cumming, 2007). In contrast with the EU, as seen in *figure 9*, Greece only recycles 10% of their total waste and the rest goes to landfills. Austria is the country that most recycles its waste but Denmark is the country that throws less waste into landfills. Most of the products sent to landfills in Greece include plastic drinking water bottles, glass, metal, paper amongst others Recycling around the world (2005). Of those products and packages sent to landfills in New Zealand, 6% are supermarket plastic bags (Cumming, 2007).

Figure 9. Recovered products disposal in the EU
 Copy from a BBC News Article, 'Recycling Around the World', 2005. Available at
<http://news.bbc.co.uk/2/hi/europe/4620041.stm>

Some city councils in New Zealand do not pick up materials that they do not recycle leaving New Zealanders without knowing how to dispose of them. For example, some city councils stop picking up paint tins as discussed with some companies under study in New Zealand. Some companies, such as Resene NZ, have found a first mover advantage in collecting paint tins that would not have been collected for recycle or reuse. What motivated this company to collect and recycle at no cost was their strong belief on stewardship programmes. Other companies have focused on recovering other products than paint. As seen with companies under study in New Zealand, stewardship programmes were often mentioned when RL was involved.

Stewardship programmes

In New Zealand, companies practice what is called 'Product Stewardship' which deals with the environmentally recovery process of products after been used by the consumers. A product stewardship schemes make manufacturers responsible for what happens to products at the end of their lives (Cumming,

2007). It can also be viewed as part of the Extended Producer Responsibility (EPR), where producers are responsible for collection and proper disposal of their products. Furthermore, it can be a way to monitor and track the manufacturers' and retailers' operations by reporting quantities of products sold and products recovered In the bag or down the drain (2007). Product stewardship minimises environmental impacts significantly.

A social responsibility viewpoint of *doing the right thing because it is the right thing to do* is what is called stewardship. Often companies in New Zealand confuse the term of RL and stewardship programmes as both deal with the recovery of products and materials. Peter Block has defined stewardship as “*the willingness to be accountable for the well-being of the larger company by operating in service, rather than in control and being responsible for what's being created*” (Spears, 1998). A stewardship is a structural form of corporate community (Fairholm, 2003). It is a free perspective and choice taken by companies.

Stewardship principles include ethics, values, vision, commitment, decision-making, and equivalence (Fairholm, 2003). *Ethics* often does not work out well with businesses as each has means to reach their goals. *Values* are to be stated as business guidelines in order to notice the company's identity. The *vision* also is to be stated to reflect in the company's direction. A *commitment* from every member is seen the company's operations where they all share a common objective. *Decision making* procedures lead to respected opinions in stewardship programmes. *Equivalence* in stewardship programmes refers to every single stakeholder in the steward is equal. Stewardship is more than a practice, it is an attitude that some companies are adopting with regards to their products (Sprinkel Grace, 2005).

Goldsby *et al.*, (2000) mentioned in their research paper three distinct categories of companies that implemented reuse and recycle activities. In the first category, there are companies that act in favour of the environment due to legislative forces. In the second category, there are companies that voluntarily act in favour of the environment beyond the law. In the third category, there are

companies that position the environment as a foundation for their business strategy and try to minimise any effects they may cause to the environment through their operations. These categories were initially established by Kopicki *et al.*, (1993) as reactive, proactive and value-seeking categories (from least progressive to most progressive).

Proactive companies exhibit consistent patterns of voluntary actions across environmental issues (Sharma *et al.*, 1998). In contrast, reactive companies respond after environmental legislation and policies. Evidently, there are many benefits for proactive companies such as lower costs and innovation of processes/inputs/products, increase reputation and relationships with stakeholders (Sharma *et al.*, 1998). Sharma *et al.*, (1998) discuss that integration of stakeholders arises as a result of product stewardship. This is realistic as there are environmental agencies, community, governments, leaders and media collaborating to product design in terms of opinions offers commitment.

Corporate responses to environmental protection are an emerging competitive field for businesses (Sharma *et al.*, 1998). This argument echoes that few companies in New Zealand, such as TyreTrack, Fisher & Paykel and Resene, are attempting to take care of the environment and community from a stewardship perspective. Costs for owning a stewardship programme may be higher than the physical benefits. Strategic stewardship involves understanding the moral dimension to attract and develop stakeholders whose commitments are important for the company's future success (Sanchez *et al.*, 2004). Other countries than New Zealand, have implemented product stewardship and RL due to legislation.

Environmental legislation in Europe

Products have been covered by green laws, legislation and direction in Europe and other countries (Blumberg, 2005). Europe is where most of the environmental RL practices have been matured and well-known. Since 1990's, European Community has played an active role in encouraging European companies and importers to be environmentally conscious by taking full responsibility on their manufactured products. The EU have been aggressive in

its concern to environmental impacts resulting in its continuous design, development and implementation of green laws (Blumberg, 2005). Companies are forced to look into alternative ways of disposing their manufactured product by increasing the tax on the use of landfills and regularly following closely what companies that produces batteries, tyres and hazardous waste do after the end life of these products.

Environmental laws in Europe have introduced the concept of EPR, where producers are fully responsible for pollution their products are generating (Krikke et al., 2004). Moreover producers are accountable for taking back and recover their products from consumers as well as their proper disposal. For example, in Netherlands manufacturers are responsible of the production and recovery of their products. Initial focus was in Germany, Finland, Denmark and Norway, where environmental impacts are an important issue (Blumberg, 2005).

In 2005, the WEEE (Waste Electrical and Electronic Equipment) directive required manufacturers of electrical and electronic equipment sold in Europe to be responsible for end-of-life environmental disposal of their products (Van Nunen et al., 2004). Companies from coming from other countries than Europe were required to adopt European new specifications and directives (Blumberg, 2005). A slow company that is reactive rather than proactive in these matters has so much to loose because competitors can certainly be prepared for this.

Synopsis of a similar RL study in Spain

Since undertaking this research and its design, there were very small amounts of literature on factors driving companies to implement RL. Throughout this research thesis, a Spanish study was published referring to the factors that influenced Spanish companies in the automobile industry to implement RL. The study, *Reverse Logistics, Stakeholder's Influence, Organizational Slack, and Managers' Posture*, was written by Ma. Jose Alvarez Gil, Pascual Berrone, F. Javier Husillos, and Nora Lado in mid-2007.

The methods used to collect data were questionnaires and interviews. The questions asked were around the RL concept, RL literature, factors influencing companies to implement RL, and resources. The structure of the Spanish study is very similar to this research thesis. The sample for the Spanish study was 200 companies but only 158 companies responded to the questionnaire through an interview with each Chief Executive Officer (Alvarez-Gil *et al.*, 2007). Data was collected in 4 months, from November 2004 to February 2005 (Alvarez-Gil *et al.*, 2007). The amount of time to collect data was reasonable as there were several researchers and 158 respondents. Alvarez-Gil *et al.*, (2007) found and proved that stakeholders, company slack and manager's strategic stance were the main factors which were similar to this research thesis finding.

Firstly, stakeholders such as customers, employees, suppliers, shareholders, NGOs and government have an influence on the implementation of RL. Alvarez *et al.*, (2007) present a chart, as seen in *figure 10*, of stakeholders and RL activities which show its relation (Alvarez-Gil *et al.*, 2007). They found that customers, suppliers, government and NGOs had a positive influence towards the implementation of RL. Only shareholders were found to have a negative influence and the reason they offer for this is that RL requires long term investments and delayed profits.

Alvarez-Gil et al (2007). Reverse logistics, stakeholders' influence, organizational slack, and managers' posture. Stakeholder's claims and firm's responses. *Journal of Business Research*, 60 (5), pg 463.

Figure 10. Copy of Alvarez-Gil et al (2007) figure of stakeholders' claims and firms' responses.

Secondly, the organisational slack refers to the availability of resources in the Spanish study. It was defined in their study that organisational slack “*is the excess of actual or potential resources which helps the company to overcome internal and external pressures*” (Alvarez-Gil et al., 2007). Resources involved in RL practices according to the authors are time, machinery, labour, materials, and external services (Alvarez-Gil et al., 2007) which are also very similar to this research thesis finding. Alvarez-Gil et al., (2007) found that organisational slack positively influences the implementation of RL. Even though in this research thesis, respondents did not refer to organisational slack as a factor, it was also discussed.

Thirdly, managers' strategic stance also has a positive influence for the implementation of RL (Alvarez-Gil et al., 2007). Evidence for this was obtained from their study and anecdotal evidence from previous studies. Managers'

progressive attitude, where they look at all times for stakeholders' satisfaction, is involved this area. Alvarez *et al.*, (2007) explained that there is the conservative attitude which also affects the implementation of RL in a negative way (Alvarez-Gil *et al.*, 2007). Such attitude is reactive and sought to maintain the status quo.

The study provides evidence from the European perspective, where there have been more active in environmental activities and regulation (Toffel, 2003). It is worth noting that the Spanish study took place after regulations with regards the environment was applied in Europe. This can affect companies' decision to implement RL and becoming more reactive. In general, when there are environmental restrictions in place, companies tend to react by changing the way they operate if they have not changed before to comply with regulations. In contrast, New Zealand has no strict regulations around product stewardship schemes, take-back product schemes and EPR. For this reason, some companies under study presented signs of being proactive. For example, Resene NZ started their take-back product (paint tins) and recycle without any regulatory body influence. In most cases, companies were found to be passionate about their people, customers, suppliers and other stakeholders, and by helping them clear used products in an environmental manner was a great satisfaction. If New Zealand regulates take-back product schemes, factors influencing companies to apply RL may change and be similar to those in Europe.

Europe has been very active in environmental legislation as seen in Germany, who imposed the first take-back programme called "*Ordinance on the Avoidance of Packaging Waste*" (Alvarez-Gil *et al.*, 2007). This programme started in 1991 and legally obliges companies to take-back their used packaging, transport and recycle them. Furthermore, Alvarez-Gil *et al.*, (2007) mentioned that further research needs to be done in another country other than Europe to generalise conclusions. This gap is covered throughout this research thesis as New Zealand is a long way from Europe.

Gap in Literature

Environmental management is gaining awareness among researchers in SCM (Van Hoek, 1999). Key stakeholders from companies are assumed to have an

influence with regards more environmentally friendly programmes. There is a gap in the RL literature in that there is only a limited amount of information as to what drives companies in New Zealand to implement RL activities such as recycling, take-back product, product stewardship and an EPR.

Research on the impact of RL on the environment is also needed. The reason for this is that in New Zealand, awareness about the impacts on the natural environment has been increasing in the past few years. The studies on RL have been mainly been about the product life-cycle but there have been relatively few studies focusing on the environmental and corporate responsibility side. Many authors, such as Van Hoek (1999), tend to separate RL from green logistics arguing that green logistics can look after environmental issues. From a socially responsible company, RL itself may not be a competitive advantage if it does not consider the natural environment consequences.

Customers and governments worldwide are demanding a more proactive approach in handling operations and the environment. Studying in-depth an independent RL activity in a country different from European countries and United States should provide unique contributions to the literature. There are only a few case studies about the application of RL activities in New Zealand from an environmental perspective.

Certainly more research on RL studies from an environmental perspective industry v.s. industry is needed (Murphy *et al.*, 2003). For example, comparisons involving electronics, white goods, paintings, tyres and food industry would appear to offer additional insights because through the comparison unforeseen information may come out. The comparison between industries may also show critical information from one industry that can be applied to another industry for analysis. This research concentrates on ten different companies from different areas in the retail and manufacturing industry. It will reflect diversity by analysing and comparing each company.

There is a tendency to consider different types of reverse flow together rather than providing an in-depth analysis on a specific RL activity (Seitz *et al.*, 2004).

It is an excellent way to analyse specific activities of RL once the RL term is agreed upon. This research thesis provides a comprehensible RL definition in order to broaden knowledge on this particular area.

Systemically thinking, it is important to first understand the RL system as a whole and then to study each of its different activities in order to supplement more knowledge in to the RL theory and practices. By doing so, researchers are able to have a clear understanding of RL before studying parts of it. RL can be evaluated from a total systems perspective (Van Hoek, 1999). Metaphorically speaking, it is easier to start a labyrinth from the end rather than the beginning. It is important to understand from end to beginning RL in order to study specific activities, such as reuse, recycling, remanufacturing, refurbish and landfills, which used products may go through when recovered.

Research Objectives

The research objectives convey an exploratory study on RL from an environmental perspective in order to:

- Understand reasons why some companies in New Zealand have implemented RL practices such as Take-Back Product, Recycling, EPR and other Stewardship Programmes from an environmental perspective.
- Provide a clear definition on what RL means from the perspective of companies in New Zealand.
- Offer managerial implications with regards the implementation of RL.
- Create greater consciousness on environmental importance in company's strategies and operations.

Research Questions

The research questions were based from the literature review. These questions have been made intentionally broad as it is an exploratory study where it was expected that there will be an emergence of new ideas, perspectives, and knowledge of the field.

The *overall research question* that this thesis concentrates on is:

- What are the factors driving the implementation of RL for companies in New Zealand from an environmental perspective? Multiple Case Studies

Sub-questions that are addressed in the thesis are:

- What does RL mean for companies in New Zealand?
- Hierarchically, what is the relative strength of the factors driving the implementation of RL in New Zealand?

Chapter 3: The Research Methodology

Overview

The methodology section presents a framework associated with a set of assumptions that were used to conduct this research (O’Leary, 2005). Every assumption made by the researcher was aimed to be clear for everyone in the research in order to fully understand the data. This research is concerned about the nature of RL knowledge and how such knowledge was obtained (Ritchie *et al.*, 2004). The purpose was to minimise all possible social influences from the researcher to participants during the interviews.

The research approach was selected to facilitate the understanding of how knowledge was produced from the research. This research is qualitative and exploratory. The rationale for a qualitative research approach was “*to build a complex, holistic picture, formed with words, reported detailed views of informants, and conducted in a natural setting*” (Creswell, 1994). The research is exploratory in nature as RL from an environmental perspective are not fully known or understood in the same manner by many people because it is a relatively new business concept. As an exploratory study, it involved “*finding out what was happening; seeking new insights; asking questions and assessing phenomena in a new light*” (Robson, 2002). Since the research was exploratory, the researcher decided to undertake:

- An extensive search on literature
- Interviews with people specialised in the field under study.

A combination of qualitative research aspects was applied: contextual and explanatory (Shank, 2006). From the contextual side, a description of RL practices with an environmental perspective was presented. And from the explanatory side, details on factors driving companies in New Zealand to implement RL practices were introduced. Explanations were presented throughout this research thesis in terms of the responses and statements of those interviewed. In summary, the research approach addresses the research

questions and research objectives. Research methods and tools for conducting this research are all included in the following sections of this chapter.

Research Objective

The research aimed to understand the reasons why some companies in New Zealand have implemented RL practices such as Take-Back Product, Recycling, EPR and other Stewardship Programmes from an environmental perspective. The objective was relevant to current events and practices happening in company lives and the natural environment. News have been published questioning what companies are doing with their products at the end of their lives. By providing in-depth information on cases across industries in New Zealand, a rich understanding of the research context and processes were presented. The research objective aimed to make it easier for companies or any individual to understand RL's drivers from an environmental perspective.

The first two objectives listed in Chapter 1 were to be accomplished by properly selecting a methodology and methods for data collection. Every methodology within the qualitative research literature was examined and only one best suited this research: Case Studies.

Research Methodology

Cumulative Case Studies

The methodology used throughout this research study was: cumulative case studies (Shank, 2006). The rationale for using cumulative case studies was the need to access whether findings from the first case occurred in the other cases as well (Saunders *et al.*, 2007). A single topic was examined through ten different cases. Each case involves a different company across various industries in New Zealand. Studying each case in-depth provided an overall rich and complex picture of RL with an environmental perspective. The purpose of each case study was to capture unique relevant information with regards to the research questions. Emphasis was placed on understanding the wholeness of all case studies (O'Leary, 2005).

Shank (2006) described three characteristics of cumulative case studies that were:

- *Particularistic*: the case studies focus on RL practices such as Taking Back Product, Reusing, Recycling, EPR and other Stewardship Programmes with an environmental perspective.
- *Descriptive*: the end product of the case studies is a rich “thick” description of the RL practices from an environmental perspective at each company.
- *Heuristic*: the case studies illuminate the reader’s understanding of the phenomenon involving factors driving companies in New Zealand implement RL with an environmental perspective. This can extend our understanding or confirm what is known already about RL.

The standard process for conducting a case study started with selecting the right cases. Criteria were defined a priori by the researcher to determine which cases were right for this research. In order to qualify, potential companies for case studies were required to meet the following:

- Operations in New Zealand (can be a non-New Zealand based company)
- Companies apply RL practices
- Manufacturer and/or retailer
- Interviewees’ experience and/or knowledge of RL
- Large and/or medium size of companies
- Located in Auckland / Wellington / Christchurch
- Availability to be interviewed from May to July 2007.

The rationale behind the criteria for selecting a company was that the researcher was interested in studying large-medium companies in New Zealand. Companies under study needed to apply some sort of RL practices to obtain information around the topic. Some companies had plenty experience with RL and others had experience to a lesser extent. Also all companies under study needed to be a manufacturer or retailer of products to avoid only analysing RL in service provider companies. Furthermore, companies that were asked for an interview required having at least one to two people with RL experience and/or knowledge in order to obtain rich information on the topic. In addition,

interviewees needed to be available for an interview from May 2007 to July 2007 to meet the researcher's thesis timetable. The company's size was assumed to be important because other small companies are more likely to adopt practices from larger companies. Companies needed to be located in Auckland, Wellington and/or Christchurch as the researcher had limited budget and companies applying RL were located in largest cities.

Companies in the New Zealand context were chosen rather than companies in other countries as most of the RL literature appeared to be based in America and Europe. One of the objectives was to contribute to the literature here in New Zealand to offer a broader view on RL practices with an environmental perspective.

After developing criteria, the process continued with determining the number of cases to be explored. Ten cases were selected to compare and contrast different settings. This number of cases was viable as having more cases could have made the research very time-consuming and complicated. There were not many companies in New Zealand applying RL practices, environmentally speaking, according to an informal search that the researcher undertook in early 2007. Therefore selecting ten cases was a relatively a reasonable sample.

For each of the cases, the research set out to find a matched company to be able to compare RL practices from an environmental perspective. A matching company refers to two companies within the same industry producing the same or similar product and/or service [eg. Coca-Cola and Pepsi]. Each case study, independently of having a pair, generated answers to 'Why?', 'What?' and 'How?' questions (Saunders *et al.*, 2007). However, the integration of these case studies aimed to provide a full understanding of the research question, where this aimed to be holistic, comprehensive and contextualised (Ritchie, 2004).

Accordingly, a list of companies operating in the retail industry in New Zealand was generated after searching through:

- Proquest database – searching for companies in New Zealand with RL practices,

- Google – searching companies specifically applying recycling, product take-back or other stewardship programmes
- Information on companies provided by academics within Victoria Management School
- Information on companies provided by academics within University of Auckland.
- Information on companies provided by the Ministry for the Environment in New Zealand
- Newspaper articles referring to environmental practices by companies in New Zealand.

Once having a list of potential companies contributing to the research, they were approached initially by e-mail. The researcher started to send personalised e-mails to key people in each company asking for information on RL practices. A personalised letter aimed to engage companies to this research. Most of the companies replied to the e-mails by sending through general information on what has been done for the environment. With this information, the researcher got to know better whether the company was appropriate for inclusion in the research. If the company was appropriate, then the researcher sent another e-mail asking for their participation. If the company was not appropriate, then the researcher sent another e-mail thanking them for replying back to the e-mail. E-mails sent for participation were followed up by phone calls to confirm participation and make an appointment.

Case studies were chosen as they are relatively straightforward the simplest form of fieldwork because this only require the researcher and the participant, and useful for decision making. The researcher's participation included acting as a listener and observer. These cumulative case studies can be used as a tool in managerial decision making (Cavana *et al.*, 2001) which can be useful for other academics and business people.

Since case studies usually involve individuals, phenomena, events or any social life company, all methodologies and/or data collection tools highly depend on

each case (O'Leary, 2005). Semi-structured interviews were selected from a number of data gathering methods as discussed in the next section.

Research method

Semi-structured interviews

The method applied throughout this research was semi-structured interviews. This type of interview was selected to maintain structure over parameters. Another reason for semi-structured interviews was that they are able to capture meanings to be explored in detail and give space for clarification of answers (Leedy et al., 2001). It was also a cheap method to use for the researcher as it did not need time-consuming resources such as paper and postage (Ritchie et al., 2004).

A written list of themes and questions were taken to each interview. Depending on the flow of the conversation from each interview, the order of questions varied across interviews. The types of questions in every semi-structured interview were open-ended and probing. The open-ended questions allowed participants to provide extensive and additional information to answer the questions. The probing questions were used to seek explanations beyond the initial answer given. The template for the semi – structured interviews appears in *Appendix B*.

Credibility of research

Saunders *et al.*, (2007) stated that credibility can be enhanced when the research design pays attention to reliability and validity. Research reliability was established by standardising the behaviour of the researcher with each interviewee. Interview questions were all asked during the interviews, attached in *Appendix B*. The questions were examined and approved by two researchers' supervisors in Management School at Victoria University of Wellington. This ensured a correct list of questions to be asked during data collection. Furthermore redundancy of questions were minimised by testing the questions prior to data collection and receiving feedback from the two supervisors.

The semi-structured interviews aimed to achieve validity by ensuring that the question content directly concentrated on the research objectives (Gray, 2004). All of the interviews were evenly applied to participants of the ten different companies and the Ministry. As a result, interviews were conducted to allow detailed information that otherwise would not have received if other method was applied.

Other factors that enhanced credibility for the research were consistency, accuracy and neutrality. Consistency was pursued by providing details of how the research was conducted and how the researcher analysed data. Accuracy was sought by including as much of what all participants said during the interviews through direct quotations. Neutrality was achieved by being aware of possible unexpected effects such as research bias.

Research Instrument

Tape recorders and brief notes were used while undertaking interviews to accurately record data for the analysis stage. Tape recorders recorded essential data and permitted the researcher to concentrate on listening, interpreting and re-focusing the interview (Gray, 2004). The advantage of tape-recording the interviews was obtaining accurate and un-biased records of the interview. It also allowed the researcher to include additional detail to direct quotes with the help of notes taken during each interview. Taking some notes during the interview was useful to:

- Help formulate new questions,
- Help remember quotes in data analysis and,
- Help pace the interview

Ethics of the research design

During the interviews, the research attempted to address ethical considerations ethics at all times. For example, if any of the interviewees did not feel comfortable talking about their company's RL practices then such questions would be immediately abandoned. Fortunately, there was no need to abandon any of the interviews. Consent and confidentiality forms were signed as an agreement between the researcher and the company under study (See *Appendix*

E). All interviews were conducted voluntarily and interviewees had the option of withdrawing the session at any time.

An information sheet (See *Appendix D*), a consent form and a cover letter (See *Appendix C*) were sent to each company before they decided to participate in the research. These documents were sent through e-mail during the first two weeks of May 2007 as the months for interviews was expected to be in June and July 2007. After companies agreed to participate, appointments with each participant were set up quickly. The strategy of making appointments as much in advance as possible was definitely a success as the research thesis ran smoothly with no interruptions.

Sample

The population for the research were companies in New Zealand involved in RL practices from an environmental perspective. A sample of ten different companies in one country was selected plus a government Ministry. For each of those ten companies, a sample of two managers was selected to be interviewed (except for one company). Three employees were interviewed from the Ministry. The sample was limited in size but captured all the elements and characteristics of the population under study (O'Leary, 2005). The sample strategy for interviews applied was handpicked sampling, in order to select a sample with specific "expertise". Each participant had an expertise role in RL within the company to be researched. Most of these participants were Business Development Managers, Marketing Managers, Import Managers, Logistics and Operations Managers, Environmental Managers and/or Corporate Responsibility Managers.

The sample strategy for interviewing another person within the same company, applied was snowball sampling. In order to identify the second best person in the company to make valuable contributions, snowball sampling was selected because the second participant to be interviewed for could not easily be identified by the researcher. Instead they were approached by the initial manager contacted who agreed to participate in the study. The referred

participant had a role within the same area as the managers/interviewees and had knowledge about RL practices with an environmental perspective.

Location

The physical location of participants was New Zealand. They were specifically located in the city centres of Auckland, Wellington and Christchurch. Of the sample of ten companies, seven companies were in Auckland and two in Wellington (plus the Ministry) and one in Christchurch. The researcher travelled to Wellington and Christchurch to collect data from those companies. Resources for travelling expenses were provided by Victoria Management School and the researcher's savings from her part-time job. Interviews were conducted on a quiet and relaxed location inside the company's building. This location was typically meeting rooms.

Limitations and Research Issues

Findings represented companies in New Zealand active in RL practices with an environmental perspective. It does not however represent the same companies in other countries as there might be other factors influencing the exact same company to be involved in such practices.

Potential research issues were identified in order to be prepared to minimise them if they arose. Having effective strategies for tackling problems avoided extending or re-carrying out the research with some issues that were to arise throughout this research:

This research involved case studies but it may still be difficult to generalise results to other situations or countries.

* To minimise this issue: semi-structured interviews invariably examine a wider range of different perspectives and activities than other means of data collection. Findings were related to existing theory to give the research a broader theoretical significance (Saunders *et al.*, 2007). The case studies obtain deep data and explore rather than predict influences for companies in New Zealand.

Some researchers may argue that case studies lack precision, as little quantitative measurement was involved.

* To minimise this issue: this is not a major concern for this research as the main question required a qualitative answer. As the research was exploratory in nature, a quantitative paradigm was rejected. The looser format of the case studies allowed the researcher to begin with broad questions and finish by narrowing down their focus during data collection and data analysis.

The quantity of companies under study was relatively few compared to the quantity of companies having presence in New Zealand.

* To minimise this issue: the number of companies under study was appropriate to understand what factors drive companies in New Zealand to implement RL practices with an environmental perspective because they got selected to potentially match with another company and due to research timeframe. However, the results may not hold for other companies of other industries. There is potentially a need for further research into this area.

Conflict of interests may be presented from the participants' side.

* To minimise this issue: participants may want to change “the truth” in order for their company to “look” good. Some participants may not want all information included in the case studies which means affect the credibility and validity of the case studies. This limitation is difficult to avoid.

Data Coding

Data coding took place during and after data collection. Inductive reasoning was used to sort and categorise data. The main objective was to give meaning and understanding to the data collected. Data were narrowed down gradually to small set of themes by using open coding (also called initial coding). Further narrowing, focused coding, was necessary to capture specific targets allowing easy data analysis.

For cumulative case studies, data analysis involved several steps created by the researcher and, literature of Leedy et al., (2001) and Saunders et al., (2007):

- *Company of details for each case*: specific facts were organised in chronological order. Index cards and a notebook were used at this stage.
- *Data review*: transcripts re-read several times to become familiar with the information. At this stage, notes were made in the margins of transcripts and post-it notes to recall key information.
- *Data categorisation*: data were arranged in general categories. These categories were formed up and modified until the data collection had been completed and reviewed.
- *Interpretation of single instances*: parts of the data were further examined due to a strong link to the research question. These were pieces of data that were critical for the research.
- *Associative analysis*: to gain a deep understanding of the topic and be able to make linkages and connections, information was linked to other information to assess key relationships.
- *Pattern identification*: all data and interpretations were allocated to their corresponding themes and other patterns that characterise the case more broadly. Patterns occurring in the data were placed in particular data groups.
- *Data integration*: an overall rich picture of the case was presented offering insights on the research question. Data were summarised and synthesised by constructing diagrams, figures, tables and/or hierarchical diagrams.

Chapter 4: Research Context

Overview

The research context chapter presents a short background summary of each of the ten companies and the Ministry that were approached and interviewed. The summary aims to explain the context of the company by providing an overview of their background, products and services, and type of RL activities. RL varies in each company and can be implemented in many different ways. Interviewees' titles are coded in direct quotations from this chapter onwards to ease the reading (See *Appendix F*).

COMPANY 1: Vodafone NZ

Background

Vodafone Group, a leading telecommunications company, was established in the UK in 1983 and has presence in 27 countries Company Information (2007). “Vodafone Group operates in Europe, United States, South Africa, Australia and New Zealand”, the VOD2 noted. In 1998, Vodafone Group purchased Bellsouth New Zealand, which had 138,000 customers at the time.

Vodafone NZ became one of the key players in the NZ Telecommunications industry having 2,100,000 customers in the country and 55% of the market share as of June 2006 Company Information (2007). In New Zealand, the company has approximately 1,400 employees. Corporate responsibility targets are set each year including targets for the mobile recycling scheme. Vodafone's NZ vision is: “To be No. 1 telecommunications provider across internet, fixed lines and mobiles in New Zealand”(VOD2).

Products and Services

Vodafone's NZ core business is mobile communications. Their products are sold in Vodafone retail stores and other electronic stores. Products include mobiles, accessories and connections. The company has more than 1000 mobile phone sites around New Zealand covering 97% of the population Company Information (2007). The GSM digital network is used by Vodafone NZ.

Services provided by Vodafone NZ include TXT (text) and PXT (picture) messaging, wireless internet, caller ID and voice and data roaming Company Information (2007). The telecommunications industry in New Zealand is fast-paced and Vodafone NZ has responded to it by introducing new products and services all the time to satisfy stakeholders.

Type of RL activities

Vodafone has a mobile recycling scheme in place where owners of used mobiles, either Telecom or Vodafone, are encouraged to give them back to Vodafone for recycling. Investment in marketing is made to raise public awareness of the mobile recycling scheme. Collaboration with their competitor, Telecom and Ministry for the Environment is sought to raise such awareness.

Their three main channels for mobiles and accessories' returns are:

- 1) Vodafone retail stores – any mobile owner is free to go to a Vodafone retail store (even Vodafone online store) and return the mobile by placing it in an allocated recycling mobile bin that looks like a large glass tube.
- 2) Free post service (for 25kg maximum) – any mobile owner can ask for a Vodafone envelope to place the used mobile and send it in via NZ mail.
- 3) Recycling bins in government departments, universities and large companies use Vodafone's mobile recycling scheme - a campaign to promote take-back used mobiles and accessories, which includes CDs to print posters and screensavers, for one to two weeks within the building.

This recycling scheme does not necessarily only recycle components but also sorts' mobiles for refurbishment and reuse.

The collection and sorting used of mobiles in New Zealand involves two companies, Recycle New Zealand and Waste Management, to collect them from certain points and deliver them to a warehouse. A logistics provider manages the warehouse and organises the returned product. Once sorted, a report specifying the quantity of mobiles, batteries, accessories, and chargers collected is written. Next, they sort products into pallets to be shipped to the UK. An export permit

from the NZ Government is required to ship them to a third party in the UK that has the capability to sort, refurbish and recycle mobiles.

Analysis of reasons for returning each mobile or accessory is conveyed by Vodafone to decide its process which can be refurbish or recycle. If the mobile works properly, it is refurbished and resold. It is sold to people in third world countries as a second hand mobile. If the mobile is completely broken, then it is sorted into either reuse or recycle piles. The reuse pile is where some materials are reused. The recycle pile ends up as traffic cones, bin liners, buckets, coasters, electric jugs, copper pipes, piece of aircraft and other non-related products.

COMPANY 2: Telecom

Background

Telecom Corporation of New Zealand Limited was formed in 1987 as part of the New Zealand Post Office, a government department History (2007). In 1990, Telecom was one of the first telecommunications company to be fully privatised History (2007). Telecom has operations in Australasia only. *“Telecom is listed on the New Zealand Stock Exchange as well as on the New York Stock Exchange”* (TEL2).

Telecom is another key player in the NZ telecommunications industry having 2,880,100 customer connections in both New Zealand and Australia as of June 2005 Quick Facts (2007). In New Zealand, Telecom has around 6,502 employees plus engineers. Telecom lacks a wider corporate environmental policy which is being worked on in 2007. Their vision is *“to inspire and enable our customers to be the most connected people in the world”* (TEL1).

Products and Services

Telecom NZ provides a range of services that include data, voice and mobile services. Their products are sold in Telecom retail stores and other electronic stores. Products include mobiles, accessories, broadband, modems and cord and cordless phones.

Type of RL activities

Telecom has a high percentage of customer returns. One main reason for having returns is their 7-day right of return policy. There are two to three third party companies that do phone door-to-door sales. The regulation in the Door-to-door Sales Act leads to a legal obligation for a cooling off period for customers to decide if that product is what they want. *“Door-to-door sales account for 20% of the sales and 50% of total returns”*, (TEL2). Returns from such sales are expensive as there are no drop-off points and a courier bag has to be sent to customers for returns.

A phone recycling scheme has been put in place where Telecom collects mobiles, landlines, modems and any other telecommunication products. Owners of used landlines, mobiles, and modems in New Zealand are encouraged by Telecom salespeople to return them to Telecom's retail store when purchasing a new phone. Phones returned are put into carton box bins and when these are full, they are put into a bigger plastic box with a clip-on lid. Then the store rings a company to collect and transport them to the assigned storage facility in Auckland as all of the bins are pre-addressed. In the North Island, all phones are consolidated in Auckland and in the South Island, they are consolidated in Christchurch. Once a large quantity of phones is consolidated in Christchurch, they are sent to Auckland.

All returns received by Telecom are put into containers and are weighed. Export permits, from the NZ Government, are required to ship them to their contractor in United States. Then the contractor will do the following:

- 1) Refurbish, remanufacture and recycle used mobiles and phones
- 2) Try to resell used mobiles and phones in developing countries such as Africa

COMPANY 3: Frucor Beverages

Background

Frucor Beverages is owned by a French company, Danone. The overall mission and vision is being innovators, leaders in the field and Research & Development. *“Frucor contributes 10% of the overall profit in the Asian-Pacific region”,* mentioned FRU2. They employ around 600 people in New Zealand. Competitively speaking, the company is the No. 2 beverage manufacturer in New Zealand after Coca-Cola. But *“Frucor is No. 1 in energy drinks for both New Zealand and Australia”,* expressed FRU2.

Products and Services

Frucor Beverages' portfolio includes waters, flavoured waters, fruit juices, carbonated soft drinks (CSDs), energy drinks and the Pepsi franchise. Their *“best selling product is ‘V Energy’”,* said FRU1.

Type of RL activities

Frucor is implementing an in-house plan to sort out recycling. *“The intention has always been there, but the planning and management was not there”,* said FRU1. Now Frucor Beverages aims to have 75% of their waste being recycled. Metal cans, PET plastics, cardboards, HDPE plastics, PP plastics, wooden pallets, and shrink wrap are collected and recycled by Frucor Beverages' recycling collectors. Such material gets weighted and taken away by collectors. In-house collectors are well organised in terms of recycling and involve around 5 to 6 recycling companies. Of those recycling companies, some of them are involved in curb side collections at some level. Some packaging for Frucor Beverages finished products is reused in stores like Pak 'n' Save buy their customers.

There are four to five different types of plastics used in Frucor Beverages' factory. All of those plastics are separated and collected properly to avoid contaminating the recycling stream of each plastic. The two main plastics used in Frucor Beverages are shrink wrap and PET plastic bottles. Shrink wrap is easy to collect without contaminating due to its volume, therefore specific bins are

allocated for that material. According to FRU2, *“the other plastic, PET bottles, often come out of the production line as the line moves fast and some of them get flicked off”*. Three tonnes of PET plastic is disposed by Frucor Beverages each month. Now the New Zealand market for such material is mature enough where instead of requiring Frucor Beverages to pay for that waste, a rebate is offered.

Besides Frucor Beverages' factory, there is a storage facility where orange juice is stored inside plastic bags in steel drums to maintain the fruit quality. There is a machine that takes each drum and removes the plastic bag to empty the juice into big containers. The emptied drums are stored outside of the factory. Then an international company picks up the steel drums for reuse in scrap or in transporting other metal around New Zealand. The frequency of steel drums pick-up is four to five times a week. Plastic wrapping usually goes to landfill and cartons for recycling.

COMPANY 4: Sanitarium NZ

Background

In 1900 Sanitarium began as a charitable company that produced the breakfast cereals business as a healthy food concept. The first manufacturing plant in New Zealand was established in Christchurch and was the major breakfast cereal manufacturer on that site (SAN2). Sanitarium NZ is owned and operated in New Zealand Our History (2007). The company also has manufacturing plants in Australia. Both Sanitarium divisions in New Zealand and Australia work collaboratively.

Sanitarium NZ employs around 350 people in New Zealand. Their mission is to help people enjoy more energy and vitality through better nutrition About Us (2007). The company is highly involved with the community and donates some of their products Community Involvement (2007).

Products and Services

Sanitarium manufactures breakfast products, dairy alternatives including soy milk, vegetarian meals and spreads such as marmite and peanut butter Our products (2007).

Type of RL activities

Numerous raw ingredients are used by Sanitarium. Most of the ingredients come in cardboard cartons with a plastic liner. A lot of Sanitarium's waste is the packaging. Recycling and reusing have been practiced within Sanitarium NZ for a long a time. *"All paper, cartons and paper bags are put in crates and collected for recycling"*, mentioned SAN1. *"Plastics are directly sent to plastics recyclers"* added SAN2. Any product that is rejected by the quality system is put into bins and sent to pig farms. *"The pig farmer pays a small amount to take the product away and uses it as pig food"*, stated SAN2.

Paper and plastics have different end-destinations. Paper is recycled by Carter Holt Harvey in New Zealand. Plastics are usually shipped overseas *"to Korea and China where they are used in their manufacturing operations of low grade*

plastics materials” mentioned SAN2. Packaging materials such as laminated films, if rejected, are sent back to the supplier for possible rework.

There is also a bin that goes to landfill where materials not fitting the recycling categories are placed. For example, tins, foam cups, drinking cups used with the offices are thrown to the rubbish. It is mainly office products that go to landfill, not so much from the factory. The bin is emptied into a landfill around every eight to ten days. Landfill is another option to dispose of product or materials.

COMPANY 5: 3M New Zealand

Background

3M is a worldwide company with its head office in the United States. They have a presence in more than 60 countries and their products are sold in nearly 200 countries. Who We Are (2007). 3M's corporate environmental policy includes "*the recognition of the necessity for responsible environmental management and conservation of resources*" Environmental, Health and Safety Policy (2002). Their life cycle management integrates the environmental, health and safety policy into the company's product design, manufacture, use and disposal Environmental, Health and Safety Policy (2004).

3M has been in New Zealand since 1955 with their manufacturing plant operating in Takapuna, Auckland since 1967. There are approximately 220 employees in all business fields in Auckland and 6 employees in their sales offices in Christchurch and Wellington.

Products and Services

3M New Zealand manufactures and exports speciality foil tape for many 3M subsidiaries.

Type of RL activities

Special adhesive for operations is delivered to the manufacturing plant in drums. 3M New Zealand ends up with a lot of those drums and to properly dispose of them, they work together with Transpacific who uses them or sends them off to Pacific Steel. Also the company gets a lot of wooden pallets which are reused and the wood that is not treated is put in a bin to be chipped into garden mulch.

3M New Zealand include under product sell adhesive tapes to other 3M's worldwide. As 3M1 stated, "*we recycle as much as we can*" so the plant can be clean. Selling to second dealers at a discount is not an option for 3M NZ because there is a corporate policy that does not allow them to sell sub-standard material. "*The closest we would do that is sell it to our staff*", said 3M2. The

bulk of 3M's sales are consumable type of items. For example, some aircrafts use 3M tape and that is disposed after many years along with the part on which it is been used. On the other side, there are a few products that become obsolete and are disposed by 3M. However, the supply chain within 3M is tight so it is rare a product becomes obsolete.

Other internal activities involve working in conjunction with Paper Reclaim for their paper recycling. In the case where materials cannot be recycled, they are sent to landfills. Landfill is used in small quantities as 3% of the total 3M NZ output is sent there.

COMPANY 6: Fisher & Paykel

Background

Fisher & Paykel (F&P) was founded in the 1930's by Maurice Paykel and Sir Woolf Fisher. The company became one of New Zealand's most successful businesses Our Heritage (2007). Technology has been the key differentiator relative to their competitors. It is listed in the New Zealand and Australian Stock Exchanges Parent Company (2007). Their philosophy has always been not to incorporate scarce resources into their products Manufacturing (2007). Central manufacturing plants are located in New Zealand, Australia, Italy and United States. F&P employs around 2,500 people in New Zealand. Their culture has traditionally been around their people and innovation.

Products and Services

F&P core product is whiteware including refrigerators, washing machines, dryers, freezers, dish washers, dish draws, cookers, ovens and cook tops. *"Outdoor barbeque products are manufactured in California"*, mentioned F&P2.

Type of RL activities

F&P provides a service to all customers through a dealer or F&P service company where old appliances are picked up for recycling. The service is only available for *"F&P's dealers and authorised service centres"*, expressed F&P2. The dealer can have fifty to sixty used appliances ready for pick-up. F&P has a truck that can carry 150 appliances and does the all the pick-up (starts empty) and drop-off.

In the greater Auckland area, old appliances are sent directly back to F&P's manufacturing plant where they are disassembled and sorted into various types of metals and reused. *"Components are not reused because old appliances used different types of components than the new appliances"*, mentioned F&P1. The old appliances go to a process called *"shredding which guarantees 70% of the weight of the appliances to be recycled"*, added F&P2. The process is able to extract the steel, stainless steel, copper and aluminium. The other 30% of the

weight of the appliances is called “fluff” or “waste” where plastics may be mixed together with other plastics.

In areas outside Auckland, used appliances are picked-up and delivered to Sims Pacific Metals, who owns a consolidation yard as some appliances, are not viable for F&P to disassemble. In such cases, F&P takes some parts out of the appliances but leaves the rest. At Sims Pacific Metals, used appliances are compacted and fed into the shredder where metals are separated in the process. F&P pays for the transportation of the used appliances which includes trucks and in some cases, ships. If in the South Island there is no available shredder, then Sims Pacific Metals compact the appliances for F&P to ship them to Auckland. Sims Pacific Metals pays for the used appliances; the metal that is extracted is not reused in F&P due to its unfeasible grade for reuse in F&P’s new products.

The other type of material in appliances, plastics such as ABS and polypropylene, is reused by F&P. Plastics in used appliances are sent to Astron Plastics for recycling and some of those plastics are bought back by F&P for reuse. Plastics is a hurdle for F&P because old appliances of all brands are picked up which often do not have any code to identify the type of plastic for recycling.

COMPANY 7: Resene NZ

Background

Resene Paints started in 1946 in New Zealand. Its core business is architectural and decorative paint with small operations in light industrial coatings. Within Resene Paints, there are two key categories. “*One focus is decorative paint and the other is medium to heavy duty industrial coatings*” mentioned RES2.

Resene Paints owns sixty stores and two manufacturing plants in New Zealand. Therefore the company manufactures and retails paint, a combination which is not very common. In total there are 600 staff in the ColorShops and approximately 100 employees in head office. The company’s mission and vision is in a process of changing and moving to include sustainability and ethics. A green attitude has been within the company since the 1950’s when Resene removed lead from paint and were the first to introduce waterborne paint in New Zealand.

Products and Services

Resene manufactures colours, coatings, wood stains and paints for exterior and interior house and industrial painting, and marine applications Welcome (2007).

Type of RL activities

Resene’s ‘PaintWise Programme’ reflects the RL process and the product stewardship scheme in general. It starts when a customer brings back any used paint to their ColorShops. Paint can be from any brand and the service is free for Resene paint returns (small charges for non Resene). Then a specially-equipped truck goes to every Resene store and collects used paints. The truck processes the paint by separating the waterborne paint into a tank and solventborne paint into another tank, and the cans are put into a crusher to be squashed down. Paint that is unknown is put with the solventborne as such paints are more hazardous. This process happens while visiting the store. The truck goes back to the central depot and deposits the solventborne and waterborne paint. Solventborne paint goes through a distiller to pull out all the solvents and

waterborne paint goes for donation and anti-graffiti. The metal cans are recycled and plastics have just started to be recycled.

Metal paint cans are recycled by getting them shredded first and then melted down and reused into other products. Resene uses metal cans which are 10% recycled for their new products but not necessarily from the old metal paint cans. Metal cans typically go into a general pool of recycled material. The metal end-destination is similar to Resene's plastics which are reused in pallets and electrical ducting but not back into Resene's products.

Resene's PaintWise programme has been set as a charitable trust where community donations are arranged. Communities send paint requests to Resene and Resene selects which community is eligible for the donated paint. The paint which is donated is only the paint from Resene brand. This is for marketing purposes, and also to prevent issues with unknown paint brands. The amount of paint which is donated each month is unpredictable. The incoming paint varies between good and poor quality.

COMPANY 8: Fletcher Building and Pacific Steel

Background

Fletcher Building is a New Zealand company whose core business includes manufacturing building materials. Other businesses are the construction and distribution business. Fletcher has diversified into Australia, US, UK, Spain, Taiwan, China and Thailand. *“Currently 60% of the revenue comes from New Zealand but will drop in the years to come to 50% with the acquisition of overseas businesses”*, mentioned FLE1. There are *“9,000 employees in New Zealand”*.

Pacific Steel, manufacturer of reinforcing bar and wire, is one of Fletcher’s businesses. It manufactures *“steel products from 98% recycled scrap that is recovered from 90,000 vehicles in New Zealand”*, mentioned FLE2 . Within Pacific Steel, there are *“5 business units which are the steel plant, the rolling mill, pacific wire, recycling and Fletcher reinforcing”* (FLE2). Joint ventures for some metals include tenanted operators to collect scrap metals (i.e. cars) to utilise at Pacific Steel’s site and provide them with their shredded and crushed material.

Products and Services

Pacific Steel is the only producer in New Zealand of reinforcing wire rod, reinforcing bar and reinforcing coil products Products (2007).

Type of RL activities

“Pacific Steel has recycling as a core business and is the largest re-user of recovered material”, stated FLE1. Scrap products are used for daily operations. Principles of RL are being used by Pacific Steel when taking waste and reusing it to make product again. As alternative energy, *“tyres (waste product) are looked for and try to be used as a fuel source due to its high carbon contents”* mentioned FLE2. Pacific Steel spends money for obtaining carbon, but if used tyres are disposed at the plant then the company only pays for the processing of the used tyre.

Tyres can be obtained from joint ventures and tyre dealers in New Zealand. The tyres then go through a process where they are exposed to peak temperatures which are fully controlled. *“Pacific Steel does not pollute as air emissions are captured in the back house for particulars”*, assured FLE2. This similar processing of tyres is seen worldwide in Japan and the United States, for example. What these countries do is to put a whole tyre into electric furnaces as a fuel source. Such a process is only one of many undertaken by Pacific Steel.

“Opportunities for taking waste material from steel and reusing it within road aggregates is been sought”, affirmed FLE1. Impurities from molten scrap contain 25% zinc which can be reused within Pacific Steel processes. Pacific Steel looks for and uses waste recovery wherever possible. Other sources of fuel are wood waste and used oil. This avoids some of this waste having to be thrown into landfills.

COMPANY 9: Holcim (New Zealand) Ltd

Background

Holcim NZ is the abbreviation for Holcim (New Zealand) Ltd and dates back to 1888 in Otago Facts and Figures (2007). It is owned by Holcim Switzerland. The vision is “*to be the most preferred company for its shareholders*”, stated HOL1. Currently, the company employs around 530 people excluding staff from the Pacific Islands. Head office of Holcim NZ is based in Christchurch and the cements works is based in Westport. Coal and used oil are the two main sources Holcim NZ uses as fuel. Most of the finished products are sent by ship from Westport to three main ports in New Zealand (Auckland, Wellington and Christchurch).

Products and Services

Holcim NZ products include cement, aggregates, ready mixed concrete and lime About Us (2007).

Type of RL activities

Holcim NZ’s RL practice is called ‘Used Oil Recovery Programme’ within the company. It involves having contracts with the large oil companies in New Zealand “*such as BP Castrol, Shell, Caltex and DR Britton Ltd (Valvoline)*” explained HOL2. Oil companies provide used oil to Holcim NZ to replace some part of the major fuel source: coal. By doing this, the natural resource of coal is extracted less, preserving the natural environment.

Used oil comes from engines and gear boxes of transportation vehicles. It gets changed in workshops where people buy new oil, having drained the used oil. All workshops have contracts with oil companies for collecting used oil. Holcim NZ provides oil companies with details on how the programme is running and the costs involved. Then, oil companies pay Holcim NZ for running the used oil recovery programme. The cost components of recovering used oil include collecting contractor companies. New Zealand is divided by areas and for every area there is a cents per litre collection rate. “*Holcim NZ selects contractors with competitive rates and appropriate equipment for handling dangerous*

material, which is not always the cheapest", mentioned HOL2. All this process is organised by Holcim as part of their 'Used Oil Recovery Programme'.

Used oil is collected by Holcim NZ contractors at the specified location. Holcim NZ provides an updated monthly list to contractors in order to let them know which location they need to pick up used oil. Holcim NZ then subcontracts three collection companies to collect the used oil from oil companies. Then the used oil is stored close to the main port waiting for Holcim NZ's ship to arrive for delivering cement and picking up used oil in the three main cities. The rationale for this is to utilise the cargo capacity available when Holcim NZ's two ships return to Westport. "The ship must have something to carry as it is costing money to return, whether it is empty or not", stated HOL2.

During times of contingency standard 20ft ISO tank containers are sometimes hired to store used oil at the transporter's yard. Only their largest ship is capable of carrying containers from any port back to Westport. Infrastructure for handling containers in Westport is been investigated as Holcim NZ does not have that at present. Only infrastructure that handles bulk used oil is owned.

A total of two ships are used by Holcim NZ for bulk delivery of cement. Inside the ships, there are designated holds to carry cement which is in the form of fine powder. Such powder is transported from the Westport works to the port by truck which is a short distance. Then it is blown into a silo and stored until the ship arrives. Then it is carried in and out of the ship by a pneumatic conveyor which blows it through pipes using air. Holcim NZ's manufacturing plant is located in Westport due to the fact that it has the right raw materials and the source of coal which is why the location was decided in the 1950's.

COMPANY 10: Tyre track

Background

Tyre track was set up in July 2004 as a first sustainability project from the NZ government focusing on tyres. *“New Zealand disposes of four million tyres a year and it is going up 10% a year due to tyre imports”*, said TYR1. Their main purpose is to make sure all end of life tyres are disposed responsibly Welcome to Tyre Track (2007). Tyre track is fully *“supported by the Ministry for the Environment, Imported Motor Vehicle Dealers Association, Motor Industry Association, Automobile Association, Local and Regional Councils”* Welcome to Tyre Track (2007).

The major benefit is to avoid illegal tyre dumping. *“Even with Tyre track, this still occurs in New Zealand”*, confirmed TYR1. There are ‘fly by night’ transporters that have an advantage over registered transporters due to some tyre suppliers being unwilling to pay the disposal fee.

Products and Services

Tyre track provides a tendering service where tyre dealers and collectors are linked.

Type of RL activities

Tyre track was set up with MTA, the biggest player in the motor industry in New Zealand. Its RL process starts when any person goes to a tyre dealer to buy a tyre and drop off their used tyres. When new tyres are purchased, a disposal fee is charged for the used tyre. *“In theory, the disposal fee should be given to the collector to help offset proper the disposal costs involved”*, explained TYR1. In some cases this does not happen as some dealers charge \$3 NZD to dispose of a tyre and only pay 50 cents to a random collector to take them away.

Tyre track has an online tendering system to put tyre suppliers or dealers in contact with registered collectors to negotiate with each other. *“The online system is set up to advertise tyres for collection, to encourage bids and to state where the tyres are going to end up”*, mentioned TYR1. The collectors’ report on

the quantity of tyres collected and their final destination is sent to the administrator in Tyre track.

The majority of the collectors have shredders and two of the largest ones are in Auckland. About $\frac{3}{4}$ of the tyres are shredded and put into landfills. Nowadays there are very few landfills that accept a whole tyre, usually they ask for the tyre to be cut into pieces. Whole tyres are used by farmers in New Zealand for silage. Those tyres go into silage with plastic veils. *“Some farmers, instead of removing them from their land, just bury them in their land and order more tyres”*, described TYR1. Other destinations for end of life tyres are silage pits, horse arenas, civil engineering projects and export to countries like China and Brazil. The *“shredded rubber from tyres can be exported to countries that have the machinery to process tyres and make products out of the fine crumb”*, explained TYR1.

Ministry for the Environment (MfE)

The Ministry for the Environment (MfE) New Zealand is the “*principal adviser on environmental sustainability and international matters that affect the environment*” About the Ministry (2007). Their vision is for a prosperous New Zealand with a healthy environment that offers social and economic benefits About the Ministry (2007). Public concern is also MfE’s concern and political concern (MfE1). Common activities for MfE include keeping New Zealand’s clean image as exporters, farmers, tourism and society as a whole rely on it. “*New Zealand exports dairy products and not having a green and clean image could severely affect New Zealand exports*”, mentioned MfE2.

Product stewardship is only one of the many projects undertaken by the MfE, which looks at companies in New Zealand to take responsibility of their products and packaging. This concept is also “*known as extended producer responsibility (EPR) or individual producer responsibility (IRP)*”, mentioned MfE2. “*Emphasis on product stewardship has been growing for the past few years as New Zealand is heading towards waste legislation*”, assured MfE2. All product stewardship schemes are voluntary in New Zealand. In comparison, some are compulsory in Europe. The schemes are industry-led and supported by New Zealand local and central governments Targets in New Zealand Waste Strategy Review (2007). It has an effect on waste minimisation at source (redesign) and at disposal (re-use and recycling) Targets in New Zealand Waste Strategy Review (2007).

MfE Sustainable Business Group is not a regulatory group but a group that works with companies to improve their environmental practices. “*Most of the companies in New Zealand approached the MfE for product stewardship support and others were approached by the MfE to initiate the scheme, with MfE acting as facilitators*”, explained MfE3. In NZ, companies are given flexibility and freedom to set their product stewardship schemes and be reviewed by them. “*Within most sectors, there are at least two to three companies in NZ that are working towards best practice in the sustainability field*”, stated MfE1. “*Competition, between companies leading sustainability is minimised when sharing environmental issues and ideas*”, said MfE2. Sharing

has been shown to encourage joint thinking to a common goal that benefits all stakeholders.

“The Waste Minimisation Bill was suggested by Members of Parliament from the Green Party and was adopted by the New Zealand Government as ‘a vehicle’ for its waste policy”, explained MfE1. It includes activities such as preventing, reducing, reusing and recycling waste Targets in New Zealand Waste Strategy Review (2007). Furthermore, *“the Waste Bill Legislation is currently before select committee, with a report back to Parliament on March 3, 2008”,* added MfE1. Another concept that was recently introduced was the Govt3 where companies that are suppliers for the government need to demonstrate sustainability in order to be kept as suppliers.

Chapter 5: Research Findings and Analysis

Overview

The research findings and analysis chapter presents the findings across the companies with the researcher’s analysis. However the discussion with respect to the literature is presented in *Chapter 6 Discussion*. In order to support the statements on this chapter, direct quotations (with codes for interviewees’ titles) from 22 interviewees are reported.

The initial section considers the overall perception of the reverse logistics (RL) concept, followed by factors influencing companies in New Zealand to implement these practices. Resources needed to implement RL were then identified. After that, potential benefits from RL were addressed, as well as the issues, missing aspects and strategies practiced by the companies. Subsequently, all companies were asked about whether they see green sustainability as a source of competitive advantage or a burden, with these findings presented at the end of this chapter.

RL perception in New Zealand

RL is a “fuzzy concept” in New Zealand. The majority of companies participating in this research were aware of the concept when another concept was mentioned: product stewardship. Most of the companies knew what logistics meant and many deducted what RL was derived from other logistics concepts. From the 22 interviewees across industry, 16 knew what RL was, 4 had a fair idea but could not describe it, and 2 did not know about it at all.

It was found that RL is not a common name to describe the backward flow of used products from the consumer to a final destination from an environmental perspective. The concept encompasses sorting and disposing which also includes the selection of transportation mode and assessing the economic and environmental impacts. As seen in *table 1*, various meanings for RL were provided by the companies in the study. *Table 1* includes the name/code of the company in the first column; what RL mean for the company in the second

column; and other names that companies referred to as RL in the last column. Most companies in the study agreed that RL is the process of having product or material returned back to a specified point in the supply chain by stating the following:

Company	RL meanings	Other RL names
Vodafone	<p><i>“Taking back product at the end of their life”.</i></p> <p><i>“Not a term used very often”.</i></p> <p><i>“Getting the product back from the consumer and through to your distributor network for dismantling and hopefully return back into its raw materials or as close as you can get”.</i></p>	<p>EPR</p> <p>Reusing</p> <p>Recycling</p> <p>Product stewardship</p>
Telecom	<p><i>“Our perspective is slightly different in that the company does not manufacture products but instead retails the products of others. Therefore the concept is about taking responsibility for the product we market and sell”.</i></p> <p><i>“[RL] means everything from return, repair, recycling and/or reuse of the products we use or retail.</i></p>	<p>Product stewardship</p>
Frucor Beverages	<p><i>“Depends on the party but mostly it is to create or degrade”.</i></p> <p><i>“Closed-loop within the one area so it might involve in-house recycling and public recycling; having partnerships with collectors”.</i></p> <p><i>“Taking ownership of the things the company buys, makes and creates; from the way materials are sourced and disposed of”.</i></p>	<p>Product stewardship</p>
Sanitarium	<p><i>“If product needs to be disposed of, it gets back to the supplier and returned</i></p>	

	<i>back through the supply chain".</i>	
3M	<i>"Disposal of waste basically". "It is trying to get back what the company does not use".</i>	Reverse supply chain
F&P	<i>"To deliver new product to customers and give the option of giving back their old product for reusing, recycling and scrap". "It involves transport modes".</i>	
Resene	<i>"Covers bringing products back to one point or all the way back to the manufacturer which it is sometimes insensible to do". "Product sent back for dismantling and goes into various states".</i>	Product stewardship Recycling
Fletcher Building	<i>"From a push mentality, means that supplier will work on behalf of the customer and manage the reverse flow". "Different ways of using materials". "Product flow, efficiencies of flow"</i>	Resource efficiency Recovery Commoditised product recovery
Holcim	<i>"Using the capability of the logistics to reuse materials". "It is about how to optimise the use of the back loading, extracting value of logistics which is returning to base".</i>	Product stewardship Reverse logistics EPR
Tyre Track	<i>"Anyone in this country who sells a product is responsible for it when it reaches end-of-life use".</i>	Product stewardship
MfE	<i>"Reverse logistics, in terms of using the distribution supply chain to take back end-of-life product, is not practiced very widely in New Zealand".</i>	Product stewardship Take-back end of life product EPR

Table 1. RL concept in New Zealand

The companies that did not describe RL as sending a product or material backwards, referred to the concept as *“taking ownership of what companies buy, make and create from source to disposal”*, stated by FRU2. In the case of Fletcher Building, FLE1 and FLE2 referred to RL as *“different ways of using materials”*. And for Tyre Track, TYR1 referred to it means as *“taking responsibility of the product when it reaches end-of-life use”*. MfE3 mentioned *“RL for product take-back at the end of their lives is not widely practiced in New Zealand”*.

Both Frucor Beverages and Tyre Track specified *“RL is mainly about taking responsibility of what has been produced”*. TEL1 also supported this statement in noting *“the concept (RL) is about taking responsibility for the products we use, market and sell”*. Taking responsibility of the product was also mentioned in other companies such as Resene, Vodafone and F&P when talking about product stewardship. For RES2, product stewardship means *“taking responsibility for the impact of the company’s product, that it has on the environment from gathering raw materials and manufacturing through its time when it is used ... also in terms of disposal”*. For Vodafone, taking back product is *“the right thing to do”* because it involves been socially responsible according to VOD2. And for F&P, F&P1 and F&P2 said *“the manufacturer is responsible for the product at the end of its life in product stewardship”*.

The ‘common’ RL disposal methods for companies in New Zealand were reusing, recycling, refurbishing and landfill. Remanufacturing was not mentioned by any of the 10 companies and Ministry interviewed. It was found that companies in New Zealand prefer to recycle their products and packaging and turn them into other non-related products rather than remanufacture the used product. As HOL1 and HOL2 mentioned, RL is *“about having the capability to reuse materials”*.

RL is not a concept for manufacturers only, but also for retailers. Some of the companies in the study were retailers and have applied RL functions successfully, such as Vodafone and Telecom. They are leaders in marketing, collecting, sorting and disposing off the product they sell even though they are

so called 'middle men', which means that they are the link between manufacturers and consumers. Phone and mobile manufacturers do not have any RL system in place in New Zealand.

In the food and beverage industry, the focus of RL is around packaging as the food and beverage cannot be reused. Sanitarium sells (for a small amount), any food ingredients when they are faulty or did not sell in the market place. Both Frucor Beverages and Sanitarium look for proper packaging materials that can be easily recycled and have a less negative environmental impact. It was found that taking back product in the food and beverage industry is not applicable. The reason for this is that food is consumed and the only product left for disposal is its packaging such as cereal boxes and plastic bottles.

Manufacturers like F&P and Resene analyse carefully the destination of their end of life products by making plans on how to retrieve the product and reuse it. Both companies have selected an efficient transport mode (truck) to collect used product. A truck is able to move to many different places to collect used product from individuals or companies. Collection of used product includes collection of their products' brand and their competitors' brand as well, offering a wide take-back service in their respective industry. Therefore, RL concept plays an important role for their marketing as well as transportation methods.

Holcim relies also on transportation in RL. The difference with Holcim's RL is that the recovered product they reuse, does not involve their end product but a supply input instead. Having a transport mode, in this case a ship, *"full for every trip is the most efficient way to operate when transporting used product for proper disposal"* said HOL2. It was found that Holcim carries used oil, which is not part of their manufacturing products but a source of fuel for production of cement and aggregates. Therefore, RL for them is not only about having responsibility of the company's own product but it can also be helping other companies with reusing and recycling their used product. Recycling is one activity in RL that can guarantee cost reduction by not using virgin raw materials.

Fletcher Building's core business is recycling. The company as a whole and its businesses have always *"maintained a green image and been a responsible corporate citizen"* (FLE1). According to FLE2, *"C8 are always looking for opportunities to recover material"*. *"Used products that have metals and materials needed for the business are collected and sorted for reusing"*, FLE1 and FLE2 added. The company does not collect the product itself but has contractors that do that and sort them out on the company's site.

According to MfE2, *"product stewardship started in New Zealand in the early 1990s"*. Product stewardship was not implemented as government policy until the 2000s when New Zealand looked at trends overseas. *"Companies overseas sought to try and make an edge for their business by being socially environmental responsible"*, said MfE1. So product stewardship and RL are somehow a new concept as companies in New Zealand are *"advanced in that they have been thinking of it as extended producer responsibility or individual producer responsibility"*, added MfE1.

Factors driving RL in New Zealand

The 7 factors driving the concept of RL most commonly referred to 'product stewardship' in New Zealand are stakeholders, green sustainability, leadership, marketing, economic, regulation, and information. These factors were designated by the researcher from data collected during the interviews. Some interviewees did not mention the exact factors but explained them throughout the interview. The researcher grouped the explanations into the factors shown in *table 2*.

Stakeholders	Regulation	Marketing	Green Sustainability
<ul style="list-style-type: none"> ▪ C11 ▪ C1 ▪ C2 ▪ C3 ▪ C4 ▪ C5 ▪ C6 ▪ C7 ▪ C8 ▪ C9 <p><i>Total: 10 companies (equivalent to 18 out of 22 interviewees)</i></p>	<ul style="list-style-type: none"> ▪ C11 ▪ C2 ▪ C3 <p><i>Total: 3 companies (equivalent to 6 out of 22 interviewees)</i></p>	<ul style="list-style-type: none"> ▪ C11 ▪ C4 ▪ C6 ▪ C7 ▪ C8 <p><i>Total: 5 companies (equivalent to 8 out of 22 interviewees)</i></p>	<ul style="list-style-type: none"> ▪ C1 ▪ C2 ▪ C5 ▪ C6 ▪ C7 <p><i>Total: 5 companies (equivalent to 9 out of 22 interviewees)</i></p>
Leadership	Information	Economic	
<ul style="list-style-type: none"> ▪ C1 ▪ C3 ▪ C5 ▪ C6 ▪ C7 <p><i>Total: 5 companies (equivalent to 9 out of 22 interviewees)</i></p>	<ul style="list-style-type: none"> ▪ C10 <p><i>Total: 1 company (equivalent to 1 out of 22 interviewee)</i></p>	<ul style="list-style-type: none"> ▪ C9 ▪ C3 ▪ C4 ▪ C8 <p><i>Total: 3 companies (equivalent to 5 out of 22 interviewees)</i></p>	

Table 2. The 7 factors promoting RL in New Zealand

In *table 2*, all 10 companies referred to stakeholders as a main driver for RL. Others were environment, leadership, and marketing for 5 companies, economic and regulation for 3 companies, and information for 1 company. The factors driving RL were identified from the interview transcripts. Each of the factors was mentioned during the interviews following question 3 (see semi-structured interview template in *Appendix B*).

1) Stakeholders

“Anyone involved in an company and may be affected by its decisions”

(Dictionary.com)

“Vodafone stakeholders provide feedback to the company about what business issues are important and which areas are not satisfactory”, said VOD2. The

annual report of Vodafone contained the stakeholders' comments and desires to address specific issues. In addition, people owning phones and mobiles would most likely be demanding a recycling scheme if there was not one in place. *"(Me) as well as customers want this kind of service"*, mentioned VOD2.

Vodafone was not the only company in New Zealand that had comments from customers on their product take-back service. Paint customers started to demand, *"in the late 1990's, a channel to dispose of their used paint cans as councils in New Zealand stopped taking them"*, mentioned RES1. Furthermore, F&P also got similar statements from customers saying *"well, I do not want my old refrigerator, could you take it away?"* Consumers indirectly were requesting manufacturers in New Zealand to dispose of their used product, particularly if they could not dispose of the used product themselves.

TEL1 and TEL2 stated *"take-back product and recycling schemes are not driven by individual consumers but by our own sense of responsibility and large customers and shareholders - who drive the company to be more responsible about their products"*. FRU1 agreed that from the consumer point of view, the importance of having RL is at a *"fairly early and low level but it certainly seems like it is going to become more important for them"*. RES1 supported TEL1 and FRU1's statement by saying, *"it is still quite early to determine if consumers value the take-back product and recycling schemes in place"*. Although consumers' pressure is seen as 'low', FRU1 said, *"they are becoming aware of it"*.

"Large customers in New Zealand and around the world are demanding more recycled content within product", said FLE1 and MfE3. By reusing waste or used product, customers' demand for recyclable content can be met. *"Customers rather than valuing efforts made in RL activities by companies, expect it to happen"*, added MfE3. This group of people are *"not the only ones expecting it but the community as well"*, said SAN2. Neighbours and society as a whole have pushed Sanitarium to be more responsible in their supply chain operations. Looking after neighbours to obtain their trust is what Holcim does as they consider this a *"long term investment to deliver value to our shareholders"*.

Another group of stakeholders that have forced companies to move towards RL activities are employees or internal customers. Employees and shareholders of 3M in the United States require environmental reports from 3M worldwide. *“In 3M NZ, constant environmental reports are sent to 3M US for assessment and reviews”*, mentioned 3M1. This is similar to what Vodafone does with Vodafone UK. *“Investors and internal customers expect financial returns as well as corporate responsibility from the companies they are involved with”*, stated VOD1. Furthermore, VOD1 said *“Vodafone has made a remarkable decision to become a ‘value-based company’ by doing the right thing”*.

Uncertainty of where and how used oil was being disposed in New Zealand initiated the Used Oil Recovery Programme by Holcim and oil companies (Shell, BP Castrol, Caltex, DR Britton Ltd). Oil companies in New Zealand were looking for *“an environmental outcome for the used oil ... they wanted to get better control of it”*, mentioned HOL2. *“Without the oil companies (suppliers of used oil), the RL would not have been implemented”*, added HOL2. The recovery programme is an example of corporate social responsibility where this waste product is incorporated into the cement manufacturing. It *“does not impact the environment as the used oil is burned in cement kilns at high temperatures”* (1400 to 2000 degrees Celsius), referred HOL2. According to HOL1 *“Holcim believes that the use of waste materials for non renewable fuels is a good environmental practice”*.

In the past few years, the New Zealand government has taken a stronger role in environmental practices by companies. There has been a lot of discussion of Govt3, which Telecom and Vodafone have been preparing for. VOD1 noted *“NZ government wants to know the company’s sustainability criteria”*. Furthermore, *“the Green Party in NZ are right into the C10’s project as the government is trying to achieve sustainability”*, said TYR1.

In summary, emerging market requirements are shifting to *“more supportive life cycle assessments of their environmental effects”*, mentioned FLE2. FRU2 supported this by saying: *“there is a trend ... there is a movement of people that*

are starting to get more responsible ... there was a group that started 3 years ago called EBAG as a response for commitment to packaging”.

2) Green sustainability

“Responsibility and care for the natural environment in which people, animals and plants live” (Dictionary.com)

“Vodafone is concerned about mobiles going to landfills and have interest in helping the environment” said VOD2. The company aims to see their mobiles reused in third world countries *“because the life of a mobile is around 5 to 7 years and people in New Zealand are using them for around 18 months”*, mentioned VOD1. They have 7 global corporate responsibility initiatives which are ethical purchasing, mobile recycling, marketing, high social value for product and service, climate change focus, mobiles and health, and waste minimisation. They form part of Global e-Sustainability Initiative to improve supply chain standards and are currently working to integrate corporate responsibility performance into supply chain processes Vodafone Corporate Responsibility Report (2007). Furthermore in 2006, Vodafone NZ worked with the MfE on the product stewardship initiative. *“Vodafone NZ mobile recycling scheme is driven by the right thing to do”* stated by VOD2.

Doing the right thing is noted not only by from Vodafone but also by Telecom, whose employees *“think it is the right thing to do too”* mentioned TEL1. The green sustainability driver for Telecom arose in 2001 when they found out what was happening to their phones, mobiles and modems in terms of disposal. They found that scrap merchants were taking *“bits and pieces of phones and disposing of the rest into landfills”*, (TEL1). In addition, TEL2 explained, *“there is, at the moment, a general push for companies to be more environmentally friendly”*. TEL1 noted that Telecom is working towards establishing a wider corporate responsibility.

Opportunities to prevent creating waste, rather than managing waste, are been sought by 3M NZ. They follow the corporate policy which incorporates the ‘3P’ (Pollution Prevention Pays) programme. This programme refers to avoiding pollution at source rather than removing it after being created. 3M NZ is

governed by corporate policy which includes environmental sustainability. *“Current practices within 3M worldwide are constantly reviewed for improvement”*, mentioned 3M2. An example *“in New Zealand back in 1993, 3M used to release volatile organic compounds to the atmosphere which are not hazardous or good either so a solvent recovery unit was established to reduce emissions by 99%”*, added 3M1. In summary *“those activities are achieved due to corporate responsibility that also helps the bottom line”*, said 3M2.

There was also a view of the future where New Zealand politicians in power would endorse a greener element which F&P foresaw when starting their RL practice. *“F&P directors attended conferences and exhibitions of whiteware in Germany where environment influence is higher than any other continent”*, said F&P1. European manufacturers displayed their range of whiteware in the exhibition considering environmental impacts of their products. *“Environmental influences from Europe affected F&P operations by changing their logistics and improving product power and water consumptions”*, expressed F&P1. *“One of the factors promoting RL for F&P includes the environment”* as F&P2 stated *“Environmentally had a lot to do with it”*. So for F&P, environmental factors did influence the company to implement RL.

Reducing the negative environmental impact and making products safer influenced Resene to implement their PaintWise programme. The programme as such covers the process of RL in terms of *“moving stock back to the company”* explained RES2. *“Customers were not the only drivers for the PaintWise programme to exist but also Resene’s responsibility and concern of leaving customers with the issue of disposing used paint”* said RES1. Resene has focused on environment for a long time when they removed hazardous materials in paint such as lead, asbestos fibres and other carcinogenic materials. Having a good environmental product was not the only thing that Resene looked at but also its life cycle as well in terms of the products end destination when used. *“Sustainability for us ... we have always focused on doing things greener”* expressed RES1.

3) Leadership

“Usually top management leading a group of people by providing vision and direction of the company” (Dictionary.com)

Most companies with a parent company overseas, such as Vodafone NZ (Vodafone UK), Frucor Beverages (Danone France), and 3M NZ (3M United States), have had a strong incentive to pursue efficient and environmental operations. *“Vodafone Group in the UK has a goal to become the number 1 telecommunications company in the world and to succeed they were persistent with regards responsibility for the products they sell”*, mentioned VOD2. In addition to Vodafone leadership, *“Vodafone UK benchmarks each Vodafone worldwide to review their performance and recycling is one of the initiatives been benchmarked”*, added VOD2. Danone in France has an environmental charter which is performing well and *“decided to implement an environmental management system in all of their subsidiaries for environmental reputation”*, said FRU1. *“3M US has experts in each environmental area, such as recycling, water consumption and energy consumption, which assess and challenge 3M NZ on their operations performance”*, expressed 3M1.

Senior management and leaders within companies have also influenced RL and product stewardship to be implemented in New Zealand. A company that has had a long history in doing things right because their people want to make things better is Resene. Most of Resene’s senior managers are environmentally motivated, *“they just naturally think that way”*, stated RES1. There is nobody in Resene who is *“a deep green ... we are just normal people who are trying to do things as best we can”* but with senior management support added RES1. F&P shares the same perspective as Resene when stating *“Resene’s director and his wisdom said that we needed to get involved by looking at our products ... how recyclable they are ... how we can recycle them and what can be done?”*

A company’s philosophy and culture plays a role in leadership by supporting people and actions to be undertaken for the best interest. Resources used for RL and other environmental activities are part of 3M NZ’s corporate philosophy. The company in NZ *“follows directors from 3M US”*, said 3M1. Resene has *“a*

very supportive culture and that is where Resene marketing manager and product stewardship planner came in when the job started”, said RES2. Resene NZ values making progress in reducing negative impacts on the environment and a number of key leaders and managers within the company share the same idea. Therefore, values and vision is what it takes for Resene to undertake a product stewardship scheme (RES1).

4) Marketing

“Activities of an company associated with presenting, advertising and selling products or services” (Dictionary.com)

Marketing deals a lot with the representation of a company’s image. A combination between marketing and environment has been the latest trend around the world. This is supported by looking at Fletcher Building, who see the environment as a component to maintain their image as a *“green steel plant and responsible corporate citizen”* stated FLE2. The MfE in New Zealand, suggested that there are companies *“who see a marketing advantage in promoting themselves as green”*. Also having RL provides *“a positive image which is a marketing advantage”*, according to F&P1 and F&P2.

From a marketing perspective, Sanitarium has looked at how to make their packaging better by being friendlier and recyclable. *“Internal bags for cereals and boards are made of recyclable contents”*, according to SAN2. Having more recyclable packaging can be good for marketing in the long run as RES1 remarked *“there is a general shift that is happening in the consumer culture in the last 6 to 18 months in New Zealand”*. People in New Zealand are starting to put *“environmental aspects closest to what they value when they are making their buying decisions”* said RES2.

A clash between marketing and economic drivers can be present in any company when deciding on implementing RL and product stewardship. At Resene, they assume it is better to resolve issues, *“you resolve an issue, you want your product back because of less liability to return the product and resolve it than to have it continuing in the market ... not so much a dollar value of your paint but in terms of your brand ... we would look at it on how important it is to*

preserve our brand” mentioned RES2. An efficient RL system and product stewardship has reinforced Resene NZ’s brand and achieved a higher quantity of people visiting their paint stores. By having more people aware of such services “promotes new sales and that is one of the many reasons F&P were motivated to start RL”, stated F&P1.

5) Economic

“Financial rewarding in terms of efficient development of wealth for an company” (Dictionary.com)

Cost-reduction has been stated as another driver for companies in New Zealand to implement RL. Holcim sees their used oil recovery programme as a *“way to make some money ... we see it as a good business if we can see a way to make it work”* said HOL1. The cost of energy is a major cost for a cement company so using waste material as a source of energy can save money. In addition, Fletcher Building have *“reduced costs in their manufacturing processes by using substitutes or supplements of raw materials as raw material prices are always increasing”*, stated FLE2. Furthermore, Frucor Beverages is still *“profit-driven or cost-reduction driven”* when it comes RL or product stewardship implementation, said FRU1. Frucor Beverages are *“actually making money out of our waste stream”* added FRU1.

Costs are not the only economic aspect that is seen as a factor reducing the implementation of RL but risks as well. Holcim NZ is able to minimise risks of not having enough fuel to keep their cement works running. According to HOL1, *“if possible, you can have more than one choice of energy, where energy might be expensive ... there is also the issue about the security of supply and that is the reason for having more than one supply”*.

Added value to processes can also be gained from RL as seen in Fletcher Building: *“we can add value to the business and take costs out of the business”* stated FLE2. The company looks at long term cost benefit advantage when analysing if a project is economical or not. So *“there has to be an economic driver to make RL worthwhile and encouraging employees to work on related processes”*, mentioned HOL1.

6) Regulation

“Official rule made by government or other authority to control companies’ actions” (Dictionary.com)

A risk avoidance attitude is been taken by some companies in New Zealand when legislation might impact them. For the beverage industry, a RL infrastructure means a large investment but sharing alternative options will cost less and be more effective. According to FRU1, *“the ‘waste minimisation bill’ has been written by the New Zealand Green Party and it specifies what the industry needs to do in terms of waste minimisation which follows the ‘container deposit legislation’ (CDL)”*. *“It does not specifically say anything about CDL but the requirements of the waste minimisation bill is basically CDL”*, added FRU1. *“Past experiences of CDL in South Australia CDL shows that it only works purely from an environmental perspective but not from the economic perspective”*, said FRU1. *“Besides South Australia, Canada and countries in Europe have CDL present where the back of the bottle says that if customers return the bottle, they would get certain amount of money”*, explained FRU1.

In New Zealand, there is no CDL at present *“but it is an option in the near future which is why the beverage industry is ‘freaking out’”*, expressed FRU1. Moreover, FRU1 mentioned *“a study commissioned showed that the industry would have to pay over \$100 million NZD to set up the infrastructure required for CDL”*. Therefore the beverage industry in New Zealand is trying to come up with effective and efficient options for a well designed RL process that is voluntarily based.

The New Zealand government has put pressure on the electronics industry – *“on one hand, the NZ government is pushing hard with regulation requiring companies to set up take back schemes” (TEL1)*. *“On the other hand, through experience we have found that there are [other] regulations to work through that can be an opposing force to the intention of the initiating regulation (eg exporting e-waste to where it can be recycled because this country is too small to run the type of recycling operations that are required)” (TEL2)*.

The electronic industry in New Zealand has also been influenced by Govt³, which basically means that companies who are suppliers for the NZ government are asked to demonstrate their sustainability practices. Government departments will be requiring current suppliers to disclose sustainability and if not, they would change suppliers. *“The NZ government is a large customer for many companies in New Zealand – that would significantly impact them if requirements are not met”* (TEL1). The reason for the NZ government doing this is to set an example of sustainability to other companies that are large customers as well. According to the MfE², *“people are influenced by regulation when applying product stewardship because they are afraid of what the regulation may dictate”*.

7) Information

“Collection of facts and details” (Dictionary.com)

Few companies have been influenced by the information driver to apply RL. Within this research thesis only 1 of the 10 companies mentioned that information was the main reason for RL. Visibility along the close loop chain is important which RL can provide when implemented. Tyre Track, a sustainability project from the NZ government is such company. For them *“it gives a great amount of statistics as to different areas in the country where tyres are being disposed of”* stated TYR1. RL provides information of used product flow that otherwise would not have obtained. *“If they could not get information about tyre disposal, the tendering system would not have been set up in the first place”*, added TYR1.

Resources needed to undertake RL

RL as any other process needs resources to operate efficiently and effectively. For that reason, all of the companies interviewed were asked about what resources they needed and used to either implement their RL system or their product stewardship scheme including recycling which is an activity of RL. It was found that resources needed for implementing RL or product stewardship schemes varied depending on the type of company, product and services, and logistics history.

Some companies needed different resources from other companies due to the fact that these companies started their RL a while ago in early 2000. In addition, companies having logistics operations in place appeared to need fewer resources. According to VOD1, when *“you already have logistics operations in place, so RL is not that difficult”*. There were also companies in the study that acknowledged that they needed certain resources that were not used yet. For example, *“Tyre Track knows that we need advertising for our RL system to work and they are working on it”*, as expressed by TYR1. Another example is Frucor Beverages where communication is seen as essential and *“at the moment it is in its infancy in New Zealand in terms of groups talking to each other within the industry”* said FRU1.

A range of different resources were noted by the companies participating in this study. As seen in *figure 11*, a total of 25 resources were found to be considered necessary for the implementation of RL. The table shows the resource linked to the company that mentioned it. Most of the resources mentioned during the interviews were resources that companies needed for other activities as well. So the resources provided in the figure 10 are not specific to RL as they can be used for other operational areas as well.

Resources | Organisations in NZ

Vision	1. MfE
Expertise	2. MfE, Resene
Persistence	3. MfE
Commitment	4. MfE, 3M, Resene
Time	5. MfE, F&P, Vodafone, Sanitarium
Advertising	6. Tyretrack
Backing from "big players"	7. Tyretrack
Money/budget	8. Telecom, Resene, Fletcher, F&P, Vodafone, 3M, Sanitarium
Market campaign	9. Telecom, Vodafone, Resene
Containers for returned product	10. Telecom,
Knowledge	11. Telecom, F&P
Communication	12. Telecom, Frucor, Vodafone, Sanitarium, Resene
Infrastructure	13. Frucor, F&P, Resene, Sanitarium
Regulation	14. Holcim
Recognition of waste hierarchy	15. Holcim
Understanding of international regulations	16. Holcim
Understanding location of waste materials	17. Holcim
Trained professionals	18. Fletcher, Vodafone, 3M
Ability to plan	19. Fletcher, Vodafone
Support from senior management	20. Fletcher, Resene
Staff	21. F&P, Sanitarium
Partnerships	22. F&P
Environmental manager	23. Vodafone, Sanitarium
Marketing team	24. Vodafone
Relationships	25. Resene

Figure 11. List of resources needed for RL implementation

From the 25 resources listed and based on the researcher's judgement, only 13 resources were somewhat "common" among the companies. These were expertise, commitment, time, money/budget, market campaign, knowledge, communication, infrastructure, trained professionals, ability to plan, full backing of senior management, staff and environmental manager. The list can be organised into 7 broad categories (See *figure 12*) which reflect resource areas that all NZ companies likely need to consider when implementing RL. Thus, these categories remove some of the context – specific idiosyncratic resources noted by individual companies. Some of the categories appear to be necessary than others for RL in New Zealand.

Figure 12. Classification of resources for RL

A prioritised list of resources for the implementation of RL is shown in *figure 13*. The method used to prioritise resources from all the interviews undertaken was counting the number of companies who suggested the same resource as other companies. The resources listed below may apply across other industries in New Zealand.

Figure 13.Resource needed for RL

The majority of the companies (7 out of 10 companies) mentioned money or budget as the key resource. A modest budget for a mobile recycling scheme is needed (TEL1). There has been “*a lot of investment in the marketing*” for Resene efforts in reusing paint and recycling cans, mentioned RES2. Moreover, a “*financial commitment*” is required as well for Resene PaintWise programme, added RES1. For 3M, “*investing some capital and being committed to it*” is what they require as they are constrained for resources in the New Zealand operations, said 3M1. Other companies such as Vodafone, F&P and Fletcher Building recognised that having the right budget is the main resource to start with the RL operations.

The second fundamental level included time and communication. Both resources had the same frequency of responses (5 out of 10 companies). It involved “*obviously quite a lot of time from Resene internal staff to start the product stewardship scheme and get the public to understand what it involves*”

and how they can collaborate”, explained RES1 and RES2. For Vodafone NZ, “there is quite a bit of resource in terms of time ... for me to be able to go to several meetings with government, to work with Telecom ‘our opposition’, to work with our suppliers, and having our corporate responsibility manager answering all e-mails and phones where people ask for more information” about the mobile recycling scheme, expressed VOD1. According to MfE1, “it takes a long time to set up a RL activities due to uncertainty of what the NZ government expects”. Sanitarium and F&P were the other two companies that mentioned time was an important resource for them.

There are different groups of people where communication is needed for RL:

- **Communication between the industry and government** is what is required for the beverage industry before implementing RL. As FRU1, “there needs to be a closed loop with communication before there is a closed loop with the product ... it needs to be very open”.
- **Communication between the company and their suppliers** is required by Sanitarium and Frucor Beverages for packaging specifications that can ease returning packaging back to a specific point for processing.
- **Communication between the company and their employees** is required by Telecom because they “need the communication to get people to understand how to process returns” (TEL2).
- **Communication between the company and their customers** is required by Vodafone and Resene. VOD2 stated “we are trying to integrate this into our customer communications ... we do not know how successful it is yet”. RES1 acknowledged “we have to go through the explanation of how their small levy works and clearly explain it until customers get it”.

Infrastructure was noted as the third fundamental resource (mentioned by 4 out of 10 companies). According to FRU1, “having a better infrastructure built up around product stewardship” is vital. This infrastructure refers to facilities needed to handle returned packaging from the beverage industry. In Resene, space to store paint, trucks, and packaging “can be quite difficult” (RES2). A depot is needed to store returned products and to sort them out as well, as FRU2 mentioned, “Making sure recyclers are picking and sorting out the right

materials” is complex. Also HOL1 and HOL2 mentioned *“having facilities to store used oil while waiting for the ship to be uploaded was beneficially but costly if the ship did not arrive as scheduled”*. Other companies where facilities are a key resource were F&P and Sanitarium.

The fourth fundamental resource was time commitment, monetary commitment, marketing, and trained professionals. Commitment for the long-haul is what is needed for companies as RL activities are *“work in progress ... never ends”* said MfE2. Commitment in monetary terms was raised by Resene and 3M in New Zealand. Marketing campaigns for Vodafone, Telecom and Resene have been undertaken for product take-back since their recycling schemes started. Their aim is to raise public awareness of the take-back product system they have put in place as is relatively new in New Zealand and consumers are not aware of it. Trained professionals were suggested by Fletcher Building, 3M and Vodafone. *“People with know-how and supply chain expertise will know how to resolve problems in RL”*, said VOD1.

The last fundamental resource areas were expertise, knowledge, ability to plan, full backing of senior management, staff and environmental manager according to the responses of 2 out of 10 companies. *“Resene has invested in expertise for reusing returned paint into other applications”*, mentioned RES2. Expertise is needed as *“it is hard to get the right model that actually achieves the environmental aims but that customers use and that it is actually economical and efficient as possible”* stated MfE3. Knowledge was suggested by Telecom and F&P by stating that knowledge around internal processes helps in order to know what to do once the returned product is received. The ability to plan is considered by Fletcher Building and Vodafone as it helps anticipate outcomes and minimise uncertainty. Support from senior management has been key for Fletcher Building and Resene as ideas around how to improve RL have been turned into practice. Having staff and an environmental manager assist the company with the implementation of RL for Vodafone, F&P and Sanitarium as their job descriptions specifically is around RL and they perform around that. As a result, companies have people that are owners and responsible for such implementation.

Benefits of RL

RL, which is part of product stewardship, have benefits for the company, their customers, and the country as a whole. Most of the companies that were interviewed enjoy the marketing, economic and operations benefits from RL. It was found from the interviews that the main benefits for customers include offering them more than one choice of product to purchase, taking waste from society for proper disposal, giving people the ability to travel less by having means of communication in developing countries (i.e. using recovered mobiles), and cleaning the environment for everybody and for future generations. For New Zealand as a country, it was found that benefits are higher quantity of recycling schemes in place, engaged-industry to waste minimisation, efficiency in minimising negative environmental impacts, and accurate forecasting on the amount of waste in landfills.

A whole list of benefits from the companies participating in the study was collected and divided into relevant themes. The list of benefits was based on what the interviewees mentioned with RL benefits. This list is ordered according to the data obtained based on benefits (see semi-structured interview template in *Appendix B*), which are:

- Sustainability benefits
- Environment benefits
- Marketing benefits
- Economic benefits
- Innovation benefits
- No / limited benefits

Sustainability benefits

Sustainability, from a business perspective, is defined by Brundtland “*as meeting the needs for current generations without compromising the future generations to meet their own needs*” (Mills, 2007). Most companies in the study refer to sustainability when asked about the benefits they have seen and received from their RL activities. For instance, Fletcher Building have gained sustainability by reducing their dependency on virgin raw materials and fossil fuels for their manufacturing processes. FLE2 mentioned that their business

becomes “*more sustainable by been aligned to customer and regulatory expectations fore reduce life cycle effects*”. Sustainability for Holcim NZ has opened up opportunities in terms of selecting different fossil fuels for their cement manufacturing.

A green sustainable company, such as Vodafone, has given people from developing countries the opportunity to economically grow and pollute less the natural environment by using less transportation due to the offering of refurbished mobiles. Such action provides environment sustainability which “*are going to come for our children*” as SAN1 stated. Sustainability allows companies to remain in business. According to 3M1, their RL “*has paid for itself ... is making their business more sustainable*”.

Environment benefits

There are certainly some benefits for the environment when implementing RL as used product and materials are taken back for reuse and recycle. As an example: Resene looks for a “*home for waste paint that cannot be reused in their factory rather than throwing that into landfill*”. Also “*Fletcher Building take a large quantity of waste material from New Zealand in a safe manner and using it in other products*”, said FLE2. Indeed, “*New Zealand industries have become further engaged in waste minimisation which consequently minimises negative environmental impacts in the country as well*”, expressed MfE2. Minimising negative environmental impacts can be seen as a long term benefit for the country.

A feeling of ‘doing the right thing’ and ‘personal satisfaction’ is gained as people feel less guilty of the environmental problems the world is experiencing at the moment. There has been a lot of media ‘pushing the environmental news’ which gets people and companies worried about the environment and sustainability. Therefore, “*having a clean environment for everybody and being socially responsible for the product is a benefit*” according to HOL1 and VOD1. Furthermore, having an efficient and effective RL system in place, allows landfill forecasting which a benefit is also as people can plan ahead for sustainability.

Marketing benefits

As RL activities have been noted to have an environmental component, marketing benefits refers to services such as product take-back that increase the number of customers and sales. *“By taking the right approach, having the right resources and because of the nature of the product they are dealing with, some of the companies in New Zealand probably make money from their operations”*, stated MfE3; and if those operations are well marketed, then customer sales are greater than of those who do not market them. It is supported by F&P1 and F&P2 that *“market awareness on post-sales services promotes sales”*.

Vodafone, Telecom and Resene have raised awareness with regards disposing off their products. For instance, Resene has invested heavily in raising awareness around disposing waste or used paint while Vodafone and Telecom have invested in raising awareness around disposing used mobiles and accessories. From raising awareness, the companies increase customer visits and image. Increased customer visits have been encountered in Resene as they have their own paint shops and take used paint from them and their competitors. *“Telecom has gained an enhanced image in terms of environmental responsibility by taking back used mobiles, modems and accessories from anyone in New Zealand”* (TEL1).

It is definitely *“worthwhile to have media coverage and respond positively to customers’ demands as it promotes trust, especially with a large customer such as the NZ government”*, mentioned VOD2 and TEL1. Trust from customers and society can also be built from marketing the take-back service of used and waste materials for reuse. This is supported by Holcim case where they have built trust with their customers which results in *“delivering good value to our shareholders in the longer term”* stated HOL1.

Economic benefits

As any other process, RL activities costs money but *“companies get a lot of value out of the service”* mentioned MfE senior advisers in the sustainable business group. For some companies in the study, they have been paid by other

companies for taking part of the used product and recycling them. Such companies include F&P, Frucor Beverages and Sanitarium. F&P1 and F&P2 confirmed that *“their company gets paid to get used plastics out of their appliances by recyclers”*. *“Frucor Beverages gets financial benefits because they get money from the waste found in the factory coming from packaging”*, added FRU1. In Sanitarium, *“they do not pay for waste disposal and transportation”* according to SAN2.

Costs can be reduced, savings can be earned and opportunities for revenue can be presented from RL activities in some companies in New Zealand. *“Telecom is able to recover some costs from modest dividends it earns from materials recovered in the recycling process and resold refurbished phones, it is not a profit driven enterprise. (TEL2). “Transport costs are saved by F&P when bringing the old appliance directly to their plant for sorting and recycling materials”, stated F&P2. In addition to savings, “Holcim saves money of coal or cost of fuel by using used oil as an energy source” according to HOL2. While other companies like “Fletcher Building have the opportunity to take costs out of the business and turn them into revenue”, expressed FLE2. Other companies have not had the advantage of receiving money from RL activities such as “Resene who just break-even since their product stewardship scheme started in the late 1990’s”, mentioned RES1.*

Other economic benefits are seen in developing countries and in product life cycle. *“There is an economic benefit for reusing mobiles in developing countries as some people are not able to buy a brand new phone”*, stated VOD2. Product is designed according to its RL flow which minimises cost by using recycled materials rather than virgin raw materials. *“F&P receives a great return on their materials as they are able to separate and identify them better”*, said F&P2. Materials from F&P appliances have a serial number to identify them at the end of their lives.

Innovation benefits

Companies in the study have been able to increase knowledge and skills in RL activities which includes retrieval, collection, transportation, storage and

disposal methods. The MfE in particular has learned *“more about the products and how the market operates”* from the New Zealand retail industry, said MfE1. *“While Frucor Beverages has a in-house recycling in place allowing their company to adopt ideas quicker”*, stated FRU1.

Another benefit is the outcome of research and knowledge from RL. According to RES2, *“one of the other benefits ... during this process, you develop technology and know-how and we are looking at licensing into other countries”*. A company is able to make money from what is generated during the know-how process of RL by passing that on elsewhere. There have been few models in New Zealand of transportation and warehousing which allows efficient and effective backward flow of a used product or material. This is supported by most of the interviewees when referring to transportation matters in RL.

Problems can be solved better with a functional RL and good communication system within the company. There are *“a lot of technological advancements and communications channels are better now a days”*, mentioned FRU1. *“Also communication through RL activities by creating good forums where companies can meet and share ideas on their RL processes”*, added MfE3.

No / limited benefits

A few companies in the study agreed that benefits from RL activities are not seen straight away as it takes years to take advantage of expected benefits. RES1 mentioned *“to be fair, the first few years not a lot of benefit; a little bit of benefit right now where people are starting to act positively towards it”*. Similarly, *“benefits are limited until there is pressure from customers and shareholders to recognise RL”* (TEL1). *“Not all companies are going to benefit from RL because of the nature of their business”*, added MfE1.

Problems in RL

There were many problems encountered when implementing RL activities in New Zealand. Even though there were few regulations in designing and implementing this process, companies that have implemented it have had

difficulties. *“In New Zealand, all of the RL activities, or so called product stewardship schemes, have been voluntary”* according to MfE1. A concern in New Zealand that is *“often cited by participants in voluntary schemes is that non-participants gain cost advantages in the market place by continuing with old, wasteful practices at a lesser cost ... undercutting those who have made a commitment to more sustainable waste practice”* 2006 Targets in the New Zealand Waste Strategy (2007).

Problems related to companies and industries

Some companies have not seen the business advantages provided by RL. *“Other companies are waiting until other companies implement RL activities as no one wants to be the ‘guinea pigs’”* said MfE2. *“Companies often have difficulties in getting suppliers collaborating with RL”*, stated TYR1. This statement is supported by RES1 when mentioning that *“every supplier they talk to for information around RL and environmental processes, say that Resene is the first company asking about that”*. Furthermore, RES1 added that *“the reason for that is because in New Zealand people often only talk about it but do not put it into practice”*.

Few recyclers are found in New Zealand compared to overseas countries which makes it even more complex to undertake RL activities. *“Recyclers for electronic products are around 2 worldwide that are able to sort, refurbish, recycle and sell into developing countries”*, mentioned MfE1. According to VOD1, *“there is a company in New Zealand that can refurbish phones but not on a large scale as for the recycler is not economic because it is not their core business”*. *“It is impracticable for 3M NZ to follow their corporate policy as there are no companies that can recycle some of their waste from products in New Zealand”*, added 3M2. Frucor Beverages has considered using TetraPak as packaging because it is more environmentally friendly but they have encountered the same problem as other companies, where there is no one that can recycle such packaging in New Zealand.

Companies called ‘free riders’ are an issue in New Zealand because they interrupt the flow of reverse RL activities. For instance *“free riders, companies*

who gain advantages from their competitors' investments and processes, do not implement RL activities due to competitiveness reasons", supported MfE2. According to VOD1, "phone and mobile manufacturers are taking a 'free ride' from Vodafone and Telecom recycling schemes". Phone and mobile manufacturers (Nokia, Sanyo, Sony Ericsson, Alcatel and Motorola) do not take responsibility for their products at the end of their lives in New Zealand. Free riders do not want to invest any money on RL knowing that if their competitors or retailers do, they still will receive benefits. This "is discouraging for companies who are actually investing money, time and effort onto such processes", added VOD2.

In the tyre industry, 'fly-by-nighters' are also an issue in New Zealand because they take used product or materials before the appropriate company take them for proper disposal. In case of Tyre Track, *"fly-by-nighters are hard to track because most of them rent vans for the weekend when they pick up tyres and dump them anywhere they like"*, stated TYR1. F&P have found a similar problem when picking up used appliances from streets. According to F&P2, *"people will go around and take valuable material off them causing an environmental damage as pipes are cut allowing gas to go"*.

Problems related to public

Public awareness about RL activities, or so called product stewardship schemes, is low in New Zealand. Particularly the telecommunications industry in New Zealand is going through such problems. *"Vodafone and Telecom have tried to achieve public awareness through a range of advertising campaigns but still gaining public recognition and awareness of the take back scheme is a battle"*, (TEL1). Both companies have *"invested heavily in marketing and [even so] the number of mobiles and phones expected to be returned are low"* (TEL2). VOD2 proposed that *"raising public awareness to all sorts of products that should be recycled at the end of their lives is required in New Zealand"*.

Other companies in New Zealand have also tried to raise awareness of their RL activities. For instance, Tyre Track lacks public awareness because advertising is expensive so people do not know about them and their processes according to

TYR1. In the beverage industry, Frucor Beverages has found that their biggest barrier is public collection of bottles to be recycled. *“Mainly getting consumers, Councils, recyclers and collectors to collaborate in the beverage industry recycling scheme is a barrier”*, stated FRU1.

For the breakfast cereals manufacturer, Sanitarium, large percentage of their customers is *“price buyers from a commercial point of view”*. Their SAN1 explained that *“people buy most of the times depending on price not on quality and environment”*. Therefore having recyclable products may come with cost that will increase the price of the final product. *“Some people are very conscious of the environment when they are making the decision of which product to buy in white ware industry ... there is a lot of people out there that are cost oriented so they are looking purely at what is the best price”* supported F&P1 and F&P2.

Problems related to New Zealand legislations and procedures

Legislation in New Zealand has impeded the RL flow such as the ‘Second Hand And Pawn Brokers Act’. Such legislation requires that for any second hand dealers making \$2,000 NZD from second hand products have a licence to be renewed each year. *“This legislation impacts the telecommunications industry in New Zealand, where it makes it difficult for Vodafone and Telecom to receive used phones for refurbishing and reselling”*, explained VOD1 and TEL2.

Fletcher Building and Tyre Track have also problems with legislation particularly with ‘Resource Management Act’. It was stated that there is *“unnecessary rigor applied by the Auckland Regional Council in implementing the Resource Management Act”* explained FLE2. In case of Tyre Track, *“a Korean company was looking to set up a plant in Auckland to break down tyres and reuse it in oil, steel and any other required manufacturing processes but it was difficult to get resource consent even though the plant was going to do good in an overall scheme”*, stated TYR1. This statement is supported by FLE2 when saying *“complex regulations ... regulators are not looking at the overall environmental benefit.”* Furthermore the Regional Council in Auckland is applying such legislation that was written by the MfE and people from the Ministry acknowledged that there is miscommunication with how this Act

should be applied. According to MfE1, *“there is a review on that matter of miscommunication between MfE and Councils at the moment”*. But *“law in New Zealand has to be very clear”* according to VOD1.

The problem with putting legislation in place with regards RL activities *“means that every company is required to follow it and then such processes becomes mandatory”*, according to MfE1. This is not convenient for those companies who have dedicated resources on such processes as RES2 stated *“you need to have the option first because companies are in the best position to determine what is sensible to do”*. TEL2 supported this notion in stating that it is *“easy to work through a process that the company knows will work rather than have a regulated process imposed upon it”*.

Hazardous waste is difficult to process in New Zealand as there are few companies that can handle it. In addition, it is also difficult to export overseas where used products can be recycled and reused. *“Part of the issue is that New Zealand has signed up for the Convention On Transportation Of Hazardous Waste”* said VOD1. For the telecommunications industry, *“it is complicated to get an export licence to ship used phones and mobiles because the used products are considered hazardous”*, noted by both TEL1 and VOD2. *“All returned and used product have been waiting in storage and containers which costs money”* (TEL1 and VOD1). Telecom, just recently, received its permits to export used mobiles, modems, chargers and fixed line consumer products to California, US for refurbishment and recycle (as part of changes to its existing recycling programme).

Other problems related to government are their processes, leadership, Commerce Commission and Councils. *“Government processes in New Zealand are slow, political and sometimes, care-taking”* according to MfE2. *“The New Zealand government also lacks leadership in terms of resource efficiency education for New Zealanders”*, supported FLE2. Commerce Commission is a ‘hurdle’ for many companies wanting to share ideas on RL and product stewardship. According to MfE3, *“the Commerce Commission limits on how much companies can agree together”*. Regional and City Councils do not

provide expected support for some companies in New Zealand according to 4 out of 10 companies from the study.

Problems related to logistics

The main cost in the RL process is **transportation**. This cost has affected some of the companies under study such as Holcim, F&P, 3M, Resene, and Fletcher Building. Holcim depends on ships for carrying cement and used oil and have to look at ways to modify the ship so that it can carry other waste materials. F&P uses trucks to transport used appliances and are facing the rising price of fuel and freight. 3M disposes off their waste in New Zealand as it is expensive to send faulty products back to the United States. Resene operates a designed truck to collect used paint and cans, and running such truck also costs money. Last, Fletcher Building has experienced those transport costs when bringing back waste materials for reuse. According to MfE1, *“when companies see cost, they see hassle”*.

The **location** of big cities in New Zealand such as Auckland, Wellington and Christchurch is where most of the waste materials and used products are collected and stored due to population density. *“Places where there is large amount of area but low population incur high travelling costs and time”*, explained F&P1 and F&P2. In addition, such places (eg. Invercargill), *“there are potential wastes that can be used in manufacturing processes as a fuel source but it is not cost-effective to send ships to that area for collection of waste”*, added HOL1. A reason for that is the remote location of Westport where cement and aggregates are being manufactured.

Capacity is another constraint in the logistics area for some companies. F&P faced the problem of placing used appliances in their truck *“as they are full of air, big and bulky”*, explained F&P1. In order to overcome such constraint, they *“took first the air out and then put smaller appliances inside bigger appliances to meet the limited capacity in the truck and avoid several trips for pick-up”* added F&P2. Other issues encountered with capacity are seen in Resene, where *“issues are found around clearing up stock piled in the paint factory”*, mentioned RES2. Dealing with stock clearance and returned product is a problem as it is uncertain when the factory will need to be cleared for a lean

manufacturing. Companies often find difficulties in clearing stock at source point because the amount and frequency of returned products is uncertain. According to TEL2, customers return phones because *“they do not like the phone, it is not what they thought it was, or they just simply changed their mind”*. Similar reasons have been found in Resene, *“we recall this, or have this sent back or somebody just does not want it anymore”* expressed RES2.

Infrastructure for handling returned and used product is another problem that was found in the study. For instance, *“the beverage industry may be required to set up recycling stations depending on the outcome of the waste minimisation proposal”*, said FRU1. Current recycling stations in New Zealand are described as *“rough”* by FRU2; because of the system recyclers follow to sort plastics from all companies in terms of brands. Therefore the beverage industry is restricted to packaging selection. Infrastructure also considers storage facilities which are also costly for handling returned products. According to HOL1 and HOL2, *“the cost of storage limits the quantity that can be stored”*. In addition, if Holcim wanted to use another type of waste (eg. tyres) as source of fuel, *“will cost them millions of dollars to buy the appropriate equipment”*, explained HOL1. Vodafone and Telecom also have storage issues because both were waiting for their export licences to be approved in order to ship used phones to overseas recyclers.

Physical properties of returned products were also found to be a problem when collecting and sorting the product. For F&P, *“the older the appliance, the harder it is to identify all plastics there”* said F&P1 and F&P2. Plastics are not the only material where problems were found, according to FRU2, *“costs for glass collection are higher than what the glass is worth”*. *“Prices for some materials such as non-ferrous scrap have risen dramatically and people are stripping out such materials for resell”*, added F&P1. *“Tyre Track found that tyre collectors have had problems in making money out of used tyres”*, said TYR1. Some materials have higher value even if they are used than others.

Networks between the company and recyclers/collectors are needed to avoid problems with the returned product flow. According to FRU1, *“the beverage*

industry in New Zealand faces the problem of not having networks connecting the recyclers and companies”. Also “people in operations often do not welcome changes in their area”, said FLE2. Many people see the short-term benefits instead of the long-term benefits which is why networking can become a challenge.

End-destination of returned product in a sustainable way has been a challenge for some companies like Vodafone and Telecom where mobiles and phones are considered hazardous waste. “*The telecommunications industry often asks the question: what happens to the phones when completely broken?*” according to VOD1. It was found that most companies in the study look at the waste hierarchy to see which process is cheaper and environmentally friendly. In most cases reuse and recycle returned products overseas is the option in New Zealand as its environment plays a role as well.

Problems related to New Zealand environment

The environment in New Zealand is a problem frequently faced by companies in terms of its geography, weather, population and technology. New Zealand geography is far away from big industrial countries like US, China, and others in Europe. As 3M1 expressed “*New Zealand is a little country miles from anywhere*”. The geographic nature of New Zealand is “*long and narrow which makes travel distances longer and more expensive to major populated areas*”, supported by FLE2. In order to operate in New Zealand, at least two different transportation modes need to be use as the country is divided into two islands. It was found that New Zealand’s south island has been more challenging than North Island. According to TYR1, “*New Zealand’s south island is the main challenge to keep track where tyres are been disposed off due to the fact that it is a vast area with few people*”.

As New Zealand is an island, weather can sometimes be rough during winter time. Particularly Holcim has had problems with their “*ships not getting in the port at Westport due to sea levels affecting the frequency of shipping required to deliver used oil*”, explained HOL2. Weather is difficult to control as well as population but operations can be planned around it. In relation to population,

“The concern is that the unemployment levels in New Zealand are very low making it harder for companies to recruit employees”, said SAN1. Furthermore technology in New Zealand is not updated compared to the US. FRU1 expressed “technology is not quite there in terms of sorting plastics in New Zealand but communications is”.

Company’s internal problems

Internal resistance within the company was found to be a constraint as projects related to RL activities *“are not perceived to be adding as much value to the business as other projects”* mentioned FLE2. Different departments within a company do not work together towards an efficient RL because each has their own priority. According to VOD1, *“it is difficult to get people from sales, marketing, and supply chain to work with corporate responsibility”*. Similarly, TEL1 stated that *“We [Telecom] need to improve its co-ordination amongst the numerous divisions and subsidiaries to address e-waste issues”*. According to SAN1, *“top management support is necessary for RL activities”*.

Furthermore, *“we need to improve our employee induction processes to provide the necessary education on the RL processes”*, stated TEL1. The use of computers has been an obstacle for Tyre Track and Resene in different ways. TYR1 stated *“people using Tyre Track tendering system, in some cases; do not know how to use a computer making it difficult to participate in a RL activity”*. Where as RES2 mentioned *“Resene levy application on the computer system was difficult to sort out as not all stores have to apply such levy due to the fact that those stores do not provide any take-back product service”*. Furthermore *“knowledge in RL activities have been gained by recycling trials at Resene that did not work at the beginning”*, added RES1. It was found that companies have to go through a learning curve to efficiently implement RL as there are no unique models.

Figure 14. Problems encountered when implementing RL in New Zealand

In summary, the problems encountered with the implementation of RL and product stewardship schemes were narrowed into 6 areas (as shown in *figure 14*) in relation with the interviews’ responses. The processing (collection, sorting and recycling) of waste materials and returned products have proven to be a major challenge linked to cost and time. It was found that cost will always be perceived as a hurdle in the RL arena.

Future RL implementation considerations in New Zealand

It was found that some areas for improvement in RL activities are required. The current process is working properly but some parts are missing in the system to minimise some of the problems mentioned in the last section. Data obtained from the interviews suggested that future RL implementation considerations are:

- Transparency of the process
- Awareness of customers and suppliers

Transparency of the RL process refers to monitoring performance. Telecom implemented its take-back product system but did not follow-up which is why changes on this are being initiated. According to TEL1, *“we need to improve monitoring and reporting [around the RL operations]”*. This future consideration has also been supported by the MfE by suggesting that companies in New Zealand that have RL activities, or so called product stewardship schemes, need *“more reporting on what their achievements are and have some kind of monitoring and self-evaluation of the scheme for review purposes”*.

“There is a high rate at which customers are becoming aware of the importance of RL”, said MfE2. Yet customers have not responded to targets set by companies such like Vodafone for mobile collection. As VOD2 explained, *“a larger quantity of mobiles not been used are still out in New Zealand that could be returned for proper disposal”*. Proper incentives to customers for returning the used product are missing in New Zealand. *“Some customers believe in the ‘recycling myth’ where either the used product is not recycled and thrown into landfill or valuable materials can be extracted for own profit-making”*, stated MfE1.

Suppliers are starting to get pressures from larger customers around their environmental practices which often include activities found in RL such as recycling. *“Frucor Beverages as a customer is starting to put pressure on their suppliers to come up with ways for recycling packaging”*, expressed FRU2. Resene is another of the companies that also *“talks to their suppliers on the type of packaging and their technologies”*, supported RES2.

Strategies for RL and product stewardship

Future strategies considered by the companies under study include components for improving current RL practices. Strategies are thought to fit the existing RL as large modifications may add extra costs which in turns make the process complex as a tight budget is normally allocated to it. Strategies, classified by company, were obtained from each company during the interviews (See table 3)

Company	Recommended Strategy
Vodafone	Be a responsible business and look for an industry scheme
Telecom	Deal with RL in an integrated-manner by educating people, having ongoing communication and expanding recycling efforts.
Frucor Beverages	Obtain partnerships to share ideas, cost, communication and flexibility.
Sanitarium	Look at challenges and evaluate.
3M	Dispose of recalls and waste in a safely way.
F&P	Deal with the South Island and organise scrap to be reused.
Resene	Learn from trials, set budget, be honest and open to every stakeholder.
Fletcher Building	Provide direction from top management and find a sustainable balance.
Holcim	Undertake research on transportation in RL and waste as an opportunity.
Tyre Track	Recycle and upgrade RL.
MfE	Communicate with the government and industry.

Table 3. Recommended strategies by company

Each of the strategies mentioned above are different depending on the industry and the extent of the RL practice. It was found that having a good communication and planning long-term are basic to have in the business strategy. Often companies may have to go through a ‘learning curve’ to get RL system right as mentioned previously. Data suggested that no company was free of errors when implementing such a process. Every company in the study had some issues in the initial stages of implementation.

Green Sustainability: is it a burden or a source of competitive advantage?

In New Zealand, green sustainability is seen as competitive advantage. All the companies that participated in this study confirmed that activities such as take-back product, recycling and reusing are a source of competitive advantage. *“It is definitely understood now as a competitive advantage”*, stated FLE2. People are becoming aware of the incremental negative environmental impacts caused

from companies' operations in the last few years. SAN2 confirmed that *"there are more people out there more aware of the environment in New Zealand"*.

As public awareness on the environmental impacts is increasing, companies in New Zealand are opening themselves to the public opinions and responses around their manufactured products and materials. In Holcim, there is *"a certain amount of time the company spends with the local community to tell them about their operations' plans and obtain feedback from them"*, explained HOL1. Local community is not the only group of people that expects efficient environmental practices as customers, employees, investors and government expects it as well. For instance Vodafone *"customers expect environmental practices from the Vodafone brand and reputation has to be protected"*, said VOD2. For Resene employees, there is a certain pride when implementing RL activities, or so called product stewardship. It definitely attracts investors when a company is presented as *"environmentally responsible"*, added TEL1.

Green sustainability is part of *"the fundamental DNA of Vodafone globally and a commitment of being a value-based company has been made"*, stated VOD1. It is also seen as an *"opportunity to help other people by selling second hand telecommunication products in developing countries to reduce energy use and transportation by using video-conference"* (both TEL1 and VOD2). According to HOL1, it is a big advantage as the company has the *"capability to provide services that can deliver environmental benefits"*. Frucor Beverages operations department sees green sustainability as an opportunity to stream lining their operations. This is supported by FRU1 when stating that operations see green sustainability as *"energy wise, cost-reduction and waste-reduction"*. For F&P, green sustainability is a big part of the operations picture from product development to product selling. *"A great improvement has been seen since F&P started environmental practices such as RL"*, expressed F&P1.

The competitive advantage of green sustainability can be seen largely in operations but also in the marketing area. TEL1 stated that *"opportunities for public relations (PR) are created with show casing good environmental practices"*. On the other side, *"Frucor Beverages can see the advantage of*

gaining higher market share in the industry with recycling schemes and biodegradable packaging", supported FRU2. Other companies did not mention the linkage between competitive advantage and marketing due to their different perspectives around competitive advantage. Competitive advantage in the marketing area *"really depends on how much is worth the marketing value for a company"* explained MfE2. Sometimes companies do not get *"a lot out of environmental practices"* added SAN1.

The competitive advantage due to green sustainability can potentially change to a process seen as business per usual depending on legislation. If take-back product, producer responsibility, recycling and reusing, which are part of *"RL and product stewardship schemes are legislated, then there will be no competitive advantage"* according to MfE1. TEL1 and TYR1 made the same argument that *"if legislation is put in place, companies would have to do it as a requirement not as value-add to their customers"* (TYR1).

"A 'good feeling factor' to companies is provided by implementing environmental practices", according to 3M2. But it also requires investment in terms of money and time which can in turn become a burden to a company. As RES1 stated, *"there is a burden on resources so that is a drawback but that is how we do business and it is worthwhile"*. Fletcher Building also recognised that there are too *"many challenges but their company is still all about greening, recycling, reusing, and recovering waste for profit"*, explained FLE2. It requires *"activities that can divert attention from core business activities, and can be seen as a burden"* (TEL1).

Changes in a company often are considered as a burden because changes can be interpreted as good or bad depending on the person. For example, in New Zealand if the beverage industry changes their packaging plastics from PET (less biodegradable) to PLA (more biodegradable) is considered as a burden as changes need to be made on recycling stations and processes. According to FRU1, *"greening can be a burden when the company has not quite reached the environmental targets due to its recent implementation"*. *"For some employees*

within the company can be a burden initially while getting use to it but not a burden for the company as a whole”, stated 3M1.

The MfE1 suggested two conditions for green environmental practices such as take-back product schemes considered as a burden which are:

- *“If the rest of the industry is not doing anything around it”.*
- *“If people and companies do not share ideas and cost related to an efficient RL system or product stewardship schemes”.*

Chapter 6: Discussion

Overview

In the previous chapter the research findings and analysis across companies were presented. This chapter contrasts the findings across companies more fully and relates this to the literature on RL. The initial section considers a holistic view of RL including its relationship to product stewardship and environment, the process, ownership and closed-loops, and perceptions. Then factors promoting RL are discussed by relating the findings with the latest literature review on this. After that, a brief discussion is presented around European RL practices contrasted to New Zealand.

A holistic view of RL

RL is a topic which was not considered for a long time until people started questioning about products' end-of-life. People are beginning to think how, where and by whom used products are disposed off in an environmental friendly way. Negative environmental impacts have been also part of awakening such views. Stakeholders were not strongly influenced by these until the change occurred in today's news media and there was greater transparency of businesses. The rapid trajectory of RL may be a possible answer for why the concept has not been fully defined (Fernandez, 2003). This trajectory has not yet achieved the popularity that other concepts in operations have such as logistics and supply chain.

RL is a relatively new concept worldwide, particularly in New Zealand, where it has not been studied as a subject separate from product stewardship programmes. For instance, most of the companies that participated in the study mentioned that RL is the 'management of the backward flow' from a broader product stewardship scheme. Product stewardship's major outcome is product recovery that manages the product at the end of its useful life (Handfield et al., 1999).

RL and its relation to product stewardship

The concept of RL is another link in supply chain management but not so much about environmental programmes even though it runs parallel to product stewardship as both take back product and packaging for proper disposal. There is a small difference between RL and product stewardship. *“RL is the ‘process’ of moving products or packaging back rather than the ‘reason’ for moving it back”*, supported by RES2. Product stewardship, therefore, encompasses a broader view of the returning process of products and packaging. As mentioned by RES2, product stewardship *“means taking responsibility for the impact of the product from gathering raw material to manufacture such product to disposing off the product at the end of its life”*. Product stewardship is a term that focuses more on the products’ life cycle rather than just the return process of such product.

People in New Zealand often think of product stewardship when referring to the backward flow, take-back schemes or/and RL. It has been found in New Zealand that the ‘unclear’ meaning of RL activities are around product stewardship. Most of the companies in New Zealand apply product stewardship for taking back their used products and dispose of them properly. But many of them do not know where RL fit in all of these. All of the companies in the study knew what logistics was and assumed that RL is the opposite flow from it which is correct. This statement is supported by Mills (2007) when mentioning that RL takes in all of the ‘logistical steps’ to provide an environmentally safe method of recovery.

RL has been thought as the return process of products and packaging. But many companies do not reflect on the last activity of RL which is disposing off the product. Such activity has been considered to comply with environmental laws and stakeholders expectations in New Zealand. At present waste policies in New Zealand are changing to focus more on the products life cycle and environmental impacts which is a concern for stakeholders. In order to make sure of appropriate disposal of products, New Zealand has got the waste minimisation proposal that has not become legislation but it is under consideration by the NZ government.

Figure 15. Relationship between product stewardship and RL

As seen in *figure 15*, created by the researcher, under product stewardship there is waste minimisation, RL and traditional logistics (from more environmentally friendly to less environmentally friendly). Most companies in New Zealand were doing just traditional logistics but it was found that current leaders in product stewardship began to shift to RL while improving their traditional logistics by adding green purchasing of raw materials. Such shift can be seen in Frucor Beverages that is implementing an environmental management system which includes RL activities and looking for more recyclable packaging for their products. In addition, F&P have implemented RL which part of that includes reusing materials from old appliances and packaging from new appliances.

Waste minimisation can be achieved when doing recycle, reuse and reduction, the first three best disposal methods according to the waste hierarchy. It concentrates more on environmental impacts than RL. RL, as seen in *figure 15*, includes activities from waste minimisation but also has other activities before

disposing off waste such as take-back, collection, transportation, handling, sortation and storage. Now, traditional logistics may be environmental or not depending if raw materials used are green and designed for an easy environmentally friendly disposal. This can come from the products design stage according to Mills (2007). This author suggests that “ecodesign principles should be implemented at the early stages in a product’s life...”.

The environment component in RL

Some authors that have written journals and publications on RL do not include the environmental aspect into the concept. For example, the Council of Logistics Management (2000) described RL as the backward flow of raw material, inventory and finished products from point of consumption for the purpose or recapturing value or proper disposal. The only environmental side of the term is proper disposal which is not accurately defined. Other authors in the RL literature such as Lambert et al. (1981), Murphy et al. (1989), Stock (1998), Ross (1998), and Dowlatshahi (2000), do not incorporate the environment or any corporate responsibility for taking back product. Carter et al. (1998) were of the few authors that incorporated environment into the RL definition by stating that companies become more environmentally efficient through its activities of recycling, reusing and reducing. Companies have to accept the environmental accountability of the products they are selling.

Accountability of used products and packaging comes along with the RL term. Companies in New Zealand started RL as means for responding to the environment. Most of used products and packaging were thrown into the rubbish ending up in landfills polluting the natural environment. Therefore RL includes the polluter – pays principle it establishes the requirement that the costs of pollution caused by a company, from its products and packaging, should be responsible for causing pollution (Sands, 2004). As a response to such principle, 3M NZ has demonstrated to be successful in their ‘pollution prevention pays’ which moves waste materials between units. Its 4-stage process includes reformulation, equipment redesign, process modification and resource recovery (Sarkis, 2001).

Disposal methods in New Zealand depend on the materials, cost, quality and responsibility. In the building and construction industry reducing the use of virgin raw materials by using alternative materials or waste has been done. Holcim uses used oil as a fuel source for cement and aggregates production and Fletcher Building uses waste wood, used steel and scrap for the manufacturing of new products. Landfills in New Zealand are in most cases the cheapest way to dispose of products and packaging as seen with the tyres case. Some collectors do recycle but others cut the tyres into pieces and throw them into landfills. As with quality, not all used products are reused in a new product, as seen with Resene, where they cannot put used paint into new paint as quality of the paint gets undermined. Last responsibility is seen in the telecommunications industry where both Vodafone and Telecom are refurbishing and recycling mobiles and accessories because they feel responsible for every stakeholder.

Most of the companies in New Zealand do reusing and recycling of used products and packaging. According to the European waste hierarchy these two disposal methods are the top second and third best methods environmentally speaking. Recycling is not always the best disposal method. According to the MfE3, recycling *“is not the best thing to do if the benefits are minimal compared to costs”*. Due to the fact that New Zealand does not have enough capability for recycling and refurbishing, many used products are sent overseas, mainly China. MfE1, TYR1 and FRU1 supported this by confirming that New Zealand's nature, size and logistics are less developed than overseas countries.

Few companies are in the first level of the European waste hierarchy, resource reduction, as explained with Holcim and Fletcher Building when using waste materials instead of virgin raw materials for their processes. Still a relatively small percentage goes to landfills. It was accepted by most companies in New Zealand that a small percentage around 2% to 5% of total products and packaging from their factories and offices goes to landfills. Since RL activities have been practiced in New Zealand, there are more recycling schemes happening which cleans and improves operations and the natural environment. Furthermore RL is seen as *“a weapon for fighting environmental degradation*

in the shorter term” (Mills, 2007). This can be true when reducing, recycling, refurbishing and reusing used products and packaging.

The logistics of the reverse flow

Network design, information flow, transportation, storing facilities and material handling are activities involved in the implementation of RL as Ferguson et al., (2001) explained. Companies in New Zealand have a network design where the used product, material or waste is going to go through after collection. This network is planned to operate from when the consumer finishes using the product or packaging to its final destination. As seen with companies in New Zealand, a collection point is identified followed by transportation, sortation and disposal. For example, Vodafone and Telecom have their retail stores as one of the collection points, uses trucks to transport used phones and mobiles, and have people to sort out the used product and store for shipment.

In RL, because it deals with used products and often is not given priority, the cheapest transportation mode for used materials is selected. Transport costs are high when fuel prices increases because New Zealand does not produce fuel. Transportation has demonstrated to be important in New Zealand due to the country's nature where the two islands are divided and surrounded by water. Often two modes of transportation, ship and truck, are used in New Zealand to transport used products and packaging. Airplanes can be considered but they are regularly used for transporting commodity products due to its cost. But for companies like Holcim, who manufactures cement and aggregates, considered as bulk product, airplane is not an option because the costs of bulk products are lower than commodity products. Therefore it is inconvenient for companies with bulk products to sacrifice monetary returns that could have earned by using other transport modes.

Transportation has been identified as a key activity involved in RL as Krikke et al., (2004) suggests. But transportation is not all about RL, storing facilities and material handling are also fundamental when implementing RL as seen with Vodafone and Telecom. Both companies have stored year by year used mobiles and accessories while waiting for an export licence to ship those products into

another country for refurbishing and recycling. In addition Holcim, stores used oil close to Auckland, Wellington and Christchurch ports while waiting for their ship to deliver cement and load used oil to take back into their cement works. In terms of material handling, companies need to plan the proper infrastructure that can provide flexibility and effectiveness. As seen with Holcim, containers can be introduced in the ships to gain higher capacity for transporting cement and used oil but do not have the appropriate container infrastructure to handle them.

RL ownership

Any person may think that RL is owned by the products' manufacturer when in reality it is not always the case as seen in Vodafone and Telecom. Both telecommunication companies are phone and network retailers in New Zealand. None of them manufacture any of the products they sell and they are the owners of the mobile recycling scheme in New Zealand. Both have invested largely in setting up the mobile recycling scheme and its marketing. They have the support from the MfE but support from phone and mobile manufacturers still lack. The reasons why phone and mobile manufacturers are not involved in the mobile recycling scheme in New Zealand are unknown. It can be assumed that phone and mobile manufacturers do not want to pay and are taking a 'free ride' as it should be their responsibility as well but others are taking it.

Other manufacturers such as Frucor Beverages, F&P, Resene, and 3M in New Zealand do take responsibility after their products. For instance Frucor Beverages know about RL of used products and are working in conjunction with Coca-Cola and other beverage industry to share ideas on how to implement such concept as an industry. F&P manufactures white ware and offers a take-back product service where they disassemble and sort the materials for reuse and recycle. Resene manufactures paint and also offers a take-back product at their ColorShops for donation and recycling. 3M manufactures adhesive tapes and does not offer take back in New Zealand as most of their product is exported but do recycle any waste.

Manufacturers, retailers and consumers should be involved in RL. The reason why manufacturers should be involved is because they are the owners of what they produce. In the past, manufacturers used to manufacture products and forget about them when sold to the retailer or consumer. Today with environmental concerns and stakeholders pressures, manufacturers need to think of their products as been leased. At least, manufacturers should think about the products end of life and the best way to dispose of them being reusing, recycling, refurbishing or landfill. Retailers and consumers also should play a responsibility role in RL as retailers sell them and consumers use them. As the MfE3, *“the consumer has the responsibility as well because they use those things”*. Particularly for consumers, takes time to think of the products or packaging they pay for as leased not as owned as well as take-back product and recycling schemes in place. According to the MfE, Vodafone, Telecom and Resene, it is difficult to raise public awareness among consumers around take-back schemes as it is relatively new in New Zealand. RL takes work as it has to make sure that the end-consumer participates on it by returning the used product and/or packaging.

Closed-loops in New Zealand

In New Zealand, companies often do not introduce their recycling materials back into the manufacturing of new products. Most companies take back their product or packaging for recycling into other non-related products. For example, Resene recycles their paint cans into other metal cans, Vodafone recycle their mobiles into traffic cones, and Tyre Track recycles their tyres for horse arenas. Therefore a closed-loop is not applied in New Zealand if returned products and packaging are to be used back into the production of related new products. A reason why closed-loops are difficult to find in New Zealand is the perception around recycling and reusing. Some companies think that recycling and reusing can decrease the quality and price of the new product. Another reason is that the company may not have the capability to manufacture such product or packaging as it is outsourced. For example, Frucor Beverages does not manufacture plastic bottles (packaging) but the beverages only. According to Geyer et al., (2004), in a closed- loop resources from used products and materials are used to manufacture products of the original product type.

There may be few companies that will use recycling or reusing materials from used products into new products such as F&P. F&P packaging is reused over and over again for new products as customers do not see their appliance with the packaging because F&P takes it down from the delivery truck without the packaging and install it in a home, building or any place. Recycling is mostly outsourced to recycling companies in New Zealand and overseas. Some of the companies follow-up their used product when sent to the recycler such as Vodafone, Telecom, Fletcher Building and Holcim.

Generally speaking, the reverse flow from a supply chain closed-loop is applied in New Zealand until the recovery stage taken from Krikke et al. (2004) model. From such model, re-distribution and sales in secondary markets were not mentioned in any of the companies that participated in the study. In fact, only 3M1 and 3M2 mentioned that their *“used products and waste were recycled and disposed of them within 3M employees if needed but not in secondary markets”* as it could affect their brand and reputation. Recycling used products, packaging and waste is highly done in New Zealand but companies are careful not to sell defective products or recalls with their logos or names that could relate to the company as it could affect their image. Particularly in New Zealand, that is small country compared to others and word of mouth spreads out quickly.

Perception of RL

RL has been considered as loss and usually placed as far away from corporate headquarters Take it back! (2007). This is consistent with Jayaraman et al., (2007) when saying *“companies are not used to thinking that the things they expel such as products, waste and resources actually have value”*. Companies have not put enough emphasis on the benefits and returns from RL as financial numbers are hard to predict. Such concept has been ignored for the past years. Today RL is a hot topic for companies, practitioners and academics as more journals and publications on this have been publicised in 2007. Driving forces in RL has been researched by Chan (2007), sustainability in RL has been researched by Mills (2007), and factors motivating RL in Spain have been researched by Alvarez-Gil et al., (2007). Before this study was undertaken, there

was little literature on factors or driving forces influencing companies to undertake RL.

The study confirms Rogers et al., (2001) conclusion where the authors stated that many companies are beginning to realise that RL is often a strategic part of the business. It is part of strategic considerations and corporate policy because the company as whole can win or loose from it. The term *“has gained increased attention in the last decade and has been a new frontier of strategic management”* (Chan, 2007). Most companies in New Zealand consider RL as a source of competitive advantage. This is in accordance with Jayaraman et al., (2007) when describing that a company’s capability of managing RL is difficult to imitate thus providing a sustained competitive advantage. Such advantage can only be gained when there is no regulations to force them have a RL system in place as it will dictate how they need to operate and will not differentiate from others. Most of the companies that participated in the study agreed that each of them can do better in terms of putting RL systems in place for themselves rather than having external groups dictating such system needs to be implemented. In addition the MfE1 stated that companies in New Zealand with take-back product schemes *“are comfortable with the models they have and are prepared to pay the cost to see a marketing advantage”*. Companies in New Zealand have demonstrated a proactive move in this situation considering there is no legislation in place yet. But what are the factors driving RL or what companies in New Zealand called product stewardship?

Factors driving RL

There is a debate in RL literature of factors influencing companies to implement RL activities such as take-back product, recycling, reusing, reducing and refurbishing worldwide. A study that concentrated on factors motivating companies to implement RL in Spain was recently published in mid-2007. The authors (Alvarez-Gil et al., 2007) suggested that stakeholders, environmental issues, regulations and change in strategic focus (also known as leadership throughout this research thesis) have encouraged activities such as returns, refurbish and recycle. This appears true in New Zealand as well because those

four factors were found in this research thesis besides marketing, economic and information.

Other studies on the topic that have been conducted demonstrate similar factors. For instance, the Take it back! (1996) article shows that regulations are a main driver. Chan (2007) states that economic and environment are main drivers as well forcing the implementation of RL. Economic, corporate citizenship and legislation have also been confirmed by de Brito et al., (2004) as main driving forces for RL implementation. Furthermore, Jayaraman et al., (2007) state that economic, marketing, regulation and leadership are key drivers for RL. At present information is the only one driver that has not been mentioned in other studies.

Factor 1: Stakeholders

Stakeholders have influenced companies in New Zealand and Spain (Alvarez-Gil et al., 2007) to implement RL. There are different pressuring groups in the development of RL programmes such as customers, consumers, shareholders, government, employees, suppliers and community. Each stakeholder provides a different pressure as interests are different but that is not the only aspect promoting RL. Some authors emphasised this further, indicating that the notoriety of stakeholders increase as they acquire power, legitimacy and urgency (Alvarez-Gil et al., 2000). For example, large customers and shareholders are demanding take-back product and recycling schemes as a way of achieving sustainable competitive advantage. In New Zealand, Vodafone, Resene, F&P, Fletcher Building, 3M, Telecom, Frucor Beverages and Holcim confirmed that strong influence from their large customers and shareholders have push them to implement RL. Customers may ask for longer periods of warranties and shareholders may claim profit maximisation through handling recalls and reuse (Alvarez-Gil et al., 2007). This group of stakeholders now expect RL as part of companies' operations.

Shareholders expect RL as many of them see it as the right thing to do, in other words corporate responsibility. As seen with Vodafone NZ, the mobile recycling scheme is part of the company's corporate responsibility and they have been

measured on outcomes coming from such scheme. F&P provides a RL service as they see it as *“quite important ... we provide such service to our external customers and internal customers ... making sure that we do what we say”* expressed F&P2. As RL gains recognition worldwide, shareholders are putting even more pressure on the implementation of RL. Authors from the article *Take it back! Reverse logistics* (1996) agree that RL is one of the fastest growing processes in the logistics industry.

Individual consumers were noticed to be of low influence to the company at this stage as mentioned by Frucor Beverages, Telecom and Resene. In fact raising public awareness on RL activities have been an issue in New Zealand for Vodafone, Telecom and Resene. Individuals are missing the knowledge and information of current RL activities. There has been a lot of capital invested in marketing to ‘awake’ people and persuade them to participate in the RL process by only returning their used product and avoid throwing it to the rubbish. One of the reasons why consumers are not fully aware of RL is due to the insufficient media news and marketing from a wider industry.

It is assumed that the government in New Zealand is feeling pressure on what to do with waste as landfills are filling up and environmental impacts such as global warming is been on the news worldwide. As a regulation group, they have the responsibility to look after the country and its people. To a certain degree they have induced companies in New Zealand to operate in a sustainable way. This is consistent to what MfE1 said *“NZ government intervenes often in a lot of related stuff (RL) that will actively save money to businesses”*. The MfE have been supportive to companies in New Zealand that are starting take-back product and recycling schemes. Other governments also have the pressure on persuading companies to implement RL as they feel the burden of how to manage ‘the mounting pile of garbage’ *Take it back!* (1996).

Community is a group from stakeholders that was not mentioned in any RL literature. According to the research findings, this group also has an effect on RL implementation. As seen with Sanitarium operations, the community surrounding the plant asked for a clean supply chain operation. Furthermore

Holcim, considers the community as key for their operational strategic plans by asking them their opinions and ideas of current and future operations. Other companies such as Vodafone are influenced by their corporate responsibility policies which include helping people from developing countries to stay in contact by using refurbished mobiles.

Requirements from different stakeholders such as customers, employees and government have an influence on the final decision of RL implementation (Alvarez-Gil et al., 2007). This is coherent to the research findings as on one side, customers such as the NZ government for Telecom is pushing towards sustainability through Govt3. On the other side, *“Vodafone employees expect the company to have large financial returns and good corporate responsibility”*, according to VOD1. Furthermore government in New Zealand has been talking about the ‘waste minimisation bill’ that could potentially become legislation.

In summary, stakeholders are major factor in RL implementation because they are the cause for the company’s success. This is in concordance with Clarkson (1995) and Post et al., (2002) relating to the survival and success of a company as a consequence of maintaining good relationships and networks with stakeholders. In addition, the natural environment fits in the companies’ success as well.

Factor 2: Green Sustainability

Environmental impacts on non-returnable products and materials are suggested in Chan’s (2007) study which is consistent to the research findings as products and packaging that are not returned are thrown into landfills and polluting the environment. Opportunities, where possible, have been taken by companies in New Zealand to minimise waste as seen with 3M, Holcim and Fletcher Building. Previously it was mentioned that 3M has been following the pollution-prevention pay principle; Holcim and Fletcher Building have reused waste in their processes to avoid pollution in larger quantities (e.g. landfills).

Corporate responsibility or ‘doing the right thing’ environmentally speaking has allowed RL implementation in some companies in New Zealand. Corporate responsibility appears to come from parent and mature companies or/and company’s top management. This is in concordance with the Ballantyne (2007) study which suggests that particularly for New Zealand motivations on RL are based on the practices of the company’s parent company. This is further sustained by Frucor Beverages case, whose parent company is Danone in France, who influence them to incorporate environmental management systems that include recycling and reusing.

Evidence suggests that some companies in New Zealand looked at “*what was happening to the products they were selling once consumers had finished with them and they were not pleased with what they saw*” (e.g., TEL1). Understanding the products end of life is becoming a common thing to do with environmental pressures. Companies do not want to get affected by poor disposal of their products and packaging as it was also found to affect their image as whole. It is also about “*business having to accept environmental cost of their products*” as MfE2 mentioned. This is consistent with Le Pla (2006) in relation to companies looking at environmental degradation as a risk of their continued profit. Working with environmental groups can help companies in New Zealand and worldwide obtain ideas on how to improve their reverse flow. This is supported by MfE3 who mentioned that the beverage industry in New Zealand is “*more like an information type of group*”.

Europe has been a leader in environmental practices including RL activities such as recycling. According to the NZ telecommunications industry, Europe has a strong recycling capability. This statement is also supported by FRU1 when stating that “*technology in terms of disposal methods is advanced in Europe and United States but not in New Zealand*”. One of the possible reasons why Europe is advanced in environmental practices, as seen in *figure 16*, is because they have environmental legislation in place since early 2000s. New Zealand on the contrary, has developed voluntary recycling schemes which have been considered “*successful*” according to MfE1.

Environmental practices

Figure 16. Worldwide environmental practices in 2007.

The figure above was created by the researcher based on judgement from the 22 interviews with companies and Ministry in New Zealand. It seems that if New Zealand develops legislation, they would come closer to Europe but this is not what most of the companies from the study want as their current schemes are working fine for them. RES1, for example, mentioned that *“if legislation is put in place, available options should be granted as they are in the best position to determine what is sensible to do”*. The situation then brings up how legislation should be applied in New Zealand to help those companies who have implemented RL activities and force those companies that do not have any returns system in place. This ideas is supported by MfE1 when saying *“with regulation, New Zealand should be able to progress than other countries...”*.

Factor 3: Leadership

Senior management have a strong influence in how RL is implemented in a company. Senior managers are involved in strategic changes and decisions in most companies. Therefore as RL becomes a more strategic subject, senior managers play an important role on its implementation. This is consistent with Alvarez-Gil et al., (2007) study in relation to the strategic perspective of the decision makers in the company. RL implementation is not simple as it takes enough resources to get it ongoing and one of them is people. This is supported by most of the companies in New Zealand that were interviewed. Resene, for example, had their marketing manager’s time and work as well as supportive

culture at all management levels. Strong leadership to inspire employees makes it a little bit easier than if it is lacking.

The company's philosophy and culture were considered part of leadership in this research as they can be seen as guidelines to reach a common goal. Company's philosophy and culture made it possible for Vodafone, Resene and 3M NZ to implement RL. Owners and shareholders are highly involved in long-term strategic practices represented in the company's philosophy. This is supported by Ballantyne (2007) when referring to corporate philosophy as a motivation that represents the owner's wishes of the company. The company's success in terms of RL performance is often attributed to the company's philosophy and culture. People working in an environment surrounded by confident and encouraged work managers and colleagues, helps achieve shared-goals.

RL is a strategic process that was ignored for a long time and people did not want to get involved in it as it was perceived as 'useless'. Now, in order to change such perception leadership has stressed its importance. Bottom-line people need top management to give the example and show that it is really worth doing. This was supported by Holcim when persuading their employees that good return on investment was been made with RL. Employees need a reason to work towards set goals which in some companies includes RL. Furthermore as mentioned by Jayaraman et al., (2007), RL deserves much attention at the corporate level as it should be managed as a business processes that can create value to the company.

Factor 4: Marketing

Marketing has been mentioned in some RL literature as a factor that influences the implementation of RL. Few authors in RL literature acknowledge the marketing benefits that come out of RL. This is supported by Jayaraman et al., (2007) when referring the return process as a way to increase loyal customer base and attract new ones. Jayaraman et al., (2007) statement is consistent with research findings as half of the companies that participated in the study assured that RL has given them the opportunity to obtain new customers and

maintaining the existing ones. RL can improve access to new customer segments.

Brand awareness results partially from RL system as people remember which companies have returns service. In New Zealand there are generally around “*one to three companies per industry that are doing RL*”, according to MfE2. So it is not difficult for people to know which companies in New Zealand have returns process as it is a small country. Brand is an important tool for marketers as customers uses it as cue to infer certain products’ attributes (Krishnan et al., 2001). Companies that have linked RL and brand such as Resene and F&P, have received more attention from the media as they are presented with a positive image.

Fletcher Building have also gained a ‘clean’ and ‘green’ image in the way they operate in New Zealand and overseas. This makes it attractive to shareholders to invest in a sustainable company where future may be foreseen. This is supported by HOL1 when saying “*we have built reputation, image ... trust by doing things well for many years ... it is opening up other opportunities for us*”. According to MfE1, 17% of New Zealand companies base their image on environmental claims. RL provides this green image as it focuses on removing used products and waste from consumers as effective and clean as possible. It is based on the fact that RL activities take value out of used products and waste by recycling, reusing and refurbishing rather than throwing everything into landfills. Some used products and waste go into landfills by mistake or because the only disposal method available for such product is landfills.

In New Zealand, city and regional councils have stopped taking few products, packaging and waste from households leaving companies and people to sort that out. For example paint cans are not picked up from households by some city and regional councils. Customers value the returns service, especially if the country’s waste system does not pick up certain products or packaging. This is in concordance with Witt (2007) study when relating RL as a major aspect of customer service. One of the main reasons why F&P in New Zealand implemented RL was to gain marketing advantage against their competitors

whose presence is global (e.g. General Electric). Certainly, the new marketing approach that markets RL can differentiate companies in New Zealand. This is supported by F&P when describing the benefits they have obtained from RL such as higher customer base.

In summary, companies, practitioners and academics have concentrated on other factors influencing the implementation of RL that marketing has left aside. Many may think that marketing is a “cold”, “profit-driven”, “image” subject that would not consider used products and waste. Marketing is worth to consider when implementing RL as it has become a natural part of supply chain (Witt, 2007). Furthermore RL offers the capability to respond to customers’ needs and requirements in after-sales situations.

Factor 5: Economic

Early RL literature shows the economic factor as a main driver for the use of RL activities (de Brito et al., 2004 and Chan, 2004). It was indicated in this study that companies in New Zealand are driven by cost-reduction and savings. Half of the companies interviewed in the study acknowledged that they are using RL activities in order to secure the company’s future income. If there is the opportunity to utilise used products, packaging and waste as input for operations without sacrificing quality, then companies become interested in implementing RL.

Changing top management attitude about RL is complex when numbers are not offered. A cost-benefit analysis (CBA) is one of the tools that provide information of the feasibility of a RL project. Most of the companies in the study mentioned that RL need to provide some kind of benefits in order to implement RL. It may be in monetary or responsibility terms. For example, Vodafone is not getting any profit out of the mobile recycling scheme but they have obtained corporate responsibility that is valuable for shareholders, customers and employees.

Companies can add value to their operations by effectively implementing RL activities. Some companies worldwide are looking into taking full advantage of

the product's useful life through leasing, recycling and more efficient packaging Take it back! (1996). This can be seen when companies such as Vodafone and Telecom, in practical terms, when asking customers to return mobiles for free. There were incentives for mobile owners to return their used mobiles in 2005 by Vodafone and they got more phones than expected but the incentive costs were high. It is up to the consumer to return used product as mentioned previously consumers, retailers and manufacturers should share responsibility.

Return on investment was found in the study to be one of the primary motives to implement RL but it was not what the ten companies that were interviewed mentioned. This shows that companies in New Zealand are driven more around stakeholders and environment when it comes to RL. Some of the companies in New Zealand are not making money out of RL yet. It has been forecasted that in the future they will make money but not at this stage. Doing RL to save costs has been seen in New Zealand in the building and construction sector. Therefore RL may not generate money in short-term but costs can be saved.

Factor 6: Regulation

The regulation factor was mentioned by few companies in the study as a driver for RL implementation. A possible reason for that is the lack of New Zealand legislation around take-back product and companies' responsibility on the products they manufacture and sell to the public. In the past, it can be inferred most companies in New Zealand have implemented RL activities due to other reasons than regulation. This is supported by RES1 mentioned "*we do this because we want to ... it is the way we think*". Regulation was not often mentioned during the interviews as a strong factor for RL implementation due to New Zealand's current legislations.

Regulations are changing in New Zealand as they include environmental aspects. There have been some statements in New Zealand referring to the 'waste minimisation bill', 'container deposit legislation' and 'Govt3'. In order to respond to future legislations, some companies in New Zealand have started to plan and execute RL programmes with environmental consideration. A risk-attitude has been taken by some companies in New Zealand.

European regulations have shown to influence New Zealand regulations by considering environmental issues worldwide. In Europe legislations such as Waste Electrical and Electronic Equipment (WEEE), Directive on Restrictions of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) and Extended Producer Responsibility (EPR), have dictated legal obligations to companies in Europe. Full application of EPR began in Europe in July 1st, 2007 (Mills, 2007). In fact companies in New Zealand whose parent company is located in Europe has influenced them to implement RL activities.

Despite regulations in Europe, companies have not realised the implications it will have on the design of their products (Mills, 2007). This is consistent with companies in New Zealand as there was only one company, F&P, where their products' design is influenced by F&P director's vision on future green legislations. Most of the companies in New Zealand concentrate on how to handle used products, packaging and waste. Thinking on products' design is close to start in New Zealand. Resene, Frucor Beverages and Sanitarium are investigating alternative packaging to their products that can be disposed easily and safely.

Factor 7: Information

Only one company in New Zealand, Tyre Track, mentioned that information is a driver for RL. In such case, RL is driven by technological information as it offers statistics and forecasts of used product. The findings in this research appear to be in accordance with Connaughton (2007) when stating "*in reality without the right technology in place, it is practically impossible to enforce the standard processes required...*".

Information also provides operational transparency to companies with regards a product life cycle. Mills (2007) admits that we are in a world of greater transparency since events like Enron and Worldcom, where businesses have to answer to consequences of their decisions. RL fits well when there are defective products recalled or issues with the environment by offering an after-sale

service. Having an effective information technology helps companies track and monitor the products' life. This information is useful when there are decisions to be made in uncertain grounds. Uncertainty refers to companies not knowing when the product will be returned as well as its quantity and quality.

Europe: the leader in RL activities

As the world becomes more competitive, companies have looked at the end part of the supply chain: RL (Field, 2006). Companies in Europe and New Zealand have found opportunities for growth with RL implementation. The difference between Europe and New Zealand is that in Europe there are environmental laws (e.g. EPR) that obligate companies to operate within those laws changing their traditional logistics to a more integrated one. In fact parent companies based in Europe pressure their subsidiaries in New Zealand to operate as if they were in Europe by incorporating RL in their operations.

Leadership is demonstrated by European companies because their environmental initiatives are far way advanced than other non-European countries. This is consistent with Jayaraman et al., (2007) study stating that Europe is a place where RL processes are maturing and associated to the environment. Jayaraman et al., (2007) also mentioned that over the last 10 – 15 years, Europe got new environmental laws. This is supported by the MfE in New Zealand when referring to Europe as having an integrated policy where companies need to look at the complete product life cycle and its environmental impact, rather than solely waste. When dealing with European companies, they require suppliers to operate within environmental standards. In a situation like this, RL comes useful as it is the process for handling and disposing off returns thus minimising the use of virgin raw materials.

“Europe is at the top with regards RL implementation”, mentioned MfE1. But New Zealand is considered a leader as well in voluntarily product stewardship schemes as there is no legislation at present. The MfE in New Zealand considers the schemes as successful because they have been adapted to what the company can do and knows are best. It is admired how, since early 2000's, a few New Zealand companies started to think on the returns process and implemented

adequate systems. This can be seen with Resene, who went through many RL trials to validate its outcomes; Vodafone, set targets to retrieve unused mobiles from the public for better disposal; F&P, organised a 'huge' truck to pick-up old appliances and recycle some parts in their factory; Holcim and Fletcher Building, used alternative waste materials in their processes; Tyre Track, set up a tendering process to link collectors and tyre dealers; 3M NZ, applied US environmental policies that are higher in standard compared to New Zealand; Frucor Beverages, started its implementation of the environmental management system and recycling; Telecom, joined Vodafone and MfE in the recycling scheme by helping with marketing and resources; and Sanitarium, organised their waste for proper disposal.

Chapter 7: Conclusion

Overview

The thesis concludes with a brief discussion of the theoretical and practical significance of the study, its managerial implications, limitations, and proposed agenda for future research.

Significance of the study

The research is relevant to current environmental and operations issues experienced by companies worldwide. Interest and knowledge on the area of RL has increased as a response for recovering used products and packaging. As part of the research significance, it helps for the sharing of information with other companies that can improve their current strategies and operations; and with academics that can investigate other gaps within RL. This research had a main research question which explored the implementation of RL in companies operating in New Zealand with an environmental perspective. The overall research question was: *What are the factors driving the implementation of RL for companies in New Zealand with an environmental perspective?* In order to assist in answering this question, two sub-questions were developed:

- What does RL mean for companies in New Zealand?
- Hierarchically, what is the relative strength of the factors driving the implementation of RL in New Zealand?

The methodology that was used to answer the overall research question was semi-structured interview with open-ended questions. The sample was two managers from each of the ten companies and three managers from the Ministry in New Zealand that agreed to participate in this research. The areas covered in the interviews included the RL concept, factors influencing the company to implement RL, and RL resources, benefits, and challenges. The interviews were exploratory in nature as RL is still an emerging subject for research. Few studies relating to factors that influence RL in other countries were published when this research was completed.

Results of the study

In terms of answering **the first sub-question** of what does RL mean for companies in New Zealand?, the researcher found that RL is also known as part of product stewardship programmes for many companies in New Zealand. Product stewardship reflects a broader picture of RL as it considers reasons for the backward flow. RL as a sole concept lacks of high awareness for some companies in New Zealand. Still most interviewees mentioned that RL was a process of having material or product back to a specific point which is correct according to Ross (1998).

Within the concept of RL, taking responsibility of the product and using materials in a different way were emphasized. A relation between corporate responsibility and RL was found. RL does not include only the economic side of the company but also the environment side. Throughout this research it was found that RL has a relation with the environment through its disposal methods. In New Zealand, the most common disposal methods were reusing, recycling, refurbishing and landfill. Many authors such as Lambert (1981), Stock (1998), Murphy (1989) and Poist (2003) have not described RL with a natural environment component.

As the RL concept is relatively new in business, ownership has not been clearly identified by some companies in New Zealand. Some manufacturers do take responsibility for their products and materials but others are passive in the sense that they do little in recovering their used products. This was mainly seen within the telecommunications industry where retailers market the take-back product and recycling schemes, whereas phone manufacturers provided little to no involvement. It was found that companies need to realise that RL is there and can affect the products and materials design. At present, companies in New Zealand are looking at different type of materials for manufacturing products considering safe disposal.

RL is similar to forward logistics but in opposite direction in terms of process and flow. Transportation mode, warehouse, used product and material handling, and network and information flow were found to be activities of RL

which are similar to forward logistics. The difference between RL and forward logistics is that RL is seen 'messy and uncertain' if the product is not recalled. It deals with recovering products and materials for proper disposal methods. RL also has a perception of 'dealing with waste' which not many senior managers want to manage. Furthermore both RL and forward logistics, when linked can form what is called 'closed-loops'. Closed-loops were not seen in the sample taken from New Zealand due to the companies' perceptions around recycling and the lack of recycling capabilities. Most of the companies did not reuse or recycle their products within New Zealand; rather they tended to transport them overseas for reuse, recycle and refurbish.

In terms of answering **the second sub-question** of what is the relative strength of the factors driving the implementation of RL in New Zealand? (Hierarchically), the researcher counted the number of each of the seven factors from all interviewees. It was found that factors promoting the implementation of RL in prioritised order were:

- 1) Stakeholders (18 interviewees)
- 2) Green Sustainability (9 interviewees)
- 3) Leadership (9 interviewees)
- 4) Marketing (8 interviewees)
- 5) Economic (5 interviewees)
- 6) Regulation (6 interviewees)
- 7) Information (1 interviewees)

The way the seven factors were established was through classification of interviewees' responses around factors influencing their company to shift its strategy and operations which involved RL. Such classification assisted the researcher to answer **the overall research question** of what are the factors driving the implementation of RL practices for companies in New Zealand with an environmental perspective. The information factor was the only one not mentioned in other studies of RL.

It was found that the stakeholders' factor, every stakeholder puts pressure on the implementation of RL. The type of pressure is different as each stakeholder

has different interests. Individual consumers were found to have the least influence of all other stakeholders. In fact, one of the challenges faced by companies in New Zealand is to increase public awareness on take-back product schemes. Shareholders, government, employees and large customers were found to put a large pressure to the company's decision to implement RL. The only stakeholder not mentioned in other RL literature was the community. In this research, some companies considered the community's opinions around the companies' operations.

The green sustainability factor came from the most used phrase by most companies who participated in the study: 'the right thing to do'. An interesting finding was their RL operations as voluntary schemes. There was no legislation with regards take-back product and recycling schemes at the time of the interviews in New Zealand. In contrast, Europe has environmental legislations where countries from the EU have to follow as well as other countries doing business with Europe. Some of the companies in New Zealand had their parent company in Europe and United States, which are leaders in environmental practices and influenced them to comply with environmental laws.

As part of the leadership factor, the companies' culture and philosophy influenced managers to bottom line employees to be enthusiastic about RL. Specifically senior management proactive actions around RL were seen as example to employees. Senior managers' full support and vision made it easier for some companies to implement RL. The key is to have passion about what the company does and this can be achieved with the companies' senior management and corporate responsibility.

RL had been also implemented for marketing purposes. Marketing was another factor due to its ability to increase loyal customers and attracting new customers. RL has given companies a 'clean and green' image which not only attracts customers but also investors. Particularly at this point in time where people are becoming more environmentally conscious, RL comes as a strategy to increase brand awareness or re-enforce the existing brand. It was found that

marketing departments need to work in conjunction with other departments which are involved in RL.

Some companies referred to the economic factor as important for the implementation of RL as it secures the companies' future financial gains. RL is known to add value to operations but many companies under study acknowledged that they have not made money yet. Few companies are starting to make money after considerable years working on RL. The problem is that RL does not come as a 'recipe' for companies. It depends on each company and how it will be implemented.

Few companies mentioned regulation and information as factors for the implementation of RL. The companies that mentioned regulation thought of future New Zealand change in legislation. New Zealand upcoming legislations include the waste minimisation proposal, container deposit legislation and Govt3. Information was the factor mentioned by only one company. This factor was relevant to Tyre Track as they have a tendering system. It was found that companies aiming for operational transparency can achieve it through RL. This allows full control of the product and material from manufacturing to disposal.

There is a challenge to get small businesses involved in RL activities as their resources are fewer than big companies. According to MfE2, *"small businesses lack of time and expertise so implementing RL activities for them is almost changing the direction of the business"*. *"Business and people's priorities also inhibit the implementation of such tools"*, expressed SAN1. The reason for small businesses not having RL in place in New Zealand is that it is a relatively new concept that larger companies are presently experiencing.

Managerial implications

This research has highlighted some of the issues faced by companies in New Zealand seeking to implement RL practices. In particular, issues in RL are presented in operational and strategic levels. Therefore, seven managerial implications are suggested in this research to minimise such issues. These implications do not apply to all industries as each is different in terms of the

type of product and service provided, strategic goals and vision, and position in the supply chain (e.g. manufacturer or retailer). As Jayaraman et al., (2007) mentioned, each company strategically speaking, should decide whether or not RL activities create sustainable competitive advantage. RL can create a sustained competitive advantage if it works efficiently and effectively as possible and for that to happen, general managerial implications are presented:

Implication #1: Recognise the value of RL

RL offers value to returned product and packaging. This value can be both tangible, in terms of financial returns and intangible, in terms of competitive advantage. Financial returns were seen in Holcim and Fletcher Building when using waste as an alternative fuel source for their processes. Both companies have saved money by not buying virgin raw materials. In addition to reducing operational costs, both companies have minimised the negative environmental impact by maintaining virgin raw materials in their natural environment. Competitive advantage is gained by having a 'good', 'clean', 'green', 'responsible' image and reputation. Recognising this value is important as RL negative perceptions are still out there in the company dynamics.

Value may be not seen in the short run but in the long run it does. The reason for this is that it takes time for a company to set up the RL process and get recognition from internal and external customers. None of the companies that participated in the study accepted that RL provided value within few weeks of implementation. At least, it takes few years to obtain value from RL if well implemented.

Companies, specifically manufacturers and retailers, are now getting to a point where RL is becoming a 'must do' as its importance is increasing. This is supported by Jayaraman et al., (2007) and the MfE in New Zealand when stating that companies are now having to accept environmental costs of their products and packaging when before no one questioned them about it, but now it is a new cost they have to accept. Companies that lack RL can lose customers to their competitors.

Returns should not be seen as waste but as perishable goods according to Jayaraman et al., (2007). The reason behind this is that if used products are returned and kept stored, they are losing value for future resale. For example, used mobiles are being kept in warehouses until appropriate export licences are provided to Vodafone and Telecom. Both companies acknowledge that used mobiles and phones are losing value as the industry changes product in a fast pace. Materials from used products that can be recycled such as metals also lose value if they are stored and not been processed. Generally this applies for some products and materials than others therefore recognising value in early stages of RL implementation is important.

Implication #2: Plan for reverse logistics RL

The stage of planning in RL and in many other applications is critical for its future performance. Careful planning prevents issues in the operational process and minimises consequent costs for re-evaluating and planning again. Issues may arise from the uncertain rate of returns, transportation and collection (Jayaraman et al., 2007). This is supported by the study as companies in New Zealand designed the RL process considering transportation mode and handling infrastructure such as warehousing and containers. Particularly in New Zealand, due to its nature and geography is complex to design a RL network which is why effective planning comes into place.

Having the above considerations and planning the utilisation of available resources for RL purposes is part of its success. Adequate resources allocated to RL can make the process run smoothly and provide flexibility. Flexibility is reflected in that resources can promote RL trials before formal implementation. At this point, companies have the opportunity to select the best end-destination of used products such as reuse, recycle, refurbish. As mentioned by Jayaraman et al., (2007) if reuse is chosen, sales and marketing need to coordinate to sell used products; if recycle is chosen, forward logistics will utilise different components of the product other than raw material; and if refurbish is chosen, forward logistics has the responsibility to bring back the product to a specified quality level and service life.

Designing products in the planning stage of forward logistics also helps easy and environmental disposal of product and packaging. Having an 'ecodesign' product and packaging can reduce costs of environmental compliance and waste disposal. Moreover it provides the company evidence of been a good corporate citizen and increases market share.

The way to back-up RL plans is by creating contingency plans, so if plan A does not work then plan B is executed while plan A is been re-assessed. As mentioned before, great part of RL involves dealing with uncertainty so even if there are plans in placed, they can change. Uncertainties in quality, quantity and time of returns are commonly presented in every company that has RL. Products can be returned from a range of quality levels from been brand new to completely broken. Furthermore, there can be times where used products and packaging are not returned but other times where it exceeds capacity for handling returns.

Implication #3: Collect information from returns

Information on returns can be gathered once RL operations are working. It can be weekly, monthly, and yearly, depending on the company's targets and plans. But gathering and organising such information can help the company reduce the level of uncertainties and assure effective plans. The information can provide feedback as to the reasons why used products are returned and statistics on quality and quantity for future forecasts. As seen with Tyre Track, this has helped them as statistics show that landfills in New Zealand by 2010 may be completely full, changing the tyres disposal method plans. Software that incorporates the RL process can provide a company tremendous control over the returns handling (Jayaraman et al., 2007).

Information also helps sales and marketing departments to create campaigns that promote the resell of used products. By analysing the information on returns, sales and marketing can identify what type of product is been returned, its market location and segment. Many companies may not want to resell used products as it can affect their brand but by taking out the logo and any identification that relates to the brand can overcome such issue. Information

related to returns, can be useful in sales and marketing if the company decides to recover value by reselling to second markets.

Marketing can also use information to raise public awareness on RL activities such as recycling. As shown in New Zealand, many people do not know that some companies have RL and are asking to return used product for proper disposal. Information can also be used to raise industry awareness which consequently help raise public awareness. Organising meetings with industry and writing reports from the meeting outcomes improves marketing campaigns and strategies.

There are many different opportunities for RL strategies that can be explored from information and reports. In this case, opportunities refer to those that can be taken to reduce costs and increase customer service. Cost reduction can be achieved if alternative biodegradable materials are used in operations. For example, Holcim has looked in using mussel shells as a fuel source rather than coal which is a better opportunity as it reduces costs and coal degradation. Customer service is improved by offering a range of options to handle unwanted and used products.

Implication #4: Search for partnerships in the value chain

An efficient and effective RL process requires of partnerships along the supply chain. Partnerships with collectors, transporters, and recyclers can be identified in early stages of the RL implementation. It depends on whether a company decides to do RL in-house or outsource to a third party. For some companies, RL may distract the company from its core competencies. For other companies, RL is the way the company can be differentiated from others giving more focus on it. Resene uses their own trucks and people to handle returns and reuse paint but do not recycle the products' packaging. The findings show that companies in New Zealand look for overseas recyclers as there are few recyclers in the country. Overseas partnerships are considered when this is the case.

Partnerships among supply chain members occur as information is shared among them for mutual benefits (Ballou, 2004). Partners collaborate to achieve

an uninterrupted RL flow through cost reduction and availability of resources. When partnering with other companies, trust is found to be an impediment. Thus if this lacks then there would not be a successful partnership. In some cases even if companies are dealing with RL due to the environment, they seem reluctant to share information with partners who may have relationships with competitors (Ballou, 2004). Formal agreements between partners can reduce the issue of trust.

Industry partners are essential in a product stewardship scheme, where RL are undertaken, to share ideas and costs. For example, Frucor Beverages share ideas with the beverage industry to implement an industry recycling scheme. Vodafone and Telecom have worked together to raise awareness on the mobile recycling scheme. This involves few meetings with competitors to move forward in the implementation of RL activities. In New Zealand, the issue is that the Commerce Commission only allows limited cooperation within industry, according to the MfE. This needs to be in consideration when partnering with competitors on environmental and RL processes.

Implication #5: Allow communications between stakeholders

Effective communication is essential in every business, particularly when dealing with RL because its process is not predictable. Partners that are involved in the process of RL need to have report for pick-up times and weight of collected used product from the company organising the scheme. The report needs to be frequently updated as the flow of used products can change in season or time of the year. As seen with Holcim, they get updated reports for pick-up used oil and organise delivery of cement at the same time. Besides having updated reports as a source of information, intranet and internet can be used as well due to its immediate means of communication.

Communication with the industry and government in New Zealand is desirable because some companies have been working together to raise awareness and share costs. Spreading communication across industry can facilitate raising public awareness as people can associate the returns process. For example if the whole electronics industry implements RL, no company selling electronics

would have difficulties in raising public awareness on such process. The New Zealand government has encouraged companies to implement more sustainable and environmental practices.

Communication between the government and companies is important particularly to know about future legislations and get prepared for it. Potential legislations about waste minimisation have been communicated in New Zealand to prepare those companies that have not acted responsible towards the products they sell and manufacture. Still companies that have implemented RL activities and assumed responsibility of their products can be impacted by legislation. So communication between companies and government should be maintained.

RL as a relative new process can bring significant changes to the way a company operates. Initially employees may resist to such changes as they are already comfortable the way they have been working. Particularly changes can be perceived as dissemble job positions and offering other positions. Therefore before implementing RL, companies should communicate to all of its employees about the new process that is going to be put in place as well as its consequences. Employees need to feel confident and reassured that the new process is not negatively impacting the company. As seen with Holcim, employees are aware of changes so they are committed to it. As a result, this has worked well for Holcim as employees working in the RL area know that their role is as important as any other role within the company.

Implication #6: Concentrate on research & development

There are many opportunities that companies can take to reduce cost provided by RL. Every used product and packaging can have a second use. As previously mentioned, using waste and recycling components as an alternative source to raw materials is an option in RL. Other options are out there in the market but have not been fully explored in New Zealand.

Research and development (R&D) plays an important role when it comes to opportunities in operations. Companies should invest limited resources in R&D

to identify a range of opportunities for product disposal. At present, some companies in New Zealand have RL activities in place and few have explored options where economic value can be gained. Many of the companies do RL for marketing reasons but it can also be implemented for economic reasons. Resene, for example, has invested in R&D for opportunities that can allow them to reuse used paint and they have found that used paint is appropriate for manufacturing construction materials.

Opportunities should also be investigated in the area of transportation as it is one of the largest costs incurred in forward and RL. Approximately 50% of the logistics costs are due to transportation (Ballou, 2004). The best way to reduce costs in transport is to fully utilise transport mode by avoiding travelling empty. Having transportation solely for RL may be expensive. Therefore integrating transportation from forward logistics to RL can be extremely beneficial.

The R&D department should be in-house rather than outsource as it gives the company the chance to grow from their own ideas. It is one of those departments that can provide sustained competitive advantage as it takes competitors to figure out how to undertake such process. It also provides a first-mover advantage by securing operations and gaining market share. R&D can be informal as seen with Resene, who encourages every employee in each department to think in innovative ideas even if it is not within their job description. Large companies often have difficulties in listening to new ideas from employees as they are 'too busy' but in reality, a new idea can positively affect the company. Employees or bottom line workers know the system better as they have experience and know how to improve. This also applies to RL as there is no correct model for its implementation. The reason behind that is that RL is not applicable to all industries in the same way and its importance has been increasing within the past few years. Jayaraman et al., (2007) supports this by stating "solutions to managing reverse flows of products are not so broad".

Implication #7: Integrate RL in the overall business strategy

Businesses departments within a company often operate independently rather than together to achieve strategic goals. For example, marketing and operations

work independently each concentrating on their objectives which are not necessarily the overall company's objective. This is supported by most of the companies that participated in the study, where departments do not want to have ownership of RL and cooperate to its success. For instance in the telecommunications industry in New Zealand, corporate responsibility and environmental departments struggle to get marketing involved by providing budget to raise public awareness. Each department needs to understand the role of the returns process and its ultimate goals (Jayaraman et al., 2007).

RL is a process that operates strategically. It is not a process seen in the bottom line as substantial value and savings can be obtained if implemented correctly. Therefore *“leadership in resource efficiency should be encouraged”* as mentioned by FLE2. Leadership facilitates the employees RL acceptance. Such leadership can be achieved from top management as an example to employees. If employees see that top management is committed to a process, buy-in from employees may occur quicker. The companies' culture also plays a role in the successful implementation of RL. Resene has a culture where senior management support ideas and practices that impact positively the company in terms of economic and non-economic (e.g. image).

RL respond to sustainability challenges as it deals with the retrieval of waste and used product and packaging. It allows finding balance between society, economy and environment. In fact, recovery is an important element for building up a green and responsible profile as it can substantially reduce volumes of waste disposal (Jayaraman et al., 2007). In brief, RL should be considered as part of a company's strategy where challenges should be analysed and evaluated thus promoting transparent operations.

Limitations of the Research

The size of the companies that participated in this study was large. This limitation does not allow generalising results to medium and small businesses. A small sample of 22 interviews in 10 companies and 1 Ministry means that there is space for studying more companies. The reason for exploring 10 large companies was due to the research timeline and budget. But generalisations can

be made to large companies in New Zealand as the research was undertaken throughout the country and across industries. Having more studies across industries in other countries can help generalise worldwide the factors driving the implementation of RL.

The second limitation to the research was the number of people interviewed per company. Only 2 managers within the same team were interviewed. Perhaps interviewing other managers and line managers/workers from other departments can augment the study's findings. The study did not get the view from people who directly deal with RL operations everyday. Managers and front line employees may have different perspectives with regards to the process.

The third limitation is that the study was undertaken when there were no legislation in New Zealand with regards take-back product schemes. Potential changes in legislation may be seen in the following years. At present, companies have implemented RL voluntarily and have modified their operations with no guidelines from the government. One of the worries of companies in New Zealand is that if legislation is applied, companies would not be able to freely modify their RL operations.

Generally, this research thesis provides relevant information on RL in New Zealand at the time the research was undertaken. Changes on the factors influencing companies to implement RL may change over time as it deals with companies and people who are very dynamic. Dynamism is seen worldwide, not just in New Zealand as part of evolution in businesses and competitive gains. The researcher assumes that future changes would not be drastic but slightly different.

Future Research

Other research which may prove useful areas for further study include:

- Undertaking the same research involving a larger sample of companies with different sizes. This research may provide more substantive findings where generalisations can be made across industry in New Zealand. The research will need to involve an increased number of interviewees and the

application of questionnaires. The combination of both can help achieve an objective analysis.

- Undertaking the same research in another country apart from New Zealand and Spain. This will allow a comparison between countries and knowledge about factors influencing companies worldwide to implement RL.
- Finding out why some manufacturers are not involved in RL? The answer to this can offer reasons for lack of responsibility and ownership of manufactured products. It is quite interesting for both manufacturers and retailers to see to what extent they own RL. This comes mainly from one of the findings throughout this research thesis were it is unknown from when to when manufacturers, retailers and consumers are responsible for used product.
- Determining what is the relation between RL and product stewardship. This research thesis presents a brief section on this but does not cover the whole relationship. Understanding the relationship between RL and product stewardship can be of great significance in New Zealand where both meanings are similar. Perhaps determining exactly what each involves can offer such understanding.
- Exploring RL in two different contexts. One context where there are no legislation around take-back products and extended producer responsibility. The other context where there is legislation. This will allow determining how significant legislation in RL implementation is, as throughout this research it was assumed that legislation strongly affects RL.

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Appendices

Appendix A. Differences between forward logistics and reverse logistics

Aspects	Forward Logistics	Reverse Logistics
Forecasting	Straightforward	Difficult
Transportation	One-to-many	Many-to-one
Quality	Uniform	Non-uniform
Packaging	Often uniform	Often damaged
Destination	Clear	Unclear
Channels	Standardised	Diverse
Disposition	Clear	Unclear
Pricing	Relatively uniform	Dependent/ non-uniform
Speed	Significant	Less significant
Visibility	High	Less
Inventory	Consistent	Not consistent
Product life-cycle	Manageable	Complicated
Negotiation terms	Straightforward	Complicated (additional considerations)
Marketing	Familiar methods used	Complicated methods
Information systems	Real-time tracking systems	No real-time tracking system fully developed

Based on the work of Rogers & Tibben-Lembke (2002).

Appendix B. Semi – structured interview

Masters Research Thesis

LONG SEMI-STRUCTURED INTERVIEW (1-1 1/2 hours)

Reverse logistics: Its Concept and Drivers in New Zealand. Case Studies

SEMI-STRUCTURED QUESTIONS

1. Details of the company background: size, industry, number of employees, core activities, mission, vision, strategy and environmental practices.
2. What do you understand of reverse logistics? / What does this concept mean to your company?
3. Explain the environmental reverse logistics process in your company.
4. What factors are driving your company to adopt reverse logistics from an environmental perspective? (in order of prioritisation).
5. What resources are needed to undertake reverse logistics from an environmental perspective?
6. What benefits have you seen coming out from reverse logistics?
7. What barriers/challenges have you seen intervening in the implementation of reverse logistics?
8. What is the basic reasoning on investing in greening? (eg. Resource savings, waste eliminating, and productivity improvement)
9. Reactive/ Proactive/ Value-seeking:
 - How much resources are committed for environmental management?

- Are there environmental laws for resource commitment and initiating recycling?
 - Has your company integrated environmental activities such as green purchasing and ISO implementation as strategic initiatives?
10. Is “greening” a burden or a source of competitive advantage for your company?
11. What environmental “best practices” is your company currently undertaking?
12. How has reverse logistics evolved since its early stages of implementation?

Appendix C. Cover letter

Letter of Introduction

<Date>

<Company>

Dear <Name>,

Companies worldwide are interested in reverse logistics which is the movement of used and returned products from the end-customer back to the retailer, distributor, manufacturer and/or supplier. Attention has focused on this area as a means of recovering a product's value, improving their marketing, and addressing government legislation and environmental agencies. Reverse logistics includes reducing, reusing, recycling, remanufacturing and refurbishing returned products/materials. Understanding and executing reverse logistics may be an effective way to minimise environmental issues and leverage off consumers' ever growing demands of eco-friendly companies.

My research to date suggests that you and your company are in a position to provide crucial and valuable insights on my research topic. The research study I am undertaking is part of a thesis for the Masters of Management Studies degree at Victoria University. The topic I have chosen examines the factors that drive companies to implement reverse logistics from an environmental perspective such as stewardship programs that may include recycling and take-back products services. In particular, I am interested in looking at all internal and external factors (in prioritised order), benefits, barriers and challenges of environmental reverse logistics.

I would like to ask for your help and participation in this research project. Confidentiality around publishing your company's name can be assured if you wish so. The data I collect will be viewed only by myself, as the principal researcher, and my thesis supervisors, Dr. Arun Elias and Dr. Urs Daellenbach. You will be able to withdraw from the study if you so wish. At the completion of the thesis a summary of the findings will be made available on request.

In total, I will interview ten companies with a New Zealand headquarters. These companies will have implemented reverse logistics such as stewardship programmes including recycling and take-back product services and others will not have.

If you would like any further information, please contact either myself (telephone 09 3684936, email delagacris@student.vuw.ac.nz) or Arun Elias (telephone 04 4635736, email arun.elias@vuw.ac.nz) or Urs Daellenbach (telephone 04 463 5732, email urs.daellenbach@vuw.ac.nz)

I would be extremely grateful for your participation in this study. Thank you in advance for your time and consideration.

Yours sincerely, Cristina Lavender

Appendix D. Information sheet

Research Thesis

INFORMATION HANDOUT

Reverse logistics: Its Concept and Drivers in New Zealand. Case Studies

WHAT IS THE RESEARCH THESIS ABOUT?

Overview

You are invited to take part in a research study that will examine factors that actively drive companies in New Zealand to become involve in reverse logistics from an environmental perspective. Ten different companies in New Zealand will be investigated to carry out the research thesis. This is a relatively new topic that will be studied in New Zealand. The study is being conducted by Cristina Lavender as part of the thesis requirements for the Masters of Management Studies (Logistics) degree being undertaken through Victoria University of Wellington.

If you agree to participate in this study, you will be asked to take part in an audio-taped interview (about 1-1½ hours in length), and, if needed, a follow-up telephone interview to clarify any points. During the interviews, questions will be asked and there will be enough time to freely answer them. The collection of data will take approximately between one to two months (June and July).

In terms of confidentiality, the name of your company can be published or it can have a disguised name such as Company A, Company B, Company C, etc. It is your choice of the type of name your company will be presented in this research thesis.

How will you be affected?

- I am looking for a range of different views from different companies about RL practices. This will be a good time to reflect and

understand your company's current environmental practices and programs. Effective strategies to become more proactive may emerge.

- You will be asked questions that are related to the general concept of reverse logistics, recycling and stewardship programs.
- You will be given a consent form that provides information about the purpose of the study, the researcher, the researcher's supervisors, data management, participation required, and timeline of the research thesis.
- You will be offered a written summary of the findings.

The researcher:

Cristina Lavender is living in Auckland City doing her full-time research thesis and working part-time for a small-medium company as marketing and management consultant. She has studied Industrial and Systems Engineering at ITESM, Mexico and Logistics & Supply Chain Management at University of British Columbia, Canada. Furthermore she has worked for General Electric in Mexico in their Logistics department, where her initial interests on Logistics commenced. Environmental practices curiosity arose after reading news and books on existing environmental issues. Increased knowledge in environmental practices and programs is desired in order to help companies, Ministry of Environment in NZ and community as a whole.

Please complete the consent form attached to confirm your agreement to participate in this research thesis.

Thank you!

Cristina Lavender

Contact information:

RESEARCHER

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Appendix E. Consent form

Masters Research Thesis

RESEARCH AGREEMENT

Title of the Masters Research Thesis:

Reverse logistics: Its Concept and Drivers in New Zealand. Case Studies

- Researcher status

I started my research thesis in February 2007 as the last step before completing my Masters. The main objective for undertaking a research thesis is to help me acquire proper analytical and written communication skills and most importantly provide accurate answers to my research question. The expected date to hand in my Masters Thesis is February 2008.

- Purpose of the interview:

The purpose of the interview is to obtain information involving reasons or factors that relates to what leads/influences companies in New Zealand to apply reverse logistics from an environmental perspective. Stewardship programs are also included in the study and they refer to environmental practices in companies driven by doing what is the “right thing to do”. General environmental reverse logistics practice information is intended to be clearly understood from the interviews. This will allow further contribution in literature and readings on reverse logistics practices, a concept that has not been fully explored in New Zealand.

- Purpose of agreement:

The purpose of this agreement is to ensure that you are informed as much as possible about the purpose of what the research thesis’ data collection and final written report will include. You, as the participant, are allowed to contact the researcher for further details that can add value to the research thesis. Participation in this research thesis is voluntarily. If you have any questions or concerns with regards the research thesis, do not hesitate in contacting the researcher (Cristina Lavender) or any of the

University supervisors (Arun Elias or Urs Daellenbach) within office hours.

- Information available:

Information included in the research thesis, including names of companies, at any stage will always be available to the researcher and University thesis supervisors for academic purposes. The completed research thesis would be available to other researchers, students, and the general public as it will be kept in the Victoria University of Wellington Library. The research thesis may have potential to be published in Business Journals and presented in conferences as it is a new and important topic. Would you like to receive? :

- ☐ Interview notes generated at that time.
- ☐ A written summary of the research findings
- ☐ Feedback in terms of power point presentation with regards findings.

- Confidentiality

Generic titles, such as senior manager or marketing manager, will be used in such a way that the exact interviewee will remain ambiguous. Representative(s) [may be the participant] of your company is asked if it is possible to write their company's name in the research thesis. If the company's name cannot be written down in the research thesis, a disguised name will be provided.

Do you want your company's name written in the research thesis?

- ☐ Yes
 - ☐ No, how you want it to be referred?
-

- Consent to participation in research:

The participant confirms that:

- ☐ I have been provided with adequate information relating to the nature and objectives of this research thesis, I have understood

that information and have been given the opportunity to seek further clarification or explanations.

- ☐ I have understood that I may withdraw myself from this study at any time and before the final analysis of data (August 2007) without providing reasons and without penalty of any sort.
- ☐ I understood that any information or opinions I provide will be kept confidential and reported only in aggregated/non-attributable form.
- ☐ I understood that the interview will be audio-taped.
- ☐ I understood that the information I have provided will be used only for this research thesis and related publications and conferences.
- ☐ I understood that when this research thesis is completed, the transcripts will be destroyed.

- Any more conditions to be written in by the participant:

Participant

Name:

Company name:

Signature:

Date: June, 2007

Researcher:

Name: Cristina Lavender

Signature:

Date: June, 2007

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Appendix F. Codes of interviewees' titles

VOD1 : Vodafone Head of Corporate Responsibility
VOD2 : Vodafone Corporate Responsibility Manager

TEL1 : Telecom Environmental Manager
TEL2 : Telecom Supply Operations Manager

FRU1 : Frucor Beverages Environmental Manager
FRU2 : Frucor Beverages Packaging Manager

SAN1 : Sanitarium Procurement Manager
SAN2 : Sanitarium Logistics Manager

3M1 : 3M Environmental Manager
3M2 : 3M Environmental Manager (new recruit)

F&P1 : F&P Logistics Manager
F&P2 : F&P Recycling Manager

RES1 : Resene Marketing Manager
RES2 : Resene Technical Manager

FLE1 : Fletcher Building Environmental Health and Safety Manager
FLE2 : Pacific Steel Environmental and Energy Manager

HOL1 : Holcim Business Development Manager
HOL2 : Holcim Operations Manager

TYR1 : Tyre Track Administrator

MfE1 : MfE Senior Adviser in the Sustainable Business Group
MfE2 : MfE Senior Adviser in the Sustainable Business Group
MfE3 : MfE Adviser in the Sustainable Business Group