Reverse Logistics Optimization --- A Research to the Uncertainties in the Third Party Reverse Logistics

Case of New Zealand Couriers Ltd

A Thesis Presented in Partial Fulfillment of the Requirements for the Degree of Master of Logistics and Supply Chain Management

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ABSTRACT

During the past decade, there has been an increasing emphasis on supply chain management as a vehicle through which firms can achieve competitiveness in markets (Porter, 1998). A large number of example in the 1990s show how companies have made large investments to streamline their supply chains in order to improve customer satisfaction and increase their internal productivity (Christopher, 1998). The core of this research is to explore the uncertainties in 3PLs reverse logistics. The uncertainty is one of the significant factors, which directly influence the performance of supply chain system (Chopra & Meindl, 2004). There are many researches and theories about the uncertainties in traditional forward logistics; however, there has been limited attention to theory-based research in the returns management arena (Jahre, 1995a; Carter and Ellram, 1998; Daugherty et al., 2001). Managing these returns is known as reverse logistics (Louise, 2010). With the development of economics, the 3PLs reverse logistics will play an increasingly important role in the supply chain system; therefore it is necessary to consider how to improve the 3PLs reverse logistics. This research focuses on the case of New Zealand Couriers, which is Freightways' flagship brand, is positioned as the premier provider of network courier services to New Zealand businesses. Since 1964 New Zealand Couriers Limited has been the leading Courier Company. Case study is one of the significant qualitative research methods, tending to provide in depth information and intimate details about the particular case being studied. This research concerns the reverse logistics in third party logistics companies. Outsourcing already became one of the significant trends in today's logistics and supply chain industry, and the third party logistics company (3PLs) is originally the outcome of the outsourcing logistics function in businesses. Therefore the findings of researching the third party logistics company could have high level of external validity (Cameron & Price, 2009) and the results can be widely applied in many other companies.

Keywords: uncertainty, reverse logistics, supply chain optimization, supply chain management, third-party logistics provider, New Zealand Couriers.

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Chapter 1 Introduction

1.1 Introduction

During the past decade, there has been an increasing emphasis on supply chain management as a vehicle through which firms can achieve competitiveness in markets (Porter, 1998). A large number of example in the 1990s show how companies have made large investments to streamline their supply chains in order to improve customer satisfaction and increase their internal productivity (Christopher, 1998). Nowadays, Return/ reverse logistics became one of the important parts in supply chain management, because the performance of return/ reverse logistics may directly influence the performance of entire supply chain system, and also affect the profitability of businesses.   This research focuses on the reverse logistics in third party logistics companies.   Outsourcing already became one of the significant trends in today's logistics and supply chain industry, and the third party logistics company (3PLs) is originally the outcome of the outsourcing logistics function in businesses. Therefore the findings of researching the third party logistics company could have high level of external validity (Cameron & Price, 2009) and the results can be widely applied in many other companies.

Case study is one of the important research methods in this thesis. And case study is used to identify the common phenomenon and issues of return/ reverse logistics in this research. The main reason the New Zealand Couriers (NZC) has been selected to be investigated in this thesis is that the Courier Company is one of the ideal 3PLs reverse logistics models for many different industries so far. And the services which were provided by Courier Companies have many advantages in reverse logistics, such as integrated networks, good locations and flexible fleet, etc.

The world is not perfect; there are too many uncertainties and unexpected events. According to the previous researches(Simchi-Levi, et al., 2008), the uncertainty is one of the important factors, which directly influence the performance of supply chain system and business processes.   This research will explore the uncertainties in return/ reverse logistics, so that the uncertainties could be minimized and avoided in practical cases.   The return/ reverse logistics is one of important parts of supply chain, therefore there are some existed methods of supply chain optimization would be used in return/ reverse logistics optimization as well, such as TOC, Goldratt's approach (Goldratt & Cox, 2004), etc.

1.2 Background

With the development of economy and society, there is a huge change in our world in the past 100 years, for instance, many new technologies which include internet, IT, new transport, etc. are used into the businesses and organizations.   And also a lot of new trends are emerged, such as the globalization global warming, third party outsourcing and so on.   Those factors do not only affect our current world significantly, but also change the business world.   Logistics was developed sharply since 1980s (Simchi-Levi, et al., 2008), it became more and more important in most of organisations, especially in the large-scale organizations.   Today, logistics function is not only psychical movement of resources within distribution network, but also linkage for different business functions such as manufacturing, operations, marketing, customer services, sales, accounting and finance in supply chain system.

A growing number of people start to understand the importance of supply chain in business, especially during the current global economic recession, a growing number of companies found it is important to use effective and efficient way to manage a business rather than just simply to cut down the cost (Goldratt & Cox, 2004). Many companies are focusing on their efficiency of supply chain system to minimize their cost during the economy recession. However, many companies only concern their forward logistics that is from the raw material to final customer rather than their reverse logistics.   Actually reverse logistics play a significant role in business. Average up to 30% of a company's products might be returned by customers (Louise, 2010), not

just because of faults. For example, a customer (bad customer) unsure what size will fit her best might order two sizes of clothing from a mail order retailer, returning the item she does not want. According to the previous research, there has been limited attention to theory-based research in the returns management arena (Carter and Ellram, 1998; Daugherty et al., 2001).

1.3 Aims and Objectives

- To study, understand and identify the uncertainties in 3PLs reverse logistics
- To find the optimizations solutions/ methods of return/ reverse logistics to reduce these uncertainties

The objectives of the thesis is to study, understand and identify the uncertainties in 3PLs reverse logistics and find the optimizations solutions/ methods of return/ reverse logistics to reduce these uncertainties. The relevant concepts and supply chain optimization methods and strategies would be discussed in this thesis, so that audiences can understand a big picture of logistics and supply chain optimizations. The return/ reverse logistics models in New Zealand Couriers Ltd will be observed and investigated. The findings of research and the solutions/methods of optimizations for the third party reverse logistics would be widely implemented in many different companies and industries.

The core of this research is to explore the uncertainties in 3PLs reverse logistics. The uncertainty is one of the significant factors, which directly influence the performance of supply chain system (Simchi-Levi, et al., 2008). As mentioned above, there are many researches and theories about the uncertainties in traditional forward logistics; however, there has been limited attention to theory-based research in the returns management arena (Carter and Ellram, 1998; Daugherty et al., 2001). New Zealand Couriers' return services will be used to indicate the different return models and return strategies in 3PLs reverse logistics.

Managing these returns is known as reverse logistics (Louise, 2010). The 3PLs reverse logistics plays a vital role in supply chain system; actually reverse logistics is not only used in recycle or reuse, also could be used for product recall, update and exchange.   And today, there are many business activities directly related to 3PLs return/ reverse logistics, because of high costs and

inefficiency, many companies employ the third party logistics services rather than run a own one. Therefore it is necessary to consider the optimizations of 3PLs reverse logistics in order to improve the overall performance. Through the research, the key uncertainties in 3PLs return/ reverse logistics service will be investigated; the relevant strategies and the optimizations solutions/ methods of 3PLs reverse logistics will be discussed.

By the end of this research it is expected that the following aspects could be achieved.

➢ To understand the key concepts in logistics and supply chain optimizations
➢ To identify the key uncertainties in 3PLs reverse logistics
➢ To understand the several methods of logistics and supply chain optimization, which could be used in return/ reverse logistics.
➢ To find the solutions of reducing the uncertainties in 3PLs reverse logistics.
➢ To understand the strategies in both traditional logistics & supply chain and return/ reverse logistics

1.4 Format of Thesis

There are two types of data are used in this thesis. One is the primary data, which is gathered from observation, interview and the other one is secondary data, which is found from Literature review, and New Zealand Couriers' internal documents.

The structure of the thesis will include follow chapters

1. The **first chapter** is an introduction, which introduces the objectives, research purpose, with format of thesis.
2. The **second chapter** summarizes the background of current logistics and supply chain, and some relevant key concepts, such as reverse logistics, third party logistics, and the Courier industry.   There are some return/ reverse logistics optimizations methods and solutions based on the traditional supply chain theories.
3. The **third chapter** a literature review, reviewing relevant literature and showing how this has informed the research issue. The relevant literatures include logistics and supply

chain, return/ reverse logistics and supply chain optimization. Then the return/reverse logistics optimization methods/ solutions are described

4. The **fourth chapter**, methodology chapter introduces the methods used in the research, and the limitations of study. Case study is an important research method, which has been used in this research.

5. The **fifth chapter** is an analysis and discussion chapter. Outlining the findings of the research itself, which include the uncertainties in the return/reverse logistics, impacts of these uncertainties, and key elements of return/reverse logistics management based on the case of New Zealand Couriers. According to analyzing and discussing the findings and solutions, the return/reverse logistics strategies are created. Four types of the return/ reverse logistics is a general guide and map for companies to find the positions of their return activities.

6. The **sixth chapter** is a conclusion based around objectives and findings in this research.

Chapter 2 Background

2.1   Introduction

This Chapter is background chapter, which is used to introduce the general information about the background of current logistics and supply chain industry in the world.   There are five major economies, which include North America, Western Europe, Japan, China Mainland, and Commonwealth of Independent States and Eastern Europe, have been listed and indicated in this chapter.   The general information could help audiences to understand a big picture of current logistics and supply chain industry.   And then the third party logistics and outsourcing in logistics are introduced due to the research focused on the return/ reverse logistics in the third party logistics.   Both the benefits and risks of implementing third part logistics also are discussed in this chapter.   The last part of this chapter focuses on the Courier Company, which is one essential third party logistic model in logistics industry. The case of New Zealand Couriers Ltd is employed in this research. Therefore the background of Courier Company is essential for the audiences to understand the case.   The history of Couriers Company, the primary activities of Couriers Companies, Characteristics of Courier's services and several information technologies are introduced in this part.

2.2   Definitions

There are a host of definitions of logistics. One of the prevailing ones is defined by The Council of Logistics Management as:

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 origin to the point of consumption for the purpose of conforming to customer requirements (Simchi-Levi, et al., 2008, P.5)

What changes took place in the past 100 years? For instance, substantial new technologies which include internet, IT, new transport, etc. were utilized by the businesses and organizations. And

also a lot of new trends emerged, such as the global warming, third party outsourcing and so on. Those factors impacted our daily life and changed the business world significantly. Logistics was developed sharply since 1980s (Simchi-Levi, et al., 2008).   It became more vital for the majority of organizations, especially for the large-scale organizations. Nowadays the function of logistics is not only the psychical movement of resources within distribution network, but also the linkage for different business functions such as manufacturing, operations, marketing, customer services, sales, accounting and finance in supply chain system.

Logistics is a wide field and it has great potential for development in future. As per the definition of logistics management, the logistics management is to manage the way of supplying and/or delivering the right goods. The management involves the right quality and quantity to the right place for the right customer at the right time using the most effective and efficient way. Generally speaking, logistic management is based on the logistic network which involves several different parties including manufacturers, suppliers, warehouses, stores and customers. The network is often linked by the transport system includes air, road, rail, sea and pipeline. (Stock & Lambert, 2001). In the logistics management, one of the most essential aspects is how to choose an effective and efficient way to supply and /or deliver the goods. This includes the raw materials, work in process and finished goods (information).   In many logistics cases, there is more than one way to supply and/ or deliver the goods. So it is significant to find the most suitable, effective and efficient way to minimize the total system-wide cost. Besides, in logistics management, the warehouse plays a key role, because the warehouse is not only a place to store the goods, but also a tool that can be used to manage the inventory in logistics system. For example, to achieve the economies of scale, warehouse can store enough volumes of goods to maximize the utilization of transport, and to reduce the transport cost for each unit.

2.3   Logistics in the Contemporary World

Today, with the development of business and transport, logistics plays a significant role in the economy. For instance, depending on the research report, in United States logistics contributes approximately 9.9 percent of GDP. Also in many other developed countries such as Japan, Germany, UK, and Canada, the cost of logistics is an indispensable component of those countries' GDP (Lambert, Stock, & Ellram, 1998a). This is because there is a very close relationship between logistics and most of the economic activities such as imports, exports, circulation of products and so on. At the same time, the logistics can directly affect the price of products in markets, the volume of imports and exports, energy costs arid availability and many other aspects of the economy; therefore logistics activities have been closely associated with human social activities. It is necessary to look at the big picture worldwide in order to understand the current situation of logistics industry as there are a host of differences in logistics industry for different countries. There are three major geographic regions representing the majority of world economic activity and international trade; North America, Western Europe, and the Pacific Rim which includes China and Japan. These three areas produce 80 percent of the world economic output and account for 75 percent of world exports (Long, 2003). The logistics in North America, Western Europe, Japan, China and CIS/Eastern Europe will be investigated in the following.

2.3.1   North America

North America occupies one of the largest economies in the world. In terms of combined purchasing power parity GDP of its members, as of 2007 the trade bloc is the largest in the world and second largest by nominal GDP comparison.   This area has a larger population and domestic economic product than the combined European Union (EU) and the European Free Trade Association (EFTA).Canada and the United States have the most advanced logistics infrastructure and systems in the world. In United States, logistics contributes approximately 9.9 percent of GDP(Lambert, Stock, & Ellram, 1998b), The North American Free Trade Agreement (NAFTA), which connects with the economies of Canada, the United States, and Mexico, is an agreement

signed by the governments of Canada, Mexico, and the United States to create a trilateral trade bloc in North America. The agreement came into force on January 1, 1994 after superseding the Canada – United States Free Trade Agreement between the U.S. and Canada(Carter & Trimble, 1995).

The goal of NAFTA was to eliminate barriers of trade and investment between the US, Canada and Mexico. The implementation of NAFTA on January 1, 1994, brought the immediate elimination of tariffs for more than a half of U.S. imports from Mexico and more than one third of U.S. exports to Mexico(Long, 2003). Within 10 years of the implementation of the agreement, all US-Mexico tariffs were eliminated except for some U.S. agricultural exports to Mexico that had been planned to be phased out in 15 years. Specifically, most US-Canada trade was duty free. NAFTA also sought to eliminate non-tariff trade barriers. One of the important NAFTA's impacts on North America was to accelerate the development of logistics industry in North America. For instance, most tariffs had been eliminated by the year 2004, and carriers' ability to operate across borders, especially between the United States and Mexico where cross-border movement occur much easily had been enhanced.

2.3.2 Western Europe

Western Europe where the countries are all developed countries is another essential trade bloc in the world. There are 17 developed countries, and the market of logistics is huge in Western Europe where most of top 500 companies in the world are located. The gross regional product of Western Europe is similar to the United Stated, and the population is 397,475,574 in 2009. (Western Europe, 2010) This is a key factor as in the big market, it is easy to gain the customers, and also in the long run, companies have greater potential to grow in the big market compared with the small market.

The transportation deregulation in the Western Europe was described as this "*Accompanying the unification of Western Europe on January 1, 1993, was the deregulation of transportation, particularly motor transport, due to the deregulation, the cost of transportation is reduced by 25% to 50%.*" (Lambert, et al., 1998, P.7). The lower cost is good for the company, especially a new

company, because lower cost means less investment and lower risk. Another trend in logistics industry in Western Europe is the changes in manufacturing. Traditionally, many firms established plants in each country, but after the Europe economic unification, the customs and transit procedures were eliminated. Consequently, a growing number of Europe companies started to set up larger plants and distribution centers which were used to supply goods to multiple countries. There was no doubt that these changes required logistics activities to support. Piles of products need to be transferred around Europe such that logistics activities were stimulated as well(Christopher, 1998).

Some challenges are involved in logistics industry in Western Europe; cost of the distribution channels and logistics network which includes equipments, operation costs and human resources. Human resources are one of the most challengeable factors for companies to perform logistics activities. This is because most European companies treat the whole European market as a single market in order to reduce the inventory level and relevant costs. Therefore, the Europe-wide distribution channel and logistics network is necessary for the logistics companies who want to provide the third part logistics services in Europe; however, the cost of distribution channel and networks is very expensive. Managing the logistics system that multiple countries are involved is a huge and complex project. There are many successful logistics companies and the competition of logistics is fierce. For example, the largest third party logistics company in Europe is "DPWN (Deutsche Post World Net + DHL) Turnover Europe: €13,700 bn (2007), Deutsche Post World Net (DPWN), through its acquisition binge has become the epicenter of far-reaching changes in the European logistics market. Already, a world leading provider of mail, express, logistics and banking services with a turnover of €33.4 billion in 2002, DPWN incorporated DHL and Exel. It had revenues in 2007 of €57,210 bn and its businesses include those formerly owned by such names as Danzas, DHL, AEI, Airborne, ASG, Nedlloyd and Exel." (Rushton, Walker, 2007, P.15). Like other successful 3PL companies, it had its business network, local experience and customers, and offered various value-add and flexible services.

2.3.3 Japan

Japan is one of the most important entities in the world and it was the second largest one in the world in 2009, after the United States in terms of the nominal GDP $5.073 trillion (International Monetary Fund, 2010). According to BBC Business, "China has overtaken Japan as the world's second-biggest economy, Japan's economy was worth $5.474 trillion (£3.414 trillion) at the end of 2010, figures from Tokyo have shown." Despite decreasing growth rates during the economics recession in Asia-pacific region which is one of the most powerful economic regions in the world, Japan is a significantly economic force. The strong economy supports the logistics industry, because activities such as the circulation of raw materials, products, and freight and the export and import are closely related to the logistics. The logistics market in Japan is huge; this country has an extensive logistics system that forms the basis for its export economy. However, when looking at the detail, it is found that the country's main manufacturing region lies in a triangle around the cities of Tokyo, Nagoya and Osaka on the island of Honshu. The heart of logistics activities is located here as well.   In recent years, Japan's industry has focused more intensely on manufacturing in international locations (Japan, 2006). The Japanese logistics company focus on certain business area and the location is one of the most significant aspects in Japanese logistics industry.

As per the previous research (Chopra & Meindl, 2004). Japanese logistics industry is different from other developed countries because of the regulation. Compared with other industrial countries, Japan's distribution system is very complex. Most aspects of goods distribution in Japan are tightly regulated by the government. Joint distribution is typical - that is, competitors who make deliveries to the same businesses tend to use joint delivery capacities and trucks (Japan, 2006). The local regulations and requirements restrict the development of logistics, especially for the foreign companies. It is essential to understand the Japanese regulations and transportation requirements of logistics industry.

Geography also limits the logistics in Japan. *Although Japan consists of more than 5,000 islands, most of the country's population lives on its four main islands, Hokkaido, Honshu, Kyushu und Shikoku. … Construction land that is on level ground is limited and, consequently, expensive. In response to this shortage, airports and major projects are increasingly being built on artificial*

islands in the sea…." (Japan, 2006, P.47). As Japan is island country, the main transport for delivery is road transports and coastal shipping and the most effective rail transport is almost non-existent. What is more, because of the large population, the cost of land is highly expensive.

2.3.4   China Mainland

China is a developing country, the logistics industry in China mainland is new and emerging; however, in recent years the rapid development of the economy in China directly impacts the global economy. As mentioned above, as per BBC Business "China has overtaken Japan as the world's second-biggest economy, Japan's economy was worth $5.474 trillion (£3.414 trillion) at the end of 2010, figures from Tokyo have shown. The logistics industry is booming industry in China, and China already has the world's longest high-speed rail (HSR) network with about 8,358 km (5,193 mi) of routes in service as of January 2011 including 2,197 km (1,365 mi) of rail lines with top speeds of 350 km/h (220 mph) The country is undergoing an HSR building boom. With generous funding from the Chinese government's economic stimulus program, 17,000 km (11,000 mi) of high-speed lines are now under construction. The entire HSR network, which could be used for both passengers and freights, will reach 13,073 km (8,123 mi) by the end of 2011 and 25,000 km (16,000 mi) by the end of 2015. China is the first and only country to have commercial train service on conventional rail lines that can reach 350 km/h (217 mph)'' (Anon, 2011).

The Chinese high-speed rail (HSR) network could directly accelerate the development of logistics industry in China. The domestic market is growing rapidly, and compared with other countries, there are huge potential for companies' further development in the long run. However, there are some challenges in this booming market. The transportation infrastructure is still poor; especially the domestic airfreights in China, there are limited number of airports in China that may influence the performance of services in logistics industry, such as same day delivery or overnight delivery, etc. Fortunately, government already realized this issue; according to the BBC news, China will build another 45 airports over the next five years. The industry regulator said on 12 Feb 2010, raising fresh questions about the potential for overcapacity in the transport sector (Anon. 2011). Lack of formal transportation regulations or laws in logistics industry, some companies may think

this is an advantage for new business; however, with the development of logistics industry this could become an important issue, because logistics industry is similar to other industries and the appropriate regulations and governing are necessary that protect companies and the entire industry in the long run.

2.3.5 Commonwealth of Independent States and Eastern Europe

The logistics industry in CIS and Eastern Europe is quite different from Western Europe, such as different political, different economic systems, different histories and cultures. And the insufficient infrastructure directly influences the logistics business in CIS. Culture differences between western and eastern lead to a big challenge in logistics industry, for example the concepts of marketing is unknown, due to the different systems. The level of productivity in each country is extremely different. Sophisticated logistics techniques and the usage of computerized order processing and information systems are unreachable in most areas of Eastern Europe (Fujita, 2003); however, with the development of globalization, the logistics in this area is moving on fast (Lambert, et al., 1998a).

2.3.6 Some Significant Factors in Logistics Industry

The logistics industries in different countries are different; however, the trend of globalization accelerates the development of logistics worldwide. The large logistics enterprises, which play a vital role in the logistics industry, directly drive the progress of logistics internationally and spread the new ideas and advanced strategies all over the world. As an emerging and booming industry, there are many new issues need to be solved. Especially with the development of new technologies and business, this industry needs continuous improvement to keep up with the world's change. The large international 3PLs firms tend to bring up new solutions and ideas firstly. Whenever the first company brings new things to market, other companies will follow up quickly, for instance in 1978, Fred Smith was famously quoted as, *"The information about the package is just as important as the package itself."* (Basch, 2002, P.23). FedEx who is one of the largest logistics company in the world, is the first company to introduce the track and trace

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system in the world, and also the first company to offer overnight delivery between the U.S., Europe and Asia (Birla, 2005). After a short period of FedEx having those new services many other logistics companies, TNT, UPS etc, started to provide similar services, and implement similar technologies to market. Therefore, large logistics companies could continuously promote and improve the logistics industry worldwide.

2.4 Third Party Logistics and Outsourcing in the Logistics and Supply Chain Industry

The third party logistics providers (3PLs) play a vital role in current logistics industry and they have been developing rapidly along with the development of outsourcing strategy. The option of 3PLs allows companies to get logistics services in an easy way. A growing number of logistics companies have started to provide flexible and customized logistics services which include inbound freight, freight consolidation, warehousing, reverse logistics, distribution, order fulfillment and outbound freight. Overall, 3PLs reverse logistics will be focused on in this research.

2.4.1 What Is The 3rd Party Logistics?

The definition of 3PL, which was found in the Council of Supply Chain Management Professionals, is shown as below.

"A firm provides multiple logistics services for use by customers. Preferably, these services are integrated, or "bundled" together, by the provider. Among the services 3PLs provide are transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding" (Simchi-Levi, et al., 2008, P.15).

The growth of 3PL companies stemmed from 1980s when business started to seek new solutions to maximize their benefits and productivities. Outsourcing logistics which has been adopted in

many large scale companies is one of the prevailing options; therefore those companies could concentrate on their core business. FedEx is one of the most successful and innovative 3PLs in the world. Its overnight delivery service changed the way in which business to business and business to customer transactions operated. This offered businesses the opportunity of using just-in-time techniques, which saved warehousing space and reduced overall costs. The introduction of efficient-consumer-response (ECR) techniques led to smaller and more efficient shipment sizes, which in turn further reduced costs (Black & Hunter, 2003).

Once a company gains the benefits of outsourcing logistics from 3PLs, which will be described below, other competitors will follow it to use 3PLs such that the development of third party logistics companies are directly accelerated. Inevitably a growing number of 3PLs lead to increasing competition and greater savings for the companies. As mentioned above, Fedex who is one of the largest logistics company in the world, was the first company to introduce the track and trace system, to provide the overnight delivery service. After Fedex had those new services very shortly, many other logistics companies such as TNT, UPS etc, start to provide similar services. (Birla, 2005). According to the previous research (Rushton, Walker, 2007), one of the most essential trends of 3PLs is the 3PL provider transited from local or regional business to national or international business. In US, the 3PL market has been growing at a compound annual rate of 14.2 percent since 1996 and in 2006, 3PL's was reported as $89.4 billion in gross revenue (Simchi-Levi, et al., 2008).

2.4.2 The Different Types of 3PL Providers

There are many different 3PLs providers in current market. According to the Hertz and Alfredsson, there are four categories (Hertz, 2003) as below

- Standard 3PL provider: this is the most basic form of a 3PL provider. They would perform activities such as pick, pack, warehousing and distribution (business) – the most basic function of logistics. For the majority of these firms, the 3PL function is not their main activity.

- Service developer: this type of 3PL provider offer their customers advanced value-added services such as tracking, tracing, cross-docking, specific packaging, or providing a unique security system. A solid IT foundation and focusing on scale and scope of economy enable this type of 3PL provider to perform these tasks.

- The customer adapter: this type of 3PL provider comes in at the request of the customer and eventually takes control of the company's logistics activities completely. The 3PL provider improves the logistics dramatically, but it does not issue a new service. The customer base for this type of 3PL provider is typically quite small.

- The customer developer: this is the highest level that a 3PL provider can attain with respect to its processes and activities. This occurs when the 3PL provider integrates itself with the customer and takes over their entire logistics function. These providers tend to have limited customers, but perform extensive and detailed tasks for them.

2.4.3   Benefits of Implementing of Third Part Logistics

The third party logistics, which is one of the most significant concepts in this research, is an outcome of outsourcing strategy in logistics industry. Throughout the 1990s, strategic outsourcing, outsourcing the transportation and logistics of key components, was utilized as a tool to cut costs rapidly (Branch, 2009), especially during the global recession when a large number of companies tried to minimize their costs in all kinds of ways. According to the relevant research (Institute of Chartered Secretaries and Administrators., 1993), the outsourcing is one of the most effective and successful way to reduce the costs of logistics and there are many successful examples about implementing outsourcing strategy in logistics function. Employing third party and outsourcing logistics bring in lots of benefits; the first is economies of scale, which is a vital concept in logistics and supply chain industry and directly influences the costs of the logistics. Achieving the economies of scale is to reduce the costs of logistics per unit through the aggregation of freights and orders from many different shippers. "Economies of scale" is a long run concept and refers to reductions in unit cost as the size of a facility and the usage levels of other inputs increase (Sullivan, 2003).

Secondly, risk pooling is a key concept in supply chain management. It suggests that demand uncertainty is reduced if one aggregates demand across locations because if demand is aggregated across different locations, it becomes more likely that high demand from one customer will be offset by low demand from another (Simchi-Levi, et al., 2008). This reduction in uncertainty allows a decrease in safety stock and consequently average inventory in supply chain is reduced. The third party logistics allows shippers to transfer the demand uncertainty to the 3PL providers, for example a shipper could use New Zealand Couriers to ship one item on Monday and the next day the shipper could send a hundred of items by New Zealand Couriers. One advantage of the 3PLs is that they aggregate demand from many shippers and thus reduce uncertainty through the risk-pooling effect. Therefore, the 3PLs can cut the unit cost by achieving economies of scale while maintaining or even increasing service level through risk pooling.

Thirdly, reducing capital investment is another essential objective in third party logistics. The outsourcing needs to transfer both demand uncertainty and capital investment to the 3PLs. New technologies and equipments could improve the productivities and the performance of logistics and supply chain; however, the expense of the application of new technologies is costly which includes training, equipments, and maintenance. Especially, in New Zealand, most companies are small businesses. 3PLs allows those small or medium companies to enjoy the advantages of new technologies in an easy way. Reducing capital investment also means saving money, as the cost of logistics is a significant component of the price (Stock, 1998), and it is significant to reduce the logistics cost in companies.

Fourthly, focusing on core competency is an advantage of 3PLs; outsourcing logistics allows those non-logistics companies to concentrate on their own core competency. With the development of business and economics, customers have more choices. Consequently, a company has to pay attention to its core strength, that is, the specific talent, skills and knowledge that differentiate it from its competitors and propagate the strength as an advantage from the perspective of customers. For instance Apple focuses on innovation, marketing, products design and sales rather than delivery, therefore the 3PLs is an effective solution for Apple. By the way, the Apple products in online apple store of New Zealand are distributed and delivered by third party logistics companies TNT and New Zealand Couriers.

Last but not least, increased flexibility is a great advantage of employing third party and outsourcing logistics; the flexibility could be found from three aspects which are as follows. The first one is the ability to react to changes in market quickly and correctly. As mentioned

previously, the 3PLs allows companies to focus on their own core competency to satisfy customers' requirements. Companies could utilize minimum resources to maintain and monitor the logistics function via 3PLs; therefore companies would have more resources to face the changes in market and customers' demand. The second is the ability to implement the 3PLs' technical knowledge and network to accelerate product development and extend market. Currently, a host of 3PLs provide various flexible and customized logistics services at low price, and they may have better ideas, for instance, FedEx, who is one of the largest logistics company in the world currently, was the first company to introduce many new technologies into this industry, and also the first company to provide the international overnight service. After FedEx offered those new services very shortly many other logistics companies, TNT, UPS etc, started to provide similar services. Buy.com, an Internet superstore, utilizes UPS for its product returns ("Operations & fulfillment," 1993). The information sharing and the new technologies in 3PLs directly accelerate the value-add services for the customers because the information could help companies to develop and redesign their products, and 3PLs' integrated network could assist companies to extend their market such as oversea markets. TNT and Apple are good examples; TNT, an international express and mail delivery services company with headquarters in Hoofddorp, fully owns operations in 65 countries and delivers documents, parcels and pieces of freight to over 200 countries (TNT, 2011). Apple Inc. is an American multinational corporation that designs and markets electronics such as computer software, personal computers and so forth. The company's best-known hardware products include the Macintosh line of computers, the iPod, the iPhone and the iPad (Apple, 2011). Due to the small scale of market in New Zealand, Apple is using TNT's international network to distribute all the Apple products from Australia Apple warehouse directly to individual customers in New Zealand market, and so is the reverse logistics. In this case the Apple's New Zealand market is relied on the TNT's distribution network. As mentioned in Chapter 3, the new technologies could directly increase the productivity and improve the performance of logistics and supply chain, for example 3PLs' online real-time track and trace technology allows different users to access the shipping information and obtain the real-time information. This real-time online technology totally changes the traditional shipping processing, as all parties include individual customers could access and monitor the movement of freights. It is impossible to set up a real-time track and trace system by a small or medium size company. According to observation, there are only two logistics groups have their own integrated real-time track and trace system from mobile devices to central server in New Zealand; one is New Zealand Post Group which consists of Courier post, NZ post, Contract Logistics and Pace Couriers and the other one is Freightways Group which consists of New Zealand Couriers, Post

Haste, Castle Parcel and Sub60. Apparently, the cost of the integrated system is extremely high. Companies could use 3PLs to get access to new technologies and upgrade their products and services at low cost.

2.4.4   Risks of Implementing Outsourcing in Logistics

These benefits of outsourcing come along with new and considerable risks (Institute of Chartered Secretaries and Administrators., 1993). Logistics plays a crucial role in business and the flow of either raw materials or products is relied on the logistics. Logistics links many different parties and organizations in the supply chain system; outsourcing logistics could directly influence the performance of supply chain system and the whole business. The influences are as follows. Firstly is loss of control. After outsourcing logistics, the performance of logistics will be relied on the 3PLs. Companies could monitor the 3PLs' performance; however, they could not actually control the operations and performance in 3PLs. Many companies tend to ignore this issue, but loss of control may impact many other aspects, such as priority, customer services, operations and inventory. Therefore it is significant to associate outsource with the real situation in a specific case. This issue will be discussed later. Secondly conflicting objectives between companies and 3PLs is another risk of outsourcing; companies and 3PLs typically have different and conflicting objectives (Simchi-Levi, et al., 2008). For instance, increasing flexibility is a key goal when companies outsource the logistics. This implies a need to match the actual market by adjusting the volume of delivery in time. Unfortunately, this objective conflicts with the 3PLs' long-term objective- firm and stable commitment to the companies. Indeed, this is a crucial issue for many 3PLs, as unlike other businesses, the profit margins of logistics and transportation is relatively small. Hence 3PLs have to focus on cost reduction rather than flexibility. Especially after Japanese disaster and during the economic recession, there is a significant decline in demand; those long-term and high volume commitments and contract entail huge financial risks for the companies. Admittedly, there are other risks of outsourcing logistics and implementing 3PLs, such as loss of competitive advantages, compatibility and cultures; however, most of them could be avoided and minimized by the logistics optimization. The solutions will be investigated later.

2.5   Courier Company - One Essential 3PL Model

3PLs are sorted into different types, which include freight forwarders, warehousing, courier companies and other companies that integrate & offer subcontracted logistics and transportation services. Courier Company is one of the most significant 3PLs modules for all types of 3PLs. This research mainly concentrates on the 3PLs reverse logistics in Courier Company, therefore all the different kinds of return items would be involved in the 3PLs reverse logistics in Courier Companies.

Traditionally Courier Companies deliver messages, packages and mail. Couriers are distinguished from ordinary mail services by features such as speed, security, tracking, signature, specialization and individualization of services, and committed delivery time which is optional for most everyday mail services. As a premium service, couriers tend to be more expensive than usual mail services, and their service is typically restricted to packages where one or more of these features are considered important enough to warrant the cost. Different courier services operate on all scales, ranging from specific towns or cities, to regional, national and global services. The world's largest courier companies include FedEx, DHL, TNT and UPS (Birla, 2005).

Today the courier service is different from traditional courier service; a large number of courier companies, especially the large scale courier companies have began to offer various services. A growing number of customized and flexible value-add services directly stimulate the courier services. There are various courier services including inbound freight, freight consolidation, warehousing, reverse logistics, value add customer services, distribution, order fulfillment and outbound freight. As per the research, one of the most significant trends of courier services is the customization that the 3PL service providers/ courier companies could offer the customized services to individual customer for certain purposes. One of the good examples is the return services/ reverse logistics services in Courier Company, which normally is used to collect, manage and deliver the return items from the point of consumption to the point of origin for the purpose of return, recapturing value or proper disposal. As companies have different requirements

and purposes for their returns and the return procedures vary with different customers, the customized services is essential in return and reverse logistics services. Actually Courier Company is one of the most effective and efficient models for the returns and reverse logistics, especially the procedures from the individual customers back to suppliers. Reverse logistics is distinguished from forward logistics by a host of factors , for example uncertainties tend to be involved in reverse logistics compared with the traditional forward logistics. As mentioned previously, reverse logistics is extremely new and emerging; many businesses and companies just start to pay attention to this area and there will be huge potential in the future. New Zealand Couriers (NZC) is one of the leading courier companies in New Zealand, this research will concentrate on the reverse logistics service in NZC.

2.5.1   History of Courier Company

Courier Company is one of the 3PL models in logistics industry. Actually couriers industry has a long history; people had wanted to deliver parcels and messages over long distance. Historical documents show that in early civilization, those who needed messages delivered over a long distance used "runners." These people would literally run miles, transporting messages or packages from one village to another; these runners were presented in ancient civilization such as China, Greece, and some Native American communities.

As per historical records, in due time, people began to utilize horses as a major form of transportation, and improve the efficiency of messengers by developing intricate networks of messenger routes. Back to 500 years ago, people already built official horse way for these runners in ancient China (Long, 2003); however, the routes were only used for emperors. At that time, another prevailing form of transporting messages was employing carrier pigeons, which were trained specifically to fly home over long distance. Messages were written on light paper, rolled into a tube, and tied to birds' legs or necks. Egyptians and Persians used this method as early as 3000 years ago. Meanwhile there are many records show that the carrier pigeon was a very prevailing way of delivering message, which had been widely used in ancient China (Fujita, 2003).

Today airplanes, ships, trains, trucks, and bicycles have been widely used in couriers to transport customers' messages and parcels. The modern transportations allow parcels to be delivered very quickly over vast distances. These methods are highly efficient and obviously far more reliable than any of the options in the past. The general parcel courier service makes use of technologies to organize, transport, and even track deliveries. With GPS-style tracking options, not only can you get parcels delivered quickly, you can watch their progress all the way. Therefore there are many information technologies which have been involved in the modern couriers, such as online real-time track and trace technology, which enables customers to monitor their freights from the point of pick up to the point of delivery.

Parcel delivery systems have come a long time since the days of foot messengers. Now, via the internet, it is also highly convenient to find and book couriers to transport packages, customers can instantly get quoted price and find a cheap courier to deliver packages. There are many parcel courier services available in our modern world, but there were not so many choices before the industrial age. Admittedly, parcel delivery services were still present at that time, although they took different forms. Nowadays we have luxurious motor-powered vehicles and other convenient technologies to transport our packages.

2.5.2   The Primary Activities of Companies in Courier Industry

According to the observation and previous studies in Courier industry (Gilbert, 2004). The **primary activities** of companies in **courier industry** can be summarized as below;

➢ Providing air, road, railway, shipping or combined courier delivery services

➢ Transfer and trucking services *without storage*

➢ Delivering services of parcels, documents and packages by point-to-point urgent mode via a hub and spoke model

➢ Providing express messenger and door-to-door delivery services locally, regionally, domestically and internationally

- ➢ Customized and flexible value-add services include inbound freight, freight consolidation, warehousing, reverse logistics, value add customer services, distribution, order fulfilment and outbound freight

- ➢ IT support became a significant active in current couriers

- ➢ Customer service plays a key role

- ➢ Delivery of high value, time sensitive and high value-to-weight ratio products

- ➢ Subcontract services such as couriers, long haul and short haul truck services

Many people might have some experiences of confusing the Post/Mail services and Courier services as they are very similar. Specifically, both services are employed to deliver the items from the point of origin to the point of delivery; especially during the last decade Post/Mail service had a huge improvement. However, the courier services have obvious advantages compared with Post/Mail service. Due to the booming of technologies, a growing number of ways of information exchange that replace the traditional Post/Mail service are emerging, such as email, fax, internet, phone, TXT, etc. As per the 3 News, New Zealand Post Group will return less money than forecast to government coffers this year. Its operating net profit after tax (NPAT) is expected to be about $72 million, $5m less on "normalised" NPAT for last year and less than the $80.8m project in its 2009 statement of corporate intent (Judith, 2011). At the same time, according to "Financial Summary in Freightways December 2010 Half Year Report", the operating revenue has a 7 percent increase compared with the previous year 2009 (See Appendix 1). The trend of delivery is becoming much closer to couriers.

2.5.3 The Characteristics of Courier's Services

According to the observation and previous relative studies (Gilbert, 2004). There are some vital **characteristics of courier's services** are summarized as below;

➢ *Speed*

As a premium service, couriers tend to be more expensive than usual mail services; however, the delivery time would be much less than Post/Mail service. In other words, couriers deliver in short transit time, for instance, overnight and 2 days economy services that is different from the traditional mail service, courier operations system also is different from traditional postal services system. Transfer and trucking services without storage could minimise the unnecessary delay.

➢ *Security*

Courier services deliver the valuable items, and courier companies have responsibility of freights' safety; therefore, the security is one of the most crucial aspects in couriers' company. Due to the transfer and trucking services without storage operation strategy, the security has a great improvement, and the various advanced technologies monitor the movement of freights 24/7 in couriers system.

➢ *Tracking*

This is one of the essential features in courier companies; however, with the development of technologies, Post/Mail services also could provide tracking service to customers. Note that one of the famous courier companies FedEx introduced the tracking service firstly(Birla, 2005).

➤ *Committed delivery time*

There was no way that customers can get certain ETD (estimate time of delivery) in traditional Post/Mail services. Hundreds and thousands of mails and items needed to be mixed and sorted to different places, and people can do nothing but wait. Nowadays, a host of advanced mobile devices and communication technologies have been implemented to manage and monitor the parcels in system. All parties, who involve in one delivery consignment, could check and see the status of freights during the transit.

➤ *Door-to-Door services and Signature*

Courier companies provide delivery service from the point of picking up to the point of delivery. Customers just need to make a phone call or book online and courier staff will go to sender's address, and pick up the parcels, then deliver them to the destination. Personally, Courier system has huge potential, due to the two ways of "pickup and delivery" system, which can be adopted for different purposes such as returns, recycles in reverse logistics.

➤ *Specialization and individualization of services*

Customized service is a key feature in courier companies. As mentioned previously, the flexible two ways of "picked up and delivery" courier system almost can meet all types and scales of individual/ business customers, for instance in New Zealand Couriers ltd, there are different types of couriers such as residential couriers, industrial couriers, point to point couriers, long-haul couriers and large scales company couriers.   The large-scale company courier, who is especially designed for one or several certain large-scale business customers, may drive van or truck to pick up and delivery regularly.

2.5.4 Technological Innovation in Modern Couriers

Technological innovation brought a lot of changes in logistics and supply chain industry, and Courier Company is one of the typical examples of implementing technology to improve the performance and services (Gilbert, 2004). Many technological innovations can be found from Courier Companies. There are several examples are introduced as below

Track & Trace Technology

With the rapid development of economics and society, a growing number of companies start to pay attention to technologies, which could directly benefit their businesses. One of the most significant technologies is Track & Trace technology. This technology concerns a process of determining the current and past locations (and other information) of a unique item or property (Emmett, 2005). Personally speaking, Track & Trace is one typical example of using technology to help businesses to collect, share and analyze information. It is a very useful tool to link the information and business operations.

The track & trace information plays a vital role in the supply chain management, as sometimes the management needs the track information to make a decision, such as delivery time, EDT (estimate delivery time). Note that the inventory planning and production scheduling also need the information to support, and location, status, etc. therefore that could be widely used for shipping, inventory management and distribution management. Besides, the track & trace technology could be used in the warehouse management to manage the location of inventory.

In New Zealand, 80% businesses are small or medium scale companies, and they do not have their own transportations to delivery due to the scale of the business and high cost of transportation (Campbell-Hunt & Corbett, 1996). Therefore they utilize the third part logistics providers to carry their freights and messages; one of the most prevailing deliveries is using

courier companies. The track & trace technology enable these companies to get the status of their delivery 24/7. There are two major courier providers, which are New Zealand Couriers and Courier Post in New Zealand market. Both couriers companies have their own track & trace systems which have several common characteristics;

✓ Firstly, they both use internet, which is a cheap way to exchange information and link their clients and customers. Actually, a growing number of businesses use the internet to process their information rather than the private network or EDI. The main reason is the high cost of the private network, and also the internet become the most popular computer network in the world with which many people can easily access the information at low cost.

✓ Secondly, one of the significant characteristics in Track & Trace system is that it is real-time, 24/7 in other words; all the scan information and status could be used immediately. Due to the limitation of their equipments and system, some courier companies still could not support the real-time information and the status of freights. However, New Zealand Couriers adopted the wireless scanners based on the telecom mobile network to collect all the scan and status from their wireless devices.

✓ Thirdly, Track & Trace technology has to be supported by a complex system and IT personnel. Moreover, the cost of implement track & trace technology is normally high. We can see both New Zealand Couriers and Courier Post have their own IT system to maintain and support the track & trace technology.

✓ Fourthly, both courier companies use barcode to implement traceability as bar-coding is a common and effective method to implement traceability at both the item and case level. And some crucial information could be easily recorded, such as variable data in a barcode or a numeric or alphanumeric code format can be applied to the packaging or label.

Most track & trace technologies have been used in logistics and transportation, and it will be widely used in all aspects of supply chain system, ranging from raw materials to finishing products, from sales orders to inventory status, and from manufacturers to customers. The technology enables the information to be distributed to the right person at the right place at the right time.

Barcode Technology

The barcode and Radio-frequency identification (RFID), which are technologies that uses communication via electromagnetic waves to exchange data between a terminal and an object such as a product, animal, or person for the purpose of identification and tracking (Emmett, 2005) have already been implemented in many businesses. One of the latest barcode technologies is 3D barcode, which is employed to replace the linear and 2D barcodes. From personal experience, currently New Zealand Couriers is using 3D barcodes to record information and details. The same basic principle of 3D barcodes is the same as linear and 2D barcodes; however, 3D barcode can hold more information than linear and 2D barcodes, and it can be much easier scanned and occupy smaller space on the label compared to linear and 2D barcode.

In recent years all courier companies have been trying to implement a bar coding system which is similar to the barcodes for purchases, logistics and the retail industry. The 3D barcodes make it impossible to alter or obstruct the barcode's information and results in fewer mistakes and in turn lead to lower operating costs of a transportation process. The code can be part of the delivery process. In Courier Company normally each parcel has one unique barcode for identification in the courier system. All the information that has been digitalized in the real-time system, could be accessed in 24/7 online, for instance each courier and consignment ticket number is the unique identification of the parcel. In the mean time, the key locations in depot such as dispatch area and receiving cage, couriers have their own unique barcodes. Once the consignment/ ticket number matches the location barcode, people can know where the specific parcel or item is in the system. The 3D barcode technology can also be found in integrated logistics system. All the information in delivery system could be digitalized by this technology in an easy way, and the partial information could be integrated by adding different barcodes together. Specifically, in New Zealand Couriers the tracking and tracing information normally combines identification number, parcel ticket/ consignment number barcode and location barcode together. Location barcode could indicate particular position of the item, such as branch detail, freight office, couriers' cage and so forth. Information barcode carries information which could be described as picked up, wrong address, damaged, delivered, holding in depot; therefore people would know the status of the particular item clearly. The courier service industry keeps growing as companies investing heavily in new technology to make the customers' experience as smooth and reliable as possible.

There is no indication that where courier services will be in fifty or sixty years; however, what people do know is that the industry will never slow down.

2.5.5   Enterprise Resource Planning (ERP) system

Today, ERP system plays a significant role in businesses, especially in large-scale corporations. ERP system is essential because it could directly influence the performance of business (Simchi-Levi, et al., 2008).   According to the studies (Chorafas, 2001), Enterprise system could improve the productivity and minimize the unnecessary errors in business processes and operations.   The explanation of ERP system is "*an integrated computer-based application used to manage internal and external resources, including tangible assets, financial resources, materials, and human resources*" (Curran & Ladd, 2000, P.32).   There are many different ERP systems in the world, but personally they have the similar purpose which is to facilitate the flow of information among all business functions inside the boundaries of the organization and manage the connections to outside stakeholders and business parties, such as finance, customer services, operations, purchase, etc. The ERP systems normally are built on a centralized database utilizing a common computing platform (Chorafas, 2001). Personally, one of the most significant characteristics of the ERP systems is to consolidate all business operations into a uniform and enterprise-wide system environment. This characteristic has totally changed the supply chain management which includes return/reverses logistics, as the systems provide a different angle to monitor and control the supply chain activities. Besides, the ERP systems enable management to see a big picture and collaborate on the different business functions to achieve a common goal. The ERP systems in Courier Company are more like a platform to integrate the IT technologies, such as the tracking and tracing technologies, barcode information storage & search, online services and real-time GPS mobile technologies.

Advantages of implementing ERP systems in logistics and supply chain management

There are several advantages of implementing ERP systems in logistics and supply chain management which are as follows.

Firstly links in the supply chain. Traditionally each business party, such as manufacturer, suppliers and wholesalers, works as a separate entity in the supply chain system. People can considerate this situation as decentralized supply chain system that each separate party only focuses on its own interests and benefits rather than the whole system. Personally, in many cases, the traditional decentralized supply chain model is an ineffective and inefficient business model, as many supply chain problems could not be solved in the decentralized system, such as information sharing, high inventory level, long lead time, etc. The implementation of ERP systems could fundamentally change this traditional decentralized model to centralized model, as the systems could eliminate the boundaries of the organizations, for instance in the traditional supply chain, manufacturers viewed their suppliers as separate entities, however in centralized system manufacturers view their suppliers as critical links in their business process.   And supply chain management considerate manufacturers and suppliers as a part of the whole process. In a word, the ERP systems integrate the different functions and parties in supply chain.

Secondly, the ERP systems integrate supply and demand in supply chain. Personally, one of the most vital objectives of logistics and supply chain management is to manage and balance the supply and demand; ERP systems provide an excellent opportunity to upgrade the supply chain strategies, such as implementing "just in time" production schedule by dynamically updating manufacturing capacity and scheduling in response to customer demands that continuously changing (Zylstra, 2006). Therefore the ERP systems enable supply chain management to obtain the dynamical and real-time capacity to manage the supply and demand. Besides, "*ERP were originally created on the value proposition of integration. By centralizing operational information in one place where it can be shared by all the company's key functional systems and standardizing business processes across functions*" (Chorafas, 2001, P.27).

Thirdly, ERP systems could improve the information exchange, sharing and communication within the supply chain system, which is a significant advantage of implementing ERP system in supply chain management. According to the researches (Narayanan, 2010), many supply chain

issues are caused by lack of the open communication and information sharing, such as running out of stocks, over-production, and forecasting errors. Personally, the ERP systems are great solutions to improve the information sharing and exchange in supply chain system. Today, many ERP systems are based on the internet and real time, and new technologies provide a huge potential for the development of ERP, such as GPS, 3G mobile network, 3D barcodes, etc. These technologies enable different companies and businesses to implement the ERP systems in their businesses easily.

Fourthly, the ERP systems could allocate the resources and manage the relationships much more effectively and efficiently than ever. In a traditional supply chain, the resources are passed through the supply chain reactively (Handfield & Nichols, 1999), and the supply chain activities are managed based on the traditional relationships. For example a retailer finds an increase in the sales of a particular product and orders a larger quantity of this product from the wholesaler. If a number of retailers increase their orders, the wholesaler will increase his orders from the manufacturer; correspondingly, the manufacturer will expand production to meet the increasing demand. To increase production, the manufacturer will order more raw materials from suppliers. Because of the inherent delay in a traditional supply chain, it might take weeks or even months to transmit the information between the manufacturer and suppliers. Raw material suppliers may need time to expand their production to meet the larger orders, resulting in temporary shortages for the manufacturer.   From this example, the resources allocation and relationship management is inefficient in the traditional supply chain model; however, ERP systems could completely change this situation. As mentioned previously, ERP systems enable the supply chain to be centralized, and only one common goal exists that is to maximize the benefits of the entire supply chain system. All the resources and relationships for different parties are determined by one centralized decision maker. Back to this case, if the retailer notices a rise in the sales of the particular product, meanwhile ERP systems could share and analyze the real-time sale information from other retailers, the wholesaler and manufacturer could adjust their plan and reschedule to keep pace with the demand. The issue of running out of stock will be avoided and the lead time will be minimized. In ERP systems, the participants in the supply chain are parts of an integrated process; information with respect to the increasing customers' demand can be passed quickly throughout the supply chain such that each link in the chain can react quickly to the change.

Fifthly, the ERP systems could optimize and customize the business processes, save budget and standardize data and processes. As mentioned previously, ERP systems promote sharing the information between different business partners in supply chain, for example a company opens its records to its suppliers, and suppliers can access the company's data because of common data formats. Working in this way could cut down on the amount of paperwork and response time involved, in the mean time the business process is simplified. Reductions in paperwork, savings in time, and other efficiency improvements turn into cost saving for the company and the suppliers. Besides ERP systems support the customized business processes, which is a significant advantage for supply chain management as the customization has already became a one of the most important competitive advantages in today's world.

There are many other advantages of implementing ERP systems in supply chain management, such as saving cost, increasing the productivity and efficiency, improving the flexibility of business and supporting decision-making. An example of ERP systems is SAP which will be introduced in the following.

One of ERP System Examples SAP

SAP (systems, Applications, and Products in Data Processing), which is one of the most prevailing ERP systems, has been widely implemented in different industries and businesses all over the world. SAP AG is the world's fourth largest software company, and the largest enterprise resource planning (ERP) vendor. The company was founded in 1972 by Dr H.C. Hasso Plattner and Dr. Henning Kagermann in Walldorf, Germany with the goal of producing an integrated suite of application software that could run all mission-critical corporate operations from purchasing to manufacturing to order fulfillment and accounting. This is an innovative idea, as the integration would help companies optimize their supply chain system, manage customers/suppliers relationship, and make better management decision based on the real-time information. SAP offers enterprises a brilliant option to connect together. Against a background of globalization, SAP escapes the limitation of the time and location, for example for the international business and purchasing, all businesses can use SAP to collaborate in different countries or locations. SAP also could be utilized along with some advanced business strategies,

for instance in lean manufacturing, SAP can assist the manufacturer to plan / schedule the JIT production and allocate resources to minimize the inventory and cost. The SAP is a useful tool for the management, because the software and the system can connect with different business functions such as accounting, production, retailing, finance, human resources, marketing, sales, logistics, etc. One of the most vital features of SAP is that it assists the business operator/ management to make some decisions such as reordering, invoicing and scheduling. Generally speaking, a host of parties and information are involved in supply chain activities. Sometimes staff cannot handle so many tasks at the same time or remember everything, but the SAP business intelligence could analyze the information from different functions and make some decisions. Due to the uncertainty and the variability, the system could not make some complex decisions; however, the system still can assist managers to identify some problems and monitor the business performance.

Characteristics of SAP

The main characteristics of SAP are as follows. Integration is in the first place; SAP can link all the business functions and parties together, from retailers to manufacturers, from accounting to human resource. Also the boundaries of organizations and different business functions could be eliminated from SAP. Secondly, SAP offers different language support for people from different countries; it is easy to be used and understood all over the world. Thirdly, SAP supports the process management which is one indispensable part in supply chain management (Chorafas, 2001), such as sourcing, procurement, shipping, billing, payment and planning & optimization. Meanwhile, SAP allows the performance of processes to be measured with respect to time, cost and so forth. Personally, this is very useful for the management people to monitor and control the business performance. Last but not the least, SAP supports information sharing and analysis both horizontally & vertically (Chorafas, 2001), for instance a salesman orders from sales department to operation team and financial department, at the same time, the information of the salesman's orders could be reviewed by senior management; SAP could directly pass the information to the both horizontal and vertical level in an organization. Overall, ERP system such as SAP is one essential factor of success in modern businesses. A host of different parties, processes, resources and relationships are involved in logistics and supply chain industry, and enterprise system directly assist businesses to achieve their targets by improving the effectiveness, the efficiency

and the flexibility to optimize the business processes (Christopher, 1998). However to implement a new enterprise system into a business is a huge project, and so many different enterprise systems exist in the world. The management should consider all aspects of business, balance the benefits and costs, and make a detailed plan before implementing the new enterprise system in the business.

Chapter 3 Literature Review

3.1 Introduction

The third chapter is a literature review.   There are four areas, which include logistics and supply chain management, reverse logistics, traditional supply chain strategies, and Return/Reverse logistics optimization, would be reviewed.   Firstly the knowledge of logistics and supply chain management is a foundation of this research, and then the reverse logistics, which is a soul of this research, would be introduced in this chapter.   The relevant knowledge and findings of reverse logistics was from the previous researches and studies, due to the limited resources and theory-based research in the returns management arena. "Going Backwards" (Rogers, 1998) is a great research for reverse logistics studies, there are some findings of "Going Backwards" in reverse logistics has been widely employed in many reports and relevant studies, and also some important findings and concepts have been introduced in this thesis, such as return percentages in reverse logistics, and reverse logistics activities.

This research focuses on the reverse logistics optimization and improvement, therefore the traditional supply chain strategies and supply chain optimizations also would be reviewed. There are two primary types of uncertainties in traditional forward logistics (Lee, 2002). And also the four types of traditional supply chain are introduced in this chapter.   Return/Reverse logistics optimization review based on traditional supply chain optimizations.   One of the significant reasons was there was limited number of researches and resource in Return/Reverse logistics optimization. According to the traditional supply chain optimizations, some other methods and approaches can be improved and used in reverse logistics as well, for instances theory of constraints (TOC), Goldratt's approach, ERP system and the process of on-going improvement. Therefore the principle of return/reverse logistics optimization in this thesis would base on the supply chain optimization.   However this thesis focuses on the reducing the uncertainties in return/ reverse logistics in practical case in order to optimize the performance of return and reverse logistics.

Literature review allows researchers to review the previous and current researches, and look at a big picture. Reverse logistics is emerging, there are many reverse logistic researches during the last couple years, however this research focuses on the uncertainties in the third party logistics companies. Case study has been employed as a research method in the thesis, therefore the findings were from practical cases, and in other words the finding could be widely used in many different companies as well.

3.2 Logistics and Supply Chain Management

There are so many different definitions of Supply Chain and Logistics management in the world. According to Council of Logistics Management, "supply chain management (SCM) is the integration of material, information and financial flows in a network of companies or organisations that make and deliver of products and services from the source to the consumer". Generally speaking, a supply chain consists of a host of different parties, such as manufacturer, supplier, distributor/wholesaler, and retailer, which are involved in a supply chain. The Figure (see Figure 3.1) indicates a supply chain system from manufacturers (OEM) to customers and
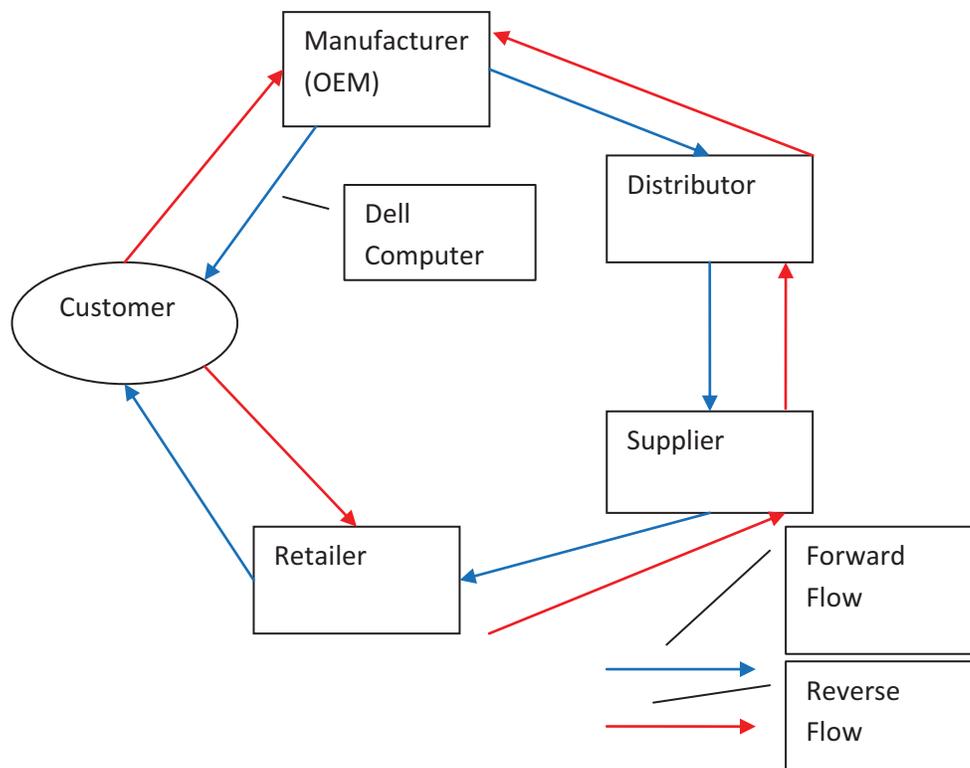
Figure 3.1 A comprehensive supply chain system(Blumberg, 2005)

reverse logistics channel from customer to OEM. According to the different industries, the supply chain systems and strategies may be various, for instance the distribution and supply chain system of Dell computer is different from other computer manufacturers, and the innovative distribution strategies have been employed in order to manage its supply chain system and inventory efficiently and effectively. Dell customers can order and purchase Dell computer directly from Dell manufacturers rather than retail store and third party suppliers.

As mentioned above, supply chain systems are various depend on the different industries and businesses. However, a typical supply chain includes three stages: Source, Make, and Deliver that is very helpful for people to understand the supply chain management (see Figure 3.2). But what exactly is supply chain management? *"Supply chain management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouse, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirement."* (Christopher, 1998) this definition includes all the key points.

Source
- Raw Materials
- Equipments
- People
- Information

Make
- Products
- Manufacturer
- processing

Deliver
- Forward logistics
- Reverse logistics
- Networks
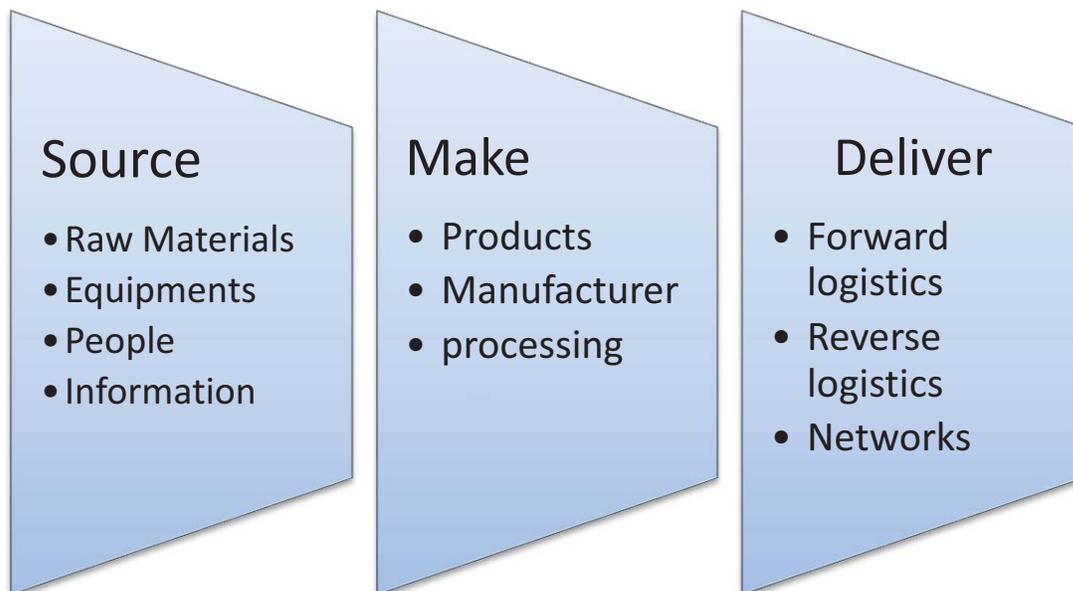
Figure 3.2 A typical supply chain which includes three stages (Christopher, 1998)

3.2.1　Supply Chain Management

Personally Supply chain management involved five main aspects as below;

1. The distribution/logistics management

   This is one of the cores in supply chain, including distribution strategies, logistics management, supplier relationship, logistics networks, etc. reverse logistics actually is a part of the distribution/logistics management.

2. Inventory management

   Inventory plays a key role in supply chain system and it is significant to manage inventory effectively and efficiently to support the whole supply chain system.

3. Planning and scheduling

   Manufacturer is one of the most important parties in a supply chain system and the effective and efficient manufacturing needs good planning and scheduling such that the cost could be reduced and waste could be minimised.

4. Operations management

   Actually, supply chain management involves lots of operations activities, to monitor and make sure all the raw materials, inventories and merchandises are running smoothly within supply chain system.　As we can see the definition of the supply chain management above "….is produced and distributed at the right quantities, to the right locations, and at the right time…." (Christopher, 1998). So operations management plays a significant role in supply chain.

5. Business management

   Admittedly, all supply chains are involved in business activities. Therefore business management becomes an essential part in supply chain management- in other words supply chain manager should look at the big picture in business, rather than focusing on one area.

3.2.2 Logistics Management

People confuse the supply chain management and logistics management; actually there is a very close relationship between them. Specifically, logistics management is a part of Supply Chain Management, the definition of logistics management is "*a subset of Supply Chain Management that plans, implements, and controls the efficient, effective, forward, and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirement.*"(Simchi-Levi, et al., 2008) the diagram below, this diagram clearly shows what exactly logistics management is. According to this chart (see Figure 3.3), the logistics management covers between 2nd tier supplier to end customer, and normally there are raw material, work in process, and finished goods, which are goods that have completed the manufacturing process but have not yet been sold or distributed to the end user, are
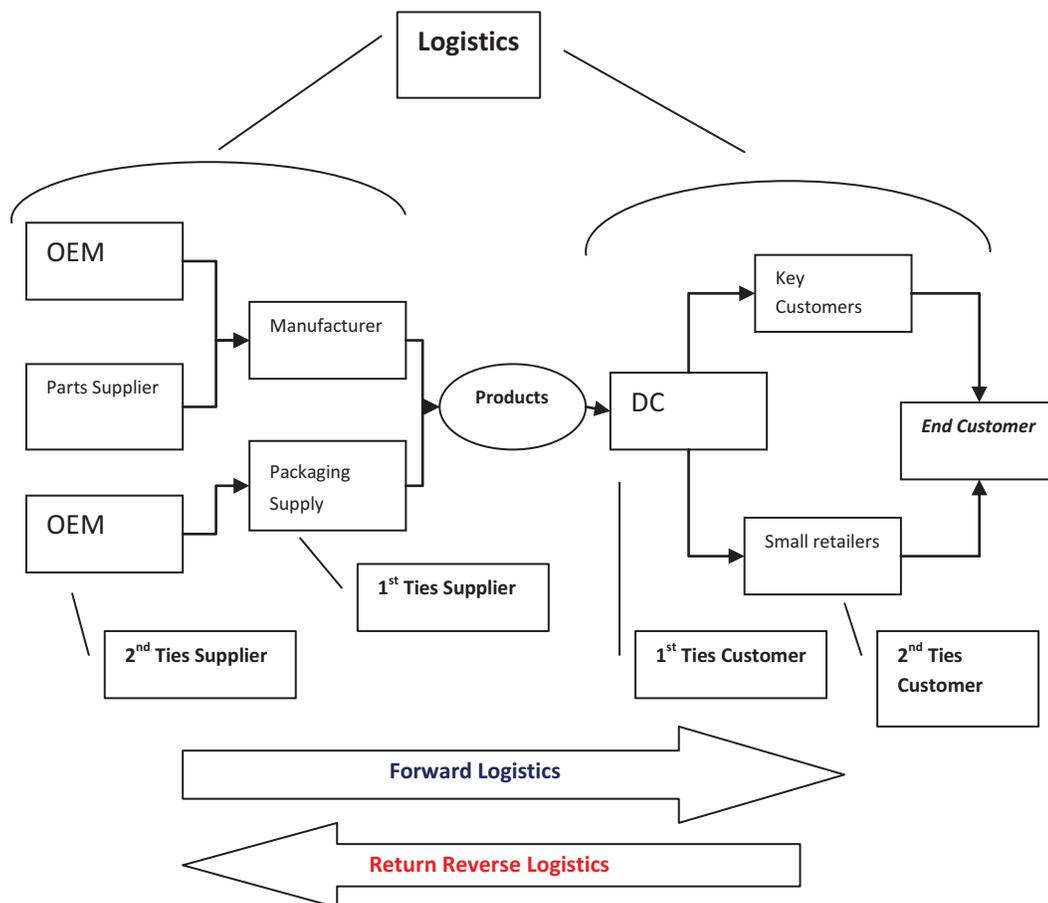
Figure 3.3 Comprehensive logistic channel(Simchi-Levi, Kaminsky, & Simchi-Levi, 2008)

involved in various logistics activities.　　The logistics activities typically include

- Transportation management
- Warehousing
- Materials handling
- Order fulfillment
- Logistics network design
- Inventory management
- Sourcing and procurement
- Management of 3rd party logistics services providers
- Packaging and assembly
- Customer services
- Planning and scheduling (Handfield & Nichols, 1999)

Logistics and supply chain management normally from manufacturers to final customers, and there are three types of goods include Raw Material, Work in process and finished goods, are involved in supply chain system.　　The reverse logistics became a important part in logistics management; in some industry, the performance of reverse logistics, which is from the point of consumption to the point of origin, could directly influence the entire supply chain system (Blumberg, 2005).

3.2.3 Differences Between Supply Chain and Logistics

According to the previous studies (Simchi-Levi, et al., 2008), the differences between Supply Chain and Logistics are summarized and illustrated in table 3.1.

Table 3.1 Differences between Supply Chain Management and Logistics Management (Simchi-Levi, et al., 2008)

Supply chain management	Logistics Management
Whole Supply Chain system, from manufacturers to customers	A part of SC system, normally from supplier to final customer
Raw Material, Work in Process, Finished Goods	Finished Goods
Full range supply chain activities from manufacturing to retailing, such as: Planning & Scheduling, forecasting…include logistics activities	Focus on transportation, warehouse Materials Handling & and packaging
Distribution channel and strategy	Focus on logistical Network
Enterprises information, multi-Enterprises, (SAP, EDI)	Information management (VMI, SMI, Warehouse Management System)
It is difficult and risky to outsource whole supply chain function	3PL, 4PL, it is easy to outsource logistics function
Normally, many different parties (more than three) are involved in Supply Chain System	Normally two or three parties are involved in Logistics

3.3 Reverse Logistics

3.3.1 What is reverse logistics?

Reverse logistics is the process of moving products from their typical final destination to another point, in an attempt to recapture some of the value of the product through resale, reverse auction or for the purpose of disposal of the item if not resalable or reusable. The return policies of most retailers in the name of customer service have caused reverse logistics to become a very visible process. In addition, these policies have created a "rent to own" mentality that the customer does not need to worry about purchases because if they do not want or like the product, they can return it (Christopher, 1998).

Reverse logistics is a new and emerging area such that only a limited amount of information has been published to date. However, reverse logistics has huge potential to be developed in the long run; there are two significant factors -economical and environmental factor-accelerating the development of reverse logistics.

Reverse logistics, which plays a significant role in the collecting, recycling and reuse process, is an indispensable part of logistics and supply chain. Hawks defined the reverse logistics as *"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 value or proper disposal"* (Hawks, 2006, p.23). More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Remanufacturing and refurbishing activities may also be included in the definition of reverse logistics. Beside, reverse logistics includes processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls, and excess inventory(Stock & Council of Logistics Management (U.S.), 1992). The return process also includes recycling programs, hazardous material programs, obsolete equipment disposition, and asset recovery. In this thesis, the reverse logistics processing

in 3PLs transportation industry will be investigated; as we can see the trend of outsourcing prevails among many different industries, such as manufacturing, transportation, warehousing, marketing, finance and accounting. 3PLs reverse logistics is a new and emerging service in 3PLs and there are many issues to be solved.

Theoretically speaking, reverse logistics should be a part of logistics, but the operational process of reverse logistics is entirely different from forward logistics and involves the implementation of material disposition management rules. There is a big difference between traditional forward logistics and reverse logistics; as shown in chart 3.4 (Blumberg, 2005). And the prime objective of reverse logistics is to enable the product to get its maximum value even at the end of its market life. There are various types of activities involved during the process of reverse logistics for the purpose of achieving its objective. These include warehousing, repair, refurbishment, recycling, packaging, transportation and disposal. However, the entire process can be efficiently managed by adhering to certain principles.

Forward Logistics		Reverse Logistics
•Distribution to Customer •Customer Fulfillment •Supplier Relationship •Inventory Mangament •Manufacturing •Customer Service •Material Mangament •Product Design •Marketing and sales •Transportation	C O N S U M E R	•After Market Customer Serivce •Recycling •Warranty Management •Environmental Resources •Warehousing •Repair •Refurbishment •Packaging •Customer Service •Transportation

Figure 3.4 Supply chain-aftermarket supply chain product life cycle(Blumberg, 2005)

According to researches, the uncertainties directly influence the performance of supply chain (Simchi-Levi, et al., 2008), and reverse logistics has more uncertainties than forward logistics.

Besides, the cost of processing a return can be two to three times that of an outbound shipment. (Christopher, 1998). Therefore, it is significant to understand how to improve the performance of reverse logistics. There are two major factors driving the development of reverse logistics in current industry.

Environmental factor in reverse logistics

According to most of the literature in research of reverse logistics emphasized the "green" or environmental aspects, environmental consideration is one of the most important aspects in the development of reverse logistics. And the trends of environmental factors will directly impact the reverse logistics. Several trends are listed as below.

· Landfill costs have increased steadily over recent years and are expected to continue to rise;

· Many products can no longer be land-filled because of environmental regulations;

· Economic and environmental considerations are forcing firms to use more reusable packaging, totes, and other materials;

· Environmentally motivated restrictions are pushing firms to take back their packaging materials;

· Many producers are required by law to take back their products at the end of their useful lifetime.

Although reverse logistics is related to the "green" and environmental protection, there is a vital distinction between reverse logistics and the "green" logistics. Reverse logistics, as mentioned above, refers to all efforts to move goods from their typical place of disposal to recapture value. Green logistics, or ecological logistics, refers to understand and minimize the ecological impact of logistics. Green logistics activities include measuring the environmental impact of particular modes of transport, ISO 14000 certification, reducing energy usage of logistics activities, and reducing usage of materials (Christopher, 1998).

Some green logistics activities can be classified as reverse logistics. For example, using reusable totes and remanufacturing are both reverse and green logistics issues. However, there are many green logistics activities that are not reverse logistics such as reducing energy consumption and designing a disposable package that requires less packaging. Designing a product to use less plastic would not be a reverse logistics activity, but designing a product to make full use of reusable packaging would involve reverse logistics.

Reverse logistics not only protects natural world but also reduces the effect of human activities on environment. It helps companies and industries to save the cost from the recycled and reused items as well. With the development of economics and society, a growing number of people pay attention to our natural environment in the earth. Especially, the companies and industries should have the social responsibility for the environment; some products such as battery, plastic etc can affect our natural environment for a long time, even the people's health. The most effective way to minimize the negative effect on environment is to collect those recyclable stuff, such as battery, paper, plastic etc. or reusable stuff such as clothes, some building material etc. Reverse logistics, a very new strategy in supply chains, have been developed sharply in the last ten years and there is still huge potential of development in the future. As mentioned above, reverse logistics could be used in recycle or reuse, meanwhile, it could be used for product recall, update and exchange.

Economical factor in reverse logistics

Economical factor still mainly drive the development of reverse logistics in the current world. As reverse logistics costs a fortune, as mentioned above, the cost of processing a return can be two to three times that of an outbound shipment. (James, 1998) The conservative estimate is that reverse logistics accounts for a significant portion of U.S. logistics costs. Logistics costs are estimated to account for approximately 10 percent of the U.S. economy (Narayanan, 2010). However, the exact amount of reverse logistics activity is difficult to determine because most companies do not know how large these are. According to pervious researches (Blumberg, 2005), reverse logistics costs accounted for approximately four percent of their total logistics costs. Applying this mean percentage to Gross Domestic Product (GDP), reverse logistics costs are estimated to be approximately a half percent of the total U.S. GDP. Delaney estimated that logistics costs

accounted for $862 billion in 1997. (Rogers, 1998) The magnitude and impact of reverse logistics varies by industry and channel position in supply chain. It also varies depending on the firm's channel choice. However, it is clear that the overall amount of reverse logistics activities in the economy is large and still growing.

A host of companies focus on their efficiency of supply chain system to minimize their cost especially during the economy recession. (Goldratt, 2011) However, some companies only concern their forward logistics that from the raw material to final customer rather than their reverse logistics. Actually reverse logistics plays a significant role in business. Up to 30% of a company's products might be returned by customers (Louise, 2010). Not just because of faults. For example, a customer (bad customer) who is unsure about what size will fit her best might order two sizes of clothing from a mail order retailer and then return the item she does not want. According to the previous research, there had been limited attention to theory-based research in the return management arena (Jahre, 1995a; Carter and Ellram, 1998; Daugherty et al., 2001). After reviewing the traditional logistics system, it can be seen that there is only one-way system from manufactures to suppliers, then retailers and finally customers. Two-way system between manufactures and customers is introduced by reverse logistics which could improve the flexibility of companies and organizations, and also the two-way logistics system has short response time for any changes in market (Kotler, 2008).   It is better in information sharing between different parties than the traditional one-way logistics system (Curran & Ladd, 2000). Also the reverse logistics could help the marketing or sales to collect the customers' feedback, and understand the customers' real needs and wants. Reverse logistics, as a competitive strategy, improves the flexibility, reliability of the logistics system (Chopra & Meindl, 2001). And the two ways logistics system is introduced by the reverse logistics.

3.3.2 Return Percentages in Reverse Logistics

According to Rogers and Tibben-Lembke, the reverse logistics process can be broke into two general areas, depending on whether the reverse flow primarily consists of products and packaging. For product returns, a high percentage is contributed by customer returns. Overall, customer returns are estimated to be approximately six percent throughout all retailers. Return percentages for selected industries are shown in Table 3.2. In each case, return percentages were established by different firms (Lembke, 1998).

Table 3.2 Sample Return Percentages (Lembke, 1998).

Industry	Percent
Magazine Publishing	50%
Book Publishers	20-30%
Book Distributors	10-20%
Greeting Cards	20-30%
Catalog Retailers	18-35%
Electronic Distributors	10-12%
Computer Manufacturers	10-20%
CD-ROMs	18-25%
Printers	4-8%
Mail Order Computer Manufacturers	2-5%

Mass Merchandisers	4-15%
Auto Industry (Parts)	4-6%
Consumer Electronics	4-5%
Household Chemicals	2-3%

Apparently, publishing industry has highest return rate among those listed industries, up to 50 percent from the distribution channel. Normally, 3PLs reverse logistics could cover all the above returns, depending on the characteristics of the item, such as value, size and weight, and the customers' needs. In the mean time, the return procedures and strategies may be various, for instance in medical vaccine returns, the lead time and temperature control during transit will be focused on rather than the cost of shipping, because the value of vaccine normally is very expensive compared with the cost of reverse logistics. Another example is wine returns, the customers' replacements and inventory control would be mainly considered in reverse logistics rather than the resell, because the wine returns normally involve a large number of exchanging orders and warehousing and bad inventory control would directly cause the over-capacity in warehouse. The more details will be discussed later in the case study of this research.

3.3.3   Reverse Logistics Activities

After return items are shipped from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal, there are several activities will be concerned. The procedures and activities are various and highly depend on the specific purposes and needs. There are hundreds of factors would impact the decision of returns. Once a product has been returned to a company, the firm has many disposal options. Some of these activities are summarized in Table 3.3 (Rogers, 1998).   Even in the same industry or for the same product, the reverse logistics activities may be different depending on the different situations. For instance wine returns, the return items which are wrong orders, will be resold to other customers, but if the return items which are faulty products must not be resold. Typical reverse logistics activities are the processes

for a company to collect used, damaged, unwanted (stock balancing returns), or outdated products, as well as packaging and shipping materials from the end-user or the reseller. As mentioned above, depending on whether the reverse flow primarily consists of products, or packaging, the reverse logistics activities could be categorized into two kinds.

Table 3.3 Common Reverse Logistics Activities (Rogers, 1998)

Material	Reverse Logistics Activities
Products	Return to Supplier Resell Sell via Outlet Salvage Recondition Refurbish Remanufacture Reclaim Materials Recycle Landfill
Packaging	Reuse Refurbish Reclaim Materials Recycle Salvage

In product return, if the product can be returned to the supplier for a full refund, the firm may return to the supplier. This return would be found in the vender managed inventory (VMI) which is a family of business models. In the inventory the buyer of a product provides certain information to a supplier and the supplier takes the full responsibility for maintaining an agreed inventory of the material, usually at the buyer's consumption location (usually a store). A third-party logistics provider can also be involved to make sure that the buyer has the required level of inventory by adjusting the demand and supply gaps. (Tempelmeier, 2006) If the product has not been used, it may be resold to a different customer, or it may be sold through an outlet store, such as wine returns, which would be sold to different customers straightaway. If the wine does not reach the quality that it to be sold through either of these options, it may be sold to a salvage company that would export the product to a foreign market (Blumberg, 2005), for instance in the fashion industry, the outdated clothing would be shipped to developing countries where the living standard is low.

For the faulty product, which cannot be sold "as is," or the firm can only significantly increase the selling price by reconditioning, refurbishing or remanufacturing the product, the firm may perform these activities before selling the product, such as product recall. Normally the manufactures will replace the faulty part and resell rather than disposal. If the firm does not perform these activities in-house, a third party firm may be contracted, or the product may be sold outright to a reconditioning, remanufacturing, or refurbishing firm. After performing these activities, the product may be sold as a reconditioned or remanufactured product rather than new. If the product cannot be reconditioned in any way because of its poor condition, legal implications, or environmental restrictions, the firm will try to dispose of the product at the least cost. Any valuable materials that can be reclaimed will be reclaimed, and any other recyclable materials will be removed before the remainder is finally sent to a landfill (Productivity Press., 2006).

Generally speaking, packaging materials returned to a firm will be reused. Apparently, reusable totes and pallets will be used many times before disposal and damaged totes and pallets can be refurbished and returned to use. This work may be done in-house, or using third party companies whose sole mission is to fix broken pallets and refurbish packaging. Once repairs no longer work, the reusable transport packaging must be disposed of. Note that before it is sent to a landfill, all salvageable materials will be reclaimed (Lembke, 1998).

The reverse logistics activities vary as per various situations and uncertainties. These activities had been sorted by Rogers and Tibben-Lembke as follows:

✓ Whether the goods in the reverse flow are coming from the end user or from another member of the distribution channel such as a retailer or distribution centre;

✓ Whether the material in the reverse flow is product or packaging material;

These two factors were used to establish a basic framework for characterizing reverse logistics activities. And the various return/ reverse logistics activities could be categorized as four types depending on the point of consumption and the type of return material, as illustrated in Table 3.4. (Blumberg, 2005)

Table 3.4 Characterization of Items in Reverse Flow (Blumberg, 2005)

		Supply Chain Partners	End Users
Products		Stock Balancing Returns Marketing Returns End of Life/Season Transit Damage	Defective/Unwanted Products Warranty Returns Recalls Environmental Disposal Issues
Packaging		Reusable Totes Multi-Trip Packaging Disposal Requirements	Reuse Recycling Disposal Restrictions

3.4   Traditional Supply Chain Strategies

3.4.1 The Uncertainties in Traditional Supply Chain

The uncertainty is one of the significant factors, which directly influence the performance of supply chain system (Simchi-Levi, et al., 2008). There are hundreds of thousands of researches and theories about the uncertainties in traditional forward logistics; however, there has been limited attention to theory-based research in the returns management arena (Jahre, 1995a; Carter and Ellram, 1998; Daugherty et al., 2001) Managing these returns is known as reverse logistics. (Louise, 2010) As per the previous researches, there are two primary types of uncertainties in traditional forward logistics (Lee, 2002).

➢ One is ***demand uncertainty,*** which is linked to the predictability of the demand for the product.

➢ The other is ***supply uncertainty*** that revolving around the supply side of the product.

3.4.2   Four Types of Supply Chain

The different types of uncertainties could directly impact the supply chain strategy in the entire system. To determine the appropriate strategy, enough attention should be paid to the uncertainties in the partition of the supply chain system. There are four main types of supply chain strategies in terms of the demand and supply uncertainty (see table 3.5) (Lee, 2002) and the main purpose of them is to reduce uncertainties in demand and supply.

Table 3.5 The Uncertainty in Forward Logistics Framework (Lee, 2002)

		Demand Uncertainty	
		Low (Functional Products)	High (Innovative Products)
Supply Uncertainty	Low (Stable Process)	Efficient Supply chain	Responsive Supply chain
	High (Evolving Process)	Risk-Hedging Supply chain	Agile Supply chain

Efficient Supply Chain

Efficient supply chain is supply chain that utilizes strategies aiming at creating the highest cost efficiencies (Zylstra, 2006). For this type, both demand and supply uncertainties are low and stable, in other words the customers in market have stable and long term needs and manufacturers and suppliers have capability to offer stable and long term supply correspondingly. The optimization in efficient supply chains should be focus on in the following aspects (Christopher, 1992);

➢ Non-value added activities should be eliminated
➢ Scale economies should be pursued and cost per unit could be minimised.
➢ Optimal techniques should be deployed to perform best in production and distribution
➢ Efficiency that is to minimise the unnecessary wastes is the key for this type of supply chain.

Functional products such as grocery, basic apparel, food, oil and gas, should be employed in the efficient supply chains to maximise the efficiency in the entire supply chain.

Responsive Supply Chain

In this type of supply chain strategy, the uncertainty in the demand tends to be very high, but that in supply side is stable and low. This is supply chain that utilizes strategies aiming at being responsive and flexible to the changing and diverse needs of the customers (Christopher, 1998). As the supply is stable and secure and the uncertainty in supply is low, company must focus on the customers' real needs and be responsive, for example mass customization processes allow the products to be flexible. Responsive supply chain is one of the most prevailing supply chain modes that has been widely employed in many companies. Take Dell computer as an example, customers order computers online by themselves and then Dell manufacturers generate the customized productions and delivery to final customers directly. Several obvious advantages of responsive supply chain are listed as follows;

➢ Focus on the customers' real needs. This strategy enables company to meet the specific requirements of customers.
➢ Increasing the flexibility of business
➢ The customized processes are normally involved such that the customer satisfaction could be increased.
➢ The lead time in production and distribution would be minimised in this quick responsive strategy

Risk-Hedging Supply Chain

Risk-Hedging supply chain is supply chain that employs strategies on the purpose of pooling and sharing resources in a supply chain such that the risks and uncertainties could be shared and reduced (Christopher, 1998). For this sort of supply chain, normally the demand uncertainty is low and customers' need is stable; however, the supply side is unstable and the uncertainty in supply is high.   One of the good examples is the seafood industry: the market demand is high

and stable, unfortunately the seafood supply is very unstable and there are many uncertainties directly influence the supply, such as weather, regulations, and many other unexpected uncertainties. There are some significant characteristics of this supply chain mode which are as follows (Handfield & Nichols, 1999);

➢ It is one of the common supply chain strategies in retailing and large chain stores.
➢ Trust plays an essential role in this supply chain strategy.
➢ Sharing risk is another important aspect in this strategy.
➢ Increased safety stocks due to the pooling and sharing resources in supply chain
➢ Safety stocks can be shared with other companies as well
➢ Risk and uncertainty of supply reduction would result in higher inventory cost

Agile Supply Chain

Agile supply chain utilizes strategies of being responsive and flexible to customer needs, while the risks of supply shortages or disruptions are hedged by poling inventory or other capacity resources. These supply chains essentially have strategies in place that combine the strengths of "hedged" and "responsive" supply chains. (Lee, 2002) This is the most difficult strategy among these four supply chain strategies, as Agile Supply Chain concerns uncertainties in both demand and supply rather than only focusing on either side. The examples of products which will be employed in this supply chain strategy include semiconductor, high-end computers, and telecom.

The Uncertainty in Forward Logistics Framework

Traditionally supply chain strategies are categorized as push or pull strategies; a number of companies have employed a hybrid approach─ the push-pull supply chain paradigm. In the pull-based supply chain, production and distribution are demand driven such that they are coordinated with true customer demand rather than forecast demand (Simchi-Levi, et al., 2008). In a vertically integrated company, there are multiple manufacturing sites and distribution and retail are both involved. It is a smart way to minimize the conflicts between the demand uncertainty and manufactures' or suppliers' economies of scale (lower unit cost) by combining

the push and pull strategies. It is significant to implement both pull-based and push-based supply chain in the different areas, and the hybrid approach could be implemented in many companies, especially for vertically integrated companies.

3.4.3   Push Strategy

In push-based supply chain, production and distribution decisions are based on long term forecasts. Generally this strategy is employed when there are not many uncertainties in demand of supply chain and marketplace in the long run. The push strategy could be applied to that portion of the supply chain where demand uncertainty is relatively small, and the production batch size is large and variable (Christopher, 1998). Besides the push-based supply chain might be used in the manufacturing sites to maximize the productivity and minimize the cost per unit (economies of scale). Especially in component manufacturing, the push strategy is much more effective and efficient than pull strategy(Wilson, 2010).

In a push based supply chain, production and distribution are based on long term forecasts. Push supply chain used to be widely adopted in the traditional manufacturing strategy to achieve economies of scales (see figure 3.5) (Lean Enterprise Institute., et al., 2009). As the quantity of production increases from Q to Q2, the average cost of each unit decreases from C to C1. Meanwhile, the push strategy was used in distribution system traditionally where the distribution decisions are based on long term forecasts. One of examples of push distribution is in seafood industry where all the fresh fish that have been caught by fisherman have to be distributed to wholesaler or retailer immediately. And the push-based supply chain might be implemented in the transportation to achieve economies of scale and minimize the transportation cost per unit. For example,

Figure 3.5 Economies of scale (Lean Enterprise Institute., Shimokawa, & Fujimoto, 2009).

considering a company that operates its own fleet of trucks and each truck has some fixed cost of operation (e.g., depreciation, driver time) and some variable cost (e.g., gas). If a truck is always full when it makes a delivery, the cost of operating the truck is shared with the largest possible number of items. Consequently, carrying full truckloads minimizes transportation costs.

In some industries, push distribution strategy is much more effective and efficient than pull distribution strategy, for instance in manufacturing industry, manufacturers prefer to have large lot sizes, as per-unit setup costs are reduced, and waiting time could be minimised (Black & Hunter, 2003). Unfortunately, in pull based supply chain, typical demand does not come in large lot sizes. And also there are some similar examples in agriculture, mining, and seafood industries; implementing the push strategy in these industries is much more effective and efficient than pull strategy. In cost accounting world, the push distribution may be a good option to reduce the various costs, such as manufacturing costs, transportation costs, human resource costs, etc. However if considering the whole supply chain system, sometimes it can be noted that pull distribution strategy is much more effective than push distribution strategy.

3.4.4 Pull Strategy

As mentioned previously, in this strategy, the distribution and production are demand driven such that they are coordinated with true customer demand rather than forecast demand. This strategy could significantly reduce the demand variability and inventory level (Handfield & Nichols, 1999); however, it requires good information sharing, effective supply chain system, cooperative business partners, and lower economies of scale. This pull strategy tends to be employed in the portion of the supply chain where demand uncertainty is high to reduce the lead time, minimize the inventory level and maximize the service level.

With the development of business, an increasing number of companies pay attention to the pull distribution strategy. There is two-way communication in pull distribution system; it is very helpful to improve the accuracy of forecasting and reduce the inventory level and operating expense. In TOC distribution system, push strategy should be replaced by pull strategy, as the pull strategy is much more effective than push strategy in throughput accounting world. As mentioned in previous chapter (Chopra & Meindl, 2004), Dell computer is a good example of

pull strategy. Personally, the pull strategy is much more flexible than push strategy, and pull strategy could be implemented with lean principle and TQM.

3.4.5 The Key Characteristics and Differences Between "Push" and "Pull"

There are several significant differences between push and pull strategies and it is hard to decide which one is better as they have their own advantages. Personally, there is no best strategy in the world and all the strategies are the same. The point is how you implement the strategy. In different cases, the strategy may be different, because the best strategy is the most suitable strategy. As mentioned previously, in some industries, the traditional push supply chain strategy still much more effective and efficient than pull strategy, such as fishing industry, dairy farm, etc. However from my perspective, pull supply chain will be the major trend as several key characteristics of pull strategy lead it to be much more suitable for today's business model, such as flexibility, short lead time, low inventory level, higher service level, and better customer satisfaction. According to the previous studies (Lambert, et al., 1998b), the key characteristics and differences between "Push" and "Pull" can be summarized as follows (see Table 3.6).

Table 3.6 The Key Characteristics and Differences between "Push" and "Pull"
(Lambert, et al., 1998b)

Push	Pull
Effective supply chain	Respond supply chain
Applied to that portion of the supply chain where demand uncertainty is relatively small	Applied to that portion of the supply chain where demand uncertainty is high
Lower cost	Normally high cost
Production & distribution decisions are based on long term forecasts	Production and distribution are demand driven
Inventory level normally high (safety inv.)	Low inventory level
Large and variable production batches	Response to specific orders
Service level low	Higher service level
No or few information sharing	Information sharing
Achieving economies of scale	economies of scale is not important

Lead time normally longer than pull	Short lead time
Low Flexibility	Higher flexibility
Traditional supply chain strategy, focus on cost	lean principle, advanced supply chain strategy
Traditional way, easy to implement	Difficult to implement

3.4.6   Hybrid Push-Pull Approach

It is necessary to mention the hybrid push-pull approach as actually it is extremely difficult to find pure push or pull supply chain in today's business. In many cases, a hybrid of push and pull approach has been widely used. Especially in vertically integrated companies who try to maximize the efficiency in the whole system, it is impossible to deploy pure push or pull strategy in one system. To apply the hybrid push-pull approach in business, the key issue is how to identify the push-pull boundary which is the interface between the push based stages and the pull based stages in business processes (Simchi-Levi, et al., 2008). Push-pull boundary might be located in the different stages or areas in different companies, as a host of factors could directly influence the push-pull boundary, such as product, distribution channel, company structures, cost etc. However, push-pull boundary must be suitable for the whole system in order to maximize the benefit and minimize the cost. Dell Computer, who also uses push-pull strategy, is an excellent example of the impact of the push-pull strategy on supply chain performance. In typical push system, a PC manufacturer who builds to stock makes all production and distribution decisions
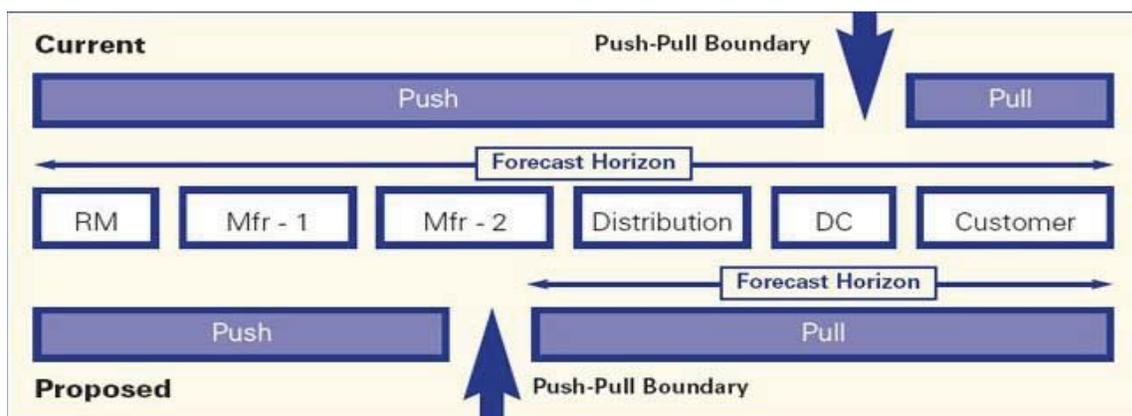
Figure 3.6 Push-pull boundary (Chopra & Meindl, 2004)

base on forecast; however, in Dell, the manufacturer builds to order. This implies that component inventory is managed based on forecast, but final assembly is finished in response to a specific customer request; therefore the push-pull boundary in Dell is at the beginning of assembly.

In a push- pull supply chain, some stages of the supply chain, typically the initial stages such as raw materials, manufacturing, and distribution are operated in a push-based supply chain; while the remaining stages such as distribution centre and retail employ a pull based strategy, as illustrated in the chart (Chopra & Meindl, 2004). As illustrated in Figure 0.6, most businesses use "current strategy" and the push-pull boundary is located in distribution centre or warehouse such that reducing the inventory cost and increasing the customers' satisfactions. However, currently many companies still employ push strategy from manufacture to distribution such that retail may lead to some extra costs due to the overproduction or shortage in manufacturing site, and unexpected demand from retail. Therefore it is significant to move the push-pull boundary upward to manufacturing site, like "Proposed strategy" in the chart (Chopra & Meindl, 2004) (see Figure 3.6). This change could minimize the negative effects of overproduction, shortage and increase the efficiency in the whole system; however there are some challenges of applying the push-pull strategy in business, as the push-pull system used in one company needs more collaborative activities, such as the better information flow system, more customer service people to handle the orders, or change management. Those activities would cause extra costs and risks, thus it is important to consider the real situation and both sides before implementing it.

Different supply chain strategies utilize different methodologies to reduce the uncertainties in system for the purpose of optimising the traditional forward logistics. With the development of supply chain industry, the reverse logistics also needs the appropriate methods of optimisation to improve the performance of reverse logistics; however, as mentioned previously, the reverse logistics has a huge difference from the forward logistics. The traditional supply chain strategies are no longer suitable for the reverse logistics. Although reverse logistics includes all supply chain actions that occur in reverse logistics, the processes and purposes of reverse logistics are different from the forward logistics.

Personally, supply chain strategies could be utilized as a way to optimise the supply chain, in other words, appropriate supply chain strategy could optimise the logistics and supply chain system, as the unnecessary wastes and procedures could be eliminated (Goldratt & Cox, 2004),

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and the efficiency of the entire supply chain system could be improved via the right strategy. However the supply chain optimisation does not only focus on the strategy, it also includes other aspects, such as issues, procedures and operations in the entire business. It is essential to review the methodologies of traditional supply chain optimisation such that these methodologies could be amended and used for reverse logistics optimisation.

3.5   Return/Reverse Logistics Optimization Methods

Return reverse logistics optimization is portion of supply chain optimization, however, as per discussing , there is limited attention paid to theory-based research in the returns/ reverse logistics management arena (Blumberg, 2005). Several optimization methods based on traditional supply chain optimization would be introduced there. Although the principle of return/ reverse logistics optimization may be similar to the traditional supply chain optimization, the steps of optimization are different from traditional supply chain optimization due to the natural differences of processes between return/ reverse logistics and forward logistics. The return/ reverse logistics optimization method is a general guide for a business who wants to improve and optimize its return/reverse logistics. And the methods are based on the previous relevant theories and practical case of New Zealand Couriers.

3.5.1   Theory of constraints (TOC)

Theory of Constraints (TOC) is a management philosophy which was invented by Dr Eliyahu M. Goldratt. Personally speaking, constraint/uncertainty plays a key role in this management philosophy. There are many different approaches to optimize the logistics and supply chain, and TOC is one of the most systemic optimization approaches in supply chains and operation. Goldratt' s theory is a strategy to guide people to optimize and improve, for example Hiroshi Okuda, CEO and chairman, Toyota Motors has said," I want everyone at Toyota to change or at least do not be an obstacle for someone else wanting to change, I also want everyone to write down their change plans for the year." (*Ono, 1988) . As per the video of "What is TOC?" (Goldratt, 2011), Dr. Eliyahu M. Goldratt explains TOC could provide rapid change for the businesses, and continuous improving is promoted by this strategy as well.

Theory of constraints (TOC) and Drum-Buffer-Rope (DBR)

Theory of constraints provides a map for the operation management, and people could discovery or create something based on this map. DBR which is one of the applications of Theory of Constraints was first introduced by Eliyahu M. Goldratt. There are three key elements. The first one is Drum which represents the constraint or the weakest chain in the production system; the second is Buffer referring to material release duration, and the buffer is used to protect the constraints in the system and ensure a constant flow of work into the buffer; the third element is Rope, which means work release time. One of the important goals of the DBR is to focus on the weakest chain and process in a system, and use the buffer and/or scheduling to protect it in order to optimize the efficiency in the entire system (Zylstra, 2006). Buffer management plays a key role in the TOC/DBR, which is different from the other management philosophies. As buffer management also is a vital tool of optimization; one of the goals of buffer management is to ensure the continuous flow in the system using the appropriate buffer to protect the bottlenecks/uncertainties. And also buffer management could help company to reduce the investment (I) in system and maximize the overall efficiency.

The optimization method of TOC/DBR is explained as follows.

- It is inefficient to keep all the workers busy all the time in plant.
- The continuous flow is significant to maximize the overall efficiency in system.
- The over production need be eliminated in order to minimize the cost (Waste).
- Buffer management is very important tool in the TOC/DBR.
- It is important to trim the excess capacity in order to cut expenses and cost.
- It is necessary to protect the plant's bottlenecks in order to ensure the continuous flow and minimize the inventory.
- Customer (Demand) is one of the important factors which directly influence the business.
- In Alex's plant, automation has been introduced at several levels to increase production efficiencies and have resulted in unprecedented savings in production time and station production rate.
- Batch size also would influence the performance of production, in TOC/DBR large process batches and small transfer batches can occur simultaneously.
- Total system capacity equals the bottleneck capacity. Bottlenecks should be optimized by

eliminating time wasted through idle bottleneck time, processing defective parts, or producing parts which do not contribute to throughput.

Theory of constraints (TOC) bottleneck

Eliyahu M. Goldratt wrote a novel "The Goal" (Goldratt, 2004) to indicate the concept of constraint. According to this book, the constraints/uncertainties could be understood as bottlenecks, which are problems and limitations that influence the organizations to achieve their goals. In this book, Jonah represents Goldratt to help the manager Alex, who manages a metal-parts plant, to solve the various problems during the production in order to achieve the certain goals.

TOC focuses on the bottleneck in a critical chain. The bottleneck may reflect insufficient resources, weakest link, time, constraint, uncertainty, weakness, issue, etc. and these could directly influence the performance of certain activities. "TOC are new management philosophy, new research methods and robust applications." (Goldratt, 1997)   For example in an assembly line, if one work is stuck it will stop the whole line. The only place that people want one hundred percent of efficiency, the only place that needs protection, is the bottleneck. Exactly as showed in book of "The Critical Chain" by Johnny, that's where the pile of inventory should be, right before the bottleneck, nowhere else, therefore the bottleneck, which is very critical, should be emphasized. Although the bottleneck would be various in return/ reverse logistics, the uncertainty, which is a bottleneck in return/reverse logistics, has been focused on in this research. Goldratt's theory of constraints put the main emphasis on the bottleneck, because if the bottle is solved, the performance of whole system will be improved. Therefore the bottleneck is a key in a procedure and project.

Focusing on the bottleneck (TOC) is one of the traditional solutions in logistics and supply chain optimization. This method has been widely used in manufacturing, logistics and operations, for instance, New Zealand Couriers has employed dedicated return label, and one of the reasons is trying to solve the uncertainties and problems which are the weaknesses/ bottlenecks between couriers and return consignee. As mentioned in Chapter5, dedicated return label carries detail information for third party such as couriers, staff and customers to use in a return processing.

Lack of information sharing was one of the bottlenecks in New Zealand Couriers' return, actually this is one of the most common problems in many companies and businesses (David, 2007); therefore NZC focused on this constraint/bottleneck and adopted the new return label to solve the problem. The advantage of this method is significant, because company only focuses on the bottleneck/problem, the cost of optimization may be relative low and the improvement may be significant; due to the bottleneck is improved.

3.5.2 Goldratt's Approach and TOC Financial Measurements

Goldratt's approach is originally from Dr Eliyahu Goldratt (Goldratt & Cox, 1993), and this approach is based on the Theory of Constraints. And the TOC distribution system is guided by Dr Goldratt's theory. Throughput Accounting is used to guide and measure the TOC distribution system. TOC financial measurement is one of cores in Goldratt's approach. There are three main measurements in the Eli Goldratt's measurements including Throughput (T), Investment (I) and Operating Expensive (OE). Companies need modify "I" and "OE", in order to maximize the "T".

Throughput (T)

Throughput is the rate at which the system generates money through sales. In the TOC/DBR, T is the most important measurement in these three, people focus on the T rather than the "I" and "OE". This is also a one of the most important differences between TOC/DBR and Lean manufacturing (Wilson, 2010).

Investment (I)

Investment is all the money that is tied up in the system. Two categories are includes; one is the physical inventory such as raw material, work in process and finished goods, and the other one is

the investments which are owned by the company in order to generate "T" such as machinery, fixtures and fittings etc.

Operating Expense (OE)

Operating Expense is all the money the system spends in order to convert Inventory into Throughput.   It includes all regular expenses.

In the cost accounting, OE is more important than the Throughput; however, the Throughput accounting would be concentrated in this thesis.   Dr Eliyahu Goldratt originated the idea in his book, "The Goal" as a way of managing the business to increase profits.   To maximize Throughput at same time to reduce the Investment and Operating Expense (Goldratt & Cox, 1993). Normally the Net Profit, Return on Investment, Cash flow, etc. are used to measure the business' profitability, according to Eli Goldratt's approach, to maximize the "Throughput" (T) is a primary goal of this method, in other words is to maximize the return and increase the profitability of business.

The financial return and profitability is a primary goal in Goldratt's approach, which was used to optimize a return/reverse logistics.

In the Throughput world, the most important thing is to maximize the throughput (T) ↑, and then try to reduce the Investment (I) ↓and Operating Expense (OE) ↓ There are many different ways to increase the throughput, however according to TOC/DBR, one of the most effective ways to increase the throughput is to adopt TOC/DBR, and focus on the constraint and using the buffer management, small transfer batches and large process batches to protect the constraints and ensure continuous flow in order to improve overall efficiency at the same time to minimize the level of uncertainty in system.   The buffer management used appropriate buffer to protect constraints in order to against the uncertainty and variability, such as equipment down, insufficient capacity, time, etc.   The other important point to increase the throughput is to eliminate the unnecessary waste, minimize the Investment (I) ↓ and cut down Operating Expense (OE) ↓ (see Figure 3.7), according to Jonah (Goldratt, 2004), it is not necessary to maximize the capacity everywhere in the system, only the constraints or bottlenecks should be monitored regularly, sometimes it is significant to trim excess capacity in order to avoid the extra expense and cut down the costs, personally trimming excess capacity also could avoid the unnecessary

waste, such as a fully loaded small truck is better than a half loaded big truck. And all the planning and scheduling should base on the actual demand in order to eliminate the extra costs and wastes. There is close relationship between "I" and "OE", sometimes change in "I" could influence "OE" simultaneously. For example in a traditional supply chain, when the inventory is reduced by using the small transfer batches, large process batches and buffer management, the investment (I) ↓includes raw materials, WIP and finished goods will be cut down, at the same time the Operating Expense (OE) ↓ would be reduced as well, due to the inventory reduction directly minimized double handling cost, storage cost, labor cost , etc. that result in the Cash Flow↑ is improved, Net profit↑is increased and the Return on Investment (ROI) ↑ is increased as well. The changes based on the formulation below:

Table 3.7 The Formulation In the Throughput World(Goldratt, 1997)

Net Profit↑= T↑− OE↓	ROI↑= (T↑-OE↓)/I↓

Replenishment solution is one of the most important parts in TOC supply chain, and also Replenishment solution is a core of Goldratt approach to optimize the traditional distribution system. It is an effective way to optimize distribution system, because it provides a clear direction for companies to improve their distribution system. In Throughput world, to reduce Investment "I" and Operating Expense "OE" is the other way to increase Throughput "T". As mentioned above, in the Throughput accounting, "T" is the most important component compared to "I" and "OE". Therefore actually the aim of reduction of "I" and "OE" is to improve "T". There are many different ways to reduce "I" and "OE" and also there is a close relationship between "I" and "OE". Replenishment solution was based on Theory of Constraints, the aim of Replenishment solution is to increase "T", and reduce both "I" and "OE" in a system.

Figure 3.7 TOC financial measurements(Goldratt & Cox, 2004)

This method could be used for the return/reverse logistics optimization, companies have to increase "T", and reduce both "I" and "OE" in their logistics system. For example recently New Zealand Couriers started to review the operation costs, which include couriers' pay, stationary orders, etc. the main reason is to eliminate the unnecessary costs in order to cut off the operation expense (OE), and also New Zealand Couriers changed the new cage label, which is similar to the parcel address label to indicate the destination of certain cage. The new cage label is smaller than previous cage label and the cost of new label is much cheaper than old one, therefore the Investment (I) could be reduced in New Zealand Couriers as well. The Throughput (T) in system wide would be increased after both operation expense (OE) and Investment (I) have been reduced. In this optimization, the change may be relative big, especially in a large scale company, there are many aspects should be considered, however the method could benefit entire company and business in the long term. Many phenomena could not be solved by treating the bottleneck (TOC), such as high operation costs could badly influence the long term development of company and business.

According to Profit leverage effect of logistics can be defined as a dollar saved in logistics costs is a dollar increase in profit. This profit-leverage effect is particularly important for low-margin businesses, such as retailing Walmart redesigned its distribution process, and successfully improved the efficiency and accuracy in the system, that caused significant increase in profit. To save $1.00 cost will cause $1.00 instantly increase in profit, but to increase $1.00 sales has less $1.00 increase in profit. The impact of $1.00 saving in supply chains on the organization's profitability is greater than a $1.00 increase in sales. Therefore reducing the (I) and (OE) is a one of the effective and efficient ways to optimize the performance in entire system and business.

3.5.3　The Process of On-Going Improvement

According to the Goldratt, TOC based on the idea that in any complex system at any point in time, there is only one, or at most, very few aspects of the system keeping that system from achieving its goal. These constraints, if properly identified and broken, provide the fastest route to significant improvement for the system and can provide the basis for long term, strategic improvement (Goldratt, 1990). Therefore company can optimize the constraints and bottlenecks in order to improve the processes and maximize the overall efficiency in system.　And the process of on-going improvement could be applied in many areas. Focus on solving twenty percent of the important problems, and you'll reap eighty percent of the benefits (Goldratt, 2011). Actually a manager has to focus on the constraints in the optimization project, and solve these constraints by using the process of on-going improvement. Because the world is not perfect, there are so many uncertainties around the people, some uncertainties and issues may be realized before implementing the optimization, but some uncertainties may hardly be noticed until something happened, the process of on-going improvement is a general guide for common cases. Actually in a real return/ reverse logistics optimization, each case should be investigated and discussed separately, there are various aspects need be considered, such as the real issue, situation, needs, etc.

Five primary steps are involved in Process of Ongoing Improvement (POOGI) (Goldratt & Cox, 2004):

➤ Firstly, identify the system's constraints; there are two ways to strengthen a bottleneck. One is to simply add more capacity, by hiring more people or buying more machines. But there is another way. To squeeze the maximum from the capacity company already have. This is an important step because sometimes the constraints or bottlenecks are not obvious, and in some cases, the constraints do not only exist in the system or organization, the external constraints also should be considered.　The constraints include resources, processes, equipment, policy, etc. that affect or limit the organization or company to achieve the goal (Goldratt, 1990).

➤ Secondly, exploit the system's constraint.　Since the output of the constraint is the limiting factor of the output of the whole system, our desire to exploit it translates to making sure that we are squeezing the most we can out of it. Utilization and productivity of the constraint

must be maximized.   This step is to focus on the constraint that was identified in the first step, and try to maximize the capacity of the constraint, in order words to minimize the time wasting on the constraint, keep constraints busy.

➢ Thirdly, subordinate all other processes to above decision.   The idea of subordination suggests that our use of the constraint itself should not be allowed to be limited by anything else that is outside of its control, including policies, habits, and assumed requirements of non-constraint. A second aspect of subordination relates to the capability of the constraint itself. Just as it makes no sense to expect a chain to lift more than its weakest link can handle, we should not expect the system to do more than the constraint can handle. It is unnecessary to keep non-constraint and non-bottleneck busy all the time, the key point is to keep constraints busy, minimize the waste around constraint.

➢ Fourthly, elevate the constraint, some constraints could be solved permanently by increase their capacity, for example to purchase new equipment, automation, redesign process, etc. Personally, it is necessary to consider and balance the costs and benefits of elevating the constraint in this step.   As mentioned before, the managers have to consider both costs and benefits firstly before to make final decision.

➢ Fifthly, to check the performance, if in the previous steps, a constraint has been broken, return to the first step. When the weakest link has been strengthened to the point that it is no longer the weakest link, and there is a new weakest link is emerged. For example, people might raise production capacity to the point that the market is now the constraint. Alternatively, in a project, people may find a way to shorten the critical path of tasks to the point that it no longer defines how soon the project can get done. This new constraint, whether it is the market, a new critical path, or whatever, demands a completely new view of the system.   Therefore, people need go back and put the "on-going" in to the process of on-going improvement.

3.5.4   Procedure and Lead Time Optimization

There are many different procedures have been involved in a return job, such as charging processing, operation processing, customer enquiry processing, claims processing etc. To optimize the procedures and reduce the lead time in a return processing is the core of this optimization method. The lead time is one of the critical factors in the logistics and supply chain (Hobbs, 2004). Therefore the procedure optimization focused on the procedure and lead time optimization.

There are several different ways to optimize the procedure and lead time which are shown as below.

➢ **Parallel step design of processing,** which was used to reduce the duration of procedure, is a very useful and simple way to redesign procedures and reduce the lead-time, some processes in a job could be run at the same time.   Therefore, the company should understand and review the procedures and all available resources, which could be used for parallel step design.   However, company should balance the costs and benefits. Although sometimes the duration of procedure could be reduced, the costs may be high; in this case, the company should not only focus on the lead-time in the optimization, but also need consider other factors.

➢ **"Multi-tasking is probably the biggest killer of lead time."** In a processing, the multi-tasking have to be avoided, because according to book "The Critical Chain" (Goldratt, 1997), the multi-tasking would cost longer time to finish a task.   In addition, resources have to be rearranged in order to achieve multitasking.   Therefore, in return/reverse logistics optimization, the bad multitasking has to be eliminated.

➢ **Companies have to protect the completion date of the critical procedure.**   The critical procedure was defined as the longest chain of dependent steps, and longest in time.   The Critical procedure determines the time it would take to finish a job. Any delay in the critical procedure would delay the completion of the entire procedure.   That is why the companies must focus on it. Don't waste the time allotted for the critical path, any waste the time will delay the job (Goldratt, 1997).

> *Add safety time and feed buffers into the procedure.* There are three mechanisms to waste that safety, one was called the student syndrome, and there is no rush so start at the last minute. The second is multi-tasking, as mentioned above, the multi-tasking cause long lead-time to finish each single job. The third one involves the dependencies between steps; these dependencies cause delays to accumulate and advances to be wasted. For each feeding path they decide to cut the original time estimates of the steps in half and use half of the trimmed lead-time as a feeding buffer (Leach & Books24x7 Inc., 2005). The "feeding buffer" protects the critical procedure from delays occurring in the corresponding noncritical procedure.

> *Standardised procedure.* This is a one of the significant optimization methods, which has been widely employed in many different industries. Moreover, international standardization is one of the most important trends in the future. Standardised procedure could directly reduce the uncertainties and variability, at the meantime the quality and consistency could be improved. For instance, the standardised services and procedure could reduce and avoid unnecessary errors and delay. As mentioned in Chapter 4, New Zealand Couriers employs third party companies Coural. Coural Ltd was employed to cover some rural deliveries and Freight link, which is a third party company, was employed to do some offshore island deliveries in New Zealand. The procedures between NZC and these third party companies have not been officially standardised, staff and couriers follow the common sense and previous procedures to handle the freights. However, any uncertainty may immediately cause a significant delay and service failure, because there is no standardised procedure, such as incorrect delivery address, missing item and delayed parcels, could directly influence the KPI. Therefore, it is significantly to standardise procedure, especially the critical procedure (Goldratt, 1997).

3.5.5   Implementing Appropriate ERP System

Another important method of optimization is implementing appropriate ERP system in a company and business. The ERP system has been introduced and discussed briefly in Chapter2. Enterprise system is one of the significant trends in today's logistic and supply chain industry, as mentioned above there are many benefits and advantages of implementing the ERP system, one of the important features of enterprise system is to assist and help companies to optimize their entire system (Narayanan, 2010). The different companies may have different enterprise systems, for instance the CDCS system (see Appendix 13).   has been used in New Zealand Couriers, and the two pictures of CDCS screen as below indicated the two functions of Track & Trace and reverse logistics (see Appendix 14).

Logistics and supply chain management, which includes the return / reverse logistics, actually monitors, controls and manages two major flows, include the freight flow and information flow in a logistics and supply chain system.   And an enterprise system is mainly used to manage the information flow in the logistics and supply chain system. As mentioned in Chapter 3, the appropriate enterprise system could improve the efficiency of entire system. Therefore this optimization method is normally used for the optimization in system wide.   For example the CDCS reverse logistics function (see Appendix 14) could optimize the information flow and return procedure in the system wide, such as improving the accuracy of information, eliminating double handling, minimizing the unnecessary errors and delay in a return/ reverse logistics job. This optimization method would bring a significant improvement in a company and business; however the cost of system and software is very expensive, and also there was a high failure rate of implementing enterprise system in previous cases.   Therefore a company and business should be very careful to employ this method to optimize its logistics and supply chain.   For some companies, which already had their enterprise systems, could modify their system and add new functions in order to optimize the logistics and supply chain (Chorafas, 2001).

An appropriate ERP system could help a company and business to reduce the uncertainties from several aspects as below

Good Communication

As mentioned in Chapter2, the ERP system links different business functions and parties, all the different types of information could be accessed and used by the different users, the traditional communication barriers could be minimized. According to New Zealand Couriers, the New Zealand Couriers' system also links the different customers through the internet and GPRS technology; the data could be shared and transferred in a system, and the errors and mistakes during the information flow also could be minimized. Effective and efficient communication is a very useful solution to reduce and minimize the uncertainties in many industries.

Transparent and Efficient Information Sharing

ERP system stimulates the information sharing in the logistics and supply chain system, there are many previous researches (Rogers, 1998; David, 2007) have proved this statement. One of the significant advantages of the information sharing is reducing the uncertainties. For instance, in New Zealand couriers, the uncertainties between 3PLs and return receiver / consignee could be minimized by the information sharing between companies and NZC. CENZ return is one of the classic examples of using ERP system to optimize the return procedures and information sharing.

Effective Business Processes Monitoring and Controlling

Another important function of ERP system is to monitor and control the procedures, and one of the main aims of processes monitoring and controlling is to reduce the negative effects of uncertainties in the processes (Narayanan, 2010). As mentioned before, there are so many unexpected things in the world; therefore it is significant to avoid the unnecessary service failures and delay, which were caused by the uncertainties. Many ERP systems could provide intelligent automatic monitoring and controlling for the users.

Improving the Relationships and Trust

The uncertainties between 3PLs and return customer/consigner and 3PLs internal uncertainties are two major types of uncertainties. As mentioned in chapter3, ERP system integrated the business parties in a supply chain system that directly improved business relationship and trust, and then the performance would be improved straightway, because of the transparent information sharing, dedicated services and customised procedures. And then many uncertainties could be reduced and eliminated by improving the relationships and trust. Therefore the ERP system indirectly reduced and eliminated the uncertainties.

Standardization

One of the important characteristics of ERP system is that the various procedures and operations could be standardized by ERP system. As mentioned in chapter3, standardization is one of the significant methods to reduce the uncertainty and variability.

Centralized System

A centralized return system could reduce and avoid many uncertainties. And centralization is more effective than decentralization in logistics and supply chains that has been proved by previous researchers (Rogers, 1998; David, 2007). For instance hub and spoke system in New Zealand Couriers is a centralized operational system. However the centralized operational system requires a centralized information system, ERP system could establish a centralized system to match its operational system so that the uncertainties and variability could be reduced by the centralized system (Curran & Ladd, 2000).

3.5.6   Return/ Reverse Logistic and Forward Logistics Optimization

In a return/ reverse logistics, the optimization method should not only focus on the return/ reverse logistics, but also consider the forward logistics, because the final goal of logistics and supply chain optimization is to maximize the benefits and efficiency in a system wide (Goldratt & Cox, 2004).   These optimization methods could be easily employed in both forward logistics and return/reverse logistics. And actually logistics and supply chain optimization includes a wide range of activities; and an optimization project may be involved in the different level, such as strategic level, tactical level, and operational level. The optimization method provides a map for the management, who could discover and create something new based on this map.   And the return/reverse strategies also could be applied in a return/reverse logistics optimization, because an appropriate strategy is a key in a company and business, inappropriate return/ reverse logistics strategy could directly influence the performance of return (Chopra & Meindl, 2004).   Many other factors also should be considered in a logistics optimization project, such as external business environment, regulations, etc.   By the way the return/reverse logistics optimization is a huge project, there is no such cookbook for all cases, the case may be different from each other; therefore each case should be investigated and analyzed separately.   And many unexpected problems and issues may be found in an optimization project, as mentioned before, the innovative solution is highly recommended.   Although there is no best solution in logistics and supply chain optimization due to the diversity, the ideal solution is the most appropriate solution in a certain case.   The logistics and supply chain optimization is a complex project, there are many risks and uncertainties could be involved in it.   And the costs of the optimization may be relative high, the duration may be long, however a successful logistic optimization could fundamentally improve and change an entire company and business in a long term.

Chapter 4 Methodology

4.1   Introduction

This chapter discusses both the conceptual framework and the practical elements of the research. It explores the research questions in more depth, and discusses what methods are the most appropriate, given the aims and nature of the research. And this chapter describes and explains the methodology deployed in this study, and then describes methods of collecting data and data analysis. The research process in this research is introduced in this chapter.

Grounded theory qualitative methodology will be mainly implemented in this thesis (Cameron & Price, 2009), as well as case study for New Zealand Couriers Ltd.   The case of New Zealand Couriers will be observed and studied, and the reverse logistics services in New Zealand Couriers will be focused on. The case study allows researchers and audiences to deeply review and investigate some common phenomenon and problems to find the correct solutions.   As per previous chapter the literature review includes logistic and supply chain management, reverse logistics, supply chain optimization, 3PLs and relevant literature and theoretical findings in supply chain management; relevant data will be collected from literature review, observation, and qualitative interview. And the collected data will be interpreted and analyzed to write up findings/ conclusions. The interpretive approach will be mainly used to conduct the research and answer the questions. The qualitative research will be the main research aim in this thesis, due to the exploratory nature of the research itself, such as the limitations of measurements, subject and research questions. It is difficult to measure the level of optimization and uncertainty by quantitative research, as lacking existed theories of reverse logistics to support quantitative research (Bryman, 2007).

There are several approaches, which has been adopted in this research, shown as below.

- ➢ Literature review on logistics and supply chain management, reverse logistics, supply chain optimization, 3PLs and theoretical findings in supply chain management
- ➢ Review of third party reverse logistics implementation practices in New Zealand Couriers

- ➢ The method of observation is used to collect the primary data, and it helps audiences to understand the big picture of NZC and its operations and business processes.

- ➢ Case study, New Zealand Couriers offers customized reverse logistics services to different clients, according to the different clients' needs and products. The case study is employed to deeply analyze each single case.

- ➢ Evaluation of the performance in NZC is on the basis of existing key performance indicators compared with initial targets and benchmarking of some key performance indicators.

- ➢ The method of qualitative interviews is also used to interview various personnel, such as managers, staff, and customers, and discuss results achieved in the last couple of years, identifying the main reasons for deviations and improvement potential in the future.

- ➢ Documentary analysis is utilised to analyze and interpret the phenomenon and data, which are obtained from observation.

4.2 Objectives

The core of this research is to explore the uncertainties in 3PLs reverse logistics. The uncertainty is one of the significant factors, which directly influence the performance of supply chain system (Chopra & Meindl, 2004). There are many researches and theories about the uncertainties in traditional forward logistics; however, there has been limited attention to theory-based research in the returns management arena (Jahre, 1995a; Carter and Ellram, 1998; Daugherty et al., 2001) Managing these returns is known as reverse logistics (Louise, 2010). With the development of economics, the 3PLs reverse logistics will play an increasingly important role in the supply chain system; therefore it is necessary to consider how to improve the 3PLs reverse logistics. In the research, the key uncertainties in 3PLs reverse logistics service will be investigated, and the solutions of how the 3PLs reduce the uncertainties in order to optimize the 3PLs reverse logistics will be discussed. And one of the main objectives of this research is to answer the research questions; the four researches questions are shown as below.

Research Questions:

1. What are the uncertainties in 3PLs reverse logistics based on the case of New Zealand Couriers Ltd?

2. What are the impacts of uncertainties in 3PLs reverse logistics on the performance of reverse logistics service?

3. How to reduce the uncertainties in 3PLs reverse logistics in order to optimize the reverse logistics services based on the case of New Zealand Couriers?

The case study will be employed to conduct an in-depth investigation about the reverse logistics services in New Zealand Couriers. In the research, the research questions will be answered and also the audiences will understand some key concepts, identify the uncertainties in 3PLs reverse logistics, and know how to optimize the reverse logistics by reducing the uncertainty in reverse logistics. The seven different types of return/ reverse logistics models are summarized from the knowledge, which is gained from the day to day operations in New Zealand Couriers. Due to the external viability and replicability of case study, the research focuses on the return models rather than the specific companies. And the companies, which are employed in return/ reverse logistics models in New Zealand Couriers, are just used for purpose of illustration and explanation.

4.3   Research Strategy

Two distinctive clusters of research strategy, which include quantitative and qualitative research, have been widely employed in today's researches. A successful research must have an appropriate research strategy and method, because the research strategy directly determines the entire research. The fundamental differences between quantitative and qualitative research strategy comparing in three different orientations are illustrated in Table 4.1 (Bryman,2007).

According to Alan Bryman and Emma Bell (2007), **Quantitative research** can be construed as a research strategy that emphasizes quantification in the collection and analysis of data and that;

- entails a deductive approach to the relationship between theory and research, in which the accent is placed on the testing of theories;
- has incorporated the practices and norms of the natural scientific model and of positivism in particular; and
- embodies a view of social reality as an external, objective reality.

By contrast, **Qualitative research** can be construed as a research strategy that usually emphasizes words rather than quantification in the collection and analysis of data and that;

- predominantly emphasizes an inductive approach to the relationship between theory and research, in which the emphasis is placed on the generation of theories;
- has rejected the practices and norms of the natural scientific model and of positivism in particular in particular in preference for an emphasis on the ways in which individuals interpret their social world;
- embodies a view of social reality as a constantly shifting emergent property of individuals' creation.

Table 0.1 Fundamental Differences between Quantitative and Qualitative Research Strategy (Bryman,2007).

	Quantitative	Qualitative
Principle orientation to the role of theory in relation to research	Deductive; testing of theory	Inductive; generation of theory
Epistemological orientation	Natural Science model, in particular positivism	Interpretivism
Ontological orientation	Objectivism	Constructionism

General speaking, the research topic determines the research strategy. As mentioned previously, the research topic is to research the uncertainties in the third party reverse logistics in this thesis, and the aim of this research is to explore the uncertainties in 3PLs reverse logistics and find the impacts of these uncertainties in practices in order to optimize the return/ reverse logistics in 3PLs, in other words to reduce and minimize the negative effects of these uncertainties in 3PLs reverse logistics. Therefore the qualitative research is selected in this research, due to the nature of the research question.

According to the previous studies, Gubrium and Holstein (1997) suggest four traditions of qualitative research (Bryman,2007).

- Naturalism—seeks to understand social reality in its own terms; "as it really is"; provides rich descriptions of people and interaction in natural settings.
- Ethnomethodology—seeks to understand how social order is created through talk and interaction; has a naturalistic orientation.
- Emotionalism –exhibits a concern with subjectivity and gaining access to inside experience; concern with the inner reality of humans.
- Postmodenism—has an emphasis "method talk"; sensitive to the different ways social reality can be constructed.

Due to the nature of research, this research belongs to the Ethnomethodology. The researcher seeks to understand the uncertainties and the impacts of uncertainties in 3PLs reverse logistics.

4.4   Research Approaches

Data gathering is one primary task involved in researching. One of the aims of research method is to collect appropriate data and knowledge to support the points and answer the questions. Qualitative research subsumes several diverse research methods that differ from each other considerably (Silverman,1993). Due to the nature of research topic and availability of research resources, there are five major research methods/approaches are employed in this research;

- Case study
- Ethnography/ participant observation,
- Qualitative interviewing,
- Language-based approaches to the collection of qualitative data, such as discourse and conversation analysis,
- The collection and qualitative analysis of texts and documents

Case study

The case study is a major research method in this research. This method is also a non-experimental, descriptive type of study. It involves an in-depth descriptive record, kept by an outside observer who is an individual or a group of individuals. As per the research topic, this research focuses on the case of New Zealand Couriers, which is Freightways' flagship brand, is positioned as the premier provider of network courier services to New Zealand businesses. Since 1964 New Zealand Couriers Limited has been the leading Courier Company. Case study is one of the significant qualitative research methods, tending to provide in depth information and intimate details about the particular case being studied. This is an excellent way to determine how policies have an effect on society at the micro level, and also to see if theories have the predicted outcomes on the individual level (Bryman, 2007).

Advantages

Case studies are particularly useful when researchers intend to get a detailed contextual view of an individual's life or of a particular phenomenon. In the social sciences they are often used to help understand the social and familial factors that might be part of the development of some form of deviant behavior in an individual. Natural scientists might use this method to study a single animal or a single instance of some physical phenomenon. Case studies are also useful when researchers cannot, for practical or ethical reasons, do experimental studies. (Bryman, 2007).

The advantages of case study also includes:

- Developing analytic and problem-solving skills
- Allowing for exploration of solutions for complex issues
- Allowing student and audience to apply new knowledge and skills

Disadvantages

First and foremost, this is a descriptive method, not an explanatory one. That is, without the controlled conditions of the laboratory, conclusions about cause-and-effect relationships cannot be drawn. Behavior can only be described, not explained. Case studies also involve an individual or just a few and therefore may not be representative of the general group or population. The social sciences case studies often rely on descriptive information provided by different people. This leaves room for important details to be left out. Also, much of the information collected is retrospective data, recollections of past events, and is therefore subject to the problems inherent to memory (Bryman,2007).

The disadvantages of case study also includes:

- Insufficient information can lead to inappropriate results
- Irrelevance to own situation
- The phenomena that as a researcher observing the specimen closely, the specimen is likely to change their behavior
- Not appropriate for an elementary level

The problems and limitations with the case study are in regards to generalizability/ external validity and intersubjectivity/ replicability. In other words, since the researcher is studying a limited case or group very deeply, it is hard to apply what is learned to society in general. For example, in Elija Anderson's book Code of the Street; he does a qualitative case study of inner city society in a particular area of Philadelphia. Since he spent many months studying this one particular neighborhood, he got a lot of rich information about this group (Bryman, 2007). New Zealand Couriers is a typical 3PLs company, which directly deals with hundreds and thousands of

other companies, and the findings have high level of external validity. Therefore New Zealand Couriers is selected as the research case to increase the level of external validity in this research.

Intersubjectivity/ replicability have to do with the nature of qualitative research itself. Since it involves observation, interaction, interview, or content analysis of a particular case, most of the interpretations are made based on the opinion of the individual researcher. In other words, if two different researchers spent a day in a local park, watching other people come and go, and taking notes of things these two researchers found significant or interesting about how people behaved, the things one researcher noted may be very different from what the other researcher noted. This is because each individual make decisions and judgments based on his/her own world view. Also, since these types of studies are so random and based on observations of events as they happen, it is very difficult (if not impossible) to replicate them in a different study. When other researchers cannot replicate a study, there is no way to determine if the findings are accurate. Therefore the intersubjectivity/ replicability may be a limitation in case study.

However the limitations can be minimized by redesigning case study. For instance this research focuses on the different types of return model in chapter 5 rather than the specific company, in order to increase the replicability and validity of research. And discussing relationships in the 3PLs reverse logistics based on the abstract designed model (Figure 5.15) rather than certain examples. Redesigned case study in this research could significant improve the reliability, replicability and validity.

And there are several reasons that New Zealand Couriers has been selected in this research;

- Firstly, the site was chosen on the basis that a recent decision had been made to optimize the return/ reverse logistics services in New Zealand Couriers.

- Secondly, due to the research topic and questions, New Zealand Couriers Ltd is a typical third party logistics company, also provides the return/ reverses logistics services to various customers. It is an ideal example of 3PLs in logistics industry.

- Thirdly, due to the availability of research resource, there is limited time and fund to explore a number of different organizations. As exploring and understanding a logistics

company is time consuming, normally each logistics company has its own background and operations system. Researcher has been working in New Zealand Couriers for about three years, which is an advantage of using New Zealand Couriers as research case.

- Fourthly, due to the reliability, replicability and viability in this research, the findings identified in the typical 3PLs Companies New Zealand Couriers could be widely implemented in other companies. Redesigned case study concerns the common return/ reverse logistics modes (chapter 5) rather than the specific companies.

- Finally yet importantly, due to lack of the accessibility, there are few large-scale logistics companies in New Zealand, and most logistics companies are competitors in market. Some information and data, which need in this research, is business confidential. Therefore, it is difficult to access several different logistics companies at the same time.

Ethnography/ Participant Observation

This is another important research method which is used in this research. The observation is based on the research topic and research questions. As mentioned in 4.4.1, the case of New Zealand Couriers has been selected in this research; therefore the observation concerns both micro level such as relationships, affects, efficiency, etc. and the macro level such as practical issues, phenomena, documents, etc. The research approach-- case study allows researchers to deeply observe and investigate the details and problem in the case. The seven different types of return/ reverse logistic models in New Zealand Couriers are identified and categorized during the observation. And also the operations and return/ reverse logistics procedures are based on the observation in practices.

Qualitative Interviewing

Qualitative interviewing is one of the major research methods in qualitative research, and there are several various personnel have been involved in qualitative interviewing, such as managers, colleagues, and customers. Due to the research questions and objectives, there is no formal interview was needed in the thesis. However the data and knowledge from informal interviews, meeting and conversations during work have been widely adopted in the research, such as the knowledge of seven types of return / reverse logistics mode in New Zealand Couriers was from this method. The effects and relationships in return/ reverse logistics are also generalised from the knowledge and information gained by this research method.

Language-Based Approaches to the Collection of Qualitative data, such as Discourse and Conversation Analysis

Language-based approaches are major methods in qualitative research. Moreover, due to the nature of this research, the language-based approaches play a significant role in this thesis. According to pervious researches, some very important findings were identified by the language-based approaches. As people see, the return/ reverse logistics is different from other traditional subjects. Reverse logistics is emerging and very new, and there is limited available resource and references for current research. Therefore, the language-based approaches are very significant tools to explore the new thing. The discourse and conversation analysis is used to investigate the return procedures and the impacts of uncertainties in Chapter 5.

The Collection and Qualitative Analysis of Texts and Documents

This is one of the most significant methods to collect and analyse the information from existing companies and organisations. Various kinds of information and data has been collected and used

in this case study.   Most data are originally from New Zealand Couriers Ltd so that audiences can have a better understanding about this company, such as the history of New Zealand Couriers. Thanks to the people who contributed the valuable knowledge, the financial statement of the Freightways Group in Chapter 5 is finished. The information and data could support the case study and actual findings in this research.

4.5   Research Process

There are several different models of the research process, most of which are devised according to a series of stages, for example, Cohen and Manion (1994) identified eight stages of action research, which appeared rather scientific in approach. Other representations of the research process include one with five stages of research form showing design, sampling, data collection, data analysis and the report is presented by Blaxter et. al. (Blaxter, 1999). This seems to be a rather over-simplification of a long and complex process.   According to the actual situation and research questions, the Alan Bryman and Emma Bell (2007)'s main steps of qualitative research process is adopted in this research.

According to Alan Bryman and Emma Bell (2007), the sequence outlined in figure 4.1 provides a representation of the qualitative research process in this research. This qualitative research process is a general guide, which is used to conduct this research.   Six main steps in this qualitative research process are indicated as below.

Step 1. General Research Questions

Research question is the starting point for the research (Bryman, 2007). The reverse logistics and third party logistics are two significant trends in today's logistics and supply chain industry. However , there has been limited attention to theory-based research in the returns management arena (Jahre, 1995a; Carter and Ellram, 1998; Daugherty et al., 2001) Many people may still do not understand what uncertainty is due to limited resource in previous researches and studies about the uncertainty in return/reverse logistics area. Personally speaking, the world is an uncertain world, in other words the world is not a perfect world, as there are so many unexpected things and various uncertain factors around individuals. The uncertainties in return/ reverse

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│ 1 General research questions    │
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│ 2 Selecting relevant site(s) and subjects │
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│ 3 Collection of relevant data   │
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│ 4 Interpretation of data        │◄╌ ╌ ╌  └──────────────────────────┘
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│ 5 Conceptual and theoretical work │╌ ╌                 ┆
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                ▼                  │ 5a. Tighter specification of │
┌─────────────────────────────────┐ │ the research question(s)   │
│ 6 writing up findings/ conclusion │ └──────────────────────────┘
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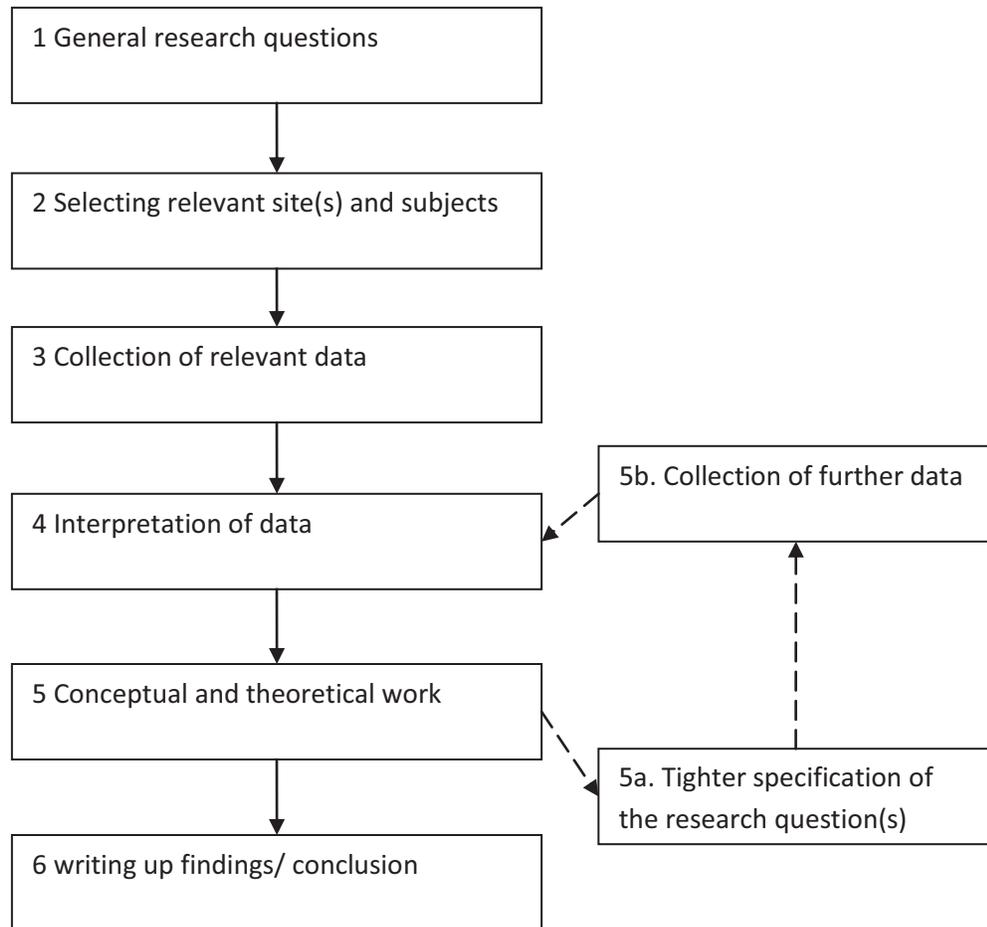
Figure 4.1 An outline of the qualitative research in this thesis (Bryman, 2007).

logistics and supply chains could be understood in the same way; the uncertainties in return/ reverse logistics are the uncertain factors, which include a wide range of activities, events and things, and may cause the return services failure and risks, and influence the normal business process and operations. Therefore it is significant to understand these uncertainties and also according to previous studies (Simchi-Levi, et al., 2008), most impacts of uncertainties in supply chain are negative, in other words to reduce and eliminate the uncertainties could significantly improve the performance of supply chain. There are three research questions emerging as below;

1. What are the uncertainties in 3PLs reverse logistics?

2. What are the impacts of uncertainties in 3PLs reverse logistics on the performance of reverse logistics service?

3. How 3PLs Company can reduce the uncertainties in reverse logistics to optimize the reverse logistics services?

Step 2. Selecting Relevant Site(s) and Subjects

The organization studied is a typical large-scale 3PLs Company New Zealand Couriers.   The site is chosen on the basis that a recent decision had been made to optimize the return/ reverse logistics services in New Zealand Couriers. The findings of this research could fundamentally improve the overall performance in New Zealand Couriers.   As per previous discussing, there are several reasons of selecting New Zealand Couriers, for example due to the limited availability of research resource, nature of research questions, etc. researcher has been working in this company for about three years also is a significant advantage in this research.

Step 3. Collection of Relevant Data

Data gathering is one primary task involved in researching. The multiple research methods have been used in this research to explore the uncertainties in practices. Five major research methods/approaches are employed in this research, such as case study, ethnography/ participant observation, qualitative interviewing, language-based approaches to the collection of qualitative data, and the collection and qualitative analysis of texts and documents.   Each method and approach is discussed in 4.5. Qualitative interviewing is one of the major research methods in qualitative research. Due to the nature of research questions and objectives, there is no formal interview was needed in the thesis; however the data and knowledge from informal interviews, meeting and conversations during work have been widely adopted in the research, for example the knowledge of seven types of return / reverse logistics mode in New Zealand Couriers is from this method. The effects and relationships in return/ reverse logistics are also generalised from the knowledge and information gained by this research method.

Step 4. Interpretation of Data

The approach to the analysis of the data is based on techniques of grounded theory (Glaser and Strauss, 1967).   One of the key themes to emerge from the data is that the level of uncertainty between return receiver/consignee and 3PLs is lower than that between return consignee and return consigner. As a return consignee is normally a customer of 3PLs Company, and there is a long term business relationship between them rather than the casual and one time off relationship between 3PLs and return consigner.

Step 5. Conceptual and Theoretical Work

The primary contribution of this research is to identify the uncertainties and their impacts in the 3PLs return/ reverse logistics. Redesigning the return procedures and changing the return modes could be a way to reduce and eliminate many negative impacts of uncertainties in return/ reverse logistics. Moreover, the brand new return/reverse logistics strategy is created in this research. The return/reverse logistics strategy is not a solution or method of supply chain optimizations for problems or issues in return/ reverse logistics, but the return/ reverse logistics could guide companies to find a correct direction and save lots of money and time.

According to the traditional supply chain optimizations, some other previous concepts and theories can be improved and used in reverse logistics, for instances theory of constraints (TOC), Goldratt's approach, ERP system and the process of on-going improvement. The principle of return/reverse logistics optimization in this thesis is guided by the theories of traditional supply chain optimization. However, this thesis concerns the uncertainties in return reverse logistics in practical case to optimize the performance of return and reverse logistics in 3PLs.

Step 6. Writing Up Findings/Conclusions

The aim of this stage is to communicate the researchers' empirical experience to a wider audience so that the overall conclusions or message of the research be summarized in an assimilable and memorable form (Johnson, 1994). All the research questions are answered during this research, the key findings and answers of research questions are summarized in final chapter.

Chapter 5 Analysis and Discussion

5.1 Introduction

Chapter 5 is a one of the most important chapters in the thesis. All the literature reviews, observations and collected data from research, is analyzed and discussed in this chapter. The chapter contains seven sections as below

- *Introduction*
- *Supply chain optimization*

    The question of "Why does a company need to optimize the logistics and supply chain system?" is answered. Because this is one of the most common questions from many companies before they start to optimize their logistics and supply chain system. Reverse logistics is a part of logistics and supply chain; therefore, it is significant to understand the reasons.

- *Case of New Zealand Couriers*

    This section concerns the general information reviewing in New Zealand Couriers. Audiences can find the history of New Zealand Couriers, company structure, the operations system, the services in New Zealand Couriers, etc in this section. The general information can provide a big picture to the audiences to understand the return/ reverse logistics services/ models in the next section.

- *Analysis return/reverse logistics services in New Zealand Couriers ltd*

    After reviewing the general information of New Zealand Couriers from previous section, the return/ reverse logistics services in New Zealand Couriers deeply investigated and analyzed here. According to observation, there are seven major return models in New Zealand Couriers, and each model has a separate practical example, which used to illustrate the differences among the different return models.

- *Uncertainties in the return/ reverse logistics, • Key Reverse Logistics Management Elements have been found in 3PLs New Zealand Couriers, and • Return/reverse logistic strategy*

The findings, which were from analysis/reverse logistics services in this research, are illustrated in these three sections.   And the answers of research questions in Chapter 4 also can be found in these sections.   Return/ reverse logistics strategy is own thinking based on the pervious literature reviews and studies.

5.2   Supply chain optimization

Supply chain optimization, as the application of processes and tools, is to ensure the optimal operation of a manufacturing and distribution supply chain. It includes the optimal placement of inventory within the supply chain, minimizing operating costs (including manufacturing costs, transportation costs, and distribution costs). Supply chain optimization tends to involve the application of mathematical modeling techniques that using computer software. The classic supply chain approach has been to try to forecast future inventory demand as accurately as possible, in other words, this approach has been used to reduce the demand uncertainties.   As per the research (Goldratt, 2004), nowadays there are several various approaches to optimize the supply chain, such as Goldratt approach, Lean manufacturing, Application of APS in Real systems, mathematical models Linear and Mixed Integer; however those different methodologies only have one goal that is to minimize the uncertainties from different aspects in supply chain.

The Reverse logistics optimization in this research is a part of supply chain optimization.   There are several supply chain optimization approaches will be introduced and employed in particular case in reverse logistics later.   Because the principles of the logistics and reverse logistics optimizations are similar, such as avoiding various uncertainties, on-going improvement, improving performance, reducing lead time, problem solving, minimizing operations cost, eliminating the wastes and redesigning insufficient processes.

5.2.1 Why does A Company Need to Optimize the Logistics and Supply Chain System?

Logistics system plays a vital role in supply chain, because logistics system integrates and links the different suppliers, manufacturers, wholesalers, and retail stores, such that merchandise or inventory could be produced and distrusted in the right quantities, to the right locations, and at the right time. An effective and efficient supply chain requires excellent distribution network and logistics system to support its activities, for instance inventory is one of the important aspects in supply chain, and logistics would directly influence the inventory level in system, and also logistics could directly influence the business strategies and structure (Simchi-Levi, et al., 2008). As mentioned in Chapter 2, the rapid development of business stimulates the logistics industry, and the reverse logistics has become one of the significant trends in current logistics and supply chain industry. Reverse logistics are often referred to as "closing the loop" in supply chain (Rogers, 1998). All the materials and products come through forward logistics channel and could be flowed back by reverse logistics. As a competitive strategy, reverse logistics plays an essential role in supply chain and influences the entire supply chain system.

First of all, it is significant to understand this question─ why does a company need to optimize the logistics and supply chain system? There are several main reasons being listed as below.

➢ The changing world

➢ Eliminating the waste

➢ To improve the business performance

➢ Market competitions

➢ Globalization

➢ Customer-driven

➢ Traditional and previous methods no longer solve the problems

The Changing World

Logistics and supply chain industry have experienced a huge change during the last 20 years (Chopra & Meindl, 2004). Also there is an impressive improvement in the operations; a growing number of new technologies, ideas and software have been applied to the daily operations. The productivity has never been so high compared with before. Our world is changing every day and new theories have been created, culture is changed etc. There is a very close relationship between logistics & supply chain industry and human society; even natural phenomenon could directly impact the logistics & supply chain industries, for instance the global movement of resources could be influenced by many factors such as politics, market, economy, and even weather. There are various uncertainties that can impact the industry, therefore it is necessary to change to adapt to those changes in this world.

Eliminating the Waste

Eliminating the waste is another vital reason to optimize logistics and supply chain (Goldratt & Cox, 2004). Various new technologies significantly increase our productivity. Especially during the economic downturn, many companies tend to pay attention to their costs and eliminate the waste is an effective way to reduce the cost. Today we can produce more than what we actually need, in other words in many industries the capacity of supply exceeds actual demand in market, which is a very big change compared with 100 years ago. Take the automotive industry as an example. In 2007, total vehicle production in the U.S. was 4,192 and the total vehicle production in the U.S. was 10,752 (Swivel, 2010), while back to 1900s, there was only a small number of manufacturers in the world and the capacity of supply was limited; however, the actual demand was very high at that time when the actual demand in market exceeded the supply. The manufacturers had to improve the productivity and produce as much as they could. Nowadays, the manufacturers try to produce right quantities to eliminate the waste, because as per Goldratt, the over-production is the biggest waste (Goldratt, Cox, & Whitford, 2004). Companies should not only focus on the supply side, but also pay attention to the demand side. It is vital to balance the supply and demand, such that the company could eliminate the waste, and maximize the profit. And supply chain optimization is one of the most effective ways to eliminate the unnecessary waste, especially during the global economic downturn and huge natural disaster occurring which

leads to reducing demand. A t that time, companies should slow down and review its business to cut off the unnecessary wastes.

To Improve the Business Performance

Optimizing the supply chain system is to improve the business performance.   The supply chain management is to manage how to supply and/or delivery the right goods which involved right quality and right quantities to the right place for right customer at the right time in the most effective and efficient way (Simchi-Levi, et al., 2008). Today, almost all supply chain activities are business-related and some critical aspects such as lead time, inventory level, service level, etc. strongly influence the performance of business. A logistics and supply chain system is a fundamental portion of the entire business. Especially in large scale company, the different supply chain activities and business functions have been integrated by logistics and supply chains system, therefore the supply chain optimization could directly impact and determine the performance of business.   Effective and efficient distribution system could assist business to achieve more profits as there is a very close relationship between supply chains and other business functions. Specifically, a fast and reliable distribution process which is normally relied on a supply chain system could reduce the lead time and the level of inventory. The short lead time could improve the cash flow in company, and low cost of inventory could reduce and eliminate many other potential costs, such as overtime operations costs, damages, extra warehouse costs and transportation costs. Consequently, the supply chain optimization would improve the entire business from manufacturers to retailers. It is significant to apply the supply chain optimization in large scale companies, such that the key performance indicator in businesses could change better. Overall, the supply chain optimization might be a way to save and improve the performance of the business.

Market Competition

One of the main reasons of implementing of logistics & supply chain optimization is the market competition. A growing number of companies are emerging in market, the market competitions force companies to cut down their cost in order to achieve lower price such that the company could survive during the economic downturn. As per the buying behavior researches, most of customers like good quality with low price, if a company maintains high cost and price, customers will leave and there is no business could survive without customers (Kotler, 2008). Admittedly, this trend is good for the customers, as the customers can save money and have more options than before; however it may be a big challenge for the company. "How to cut down the business cost?" As per the research, optimizing supply chain system is a way to reduce the costs (Emmett, 2005), as the cost of logistics is a significant component of price, and in United States, logistics contributes approximately 9.9 percent of GDP that also happens in many other developed countries, such as Japan, Germany, UK, Canada and so on; logistics is a significant component of those countries' GDP as well (Simchi-Levi, et al., 2008). When cost of logistics and supply chain is reduced, the price of products will be dropped. The lower price could help company to beat other competitors in market.

Globalization

Globalization stimulates firms to seek scientific management and effective strategies in worldwide. The globalization has created many different opportunities for different businesses and industries; however, it has brought threats and global competitions as well. Today's market has been extended to the entire world; a growing number of large-scale manufacturers have established their businesses and factories overseas, which spread their new ideas, methods and advanced strategies to all over the world at the same time.   For instance the lean strategy offers a smart way to eliminate the various wastes during the processes in order to minimize the cost and maximize the efficiency (Handfield & Nichols, 1999). When the first company gained the benefits from the lean strategy, due to the market competition, other companies would follow the same strategy, such that the lean manufacturing became prevailing.   TOC/DBR provides the

different pathway to assist businesses to achieve their goals (Goldratt, et al., 2004), such as focusing on the constraints, maximizing throughput, and keeping continuous flow in supply chain system.

Customer-Driven

Customer also is one of vital factors that drive business to improve their logistics & supply chain, as logistics and supply chain optimizations should focus on customers' needs and wants. Today customers have become an essential party in the market, and manufacturers pay attention to customers rather than just focusing on the production. Lean strategy and TOC offer an effective and efficient customer-driven or demand- driven (PULL) strategy throughout the production, while the traditional manufacturing strategy is based on Push system. Generally speaking, the production is based on the demand in the lean strategy, in other words it is customer-driven rather than the production-driven (Kotler, 2008). For example: Kan ban, which is one crucial tool, has been used in both lean manufacturing and TOC/DBR. In the Kan-ban Scheduling systems, downstream processes take what are needed from upstream processes. And also Value can only be defined by the ultimate customer and must be expressed in terms of a specific product which meets the customer's needs at a specific price at a specific time (Simchi-Levi, et al., 2008). Overall, the lean strategy and TOC are customer-driven strategy, which is suitable for the current market in our world.

Traditional and Previous Methods No Longer Solve the Problems

One of the most vital reasons why a company needs the methods of optimization is that the traditional method could not solve problems any more, and the manufacturers or companies have to find a new way to deal with these problems. There is no cookbook for manufacturing. Each firm has its own unique set of products, processes, people, and history. While certain principles may be immutable, their application is not, Strategy will always be a difficult, uncertain, and individual process (Wilson, 2010). Supply chain optimization includes various methods, for

instance one of the significant methods is the lean manufacturing and TOC/DBR, which provide new thinking and ideas to help people to solve the problems and improve the business performance. The focus is on reducing Non Value Added (NVA) waste. Waste is anything that impedes the flow of product as it is being transformed in the value chain (Leach & Books24x7 Inc., 2005). Compared with the traditional manufacturing strategy which is based on push system, the lean manufacturing and TOC/DBR are more flexible, demand-driven rather than the supply-driven, and also focus on tight cost management and continuous improvement.

Improving the Productivity of Supply Chain

One of the important aims of Logistics and supply chain optimization is to improve the productivity of supply chain (Goldratt & Cox, 2004). The improvement of the logistics productivity will drive the development of economy, and directly benefit consumers. The cost of logistics will be reduced, if the productivity of supply chain is improved. And the cost of logistics is a significant portion in the price of products; when the cost of logistics is reduced, the price of products will drop consequently. The individual consumers can buy the same product in cheaper price, also personally the improvement of the logistics productivity will stimulate the exports and imports in the world-wide. The individual consumers can enjoy more products and foods from overseas. The other key effect is the transit time; the improvement of the logistics productivity will reduce the transit time, which benefits both the entire economy and consumers.

Here is an example of the improvement of the logistics productivity directly benefits our world. Today an increasing number of international companies move their manufactures to Asia such as India, China, and Indonesia in order to cut down the cost, as in those countries, the cost of operations is relative low; however, the movement of raw materials and products has to rely on the logistics. The improvement of the logistics productivity will stimulate this trend; usually those international companies who have cutting-edge technologies and ample funds are from developed countries. When those companies move their manufactures into those low operations cost countries, at the same time those companies bring money and technologies into those developing areas, thus it is helpful for balancing the development of global economy. Besides, those manufactures can create hundreds and thousands of job opportunities in those developing countries to help the local people by increasing their income and improving their purchase power. On the other side, the cost of products is dropped, and the price of products will be cheaper

correspondingly, which directly benefit the world-wide individual consumers. A boom in economics tends to involve a huge volume of goods movement, which stimulates the development of logistics, and also the developed logistics will support the development of economics. This is a win-win situation. As we can see, most developed countries have better logistics system than the developing countries.   Improving the logistics productivity will save the cost, and bring more savings and profits to the companies. Overall, logistics plays a significant role in our world and the movement of either raw materials or products is relied on the logistics. Logistics links many different parties and organizations in the system; the improvement of logistics productivity will directly trigger the development economics, increase the customers' purchase power; balance the development of global economics, etc. Besides, the improvement of the logistic productivity will save the cost and time for the entire human society and have a positive effect in the natural environment in the long run.

5.3   Case of New Zealand Couriers

As Mentioned in Chapter 4, New Zealand Couriers, which is Freightways' flagship brand, is positioned as the premier provider of network courier services to New Zealand businesses. Since 1964 New Zealand Couriers Limited has been the leading Courier Company. In an industry plagued with short-lived companies year in and year out New Zealand Couriers Limited has been meeting the needs of industry and commerce. Over thirty years our emphasis has been on the development of an increasingly comprehensive service. New Zealand Couriers vision, Mission, value are introduced briefly (see Appendix 1)

Today the New Zealand Couriers service standards ranging from 2.5 hours for local deliveries to overnight by 9.30am for nationwide deliveries, New Zealand Couriers Ltd has 46 line-haul trucks, 5 dedicated cargo planes, 18 branches and over 500 couriers national wide. And New Zealand Couriers sits at the premium service/premium price end of Freightways' multi-brand strategy. New Zealand Couriers is Freightways' largest brand by revenue and operating earnings. Therefore it is significant to introduce the Freightways so that audiences can see a big picture.

5.3.1   Introduction of Freightways Group

Freightways, as a leading integrated group, provides business delivery systems in express parcel, security and distribution markets, with complementary business service in the information management and business mail sectors within New Zealand. The Group's origin date backed to 1964 through New Zealand Couriers - a pioneer in the express package industry in New Zealand. Since commencing operations in Auckland, Freightways has grown organically and by acquisition to become a leading New Zealand service provider, with representation in every major town and city throughout the country.

Freightways is a clear demonstration of competitive business in action, all with one stated aim in common that of providing faster, more efficient, time-guaranteed business solutions. The

principal activities are the operation of express freight and courier services, business mail services, contract distribution, document and computer media storage and retrieval and destruction services. Freightways delivers approximately 200,000 items each business day and approximately 50 million items each year. In addition to its extensive nationwide network, Freightways offers a worldwide export service through alliances with international express package operators TNT; all the international parcels and deliveries are based on the airfreights and the international export network covers over 220 countries all over the world.   Besides, Freightways works with TNT, FedEx, UPS and Australia Post to provide domestic delivery service for their import services from over 140 countries.

As per the Freightways Financial Report in 2010, the total operating revenue of Freightways group is NZ$328.5 million (see Figure 4.1and 4.2). The core express package business contributes the majority of Freightways' revenue and earnings. The Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA) of $63.7 million for the full year of 2010 was 2% lower than the normalized prior comparative period. The consolidated operating revenue of $328.5 million for 2010 was 2% lower than the normalized prior comparative period. The core Express Package & Business Mail division currently contributes 80% of Freightways' revenue and 78% of its earnings through its brands of New Zealand Couriers, Post Haste Couriers, Castle Parcels, NOW Couriers, SUB60, Security Express, Kiwi Express and DX Mail. The information management division is established in New Zealand through the brands of Online Security Services, Archive Security, Document Destruction Services and Data Security Services and in Australia through the brands of Data Bank, Archive Security and Shred-X, this division continues to demonstrate excellent revenue and earnings growth. Operating revenue of $66.2 million for the full year of 2010 was 9% above the normalized prior comparative period (NZC, 2011).

FINANCIAL SUMMARY
FOR THE YEAR ENDED 30 JUNE 2010

	NOTE	2010 $000	2009 $000	PERCENTAGE VARIANCE
Operating revenue		328,469	339,491	(3%)
EBITA, excluding non-recurring items	(i)	53,881	56,976	(5%)
Non-recurring items:				
- income tax charge as a result of tax law changes		(5,694)	-	-
- profit on sale of Wellington property		-	3,907	-
NPAT, excluding non-recurring items	(ii)	28,858	30,686	(6%)

Note:
(i) Operating profit before interest, income tax, goodwill amortisation and non-recurring items
(ii) Net profit for the year after tax and before non-recurring items

Figure 5.1 Freightways Financial Summary (NZC, 2011)

Figure 5.2 Freightways Operating Revenue (NZC, 2011)

Freightways employs a multi-brand strategy within the network courier segment of the Express Package market via New Zealand Couriers, Post Haste Couriers, Castle Parcels, DX Mail, Sub 60 and NOW Couriers. This strategy allows Freightways to successfully segment the market by meeting varying customer service and price requirements.

The different brands in Freightways group has different market target.   For instance **Post Haste** is made up of two brands: Post Haste Couriers (PHC) and Castle Parcels (CPL).   Post Haste Caters is designed to meet the needs of the commercial and industrial sectors and it has been a specialist in next day delivery of medium to large-sized parcels since 1980. It operates in 16 locations throughout New Zealand. Post Haste offer:

- Same day and overnight services

- Delivery by 12:00 pm for commercial deliveries

- Delivery by 5:00 pm for residential

- Two-day service

Castle Parcels operates in the economy next day delivery segment, with the ability to cater for bulk distribution high volume parcel customers. They have branches in the three main centers: Auckland, Wellington and Christchurch and operates a fleet of mid-size trucks in these centers. They have offered economical movement of less urgent parcels and bulk freight nationwide since 1984. The main services of Castle Parcels timeframe are as below

- Commercial CBD deliveries are completed by noon

- Other commercial deliveries by 2:00 pm

- Residential by 5:00 pm

New Zealand Document Exchange (DX Mail) provides an overnight business mail service between members throughout New Zealand. DX mail is the only dedicated nationwide business mail alternative to New Zealand Post.   Established in the 1970s as a document exchange system primarily for the legal, travel, and financial sectors, deregulation of the New Zealand postal

market has enabled DX mail to expand its range of services to offer a total mail processing and delivery solution to general business community including box to box delivery, domestic street delivery and international delivery. New Zealand Couriers is NZDX's preferred courier supplier. The main services provided by DX are:

- Business to business mail box delivery

- Mailroom facilities management

- Strategic street delivery and courier delivery

- Postal mail delivery and lodgement

- International mail

- Distribution consultancy

Sub60 is another important courier company in Freightways and it provides point to point urgent courier service, specializing in time critical─ typically 1 hour metropolitan deliveries in Auckland, Wellington and Christchurch. The urgent same day intercity deliveries also are included in SUB60 couriers' services. Due to the non-storage delivery strategy, there is no depot or warehouse for sub60 couriers; consignments are handled by the same SUB60 contractor from pick-up until delivery.

There are three main internal service providers in Freightways

➢ *Fieldair Holdings Limited* provides airfreight line-haul services. The primary purpose is to operate and maintain a fleet of four Convair 580 and one Convair 5800 freight aircraft, which operate dedicated air line-haul services between the North and South Islands. The airfreight line-haul service enables the inter-island freights between the North and South Islands to be delivered overnight. All the air line-haul services between the North and South Islands are operated nightly and the air line-haul network links with dedicated road line-haul service. This company also provides maintenance and support aviation services for these aircraft and for external customers.

➢ ***Parceline Express*** provides line-haul services. It is the dedicated in-house express line-haul service provider for Freightways Express package and business mail companies. They transport the freight around the country by road, sea and air for Post Haste, New Zealand Couriers, Castle Parcels and New Zealand Document Exchange. The Parceline express network is comprised of independent contractors who operate over the major arterial routes across NZ each evening. The road line-haul network links with Fieldar's air line-haul services to provide Freightways links with a dedicated national line-haul network. There is a network of 45 trucks and four Convair aircraft dedicated to moving out freight.

➢ ***Freightways Information Services*** provides computer services and IT support for the Freightways companies. Specifically, it manages front line express package & business mail, transaction-processing systems and is responsible for the design, development, maintenance and support of Freightways' in house express package application software.

5.3.2 History of New Zealand Couriers

In the year 1964 an Aucklander named Jim Corkill went for an overseas holiday. Whilst away he observed courier services operating in other countries. Jim came back to New Zealand with the idea of commencing a courier service in this country and discussed the idea over with his accountant – Maurice Copeland. As most accountants are fairly conservative, Maurice adopted the attitude that overseas ideas would not work in New Zealand and did not think Jim's proposal would work. Six months later Jim returned to his accountant for his annual tax visit, informing Maurice that he had already started two courier vans and was in the process of commencing a third. It was at this time that Maurice agreed the idea could work after all and a company was formed with a capital of 1000 pounds and named New Zealand Couriers Limited. Members of the company were Maurice Copeland, Jim Corkill, Bill Davies, Colin Thompson, Ted Taylor and Bill Morris. The last three named were the couriers who started working for Jim. These men were the pioneers of the great company we work for now and a lot of gratitude is owed to them.

The first courier to commence a run was Ted Taylor whose run went from the central post office through Newmarket to Penrose and back. The second courier was Bill Morris and his run covered from the central post office to Mt. Roskill.

About the same time as New Zealand Couriers started in Auckland a company called Mercury Couriers started a similar operation in Wellington. Merv Williams, who was working for a security firm, started this company. He saw a report about the couriers in a trade magazine. Merv decided to try the courier field in Wellington. New Zealand Couriers formed another company involved in doing the Databank work. Mercury Couriers was bought out by New Zealand Couriers Limited in 1971 and this meant that NZC now had two branches in the North Island. Soon to follow were branches in Hamilton and Christchurch.

New Zealand Couriers first became involved in inter-city consignments by becoming pick-up and delivery agents for Brambles SOS. Ray McBreen will probably remember these days vividly. Needless to say, it did not take New Zealand Couriers long to realise the potential of an efficient overnight service to combat the Post Office and Railways. Our own overnight service was started and various methods of movement have since been used. Initially freight was sent by NZC on the last flights between Auckland and Wellington.

As the volumes grew NAC would not guarantee space being available to NZC and often NZC's freight was left behind and forwarded the next day. To overcome this problem a system was set up where a courier flew from Auckland to Wellington on the last flight and then Wellington to Auckland on that last flight and he carried the bags of freight as his baggage. This system was used for approximately six months until volumes of freight that we were receiving were too much for the couriers to carry. The only alternative for us was to provide our own transportation and we turned to a charter airline named Akarana Air and took out a twelve-month contract for them to fly AKL/WLG/CHC/WLG/AKL every night with our freight.

The aircraft used was an Aztec with a payload of 550kg and the Airfreight Company told that New Zealand couriers were mad to start this service, because it would never get enough freight to fill it and they would go broke. Admittedly NZC struggled for a while but proved that they were not mad; they could fill it and did not go broke. The operation proved to be perhaps the most successful venture undertaken and within twelve months the company was using two planes each night. The success of NZC overnight service grew and eventually outgrew the use of small

aircraft and in 1978 NZC commenced using the Air New Zealand Argosies to transport freight between AKL/WLG/CHC/DUD.

The company has continued to grow rapidly and New Zealand Couriers now have branches and agents in most cities throughout New Zealand.

5.3.3   Operations in New Zealand Couriers

Operation is one of the vital parts in the logistics and supply chains industry, in other words, the logistics and supply chain could not exist without operations. Therefore the operations in New Zealand Couriers will be introduced and analyzed as follows.

Branches

New Zealand Couriers has fourteen main branches nationwide and several unmanned depots all over the country. (See appendix 3)

Customers have the opportunity to drop off freight to an unmanned depot providing couriers are in base to take the items. The fourteen main branches are listed as below (see Table 5.1).

Table 5.1 NZC (NZC, 2011)

Branches	Drop Codes
Whangarei	WRE
Auckland	AKL
Hamilton	HLZ
Tauranga	TRG
Rotorua	ROT

New Plymouth	NPL
Hawkes Bay	HBY
Palmerston North	PMR
Wellington	WLG
Nelson	NSN
Christchurch	CHC
Timaru	TIM
Dunedin	DUD
Invercargill	IVC

Hub and Spoke System

A hub and spoke system is where New Zealand Couriers move freight through the hub i.e. like the center of a wheel, to and from the satellite depots i.e. the spokes of the wheel. This has proven to be the most cost effective and best way for us to service a bulk amount of customer's in a smaller frame of time. And another essential characteristic of this system is allowing two ways delivery. This system is different from the traditional forward logistics system; the cycle operation enables freight to be carried both forward and reverse ways, which is a very good improvement in transportation. As per to the previous research (Simchi-Levi, et al., 2008), the several benefits and drawbacks have been listed as below (see Figure 5.3).
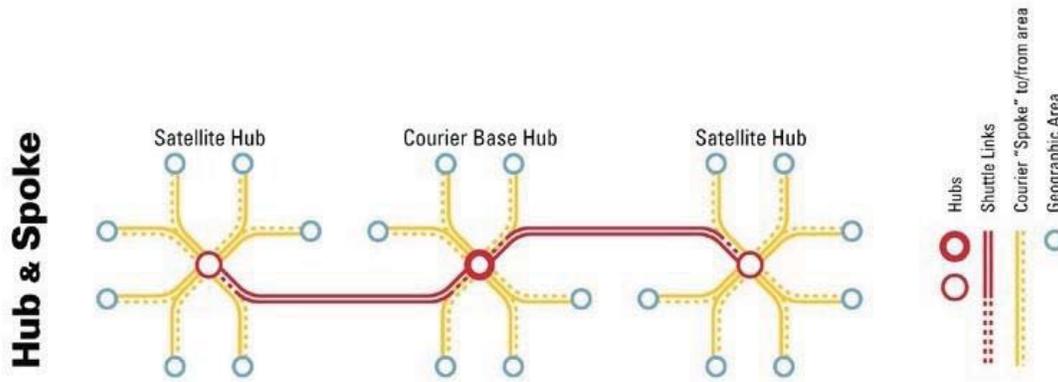
Figure 5.3 Hub and Spoke system (NZC, 2011)

The benefits

- The hub & spoke is a centralized system; there are many advantages in centralized transportation and distribution system, for instance respond time is much shorter and service level in centralized system is higher than decentralized system based on the same situation. Economies of scale could be achieved during the centralized operations such as freight consolidation.

- The small number of routes generally leads to more efficient use of transportation resources (Simchi-Levi, et al., 2008). For instance, trucks and aircrafts are more likely to run at full capacity, as the centralized mode could collect and consolidate the freight from different locations. And hub could gather and store all the freight from satellite hubs in this hub & spoke system to achieve the economies of scale. Besides trucks and aircrafts can often run routes more than once a day between the hubs and spokes.

- Some complicated activities, such as freight consolidation, deconsolidation, package sorting and freight ticketing, can be carried out at the hub, rather than at every spoke. Centralized operation strategy could maximize the efficiency of system, as people would focus on the complicated operations core area- hub rather than spokes, and the accurate planning and scheduling in hubs could improve the performance of entire system.

- The spoke is simple, and new ones can be created easily (Basch, 2002). For instance, New Zealand Couriers are using several unmanned spokes to link the shuttle and local couriers somewhere in small towns. Because all the freight has been sorted in hub, the couriers only need scan and load into courier van.

- Customers may find the network more intuitive. Scheduling is convenient for them since there are few routes, with frequent service. The mode has been widely employed in many courier and transportation companies, as the benefit is more than you can image. The centralized system design has a huge potential for the future development.

Drawbacks

- According to the observation, the hub & spoke system in New Zealand Couriers is centralized and day-to-day operations may be relatively inflexible. Changes at the hub, or even in a single route, could have unexpected consequences throughout the network. It may be difficult or impossible to handle occasional periods of high demand between two spokes.

- Route scheduling is complicated for the network operator at beginning. Scarce resources must be used carefully to avoid starving the hub. Careful traffic analysis and precise timing are required to keep the hub operating efficiently. Especially for the international route scheduling, the planning and scheduling directly influence the costs of operations.

- The hub constitutes a bottleneck or single point of failure in the network. Total cargo capacity of the network is limited by the hub's capacity. Delays at the hub (caused, for example, by bad weather conditions) can result in delays throughout the network. Delays at a spoke for instance from mechanical problems with an airplane or truck can also affect the network. The timing is one of the important aspects in this fast-paced operation.

- Passengers, cargo and freight must pass through the hub before reaching its destination, requiring longer journeys than direct point-to-point trips (Simchi-Levi, et al., 2008). This trade-off may be desirable for freight, which can benefit from sorting and consolidating operations at the hub, but not for time-critical cargo and passengers. The Economies of scale is one of the most important targets to be achieved in Courier Company.

Cycles

According to the observation, New Zealand Couriers currently have five – nine cycles per day working nationwide on a hub and spoke system. A cycle starts when a courier leaves depot, serves their area for approximately 90 minutes, picking up and delivering freight. At the end of that cycle, they return to their depot to unload and reload freight and are ready to go out and serve their run again for the following cycle. The cycles can range from five to nine cycles per day depending on the branch; however, the time of each cycle is fixed due to the centralized hub & spoke system requires integrated operations around system.

5.3.4   Services in New Zealand Couriers

Day Runs

New Zealand Couriers networks cover 360 towns and cities nationwide and have a dedicated fleet of 52 line-haul vehicles and 4 cargo aircrafts. Day Runs plays a key role in the same day delivery between cities and towns, also links the different hubs in system. According to the regional same day services (see Appendix 6), the Auckland Hub can cover 57 towns and cities in North Island by day run service.

The hub & spoke networks provide the run density that is essential in ensuring a national, regional and local service delivery standard of 9.30am to main commercial and business areas and midday to Residential, the day after pick-up. Rural can take an additional 24 - 48 hours.

Local – Same Day Service

New Zealand Courier provides delivery across town through the New Zealand Couriers hub and spoke system. The NZC local delivery service can reach local customers and suppliers up to seven times a day. For instance there are one main hub and five satellite depots around Auckland, the operations timetable between the hub and satellite depots are illustrated in Table

4.2. The first cycle starts at 8:15am, approximately every two hours between each cycle. AKL Hub has seven cycles per day, City depot has five cycles, other depots North Harbour, West Auckland, East Tamaki and Manukau has six cycles every day. During the each cycle time, couriers pick up the items and also deliver the freights (also see Appendix 5).

Table 5.2 Hub and Satellite Depots in Auckland Regional Area (NZC, 2011)

Hub	
South Auckland (Botha Rd Penrose)	SAK
Satellite Depots	
North Harbour (Albany)	NHB covers Wellsford (WFD) and Warkworth (WWH)
Central City (Parnell)	CST
West Auckland (Avondale)	WAK
East Tamaki	EST
Manukau City	MKC

Regional

New Zealand Couriers operate an extensive regional service with "day runs" connecting towns and cities across the country.   NZC national network means couriers operate over 1000 day runs regionally, a "day run" connecting many of New Zealand' s towns and cities, provides delivery the same day and enables customer to access a large number of destinations - often two or three times a day.   For instance there are three times day run at 10:30am, 12:30pm and 2:15pm between Auckland and Hamilton.   Frequent services also could avoid and reduce the failure in daily operations, such as overflow freight could be carried by the next cycle day run in the same day, and any missorted freight or late freight could be delivered by the next service truck or aircraft.

National

In 1971 New Zealand Couriers developed the first inter-city inter-island same-day and overnight service in New Zealand express freight market. Today, the standard of national wide delivery service is overnight delivery, which starts at 7.30am and enables couriers to delivery to the door, prior to 9.30am, in all main commercial and business area. The nationwide network provides the country's ultimate overnight delivery service standard. Fieldair Holdings Limited and Parceline Express provide the solid dedicated air and road line-haul services to link the different branches and depots. In many areas NZC also provide local "sprint" services - pickup and delivery by a single courier - ensuring item reaches its destination within the shortest possible time frame.

Rural

New Zealand Couriers delivers to thousands of rural addresses across the country. There is an extra cost for all rural delivery. New Zealand Couriers do not deliver to Rural Delivery Addresses ourselves. Rural delivery mail contractors, otherwise known as Coural, perform the service. NZC Courier drivers will drop freight out to an agent or to a meeting point for coural, who will then deliver on behalf.

Due to the geography in New Zealand, rural service is a part of courier services in New Zealand Couriers, the brief introduction as below

- These on forwarders do not obtain signatures on delivery.

- Rural can take an additional 24-48 hours for delivery from pickup.

- Signatures are not obtained by rural services.

- No additional costs incurred

- Some rural addresses are not serviced by either New Zealand Couriers or coural, and are left at the closest agent. A rural customer is required to take their package to the closest agent or drop off point for collection.

5.3.5 Extension of New Zealand Couriers' Networks

Agents / Drop off points

Nationwide New Zealand Couriers have agents / drop off points where our freight can be left for pickup or delivery. This is a significant extension of hub & spoke system, which increases the flexibility of New Zealand Couriers networks. Customers can have the items left here, couriers will collect the items regularly from these places, and the main difference between the Agents and Drop off Points is Agents could provide some courier services to individual customers. Most New Zealand Couriers' agents and drop off points have been established on existed businesses in residential areas, such as petrol stations, dairy shop and supermarket.

Agents

- Pickup and delivery point where freight is left, but also are a cash sales agent. Agents will also ring receivers and advise them freight is there for uplifting.

- Provides limited courier services, such as ticket sales, parcel collections and drop off.

Drop Off Points

- This only acts as a pickup or delivery point. No ticket sales.

- Unmanned depots, normally truck drivers manage everything there.

5.3.6 Couriers in NZC

Couriers (otherwise known as Contractors) are one of the key elements in New Zealand Couriers. They are NZC's face to the public. Couriers start their day generally from 5.30am to 7.30am and finish between 5.30pm – 7pm each evening.

They have two numbers allocated to them:

- ***Contractor number*** This number stays with the courier throughout their employment with the company e.g. 04-599 (this is the fourth courier to start on run 599).

- ***Run number*** Each branch services various areas of New Zealand. Each of those areas is broken up into small sections. Each of these sections is called a run. The runs have a number allocated to them e.g. #050. The courier allocated to that area is known as the run number.

The size of a run can vary e.g. a small run may cover ten streets in an industrial area; another may cover three suburbs. The size of a run depends on the customer demand for that area. The dedicated services allow the couriers service to be flexible and customized. The reverse logistics, many people know that as return is one of the dedicated services in New Zealand Couriers.

Couriers do not only deliver mails, parcels and items, but also pick up from the customers either individual or business customers; they have two main delivery jobs.

- Pick up

There are two different types of pickup in New Zealand couriers so far. One is the casual pickup. Couriers received the pager messages that contain the pickup address and contact detail; couriers only go to pick up when they received the requests from customers. The other one is regular pick up, courier go there regularly such as daily or every two hours during the day, normally the regular pick up service is designed for business customers, and the frequency of pick up is negotiable.

- Delivery

During the each cycle, courier will deliver the items that they received from the hub, every courier has separate cage, which was sorted in hub and distributed to spokes. Normally, residential area couriers have a greater number of deliveries than industrial area couriers, for industrial customers, due to the volume of freight; they dispatch freight to their customers by using couriers rather than receiving from Courier Company.

Different Types of Couriers in NZC

There are five different types of couriers work in New Zealand Couriers' system; each type of courier plays an essential role in the day to day operations. These different types of couriers will be involved in the return/reverse logistics activities.   Therefore it is necessary to view each type of courier in NZC.

Fleet

These couriers are the main source of picking up and delivering of prepaid freight. They drive only vans and cover an allocated area (Run). These couriers meet at their closest depot each cycle, where they have approximately 10-15 minutes to unload and reload freight. Fleet couriers pick up the freight phoned in through the 0800 line to either Customer Services or VAN. This information is then sent to the couriers' pager. Generally their day will depend on how many pick-ups are called in for them, and what volume of items they receive to deliver from other couriers, however they have some automatic pickups from customers.

Contract Fleet

These couriers (otherwise known as the Point to Point Fleet) are the main pickup and delivery agents for contracted movements (otherwise known as Dedicated Services). They specialize in the movement of Contract bags that predominantly contain documents only. They are not required to meet each cycle and work on a different network to the Fleet drivers. They drive either vans or cars. These couriers have pre-arranged pickup and delivery times with their customers. They are not allocated into any one particular area like Fleet; these couriers may travel quite a distance to move contract bags from one customer to the next.

Company/Wage Runs

When a run has become vacant because the previous courier has left the company or transferred to another run, the branch will supply a Company/Wage Driver to work on that run until a replacement has been found.

Relief Drivers

When a courier has annual or sick leave they supply a relief driver to work on their run in their absence. These relief drivers are selected, trained and paid at that courier's discretion. All couriers are responsible for providing their own relief drivers.

Shuttle Runs

New Zealand Couriers contract work to couriers to line haul freight a short distance from one depot to another, or from a depot to couriers who may work in an Outer-Area.

5.4 Analysis Return/Reverse Logistics Services in New Zealand Couriers Ltd

As mentioned in the Chapter 2, one of the most significant trends of courier services is the customization which means the 3PL service providers/ courier companies could offer the customized services to single customer for the certain purposes and needs. Many courier companies offer return services, especially New Zealand Couriers who have focused on business customers' needs and wants since the company established in 1964. Today New Zealand Couriers offers various value-added 3PL logistics services to different customers, and one of the vital 3PL logistics services is the customized return/reverse logistics services which is called dedicated services in New Zealand Couriers. There are several different models of return/reverse logistics services that have been deployed for customers in New Zealand such as John Sands, New Zealand Wine Society (CMW), Corporate Express (CENZ), ProPharma, NZQA, and Stanley Tools NZ. Besides, New Zealand Couriers has cooperated with TNT to run the international return consignment for the major customer such as Apple products return. Each major customer who has been listed above stands for each different model of return. There are six different return models in New Zealand Couriers and they will be reviewed case by case in the following thesis.

5.4.1 New Zealand Couriers' Ticketing

First of all, the ticketing system is an essential part in return procedure; there are four major tickets has been used in New Zealand Couriers return services so far, which have been used in different return models.

New Zealand Couriers' Prepaid Tickets

The prepaid ticket is a basic ticket which could be used for full range of delivery purposes including return delivery.

New Zealand Couriers' Charge Label

The charge label is a special type of ticket which has widely used for various returns since earlier time.

New Zealand Couriers' Customer Printed Label

Customer printed label was designed for business customers; this type of ticket needs extra dedicated label printer, system and computer to support. The label can be customized by customers' needs, and also can be used for return purpose.

New Zealand Couriers' Dedicated Return Label

The dedicated return label which is a very new type of ticket in New Zealand Couriers is only used for dedicated return processing for certain customers.

New Zealand Couriers' Prepaid Tickets

Figure 5.4 An example of prepaid ticket (NZC, 2011)

Prepaid ticket is one of the majority tickets which is using in NZC ticketing system. Customers have paid the delivery fee before sending parcels and the types of tickets depend on the destination of parcels. There are six types of prepaid tickets, which include Local, Short haul, Long haul (see Figure 5.4), Inter-island, Saturday delivery and Rural delivery. The ticket could be used for any purpose of delivery both forward and reverse/return delivery and it can be tracked and traced online from New Zealand Couriers website. These prepaid tickets can only be used for domestic delivery service which means within New Zealand. And this ticket can only carry sender's detail and limited information. It is not easy for sender to manage their returns, if the volume of return is large. Especially a large-scale business will not allow their individual customers to send their return items by themselves without premise,

as the business cannot match the return item to the certain customer if there are a large number of returns have been involved.

Merit

·   There is no complicated charge processing in prepaid ticket, and customers have to pay before receiving services.

·   Easy ticketing procedure for both business and individual customers, and there is no extra equipments and PC involved. They only need place the right tickets on the parcels.

·   It is easy to control and manage the delivery tickets, and customers can see how many tickets have been left straightway.

·   Prepaid tickets could be purchased in any NZ couriers' branch and agency.

Demerit

·   The ticket only could carry limited information about sender's detail, and it cannot record the receiver's detail; especially for cash sales customers, the information in the ticket might not be enough.

·   It is difficult to use a prepaid ticket for return delivery, as the receiver could not match the customers and return items, and customers cannot tell if their return items have been accepted by the receiver.

·   Customers have to pay before they can use NZC services; however, sometimes receivers want to pay the cost of delivery instead of charging senders.

New Zealand Couriers' Charge Label

What is a Charge Label?

A charge label means charging a customer's account for the movement of a consignment.

When is a Charge Label used?

A charge label may be used by either a customer or courier. NZC can arrange for the customers charge labels to be pre-printed with certain name and account number (see Figure 5.5).

Figure 5.5 An example of a charge label

(NZC, 2011)

NZC Charge label, which is a flexible way to charge the customer, could be used to charge either sender or receiver in one consignment. The charge label was widely used in New Zealand Couriers return services at early stage, and even now the charge label is still being used for some customers' return. The relevant case will be discussed later.

Charge label is one of the innovative ideas in delivery services, as it provides a flexible charging method against the uncertainty in some cases, for instance, the sender does not have to pay for return items, couriers could charge the receiver or certain party after consignment is finished. All

the charge labels can be tracked and traced, which enable company to monitor and review the charging and processing. The pickup portion is used for pick up couriers and delivery portion is normally used for delivery couriers. All the track and trace recording have been digitalized since new hand held scanning devices were implemented in 2007. However the pickup portion records the important information such as the weight and dimensions and is still being used for charging processing.

Merit

· The charge label offers a flexible way of ticketing, and the cost of delivery could be charged to the certain New Zealand Couriers' customer rather than senders.

· Normally business customers are responsible for the cost of return delivery, therefore the individual customers could just go to any branch or call the free 0800 number to make a charge label delivery.

· One of the vital reasons that charge label could be used as a prevailing way of return charging in New Zealand Couriers is that it has special ticket designs for different purposes of usage. Actually the delivery and pickup portion could be peeled off by different party for charging and ticket manifest.

· Easy ticketing procedure for customers and couriers and there is no extra ticket printer or computer required, as all the information on charge label could be done by handwriting.

Demerit

· The charge label number only can carry limited information, and it is difficult to get the delivery address from charge label.

· A complicated charge processing is involved in charge label, and the extra work also could occur, as the pickup portions have to be collected and sent to accountant.

· The error may be occurred by couriers or customers.

- The individual, who want to use the charge label, have to be fully trained.

New Zealand Couriers' Customer Printed Label

The customer printed ticket is one of the major types of ticket in New Zealand Courier and it has another name─ ICOS ticket. Actually this type of ticket is designed for business customers. As mentioned in chapter4, the New Zealand Couriers focused on the business customers, and this ticket will be printed by customers, normally the sender.

This type of ticket has to be printed by specific label machines and customized software which are the terminals in New Zealand Couriers' IT system (see Figure 5.6).   The ticket can contain much information for any purposes of usage, and all the information on it is updated to the NZC' system. The ticket can also carry the information for the third party, such as order number, consignment reference number, and delivery instructions, etc. This technology is an advanced freight ticketing; after New Zealand Couriers introduced the ticketing system into New Zealand Market, a growing number of companies tried to implement similar technology, such as Courier Post. Admittedly, the technology might be not suitable for return/reverse logistics, as most return items are come from individual customers who do not have the label machines and software.

Figure 5.6 An example of customer printed ticket (NZC, 2011)

The customer printed ticket is mainly used in key account customer, such as Porpharma who is one of the key customers in NZC and will be introduced later. The customized printed ticket of Porpharma is different from the normal customer printed ticket, as shown in Figure 5.7.

Figure 5.7 An example of Porpharma delivery ticket (NZC, 2011)

Merit

·   Advanced ticketing technology, which can carry so much information, allows different parties to use in the different ways,

·   Customized ticketing processing allows a company to print its own information, such as order number, customer reference, company name, and contact phone. All the information on the address label could be updated in real time.

·   The ticket can be tracked and traced and even the delivery address can be found from it. In some cases, the damaged label may lead to service failure or missing freight; however, the new ticketing technology enable staff to find the delivery address via ticket number.

·   PC based ticketing is accurate, update and in- time, in other words many issues and delay could be avoided, such as unclear handwriting will be replaced by printing label.

·   This technology also provides fast and efficient dispatching solution; especially when the business customers have a large volume of freight, they do not have to process address labels and tickets separately.

Demerit

·   The cost of label is expensive; customers have to buy the labels and special label printers for the customer printed label.

·   Personnel have to be fully trained as the little mistake may lead to bigger problems. The customer side links with the entire NZ couriers' system including accounting, sales and other different departments. If the staff printed the wrong address, it would cause delay and increased cost of delivery.

·   This ticket is not suitable for return processing, as customers do not have such label and special printers.

New Zealand Couriers' Dedicated Return Label

A growing number of return delivery leads to the emergence of a brand new NZC return label at the end of 2010. The return label is designed for any purpose of return, and the label is very flexible─ they can be altered for a certain customer (see Figure 5.8); however, this dedicated return label is only used for a couple of key customers so far. This dedicated return process tries to match the current advanced return processing in the world.

Figure 5.8 An example of dedicated return label (NZC, 2011)

The return label normally includes two parts; part 1 which contains some general information and pick up instructions, etc. is used for internal staff and couriers while part 2 is actual return address label. Part 2 is designed for the certain return items as all the key information such as return address, pickup address, contact person, number of items and special instructions has been pre-printed before couriers have this label. Besides all the information on the return label is from the receivers, in other words receivers have arranged the entire return processing such that the sender or individual customer only need to contact the receiver to request the return. Generally speaking, couriers only pick up the items when they receive this sort of label.

Dedicated Return Label Return Processing

The return processing is quite different from other tickets, for instance if a company uses the NZ couriers brand new return services, its customers do not have to contact both the company and the couriers, as the company can arrange everything includeing pick up time, address and special instructions from its individual customers, and send this updated information to NZ couriers every day, and then couriers will pick up from the customers.

·   Customers contact a company to request products return from online or phone, such as exchange, refund, damaged and recall.

·   Once the company received the customers' requests, it will be processed case by case depending on the actual situations and issues.

·   The Company may refuse a return or accept a request. The rejected return request will be ended at the company side; otherwise the return requests will be moved to the next process.

·   The approved and authorized return requests will be passed internally to NZ couriers' dedicated return team on a daily basis before 7:30am.

·   As mentioned previously in this chapter, NZ couriers uses Hub and Spokes system and all the requests and pickup detail will be dispatched by dedicated return teams in hub. The

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return processing is centralized and the return teams are mainly located in Auckland Branch. Return teams print all the dedicated return labels and inform pick up couriers, and then the return jobs and labels will be dispatched to both couriers and depots.

·   The return labels will physically be distributed to the different depots (Spokes) by internal delivery. An example of return labels during the transit is illustrated in Figure 5.9. Normally the return labels will be received by the second cycle time before 10:30am, and then couriers will follow the instructions and pickup address to collect the item.

Figure 5.9 An example of return label in transit (NZC, 2011)

·   The new return label and process significantly improve the performance of return/reverse logistics in NZ couriers such that many uncertainties have been minimized. At the beginning of implementing the return process, the return process is finished, when couriers tried to pick up; however, there are still some problems that occur, for instance the detail is not updated, wrong pick up address, etc. Therefore the return process could not be done at that stage.

·   The return process now has been extended and improved. The negative return jobs, which include incomplete return jobs, wrong return jobs, etc. will be recorded and investigated, then the information will be returned to return teams, and new corrected return jobs will be resent again until the picked up job has been completed. Therefore the return process becomes a closed loop, and this design is suitable for various situations, especially the high volume of returns, as no return job will be missed following the closed loop.

5.4.2 Seven Types of Return Models in New Zealand Couriers

As mentioned previously in this chapter, the return procedures may be various due to the different situations and requirements from customers; however, the return principle is similar and there is only the most suitable solution rather than the best solution. The world is changing rapidly, therefore the on-going improvement and optimization in logistics and supply chain should never be ended. There are seven major returns models which were discovered from the following organizations.

- John Sands
- New Zealand Wine Society(CMW),
- Corporate Express (CENZ),
- ProPharma
- The New Zealand Qualifications Authority (NZQA)
- Stanley Tools NZ
- TNT

John Sands New Zealand Return

Many people might not know this company— John Sands, and some even never hear about it; however, when you go to the supermarkets, book shops, convenience stores and stationery stores, and pay attention to the greeting cards, surprisingly almost all the greeting cards are come from this company, which is the largest greeting card and social expression company in Australasia, supplying a wide range of greeting card to major supermarket and chain stores, such as Food town, Whitecoulls, and Farmers in New Zealand. As mentioned in previous chapter, return percentages of greeting cards is 20 percent to 30 percent, and this is much higher than the overall customer returns that are estimated to be approximately six percent across all retailers. (Rogers, 1998) Johns Sands actually is one of the key customers of DX mail which was the only dedicated nationwide business mail alternative to New Zealand Post, and New Zealand Couriers is NZDX's preferred courier supplier. Therefore, the returns delivery is done by New Zealand Couriers and the relevant return ticket is illustrated in Figure 5.10 (NZC, 2011).

Figure 5.10 An example of John Sands (NZC, 2011)

It is well-know that the greeting card is seasonal product, that is to say certain cards are only prevailing during certain periods, for example Merry Charismas cards cannot be sold in Mother's day. Therefore there must be many exchanges and returns involving in this business. John Sands return is periodic; normally it occurs after each festival, all the returning items including outdated, unsold and damaged greeting cards, wrapping paper and decorations, will be destroyed after NZC has sent them back to the John Sands.

**Figure 5.11 An example of John Sands return
tickets (NZC, 2011)**

This John Sands return process represents the traditional way of New Zealand Couriers' return procedure. Five steps have been involved as follows.

1. Customers book the return jobs from New Zealand Couriers. As almost all the John Sands returns are Business to Business transaction, the return is actually a portion of the sales agreement. The return package normally is the original package with the original delivery ticket which shows the original delivery address, order number and business name.

2. After the return job is booked, Couriers go and pick up the return items from arranged location, and the actual pickup time normally is during business hours.

3. The John Sands return charge label (see Figure 5.11) is used in this model of return delivery, and different couriers are picked up from different locations; however, all the return items would be readdressed to Auckland Branch Botha Rd Penrose (Hub).

4. After a certain period when the return items have accumulated to certain volumes, the freight staff will manually manifest and record the relevant information in the separate sheets for different purposes, such as charge and back up.

5. And then all the manifested return items will be returned to John Sands; the frequency of delivery back to John Sands is various, depending on the volume of return items.

This John Sands return process is a classic example of New Zealand Couriers returns procedure, as in long time ago most of the returns were occurred between businesses and the situations were simple and the uncertainty was relative low.

Due to the nature of business, most John Sands returns are from the companies' Distribution Centers and large chain stores rather than the individual customers. Several essential characteristics of this return model are summarized as follows.

- Most returns are from business customers rather than individual customers.
- The uncertainty is relative low.
- The gate keeping is low.
- The reasons of return are simple.
- The return procedure is uncomplicated.
- High volumes of returns have been involved in the return delivery.
- The volume of returns normally is large from one single customer.
- The value of return products is relative low.
- Locations of return customers are relative stable.
- Receiver is responsible for the cost of return delivery, and in this case the charge label is used to charge John Sands Ltd.

Card Member Wine (CMW) Return

New Zealand Wine Society is one of the most prevailing online wine shopping website in New Zealand, and "100% Money-back Guarantee" is its promises. New Zealand Wine Society also has been known as Card Member Wine (CMW) in New Zealand Couriers; this is one of the key customers of New Zealand Couriers, and this company spent multi-million dollars on the wine delivery each year. Here is an example of CMW ticket (see Figure 5.12).

This return model, which is centralized return system, is currently reforming from charge label to dedicated return label. All the return items are gathered into NZC Hub and sent back to customers. The return process of this model is more complicated than John Sands Return, as the uncertainty is relative higher, and customers are individual customers rather than business customers. The wine products are various; hundreds of thousands of kinds of wine are involved in delivery. The situations are complex; each return may have different reasons and problems, such as damaged, wrong order, unsatisfied products, changed mind, customer moved, etc.

Figure 5.12 An example of CMW ticket(NZC, 2011)

The new return process is similar to CENZ return model, which will be investigated and discussed in the next model. The return procedure of original CMW return in New Zealand Couriers includes following steps;

1. Customers have to contact CMW to request return.

2. CMW advises the customer the ways to arrange the return delivery from the point of consumer.

3. Customers book the return delivery directly from New Zealand Couriers by themselves.

4. Couriers pick up the wine from the arranged location at arranged time.

5. The charge label is used for each single return item, and the customer name is the reference of the return charge.

6. All the returns will be gathered from other satellite depots in Hub daily, and the last return delivery cycle during the day is 2:00pm.

7. NZC Hub freight office staff manually manifest all the return items on the sheets every workday before 3:00pm.

8. The CMW manifested sheets have to be passed to CMW dedicated return team every workday before 4:00pm.

9. The dedicated return team will contact CMW personnel to make sure everything goes well.

10. All the return items will be returned to CMW's main warehouse in Auckland in the next morning before 7:00am.

As per the CMW return processing, there are some vital characteristics shown as below;

- The customers are individual customers rather than business customers.
- The uncertainty is high.
- Gate keeping is medium, as all the return items have to be confirmed before returning back to warehouse.
- The situations are complex; the reasons of returns are various.
- The return procedure is relative complicated.
- The number of return items is small in each single return delivery.
- The value of return products is relative high.
- Locations of return customers are unstable and separate.
- Receiver is responsible for the cost of return delivery, and in this case the charge label is used to charge CMW ltd.

Corporate Express (CENZ) Return

"Imagine… a supply partner that brings together many of the things you need to buy to run your business, who reaches every aspect of your business, under the one roof. Imagine access to highly specialized expertise that offers tailored advice to streamline your procurement needs.

Imagine a national distribution network providing reliable, next day delivery direct to your desk. A delivery service that includes the same driver who becomes a key member of your team, quietly and efficiently delivering and unpacking your order so you can get on with running your business. Imagine stress-free electronic purchasing and a consolidated invoice at month end.

You are imagining Corporate Express - a better way to do business."

The article above, which was extracted from the official website of Corporate Express New Zealand, provides a brief idea what this company is. Corporate Express NZ (CENZ) is one of the key customers in New Zealand Couriers, and NZ Couriers provides value-added 3PL logistics services for this customer including return logistics services. CENZ is one of the largest clients of

New Zealand Couriers which spends multi-million dollars for the logistics and delivery each year. This company supplies dedicated uniforms for specific customers, for example NZ couriers' uniforms are all from CENZ, and also it sells textbooks, school stationery, school notebooks, etc. to schools. This year CENZ has a contract of supplying all the school stationery and textbooks for more than 2000 students of MacLean's College in East Tamaki, Auckland, and NZ couriers East Tamaki depot is responsible for all the deliveries. It is clear that CENZ provides a wide range of supplies to both business and individual customers in New Zealand.

There are three main distribution centers which are in Auckland, Wellington, and Christchurch, each of which is responsible for the different geographic area. All three centers are responsible for dispatching items and receiving returning items throughout New Zealand. NZC offers dedicated courier services for CENZ, and there is a CENZ dedicated courier, who is based on East Tamaki Depot, delivering all CENZ delivery items from CENZ 49 Waiouru Road East Tamaki directly to NZC Auckland Botha rd Penrose (Hub) rather than following the normal flow route— through East Tamaki Depot (Spoke), CENZ delivery items would be sorted into New Zealand Couriers' delivery network. It is no doubt that the return process is totally different from the forward delivery.

Personally speaking, CENZ return processing is different from others; the procedure is precise and well designed, and it could meet complicated situation, higher level of uncertainty and different requirements from different customers. CENZ Company is the first company to employ the New Zealand Couriers' dedicated return label in its own return processes. As mentioned previously in this chapter, the dedicated return label is very flexible and suitable for almost all return projects; however the label has to be altered and customized for certain customers.

The customized CENZ return processing includes following processes;

1. Customers including both business and individual customers, have to contact CENZ customer services team to request products return such as exchange, refund, damaged and wrong order from email, (see appendix 11) online website and phone.

2. CENZ receives the customers' requests, and it will be processed case by case, depending on the actual situations and issues.

3. The CENZ Company may refuse a return or accept a return request. The rejected return request will be ended at the CENZ company side.

4. If the return has been authorized, CENZ will inform customer and send the CENZ return authority sheet (see appendix 12) which is paper work containing various information such as Return Authority (RA) number, original delivery number, return items, pick up address and return delivery address.

5. Customers have to print CENZ pick up form (see Figure 5.13) and attach it on the return item for third party pick up.

Figure 5.13 CENZ pick up form (NZC, 2011)

6. CENZ return team will send the approved and authorized return requests internally to NZ couriers' CENZ dedicated return team on a daily base before 7:30am.

7. All the return requests and pickup detail will be dispatched by NZC dedicated return teams in Hub. As mentioned previously, NZ couriers are using Hub and Spokes system; the return processing is centralized and the CENZ return team are mainly located in Auckland Branch. The return team prints all the dedicated return labels from NZC dedicated address label printers and informs pick up couriers, and then the return jobs will be dispatched to couriers by pager message and the

pre-printed return label will reach each depot on the same day in Auckland regional area.

8. The CENZ return labels will physically be distributed to the different depots (Spokes) by internal delivery bags. An example of CENZ return labels during the transit is shown in Figure 5.6. Normally the return labels will be received by the second cycle time before 10:30 am, and then couriers will follow the instructions and pickup address to collect the item on the same day.

9. Some issues may be occurred during the pickup, for instance no item, the item is not ready, the pickup job has been done, the customer has moved, incorrect address, and wrong item. The problem is unexpected, and some pick up jobs could not be done. Therefore, these problems should be reported and updated by couriers' scanners. Once the couriers scan the barcode and press certain buttons, the information will be returned to CENZ return team in Hub automatically. Depending on the different situations, the pickup job may be cancelled or a new corrected return job may be resent again until the picked up job has been completed.

10. If the pickup job has been done by couriers, the scanner will report to team automatically as well.

11. In the next morning NZC dedicated return team will email an updated report to the relevant personnel in each branch or depot to confirm and check if the each pickup job has been reported and done correctly.

The model, which is one of the advanced return modes in current world, has a wide range of flexibility to face different customers' needs and wants. The model has been implemented in some other well-known companies such as TNT and UPS. Another example is Buy.com, which is an Internet superstore, utilizes UPS for its product returns. "Instead of calling a toll-free number and going through the usual rigmarole, customers can go to Buy.com's Web site, log onto the returns area, go through a self-service process that lets them obtain a return merchandise authorization (RMA) number, generate and print a pre-addressed return label, and get complete shipping instructions, a list of local drop-off locations, and maps."(Dana, 2001) However this

return processes need mature IT system and well trained personnel to support the entire procedures. Some key characteristics of the model are shown as below.

- The customers could be both individual customers and business customers in this model.
- The range of uncertainty could be various; the model could minimize the level of uncertainty during the return processing.
- The gate keeping is good, and the return sheet enable all parties such as sender, receiver and couriers to access all the information.
- Improved customer experiences— a customer only needs contact CENZ in this case.
- Reduced cycle time; daily update and internal information exchange between CENZ and NZ Couriers eliminate the traditional barriers.
- This return model could cover a wide range of returns items, and is suitable for various situations.
- The reasons of returns in this model could be various.
- The return procedure is very complicated; all parties have to be well informed, and key personnel have to be fully trained.
- This return model needs strong system background and good equipments to support.
- The number of return items could be various in each single return delivery.
- The model has to be customized for specific customers.
- The cost of pre- setup in this model is high.
- This model is very flexible and well designed; the processes could be altered.
- Good communication among all parties in this return mode;
- Receiver is responsible for the cost of return delivery in this case, and the dedicated return label enables the couriers company to charge either sender or receiver depending on the different situations.

ProPharma Return

ProPharma, which is another vital customer of New Zealand Couriers, is the only national pharmaceutical wholesaler in New Zealand with more than 250 staff operating from 8 branches nationwide, along with two hospital divisions in the North and South island. It supplies and distributes a wide range of medical stuffs to all pharmacies, clinics and hospitals. Due to the nature of business, many medical items from ProPharma are urgently required; therefore, the

delivery time is highly restricted and each single item normally has very high value, for instance a vaccine delivery requirement is much higher than other normal parcels. Firstly the range of delivery time for the vaccine is normally only between 4 hours to 24 hours within Auckland. Secondly the value of each little package of vaccine may be up to thousand dollars. In the next place, various complex and urgent situations are involved in ProPharma deliveries. Last but not the least, due to the regulations, the expired and unwanted medical stuff has to be returned to ProPharma. Because of the high standard of delivery, delay and losing items are unacceptable; and the deliveries and returns have to be done within certain time, no matter how many emergency cases there are. Therefore it is understandable the cost of delivery is not the priority in ProPharma delivery. ProPharma spend a heap of money every year in its logistics services, and New Zealand Couriers has very special separate delivery process for all ProPharma delivery items and returns from the points of pickup to points of delivery, and then from points of delivery back to ProPharma.

The ProPharma delivery ticket is totally different from that of other companies (see Figure 5.14), the precise delivery information on the address label even shows the delivery courier number, which was introduced in the chapter 4. The accurate information could directly improve the performance of delivery. Actually, the main reason of delayed or lost parcels is mis-sorted, in other words the parcels have been sorted to incorrect delivery courier's cage in Hub and then the truck deliver the cages to spokes. Usually, when people realized the mistake it is too late to deliver. Therefore the detailed information is very helpful to improve the accuracy of sorting and minimize the service failure. Besides, all the ProPharma items are stored in the separate ProPharma cage during the transit from Hub to Spokes; every time ProPharma items are sent out from Hub and received in satellite depots, all the ProPharma items have to be scanned by scanners (NZC, 2011).
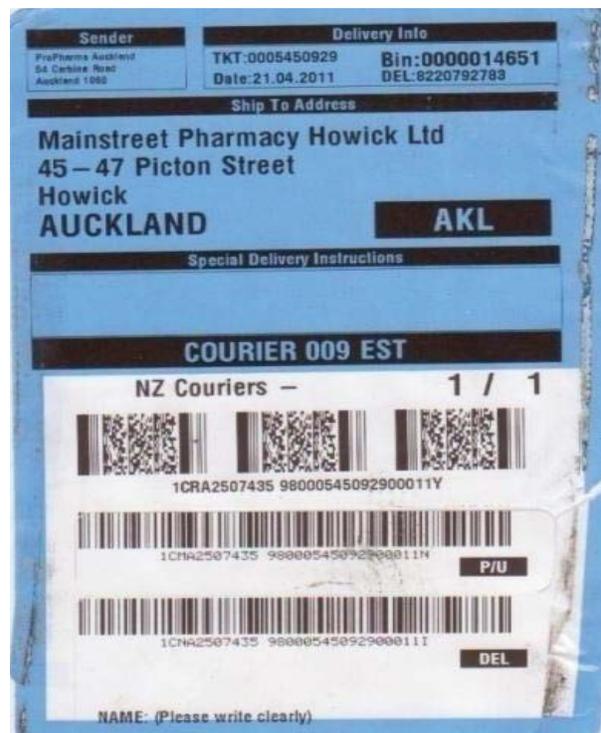
Figure 5.14 An example of ProPharma ticket (NZC, 2011)

ProPharma returns are various and it has different return processing for different items. The original delivery ticket might be utilized as return purpose, and sometimes the charge label will be utilized for return delivery depending on different situations and reasons of return. The main return processing of ProPharma is similar to that of CMW and John Sands; the major different is NZ couriers do not hold any ProPharma return item in depot and all the return items will be returned back to ProPharma as soon as possible. Actually this return model focuses on ProPharma Red Bin Return Processing.

ProPharma Red Bin returns

The ProPharma Red Bin return is a unique process in New Zealand Couriers, and the model could be used for other industries as well. Back to the pervious chapter, typical reverse logistics activities would be the processes a company uses to collect used, damaged, unwanted (stock balancing returns), or outdated products, as well as packaging and shipping materials from the end-user or the reseller. Reverse logistics activities have been divided by Rogers and Tibben-Lembke into two different major categories, depending on the type of materials

Figure 5.15 ProPharma return red bin in transit (NZC, 2011)

that flow in the reverse logistics channel, one is the products, and the other one is the packaging. ProPharma Red Bin is the second type of the return—packaging return. The Red Bin is a plastic container (see Figure 5.15) which carries the medical stuffs and order and be delivered from ProPharma to a certain customer. The red bin return is to collect all the empty bins from the customers and return them back to ProPharma. The red bin, which was made of strong plastic material, could be reused many times. The unique part of this return is that there is no any return label involving in this red bin return process, and all the return delivery fee of red bin has been paid when courier first delivers the bin to customers, in other words ProPharma has paid for the

delivery and return together when courier delivers red bin. And then all the red bins will be returned to ProPharma on a daily base.

The red bin return processing could be briefly indicated as below.

1. ProPharma Red Bin has been delivered to a certain customers, and the courier's payment includes delivery and return costs.

2. The red bin turns in empty and original delivery ticket are removed, and couriers pick it up regularly. The red bins are delivered to pharmacies, hospitals and clinics, and couriers normally pick up again in the next cycle time and return to Hub.

3. All the red bins will be collected and carried by separated PorPharma Cage (see Figure 5.15).

4. Dedicated ProPharma couriers return all the return red bins to ProPharma every day.

Figure 5.15 ProPharma Return Cage(NZC, 2011)

Obviously, the benefits of reusing package is beyond what you can image; many other industries could use this way to reduce their costs as well, such as the seafood industry where many ice coolers and nice packages should be reused more than once. However, there is no way customers can return them, and this model may be a good example of enlightening people to think some

innovative ideas and solutions. The package return/ reverse logistics just started, and it will become a major trend in reverse logistics industry in the future.

Merit

- Environmental protection─ the plastic bins could be reused many times. Paper box cannot last for long.

- Easy charging process─ company only pay once including delivery and return fee.

- Reducing the damages during the transit─ the strong plastic container gives a very good protection for the freight inside.

- Cost saving in the long run─ red bin could be reused many times. The paper package could be saved which can only be used for a few times.

Demerit

- Loss and miss bins— as the label is no longer used on the red bins, it is difficult to locate customers' bins.

- The cost of plastic bin is higher than that of cardboard.

The New Zealand Qualifications Authority (NZQA)

NZQA Exam Papers Delivery Project

NZQA exam papers delivery is one of the major projects in New Zealand Couriers. Many returns/ reverse logistics processes are involved in this unique project; this mode is highly customized for a certain large-scale project and the procedures are very complicated. The characteristics of this type of return mode are large scale, customization and innovation.

First of all, according to New Zealand courier national operation manager John Charles's presentation about NZQA project to all staff and couriers in 2010,

"The NZQA contract involves the critical movement of the NCEA exams for all high school students. On our success or failure to manage the contract could rest the success and failure for some 130 000 students. Every movement, every pick up, every delivery, every signature….each and every one is critical. A year's hard work rests in your hands for all of these persons…."

He emphasized "Security is absolute. Any breach could result in failure, any misdirect, wrong delivery, scan failure…all could be disastrous. Always lock your van and ensure no one touches your items until YOU have passed them to the receivers or NZC staff.   Please then treat these items as if they were your own. 130, 000+ people trust you, and us, to deliver. Please ensure you know every one of your delivery points, the expected times of pick up, and the likely volumes. Ask your manager or staff for help or information if you need it…. EVERY ITEM MUST BE SIGNED FOR AND SCANNED…INCLUDING ON BOARD.   We know this will not be easy, but we believe we have the team of contractors who can deliver the goods!" (NZC, 2011)

One day before the Easter holiday in 2011, there is an opportunity to meet NZC Auckland Customer Services Manager Tania Barrett. She introduced the NZQA project in the previous year. "New Zealand Couriers has been fortunate to be asked once again to provide delivery and pickup services for the New Zealand Qualifications Authority (NZQA) in 2010. The project involves moving some 1.3 million exam papers, 400 exam centres and 2000 markers throughout New Zealand…"

This project does not only distribute the exam papers to the different schools, but also involves picking up and returning papers from several different locations. Some terms of the project are introduced in Appendix 8.

According to the NZC customer services NZQA delivery flow chart (see appendix 9), there were five parties in this NZQA project, and each part of the project is divided into Blocks. The five blocks is introduced briefly as below

- **Block 1:** Distribution and movement flow of all Graphics and Technology folders. These are separate from the "exams" and involve the assessment of art and technology and the movements fall outside the timetable of the exams proper.
- **Block 2:** Distribution of exam papers to Exam Centre Managers
- **Block 3:** Collection of exam papers (Kermit's) & "Guinea Pig" packs from Exam Centres
- **Block 4:** Delivery of exams to Markers & movement of "Check Marker" packs from Markers to Panel Leaders
- **Block 5:** Collection of marked papers from Markers for delivery to Printlink

The five blocks include both delivery and reverse/ return jobs. NZQA return and delivery processes involve more than two different parties during the same period. Besides, NZC employ many innovative ways to reduce the error during the operation processing, one of which is utilizing different colors of bag and box to stand for different processes.

There are several different colors of NZQA special delivery packs being used in this project (see appendix 10)**.**

- *The Kermit:* These packs will carry the exam papers back from the exam centres. These MUST be packed into the cloth "consol" bags.
- *The Guinea pig and Check Marker packs:* These will travel directly from the exam centre to a Panel leader (head marker) overnight as a standard NZC freight movement. They also move between Markers and their Panel leaders who check their work.
- *Chaser packs:* These are "Ad hoc" packs and are used for special needs when required.
- *Graphics and technology packs:* These big packs are either **blue** or **orange** and will carry the art folders etc. to and from the exam centre to marker and Printlink.

This project is national-wide, and many services are dedicated to NZQA delivery only and each branch has its own NZQA team to ensure the project to be run smoothly and all the problems to be solved in time. This return mode involves a large volume of deliveries; however, the uncertainty is lower than other models. As the return processes, which include pick up time, delivery time, different colors of delivery pack and so forth, have been standardized; all points of delivery and pickup have been pre-booked; all the staff and couriers have been fully informed and key personnel have been fully trained as well.

During the entire project, Auckland Customer Services Manager Tania Barrett also emphasized "Security is paramount, as is the pickup and delivery performance. Absolutely 100% right first time!"

This return model is unique in New Zealand Couriers, and the requirements and KPIs could be various in terms of the different customers. Innovations and creative ideas could be found in this return. Customization is a key in this return model, and the cost of this dedicated return service is huge; however, the benefits that customers can gain are unbeatable. Besides, 3PLs running the large scales return and reverse logistics project could test and improve their systems and services. Many innovative ideas and procedures could be used in the future, for example some new procedures in this return project secure the freights such that the security of delivery will be improved. NZC is going to implement the successful procedures to other customers after the project.

Stanley Tools NZ Return

Stanley Tools New Zealand is an example of New Zealand Small & Medium businesses' returns, which is one of the most common return models in practices. The Stanley Hand Tool is an international brand, and Stanley Tools NZ is the wholesaler of this brand in New Zealand Market. This company is located in East Tamaki Heights in Auckland; it supplies specialty/ergonomically designed hand tools, pro line of tools made of extra durable materials tough enough for the job site, and an assortment of products for the home mechanic and homeowner.

As mentioned previously, Stanley Tools NZ is a wholesaler, who supplies the products to the business and individual customers. In this case, most of returns are repairs and exchanges from both business and individual customers, but the customers have to pay for return delivery instead of Stanley Tools NZ paying for return delivery. And the NZ couriers' prepaid ticket is used in this type of return delivery. Actually a large amount of return deliveries have been done in this way, especially in small & medium businesses.

In this model, either business customers or individual customers, who want to return their items to the point of origin, have to pay the return delivery fee and arrange the courier services by themselves. The return delivery process is simple for 3PL Couriers Company; however, the customers have to contact the receiver to deal with the return, for instance Stanley Tools NZ will not accept any return items from Couriers Companies, unless customers provide the Stanley Tools' Return Authority (RA) numbers, in other words customers have to contact Stanley Tools NZ first and get the authorized return permission before they can arrange return delivery. Many items have to be returned to customers by New Zealand Couriers because of missing Return Authority.

This prepaid ticket return model has been widely used for many different purposes, such as online shopping return, TV shopping return, and warranty repairs; however, many issues are involved in this model. Especially with a large number of customers' return, this return processing is insufficient for all parties. As customers may return items without any Return Authority, Courier Company cannot deliver the item to the receiver, and the receiver cannot match the customers and certain items. These would be a nightmare for everyone who is involved in this return. Therefore many large-scale companies set up their own return procedure and work with courier companies to solve these issues.

Admittedly, this prepaid return service model is a very basic return processing, and it had been widely used in many other industries. Some vital characteristics can be summarized from this model as below.

- The returns are from both business customers and individual customers in this model.
- This model may only be suitable for small & medium size businesses with a small number of returns, or it has to be improved before implementing in large-scale companies.

- The return processing in this model has been done by receivers and senders. Courier Company is just responsible for delivery from the point of pickup to the point of delivery in this model.
- The uncertainty is quite high due to too many unexpected factors and insufficient return processing.
- The gate keeping is poor due to the insufficient return procedures and lack of communication.
- The reasons of return may be various and the situations may be complex.
- The return procedure is simple for Courier Company; however many issues may occur between senders and receiver, such as missing return authority, wrong item, etc.
- Normally a low volume of returns are involved in this return delivery.
- The volume of returns normally is very small from one single customer.
- Locations of return customers are unstable and separate.
- Sender, who wants to return the item to the point of origin, has to pay for the delivery. And receiver may refuse to return item from courier companies due to the missing Return Authority.

TNT International Returns

This TNT return model is an international return/reverse courier model, which is used for New Zealand Couriers international returns. As mentioned in chapter 4, New Zealand Couriers not only provide domestic services, but also offer a worldwide export service through alliances with international express package operators TNT, all the international parcels and deliveries basing on the airfreights, the international export network covering over 220 countries all over the world. And also as mentioned in chapter 2, the 3PLs is an effective solution for Apple. Apple products in online Apple stores of New Zealand are distributed and delivered by third party logistics companies TNT and New Zealand Couriers. Actually there is no physical Apple distribution centre in New Zealand, in other words all Apple products are come from the other side of Tasman Sea internationally; therefore, the international return is unavoidable.

The TNT international return is quite similar to the CENZ returns, no matter business or individual customers, they are all treated equally, and the customers only need to contact receiver/company to arrange the return rather than to arrange return delivery with Couriers Company. In this case, Apple New Zealand Customer only needs to contact Apple store to arrange return delivery by international door-to-door courier services. Apple store will arrange the pickup address and return instruction with TNT, and the New Zealand customer will receive an international delivery consignment note by email or fax from Apple, and then customers have to print it out and attach it on the return item (see Figure 5.16). The New Zealand couriers will come to pick up. The entire international return processes could be easily done online by customers.
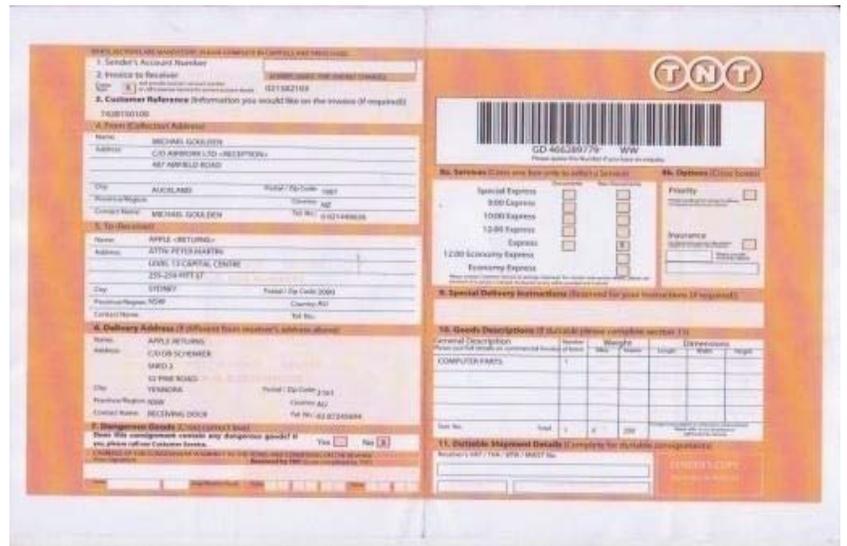
Figure 5.16 TNT international return ticket (NZC, 2011)

The TNT return process could be summarized as following processes;

1. Customers include both business and individual customers, have to contact Apple Store customer services team to request a products return such as exchange, refund, damaged and wrong order from email, online website or phone.

2. Once Apple Store receives the customers' requests, they will be processed case by case depending on the actual situations and issues.

3. The Apple may refuse a return or accept a return request. The rejected return request will be ended at the Apple side.

4. If the return has been authorized by Apple, Apple will inform customer and send the pre-printed TNT international consignment note which is a formal international delivery document containing the detail information such as return address, pick up address and contact person.

5. Customers have to print this TNT consignment note and attach it on the return items.

6. TNT will send a pickup request internally to NZ couriers' dispatch team to ask to pick up the Apple items.

7. TNT delivery ticket belongs to NZC's 3PL logistics services, in other words TNT and New Zealand Couriers share international delivery barcode. After return items reach the depot, all the processes will follow the normal international services.

8. If the pickup job has been done by couriers, the scanner will report to dispatch team and TNT automatically as well.

9. If some issues occur, for example people have moved or company has closed down, the NZC customer service team will contact TNT to gain the updated and corrected information. And a new pickup job will be sent to pickup couriers.

This is one of the advanced courier return models in current world, as mentioned in chapter 2, UPS are using similar return process to handle all the returns. New Zealand Couriers is currently reviewing and reforming its services and processes, and it is not too late to catch up the world class.

The essential characteristics of this advanced return model will be indicated as below.

- The full range of customers could be included in this model.
- The range of uncertainty could be various; the model could minimize the level of uncertainty during the return processing.

- The gate keeping is good; the return delivery ticket can only be issued once the return has been approved.
- Better customer experience— customer only contacts Apple to arrange a return.
- Reduced cycle time— real time delivery update and internal information exchange between TNT and NZ Couriers eliminate the traditional barriers.
- This return model covers a wide range of returns items, and is suitable for various situations.
- The reasons of returns in this model could be various.
- The return procedure is complicated, that is to say all parties have to be well informed, and key personnel have to be fully trained.
- This return model needs strong system background and good equipments to support.
- The number of return items could be various in each single return delivery.
- The model has to be customized for specific customers.
- This model is very flexible and well designed, and the processes could be altered, depending on the actual customers' needs and wants.
- Good communication among all parties;
- Either sender or receiver is responsible for the cost of return delivery.

5.5 Uncertainties in the Return/ Reverse Logistics

Uncertainty is one of the most essential concepts in logistics and supply chain management. As mentioned in Chapter 3, there are many researches and theories about the uncertainties in traditional forward logistics, however, there has been limited attention to theory-based research in the returns management arena (Jahre, 1995a; Carter and Ellram, 1998; Daugherty et al., 2001) Many people may still do not understand what uncertainty is due to limited resource in previous researches about the uncertainty in return/reverse logistics area. Personally speaking, the world is an uncertain world, in other words the world is not a perfect world, as there are so many unexpected things and various uncertain factors around individuals. The uncertainties in return/ reverse logistics and supply chains could be understood in the same way; the uncertainties in return/ reverse logistics are the uncertain factors, which include a wide range of activities, events and things, and may cause the return services failure and risks, and influence the normal business process and operations. According to the chapter 4, there are only two main types of uncertainties which include supply and demand in traditional forward logistics (Lee, 2002). Actually these two main types of uncertainties cannot cover all the uncertainties in real environment.

5.5.1 Five Types of Uncertainties in the 3PLs Return/ Reverse Logistics

Five types of uncertainties in the 3PLs return/ reverse logistics are one of the significant finding in this research. The uncertainties in the return/ reverse logistics are various, and each case may have different uncertainties. According to the observations in 3PLs, and case study of New Zealand Couriers, personally, the uncertainties which will be focused in this thesis could be categorized as five different types.

- 3PLs internal uncertainties
- The uncertainties between 3PLs and return customer/consigner
- The uncertainties between 3PLs and return receiver/consignee who is the receiver of the returning items
- The uncertainties between return customer/ consigner and receiver/consignee
- External uncertainties
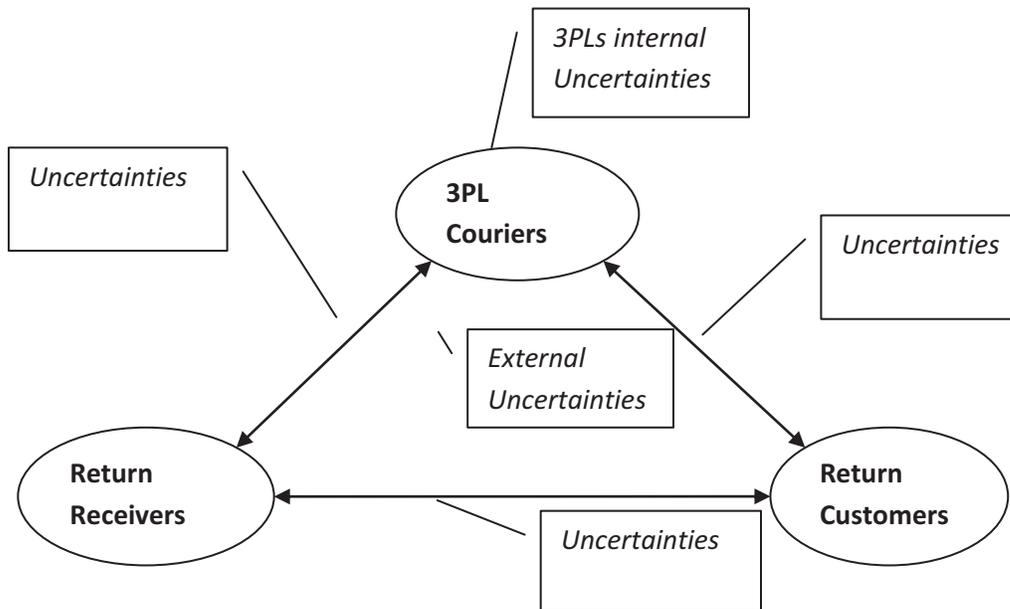
Figure 5.17 Ucertainties among three parties

These five types of uncertainties could cover all major uncertainties in 3PLs return/ reverse logistics services. And as per the seven different types of returns in New Zealand Couriers which has been introduced and discussed in Chapter 3, three main parties which include 3PL Couriers companies, return customers and return receivers are involved in a 3PL courier's return/reverse service. The first four types of uncertainties originate from these three major parties in a return/ reverse logistics services; the last one is from external uncertain environment. The five types of uncertainties in a return/ reverse logistics service are shown in Figure 5.17.

3PLs Internal Uncertainties

This type of uncertainty is located inside of the third party logistics providers. Many internal uncertainties cannot be eliminated, but the negative effects of these internal uncertainties can be reduced and minimized (see Figure 5.17). As mentioned previously, the world is not perfect such that there are many uncertain things, so is the company. The 3PLs internal uncertainties are

various and based on the certain companies. Each company may have its own internal uncertainties, as each one has different situations, business processes, structures, and personnel and so forth. In this thesis, New Zealand Couriers is selected as the case to be investigated. According to the observation, several internal uncertainties in return/ reverse logistics services in New Zealand Couriers are shown as below.

The Return Procedures

According to the Chapter 5, there are several different return procedures in New Zealand Couriers, and different customers may have very different return procedures. Various return procedures may lead to some issues, which could directly influence the performance of entire return processes, such as confusion, delay and error. Moreover, some return procedures in New Zealand Couriers are complicated, in other words many personnel and different departments are involved in a single return processing. The procedure is one of the common 3PLs internal uncertainties in many companies, and also is one of the vital reasons of logistics and supply chain optimization.

Internal Staff and Couriers' Knowledge

Staff and couriers play a vital role in a return processing. As we can see, many staff and couriers are involved in a return processing, and it is impossible to complete an entire return processing by a couple of personnel, especially in a large-scale company. For example, in New Zealand Couriers, there are over 1000 staff and couriers throughout New Zealand, and each individual's knowledge is distinct. Many previous logistics and supply chain cases show the services failure occurred by just one person's mistake; therefore, comprehensive training is essential, in order to avoid unnecessary errors and mistakes.

Equipments

As mentioned in Chapter 3, with the development of technologies, there are many new equipments and technology being introduced in logistics and supply chain industry. The various

advanced equipments directly improve the performance of the business; however, the equipment failure and incorrect using could lead to many potential issues, for instance the couriers' scanners can report all the delivery information to the system automatically such that many jobs are relied on the scanners, in other words once the scanners do not work properly, issues would rise. Thus the good support team of the critical equipments and good backup plans B are the effective solutions to reduce the negative effects of this kind of uncertainty.

Communication

Communication is a very vital part in many aspects, especially in the logistics and supply chain industry where a host of parties and people are involved. The 3PLs company must have a good communication system to connect and communicate each other. There are many previous instances indicating the insufficient communication could not only reduce the efficiency, but also cause many serious issues. According to Chapter 4, New Zealand Couriers have 18 branches throughout the country and over 500 couriers national-wide, so good communication is a one of the crucial factors of success, and fortunately, New Zealand Couriers has already realized that—monthly Company Newsletter and regular staff meeting could minimize the negative effects of this uncertainty.

Company's Structure

Company's structure could directly influence the entire operations; however, it is also one of the internal uncertainties in 3PLs Company. Ineffective and inefficient company's structure might lead to many potential problems, especially in large scale organization/company, for instance the relationships between different departments could be affected by the company's structure, and the major business processes are closely related to the company's structure. Logistics and supply chain optimization is one of the solutions to improve the company's structure. The company's structure of New Zealand Couriers is listed in Appendix 2.

The Uncertainties between 3PLs and Return Customers/Consigner

This type of uncertainty includes all the uncertainties between 3PLs Company and return customers who are either business customer or individual customers. And the level of this type of uncertainty is the highest among these five types of uncertainties. A host of factors may turn into a return uncertainty, especially when the return customer is individual; however, this type of uncertainty is different from the 3PLs internal uncertainties, as the uncertainties between 3PLs and return customers could be easily reduced and even eliminated by improving, optimizing and redesigning the procedures. Therefore, many 3PLs companies have started to reduce the uncertainties from this type. As mentioned above, one of the advanced return models is TNT-NZC returns where the uncertainties between 3PLs and return customers have been eliminated completely. This is because return customers have nothing to do with a 3PLs delivery company at all, and the 3PLs company only deals with return receivers who are business customers rather than individual customers. Therefore the uncertainties could be significantly dropped in the whole system, and this solution is one of effective way to reduce the uncertainties in return/reverse logistics as well.

As per the seven different return models in New Zealand Couriers, there are several significant uncertainties between 3PLs and return customers being listed as below;

Pickup Time

Time is one of the critical factors in logistics and supply chains. In the traditional forward supply chain, people focus on the cycle time, delivery time and lead time; however, in return /reverse logistics, the pickup time is a key, as a return processing starts from pickup time. A number of previous courier cases indicate that high percentage failure rate was caused by incorrect pickup time. Especially for the individual customers, the pickup time is unstable. For example if people missed the rubbish collection time, the rubbish would not be collected until next time. It is clear that this is one of the most significant uncertainties, which could directly lead to the service failure in the return/reverse logistics. A host of solutions are found to reduce this uncertainty, such as pre arrange the time, fixed pickup time and so forth; however, there is no best solution, which is suitable for every case.

Return Item

 The return item is another critical factor in return/ reverses logistics. Any error and mistake also could directly lead to the failure, for instance if an item is an authorized return item, if a delivery address is clear and correct, if an item has been packed correctly, and if the relevant return paperwork has been completed such as custom declaration form, dangerous good declaration form, return form and so forth. Generally speaking, business customers experience better service than individual customers such individual customers would have higher level of uncertainty than business customers; however, this critical uncertainty can be reduced and eliminated by improved services and other ideas such as pre-return packages and pre-printed return labels for return customers.

Volume of Return

Volume of return directly influences the 3PL return/reverse logistic strategy, which will be discussed later. The volume of return could directly influence the performance of the return processing and the charging for the different volume of return is different, as many 3PLs companies have separated processing for the bulk delivery and small parcels delivery. The volume of return has to use correct ticket and been processed by correctly delivery procedures to avoid any unnecessary delay and failure. Again, individual customer should be focused on by 3PLs Company. The ticketing teams of New Zealand Couriers have to deal with considerable insufficient ticket deliveries every day, the cost of which is huge. New Zealand Couriers is going to introduce new machines against this uncertainty.

Return Frequency

Return frequency means how often a customer returns the items. Return frequency is one of the crucial dimensions in return/reverse logistic strategy. Personally speaking, the 3PLs return/reverse logistic strategies could be categorized by the return frequency and the volume of return. 3PL companies could use appropriate strategies for different customers to minimize the

costs and improve the performance of services. This uncertainty could be reduced and eliminated depending on the different situations, for instance a business customer such as a retailer has higher return frequency than an individual customer, and New Zealand Couriers could offer regular pickup service and dedicated return services for the business customer to reduce the uncertainty.

Locations/Addresses

This uncertainty between 3PLs and return customers stands for the pickup addresses and locations from return customers. As we can see, many 3PLs couriers companies provide door-to-door services, but the services cannot be done without correct and sufficient either pickup or delivery address, for example customers have moved, company customers do not update their information; however, the well-designed processes and good communication could significantly reduce the negative effects of this uncertainty. Actually this uncertainty could be eliminated in an advanced return model where customers only contact with the return receivers to arrange the return delivery rather than 3PL delivery company.

Reason of Return

Reasons of return are various, and that is a major uncertainty in return/reverse logistics, as the different reason of return may require the different return procedures. For instance in New Zealand Couriers, return items, which are refused by receivers, could be returned straightway by original delivery ticket without any extra cost; however, if receivers have accepted the items and then want to return them to senders, they have to follow return procedures to complete the return. Overall, there are several major reasons being listed as below.

- Disposal issues
- Warranty returns
- Defective/unwanted products
- Environmental disposal issues
- Transit damage
- Marketing returns

- End of life/season
- Stock balancing returns
- Receiver refused

Again this type of uncertainty between 3PLs and customers could be improved and even eliminated by multiple methods and solutions. No matter what kinds of ways have been used in the return/ reverse logistics optimization, the point is these ways have to be suitable for the certain situation and case.

The Uncertainties between 3PLs and Return Receivers

The relationship between 3PLs Company and return receivers is a critical part in return/ reverse logistics services. As mentioned previously, individual customers involve there considerable uncertainties; therefore 3PLs Company has to try to improve and develop the relationship between 3PLs and return receivers to reduce the uncertainties, for instance the NZC-Corporate Express return and TNT-NZC return are advanced return models in current logistics and supply chain industry. One of the significant common characteristics could be found from these cases is the return customers no longer contact a delivery company to return items, and the 3PLs Company New Zealand Couriers only assist return receivers to arrange the returns. 3PL Company only deals with one part which is return receiver, instead of dealing with two parties— both return customer and receiver at the same time. Therefore, the uncertainties between 3PLs and return customers have been eliminated and transferred to return customers and return receivers. And the traditional triangle relationship of return chart is changed correspondingly (see Figure 5.18).
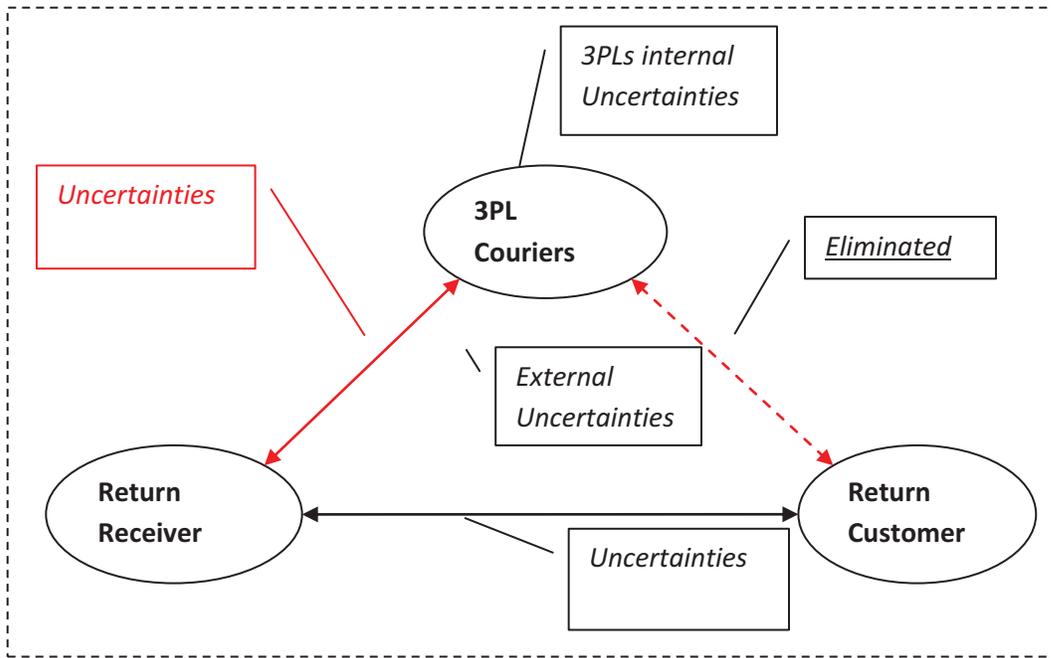
Figure 5.18 New relationship among three parties after eliminating uncertainties between return customer and 3PLs

Generally speaking, the level of uncertainty between return receiver/consignee and 3PLs is lower than that between return consignee and return consigner, as a return consignee is normally a customer of 3PLs Company, and there is a long term business relationship between them rather than the casual and one time off relationship between 3PLs and return consigner; however, there are several common uncertainties between the 3PLs and return receiver/consignee shown as below.

The Uncertainty of Return Procedures between Different Companies

The return receivers' return procedures may be various, and three PLs company's return processing has to match the different procedures of customers. As discussed above, normally the return receivers are customers of 3 PLs company, for instance one of the largest customers of New Zealand Couriers is CENZ who not only employ New Zealand Couriers as its forward delivery service provider, but also as return service provider. And ProPharma is another example of employing New Zealand Couriers as its full range logistics service providers. One of the main

reasons to employ the same 3PL company to deal with both deliveries and returns is to reduce the uncertainty between two different companies. In addition, customized and dedicated return services are effective solutions to reduce this sort of uncertainty.

Various Requirements of Return Receivers

Depending on the different nature of businesses, the return requirements from different return receivers may be different, for instance, ProPharma return requires fast delivery and return services, NZQA exam paper delivery and return requires secure and accurate services, CENZ requires efficient and economical services, and CMW return requires reliable and flexible services for individual customers' wine returns. Different requirements may need different processes and strategies to support, therefore for 3PLs Company, especially large-scale company such as New Zealand Couriers, who offers various returns services for different customers at the same time, the different requirements from different clients could easily be confused. Usually the return services are complicated and involve a number of different both internal and external parties in a return processing, so the uncertainty could be relative high. The solutions to reduce the level of this uncertainty include standardize the return procedure and comprehensive training. Customized and dedicated services could be a way to reduce the uncertainty as well.

Types of Returns

The types of return is another significant factor in return/ reverse logistics. According to Chapter 3, the return type includes products return and package return. There are various product returns currently in the market, such as recall, refund, repair, etc. and package return is becoming a significant trend in logistics. This is because package is one of the vital aspects in logistics, and incorrect package may cause a huge cost of damage. Besides, some package standards are required by regulations and laws, such as Dangerous Goods, the incorrect package of which may break the law. What is more, the cost of package is not cheap, and reusing package may be one of the effective solutions, for instance PorPharma red bin return, which has been discussed previously, is classic case of package returns. The plastic red bins replace the traditional brown boxes, and the advantages of the plastic red bin are not only to protect the freight inside, but also

the red bins could be reused many times. The strategy of different types of return may be different, therefore appropriate return/reverse logistics strategy could be a way to reduce this uncertainty.   The return/ reverse logistics strategy will be discussed later.

Transparent Information Sharing

Information sharing is one of the vital topics in traditional supply chains, and many researches about the impacts of information sharing in the traditional supply chain channel have done.   One of which is the MIT Beer Game; however, the information sharing also plays a significant role in return/ reverses logistics, for instance, transparent information sharing directly improves the performance of return and reverse logistics in New Zealand Couriers. This phenomenon was found from the New Zealand Couriers CENZ return case. As per Chapter 5, CENZ has employed New Zealand Couriers' dedicated return label as its return services' label, the characteristic of which is the New Zealand Couriers' dedicated return label contains a wide range of useful information for both internal and external using. The errors and delay could be minimized by transparent sharing information between 3PLs and return receiver, such as the pickup couriers' number, reasons of return, descriptions of return item, and pickup instructions.   All these information could be found on the return label, and all parties, which are involved in a return, could access the same information. This is one of the important ways to improve the services in the long run. And transparent information sharing could improve the relationship between 3Pls and customers, the benefits of which are beyond you can imagine.

Relationship

The relationship between 3PLs and return receivers is significant. In an advanced return model, the 3PLs only contact with return receiver to arrange a return rather than senders. Besides, today's return delivery has a huge difference compared with the previous way, in other words many returns are from individual customers rather than companies. A return receiver normally is a business customer who is also a customer of 3PLs Company. The trend of return model is return receivers and shippers work together to complete a return from the point of consumption to the point of origin. There are many different types of relationship between two companies, such as alliance, associate, outsourcing, contract, casual, etc.; therefore, the relationship may be an

uncertain influence on the return performance in long run, and for example casual sales relationship between two companies is much more unstable than 3PLs outsourcing. It is no doubt that, the stable and firm business relationships benefit all parties in the long run. The best way to minimize and even eliminate this uncertainty is to find reliable and appropriate business partners.

The Uncertainties between Return Customer and Receiver

The uncertainties between return customers and receivers are critical factors, which directly determine the performance of returns. Most return uncertainties originate from this type of uncertainty, as 3PLs Company is a shipper, just like middleman who tries to deliver items between these two parties. This type of uncertainty is similar to uncertainty between 3PLs Company and return customer which has been discussed previously, such as reasons of return, return item, time, and location. The uncertainties between return customers and receivers also are various; however, there are some significant uncertainties which are shown as below.

Characteristics of Returns

As mentioned in Chapter 3, the 3PLs Company is a physical middle-man, which links between the return consigners and consignees. In other words, 3PLs Company have to deal with a wide range of complex situations and returns, for example, both consignees and congers are either business customers or individual customers such that 3PLs Company is able to offer appropriate value-added services for them. The characteristics of returns include a wide range of factors; some of which have been discussed previously while other vital uncertainties are listed as below.

Return Lead Time

Return lead time is one of the key KPI in many businesses, as the return time affects both the inventory level and the financial performance. In some specific industries, the return time must be restricted, for instance the ProPharma return items in New Zealand Couriers are always the priority, and the returns have to be completed within the estimated time between consignee and consigner. Therefore return lead time is one of the essential characteristics during a return

processing, and it is significant to reduce the uncertainties and service failures between consignee and consigner by utilising value-added services and dedicated services in 3PLs Company.

Seasonal Returns

This is one of the key factors between business customers to business customers, especially between retailers and wholesalers. Generally speaking, a huge volume of return items are involved in business customers to business customers and some dedicated return projects, such as New Zealand Couriers' NZQA exam paper delivery and return project. It is vital to understand the specific requirements and needs between consignees and consigners such that New Zealand Couriers can make a comprehensive plan to minimize the uncertainties and avoid service failures.

Business to Business or Business to Customer relationship

The business relationship is one of the significant factors which directly influence the performance of return in 3PLs Company; therefore 3PLs return shipper should know the relationship to reduce the avoidable uncertainties. Generally speaking, Business to Business (B2B) relationship is a stable relationship based on a long term compared with Business to Customer (B2C) relationship which is relatively casual and one time off.

Return Cycle Time between Return Consignee and Consigner

The different return cycle times between return consignee and consigner will lead to different return strategies, which 3PLs Company may use, for example the short return cycle time between return consignee and consigner needs responsive return strategy that requires short lead-time rather than the efficient return strategy that focuses on the cost and efficiency. The different return strategies also directly determine the different operational procedures in 3PLs Company, and the different return cases, which have been discussed in this chapter, clearly shows the differences of operational procedures in the different situations. ProPharma requires fast and effective return services rather than CMW's cost efficient return services; actually the return cycle time is one of the critical factors to determine the type of returns.

Bulk Return or Small Parcel Return

The volume of return between return consigner and consignee is another critical uncertainty which should be concerned by 3PLs Company, and this factor has been discussed in Chapter 3. 3PLs Company should employ the appropriate strategy to meet the customers' needs, and maximize the benefits in all parties in a return. And also the volume of return directly influence the economies of scales; there is a very closed relationship between costs and volume, and one of the examples is the costs of transportation of full container load (FCL) is much cheaper than that of Less than container load (LCL).

The Return Procedures between Return Consignee and Consigner

3PLs Company has to know the return procedures between return consignee and consigner to improve the 3PLs' customized and dedicated return services. There are many return procedures in current logistics and supply chain industry, and the return situations are various. Normally the return consignee and consigner belong to the different companies and business areas, and the business procedures must be various and different from each other. For instance many different companies and businesses have been involved in the case of ProPharma return, and New Zealand Couriers links the different companies and business procedures between ProPharma and its customers as a shipper and middleman. Therefore it is significant to conjoin the return procedures by 3PLs so that the uncertainties between the different companies and business procedures could be avoided in the mean time.

Return Authority

This is a major uncertainty at the beginning of the return between return consignee and consigner. According to the CENZ return, a formal return procedure in 3PLs Company New Zealand Couriers is started at an approved return authority from return consignee CENZ. A return cannot be completed without return authority, for instance there are so many return items being returned to return consigner without return authority in Stanley Tools NZ and this will significantly increase the cost of return delivery and the return cycle time. Besides, considerable invisible aspects may be affected by the authority return, such as trust between return consignee

and consigner, reputation, and business relationship. Good communication among all parties is an effective and simple solution to reduce the unnecessary delay and extra cost of return delivery.

A host of uncertainties with regard to return relationship between return consignee/receiver and consigner/ customer are similar to the uncertainties between 3PLs Company and return consigner/ customer. According to the CENZ and TNT return models which are one of the advanced return/ reverse logistic model in the current world, return customers only need to contact the return receiver instead of 3PLs Company; therefore, these uncertainties between 3PLs Company and return customer would be transferred to the uncertainties between return consignee/receiver and consigner / customer. However as mentioned above, many of these uncertainties could be reduced and even eliminated by various ways and innovative ideas, for example the uncertainty of pick up time could be improved by a good communication system and information sharing in all parties, which have been involved in a return. Many uncertainties are unexpected and various, therefore the appropriate solution should be innovative and flexible in order to match the complex situations.

External uncertainties

External uncertainties also may influence the return/reverse logistics; however the external uncertainty is not the major uncertainty in the returns, compared with other uncertainties in the triangle return relation. One of the main reasons is that most of the external uncertainties are relative stable, and some changes of external uncertainty may be expected. Several vital external uncertainties can be listed as below.

Economic Environment

This is a critical factor, which directly influences many industries and businesses including the return/ reverse logistics. Generally speaking, the economic growth would directly stimulate the business activities, and increased business activities require more 3PLs return and reverse logistics services, as many logistics and supply chains activities are business activities or directly/indirectly related to the business activities. The economic growth also creates booming market which needs various logistics and supply chain services to support. During the last 20

years, the global economy has had a great improvement, while logistic and supply chain industry has made a remarkable progress. Contrarily during the economic downturn, the economic activities would be reduced and the development of return/reverse logistics would be restricted, and even the traditional forward logistics and supply chain industry would be influenced by the current global recession, for example according to the BBC news, there were hundreds and thousands of vessels in the world had to be suspended because of the economic recession. Therefore economic environment is a significant factor which should be considered in the return/reverse logistics optimization in the long run.

Government and Regulations

Government and regulations are non-ignorable external uncertainties; however this uncertainty is relative stable and the change of this uncertainty could be expected. Many industries have been governed and regulated due to various reasons. Especially, logistics and supply chain industry is a highly regulated and restricted industry in many countries, because this industry plays a critical role in a domestic dominion and economy. The classic example is the Japanese logistic industry which is unique and different from other developed countries. Because of the regulations in Japanese logistics industry, compared with other industrial countries, Japan's distribution system is very complex. Most aspects of goods distribution in Japan are tightly regulated by the government; however, with the development of business activities, a booming logistics and supply chain market needs more efficient and effective logistics services. Therefore the trend of deregulation of logistics industry spreads worldwide, and a growing number of countries have deregulated their logistics industry. Admittedly, nowadays logistics industry still is regulated and governed in many countries, therefore the return procedures have to obey the relevant regulations and laws.

Market Competition

The market competition is one of the unavoidable external uncertainties in many fields including the return/reverse logistics. Especially after the international deregulation of the logistics industry, a growing number of various logistics service providers emerge. The market competition can stimulate the development of logistics and supply chain industry; however, many unexpected and uncertain things may occur during the market competition. This is one of

the most important factors which should be considered in the logistics optimization in the long run.

Technologies

As we can see, the technologies have changed the world, and many advanced technologies have been widely employed in the logistics and supply chain industry. Several technologies already have been introduced and discussed in Chapter 2, such as Tracking & Tracing, barcode, and ERP system. As mentioned in Chapter 2 & 3, the trend of technologies implementing in logistics and supply chain industry is significant. However, the uncertainties of technologies are various depending on the different situations, one of the examples is the New Zealand Couriers' scanners sometimes could not be connected to the servers due to the issue of telecom mobile network. Therefore, the backup system and operational plan B for technical problems and emergency should be considered. The solution may be various; however, the best solution is the most appropriate solution in actual case.

Consumer Behavior and Culture

The consumer behaviour and culture are significant external uncertainties as well. It is no doubt that customers play a vital role in business; logistics optimization actually is trying to improve and optimize a business, and customer should be focused in the logistics optimization. The consumer behaviours and cultures are various in different regions and countries; however, this uncertainty is stable and unavoidable. Overall, the company and services have to match the consumer behaviour and culture.

Significant Trends

Some significant trends may become the external uncertainties of return, which influence the return/reverse logistics activities directly/indirectly. The trends include globalization, outsourcing, customization, customer focused strategy, for instance globalization and outsourcing may directly stimulate the development of logistics and supply chain. Nowadays a growing number of companies and businesses move their manufactures to Asia, such as India, China, and Indonesia in order to cut down the operation costs, as the cost of operations is relative low in those countries; however, the movement of raw materials and products has to be relied on the logistics. Some raw materials may be shipped from the third country and the final products may

be shipped to the different target market; therefore, the increased logistics activities lead to reverse logistics such as return products and recall. One of the effective solutions to reduce the external uncertainties is to implement on-going improvement such that the businesses are able to face the various changes.

Impacts of Uncertainties

The impacts of various uncertainties in the return/reverse logistics are different. Normally the impacts are negative, and the uncertainties could directly influence many aspects in a company and business; therefore, it is significant to minimise and even eliminate the uncertainties in a logistics system. Some impacts of uncertainties have been discussed previously; the impacts of uncertainties in 3PLs reverse logistics on the performance of reverse logistics service based on the case of New Zealand Couriers are summarized as below.

Increasing the Lead Time

Lead time is one of the critical factors in logistics and supply chain activities. Short lead time is always pursued, as short lead time represents an effective and efficient system, and many potential problems could occur by the lead time, such as unexpected delay, customer complaints, extra operational costs, etc. however, the lead time could be increased by many various uncertainties in a system, such as insufficient communication, unclear pickup time, broken-down equipment, etc.

Increasing Cost

Cost is an essential KPI in many companies and businesses. Many uncertainties could increase the cost significantly, for instance in New Zealand Couriers, a negative pick up job, which means an incorrect pickup job, is normally caused by the uncertainties between 3PLs and return customer/consigner such as wrong item, insufficient pickup address and bad communication. The negative pickup job increases both the lead time and the cost, as couriers have to redo it. Besides,

various extra costs could be caused by various uncertainties such as overtime costs, extra operation cost and so forth.

Reducing the Efficiency of Operations

Uncertainty is one of the menaces to logistics operations. Especially in New Zealand Couriers the day-to-day operation is based on a hub and spoke system which requires accurate planning and scheduling, in other words any delay and uncertainty could directly influence the performance of entire system. For instance in New Zealand Couriers, one truck from a satellite depot (spoke) to a branch (hub) delay due to various uncertainties, and then the shuttles from the branch (hub) to other different branches (hub) would be delayed and other trucks from the branch (hub) to the other satellite depot (spoke) would be delayed as well. Besides, the uncertainties such as 3PLs internal uncertainties, insufficient staff and couriers' knowledge could directly reduce the efficiency of operations, and cause extra cost, such as double-handling, mistakes and errors.

Disturbing Relationships

Uncertainty could influence the relationship between 3PLs and customers, and this phenomenon normally is result from the uncertainties between 3PLs and return receiver / consignee such as various requirements of return receivers, different types of returns, insufficient information sharing and so on. Besides, the uncertainty could influence the internal relationship within the 3PLs; this impact could be found in 3PLs internal uncertainties.

Decreasing Customer Satisfaction

Various aspects could affect the customer satisfaction, which is one of the significant KPI in logistics and supply chain industry. Customers do not like unexpected surprise, for example there is no standardised urgent service in New Zealand Couriers, and the urgent parcel sticker may be only used to notice couriers. A customer asks an urgent parcel to be delivered on the same day; however, for some reasons/uncertainties, the parcel is delivered in a few days late, so the

customer satisfaction must be affected by the unexpected delay. Customer satisfaction directly represents the quality of services. Note that standardised and separate urgent service may avoid the unexpected delay.

5.6 Key Reverse Logistics Management Elements Have Been Found in 3PLs New Zealand Couriers

According to Rogers and Tibben-Lembke's Reverse Logistics Trends and Practices research (Rogers, 1998); there are several key elements of reverse logistics management that also could be found in the New Zealand Couriers' return cases.

5.6.1 Gate Keeping

The gate could be understood as the point of entry into the reverse logistics channel, and the Gate keeping is a filter which is used to screen the defective and unauthority returned items and products at the entry point into the return/reverse logistics channel (Rogers, 1998). In the return cases of New Zealand Couriers, the gate keeping has been considered, for instance the return authority is one kind of the return gate keeping. For example, Stanley Tools return items need the authority number; otherwise un-authority returns could be directly refused and declined by the return consignee. CENZ return customers have to arrange return delivery directly with CENZ rather than courier/ shipper; one of the main reasons is the gate keeping. Good gate keeping is the first critical factor in making the entire reverse flow manageable and profitable (Rogers, 1998). And insufficient gate keeping could directly influence the performance of entire reverse logistics, for example the return items cannot be matched to appropriate customers, and also the massive returns could directly influence the financial performance in a company.

5.6.2   Compacting Cycle Time

The return cycle time is one of the critical factors in return/reverse logistics, as the cycle time directly influence many vital aspects, such as return procedure, inventory level, return strategy, financial performance etc.. And also the return cycle time may directly influence the performance of forward logistics, for example, the long return cycle time could directly cause the high average inventory level in the entire supply chain channel of the Card member wine's return. As discussed previously, a return CMW wine would be resold to another customer, therefore compacting return cycle time could reduce the cycle time of entire wine reselling, and directly improve the business performance such as cash flow, low operations costs, low inventory costs, etc.. Especially in some special industry such as the medical industry, the return cycle time is critical, and the cycle time determines the return activity; long cycle time lead to many issues and extra costs such as the urgent vaccine return in ProPharma return, which has been discussed in Chapter 5. Therefore compacting cycle time must be considered in the return/reverser logistics services.

5.6.3   Reverse Logistics Information Systems

Information system is one of the significant parts in logistics and supply chain, and the return/ reverse logistics, which is similar to the forward logistics, needs an integrated information system to link the different parties in a return procedure. As per Chapter 5, New Zealand Couriers has its own information system, which is maintained and improved by FIS. New Zealand Couriers' information system was mainly designed for the forward logistics using; however, with the rapid increase of demand of return/ reverse logistics services, the information system is continuously improving, for instance CENZ return case shows the utility of information system in the return processing, and the preprinted dedicated return label actually is a part extension of information system. The accurate and effective return information exchange among the different parties such as internal staff, couriers, return consignees, and consigners is relied on the integrated information system. Return consignees could use the integrated system to book the return delivery job; return consigners could track and trace the status of return items from the information system, and the information system also could be employed to collect the data from couriers and staff. Successful information system could promote information sharing in the entire supply chain

system, and reduce the communication barriers between different parties in the logistics and supply chain channel.

5.6.4   Central Return Centers

As per the observation on New Zealand Couriers' returns and the various dedicated returns for different customers of New Zealand Couriers, the centralized return procedure has been widely used in NZC such as the John sands, CMW, and CENZ, and they all employed the central return centers to handle and process all the returns from different customers. According to Chapter 3, centralized system in traditional supply chain channel already has proved its advantages, several of which are shown as below.

Reducing the Cycle Time

One of the critical characteristics of centralized return centers is reducing the return cycle time, as all the complicated return procedures has been aggregated in one center, in other words the return procedure could be easily monitored and managed, and any unexpected issues could be solved in time, and unnecessary wastes and delay during the internal transit could be eliminated.

Simply Return Delivery Instruction

This is another significant advantage in return processing. Normally the return items come from different customers who may use the different 3PL transportation companies. The central return center could eliminate the confusion of return address, as there is a significant portion of service failures which are resulted from the incorrect return delivery address; especially for the return items from the individual customers, single return address is an easy solution for people to arrange return delivery.

Minimizing the Confusion and Errors in Return Processing

As per CENZ returns in New Zealand Couriers, CENZ employs centralized return system in regional area, for example Auckland return centre is responsible for all the returns from Far North to Hamilton area. One of the reasons of implementing centralized return is that too many errors and confusions were resulted from a decentralized return system, for example in a decentralized return system, each local branch was responsible for its own customers' return while CENZ customers in Hamilton are only allowed to return their items to Hamilton rather than Auckland; therefore a host of unexpected issues arose, for example customers returned their items, but company cannot identify their return item. Centralized return could directly improve the performance by minimizing the confusion and errors in return processing.

Economies of Scale

There are various return activities in the different return procedures. As mentioned in Chapter 3, many companies not only receive the return items, but also they deal with the returns. Some kinds of return items have to be remanufactured and refurbished in manufacturers such as recall products, outdated products, etc. while some kinds of return items have to be disposed such as John Sands, medical products, battery, etc. Therefore centralized return system could help companies to achieve the economies of scale, which is similar to the forward logistics.

Effective and Efficient Centralized System

Centralized system has been proved as an effective and efficient supply chain system in many previous researches (Rogers, 1998). The centralized system could maximize the efficiency of entire system, and reduce the various costs such as operations costs, inventory costs, etc. in order to improve the performance in system wide. The centralized system also could be widely employed in the return/ reverse logistics services, and also centralized return system could match

the gate keeping; however, as mentioned in Chapter 3, the return situation is various and complex, and the centralized system may be not suitable for some cases, and no matter what kind of return system has been employed, the critical point is the return system have to be suitable for the real situation and particular cases.

Outsourcing

Outsourcing is one of the significant trends in current logistic and supply chain industry and a growing number of companies have realized the benefits of outsourcing. Many companies employ 3PL return/ reverse logistics services which are provided by New Zealand Couriers; however, at this stage the NZC can only offer a limited 3PLs return and reverse logistics outsourcing to these companies. Outsourcing reverse logistics is different from the outsourcing forward logistics and warehouse, as there are various return activities and complex situations being involved. As mentioned above, the NZQA paper delivery project has the highest level of return outsourcing compared with other returns. The reasons are as follows. In the first place, the return situation and reason in NZQA return are simple, and 3PLs Company could follow the procedure to complete the return processing, and the uncertainties and major issues could be expected. Secondly the standardized dedicated NZQA return processing significantly improves the performance of outsourcing, and standardization also could avoid unnecessary wastes and errors. Thirdly all the key information have been shared between NZQA and NZC before they start to run this project such as the quantity of return, the pickup time, locations, etc. Actually the dedicated NZQA service is designed based on the key information; therefore, the negative effects of uncertainties have been minimized. From the NZQA exam paper delivery and return, there are two critical factors including standardized return procedure and transparent information sharing , both of which could improve the outsourcing services in 3PLs.

5.7   Return/Reverse Logistic Strategy

Return/reverse logistic strategy plays an essential role in logistic and supply chain management. As per the previous research the strategy had not been paid enough attention to. In the past 20 years with the rapidly increasing demand of return/reverse logistic service (Rogers, 1998).   a growing number of relevant strategies have been in demand accordingly; however, the reality is that there are not sufficient strategies can be utilized at hand. Similarly to other business strategies, the appropriate return/reverse logistic strategy could help businesses to improve their performances and also it is an indispensable part of the return/reverse logistic optimization.

According to traditional supply chain strategies which have been mentioned in Chapter 3, there are two major supply chain strategies including push and pull strategy, and four types of supply chain including efficient supply chains, responsive supply chains, risk-hedging supply chain, and agile supply chains (Lee, 2002). Actually these traditional forward logistics and supply chain strategies and thinking could be employed in return/ reverse logistics strategy.   However there are some differences between traditional supply chain strategies and return/ reverse logistics strategies.   Both 5.6.1 and 5.6.2 based on own brand new thinking and ideas.

5.7.1   Two Critical Dimensions

Two critical dimensions have been found in return/ reverse logistics in terms of the return cases in New Zealand Couriers. These two critical factors have been discussed previously.

·   *Volume of Return*

Normally the quantity of the return items during certain period could be understood as volume of return.

· *Return Frequency*

Return frequency indicated how often return items can be returned during the same period in volume of return.

According to the two critical dimensions/factors, all the return/reverse logistics activities and strategies can be categorized as four different types of the return/reverse logistics, which are brand new thinking in history of logistics and supply chain industry.   The new four categories of return/ reverse logistics can be widely used in many different industries and businesses. And the management could easily make accurate decisions, while the unnecessary wastes and time could be saved.   The return/ reverse logistics strategy likes a general guide and map for people to improve and optimize their return/ reverse logistics.   As discussed previously, there are many different solutions and methods could be used in the logistics and supply chain optimization, however there is no such best solution or answer to solve all problems.   Because all the problems and situations are all different, some successful solutions only can be implemented in certain situations.   Therefore the return/reverse logistics is not a solution or method of supply chain optimizations for all problems or issues in return/ reverse logistics, but the return/ reverse logistics could guide companies to find a correct direction and save lots of money and time.   The four different types of return/ reverse logistics strategies are introduced in 5.6.2.

5.7.2   Four Types of the Return/ Reverse Logistics

As illustrated in Figure 5.19, the return/ reverse logistic strategies can be sorted into four types with respect to the volume of return and return frequency.

· ***Efficient Return***

· ***Responsive Return***

· ***Efficient & Responsive return***

· ***Agile Return***
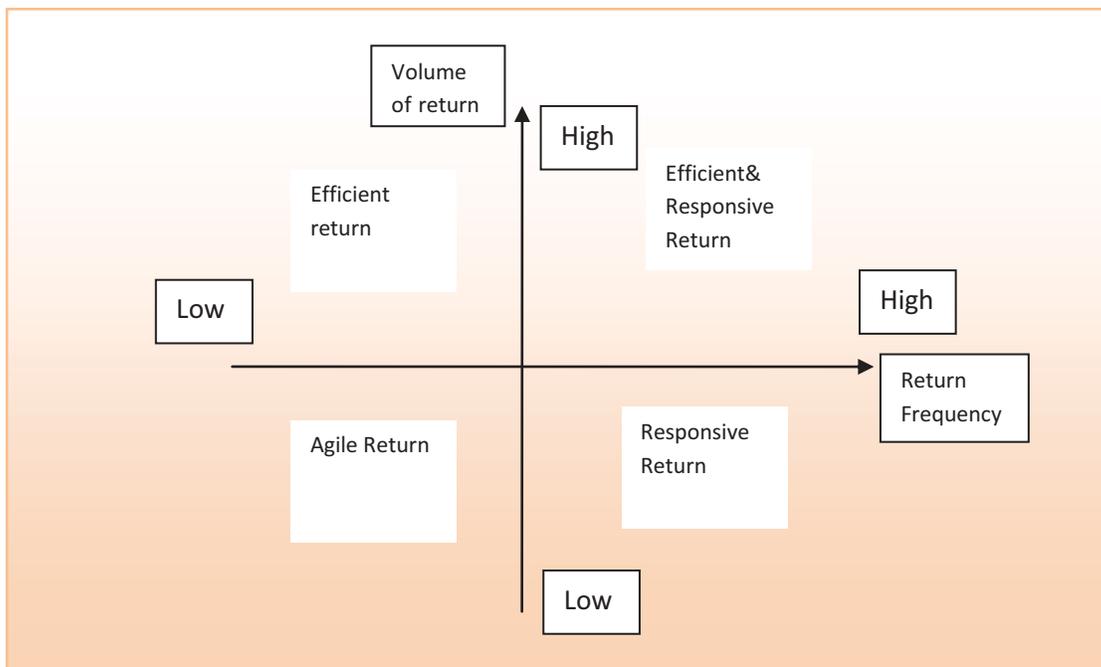
Figure 5.19 Four types of the return/ reverse logistics

Each type of return strategy has its different characteristics, which are suitable for different return satiations in terms of the volume of return and the return frequency; however, other factors should be considered as well depending on the particular case such as regulations, urgency, customers' needs, etc. The four types of return strategies will be discussed in this thesis in the following.

Efficient Return

This type of return normally occurs between business and business where the return frequency is low but the volume of return is high. As mentioned in this chapter, the uncertainties in this type of return are relative low, therefore the return strategies should focus on the efficiency of return.

One of the solutions for this type of return is using dedicated return procedure in New Zealand Couriers such as John sands return between retailers /wholesalers and manufacturers. The efficient return strategies could achieve economies of scale in order to minimise the return costs, and one of the classic examples of this type of return is rubbish collection and recycling.

The optimization in efficient return should be focused on the following aspects;

➢ Non-value added activities should be eliminated
➢ Uncertainties should be minimised
➢ Dedicated return services in 3PLs such as bulk delivery
➢ Scale economies should be pursued, and cost per unit could be minimised.
➢ Optimization techniques should be deployed to get the best capacity utilization in return collection and return delivery.
➢ Efficiency is the key in this type return, to minimise the unnecessary wastes.

Responsive Return

This is one of the most common return models in courier companies. The return frequency is relative high; however, the volume of return is low in the responsive return. This model also can often be found in small & medium businesses returns. The significant difference between responsive return and efficient return is the volume of return, therefore it is difficult to achieve the economies of scale in one return, but using the outsourcing and 3PLs services could help company to get over this demerit. This type of return strategies should focus on value-add services and minimizing the negative effects of uncertainties. One of the examples of this type of return is warrant repairs.

The optimization in responsive return should focus on the following aspects.,

➢ Value added activities should be focused
➢ The negative effects of uncertainties should be minimised
➢ Flexible procedures in order to meet the different sizes of returns
➢ Efficient return system should be designed for the various returns
➢ Centralised return system may be employed for this return model in order to achieve the aggregate economies of scale from small volume of returns.
➢ Minimising the unnecessary wastes also is a critical part in this type of return.

Efficient & Responsive Return

Efficient & responsive return strategy which could be employed in a return situation of volume of return is high and also the return frequency is high. Normally various situations and return uncertainties would be involved in this type of return. The optimization of this type of return is difficult and many other uncertainties and factors may influence the optimization, for example the optimization could significantly improve the performance of CENZ returns in New Zealand Couriers. Transparent information sharing between company and 3PLs is another critical factor which directly influences the performance in this type of return, as the efficient & responsive return has the high level of uncertainty, high volume of return and high return frequency, in other words any little error could result into a big lost. Good information sharing could directly minimize the communication barrier, avoid unnecessary errors and eliminate some uncertainties; however, the logistics and supply chain optimization should focus on particular case, as different case may have different solutions. Generally speaking, the optimization in efficient & responsive return should focus on the following aspects;

➢ Return requirements and Customers' real needs and wants
➢ Minimising the level of return uncertainty
➢ Standardised return procedure could help company to reduce the errors and confusion in the high volume and high frequency return.
➢ Dedicated service for the certain customer in 3PLs company
➢ Transparent information sharing in return channel
➢ Information Technology and system could optimise the business processes
➢ Innovative solutions could be used to solve many unexpected problem.
➢ Centralised return system may be employed in this type of return depend on the certain case.

Agile Return

This type of return has relative low return volume and return frequency compared with other three types of return and it may be casual and one time off; however, this type of return may

become a majority in the future, as with the rapid development of internet businesses and online shopping, a growing number of people prefer to go shopping online rather than going to the shops. The return will occur accordingly, for example a customer will return a disliked product after receiving the real product from online shop. This is one of the significant trends in the current return/reverse logistics services; therefore many 3PLs logistics companies have separate services for these casual returns. The prepaid ticket service could be utilized for casual return in New Zealand Couriers. The optimization in efficient & responsive return should focus on the following aspects.

➢ Value added services should be focused.

➢ Efficiency may be pursued depending on the certain cases.

➢ Flexible charging processing and pricing in order to meet the various casual customers;

➢ Standardised procedures in order to minimise the uncertainties in various casual returns;

➢ Efficient return system should be designed for the various returns.

➢ Centralised return system may be employed for this return model in order to achieve the aggregate economies of scale from small volume of returns.

➢ Minimising the unnecessary wastes and errors also is a critical part in this type of return.

➢ Innovative solutions and creative ideas may solve many new problems.

Chapter 6 Conclusion

6.1 Research Conclusion

The core of this research is to explore the uncertainties in 3PLs reverse logistics. The uncertainty is one of the significant factors, which directly influence the performance of supply chain system (David, 2007). And return/ reverse logistics is one of the vital portions in logistics and supply chain. The New Zealand Couriers' return services have been investigated, and there are seven types of return/reverse logistics models that have been found in this research; each different return/ reverse logistics model has different characteristics. CENZ return and TNT international return are two of the world-class return models in which the return consigners do not have to contact shipper/3PLs to arrange a return consignment. One of the significant advantages of the two models is reducing and eliminating the uncertainties between 3PLs and return consigners. The different return models in New Zealand Couriers enlighten people to think and seek the most suitable solution for themselves as innovative spirit is the core of logistics and supply chain optimization.

Compared with the forward logistics, the level of uncertainty and variability is relative high in return/ reverse logistics. In the case of New Zealand Couriers, there are various uncertainties in a return delivery; especially when an individual customer is involved in a return/ reverse logistics job, the uncertainty and variability are high compared with a business customer. The world-class return models could avoid such differences, that is to say all the return customers either individual or business could be treated equally; however, the advanced return models require complicated return procedures, comprehensive system, and expensive equipments and so forth to support.

New Zealand Couriers' ticketing has been described and discussed in Chapter 5. The ticketing is one of the most critical factors in a consignment. Accurate and efficient return ticketing could directly reduce the lead time, and avoid the unnecessary error and delay. Each different type of ticketing has different merits and demerits, and each ticketing is suitable for different situations. As mentioned in Chapter 4, New Zealand Couriers has focused on business customer since the company established in 1964; several types of ticketing including New Zealand Couriers' Charge

Label, New Zealand Couriers' customer printed Label, and New Zealand Couriers' dedicated return label, are mainly designed for business customers.

6.2 Objectives

6.2.1　Research Questions

As mentioned in Chapter 4, there are three research questions should be answered during this research. Although the research questions have been answered in previous chapters, the brief research questions' answers are now summarized as below.

> ➢ What are the uncertainties in 3PLs reverse logistics based on the case of New Zealand Couriers Ltd?

The uncertainties in a return/ reverse logistics are different from the uncertainties in traditional logistics and supply chain channel. As mentioned in Chapter 3, there are two major types of uncertainties, which include demand and supply uncertainties, in a traditional supply chain channel. However, a return/ reverse logistics is different from forward logistics, normally has complex situations and various return reasons, which leads to more complicated return uncertainties. Also as per discussing in Chapter 5, the uncertainties in 3PLs return/reverse logistics could be sorted into five different types according to the seven different types of returns in New Zealand Couriers. Moreover, three parties, which are 3PL Couriers companies, return customers and return receivers, are involved in a 3PL courier's return/reverse service. The uncertainties are various in different cases and companies. And the uncertainties should be investigated case by case. Some common uncertainties have been listed in this thesis in Chapter 5.

> ➢ What are the impacts of uncertainties in 3PLs reverse logistics on the performance of reverse logistics service?

The impacts of various uncertainties in the return/reverse logistics are different. Generally speaking, the impacts of uncertainties are negative, and the uncertainties could directly influence many other aspects in an enterprise. Therefore it is significant to minimise and even eliminate the uncertainties in a logistics system. Several common effects are listed and discussed in Chapter 5. The effects include increasing the lead time, increasing cost, reducing the efficiency of operations, disturbing relationships, and decreasing customer satisfaction. The influence of uncertainties also is investigated in the case of New Zealand Couriers; the KPI of return consignments indicates that the uncertainties directly influence the performance of return/ reverse logistics. According to the observations and previous studies (Goldratt & Cox, 2004), some negative impacts of uncertainties could be minimised and avoided by several methods of optimization.

➢ How 3PLs Companies can reduce the uncertainties in 3PLs reverse logistics in order to optimize the reverse logistics services based on the case of New Zealand Couriers?

There are a host of different ways to reduce the uncertainties and increase the efficiency of logistics system. And return/reverse logistics optimization is actually a portion of the logistics and supply chain optimization. Although there are some differences between return/reverse logistics and forward logistics, the principle of the optimization is similar to each other. Logistics and supply chain optimisation is based on Goldratt's approach and TOC has been described and employed into return/reverse logistics. Besides process of on-going improvement is a methodology to implement on-going improvement and optimization.

6.2.2   Key Findings in Research

There are several key findings have been identified in previous chapters.   Those findings are significant, because other researchers and companies may also use them.   Now the key findings are summarized as below.

Five Types of Uncertainties in the 3PLs Return/ Reverse Logistics

As discussed in the thesis, the uncertainties in return/ reverse logistics are much more complicated than the traditional logistics and supply chain. Because the return situations are normally much more complicated than the situations in traditional forward logistics and the return/ reverse logistics is new, there is a limited practical experiences and lack of theory-based research in return/reverse logistics.   Therefore the uncertainties in the return/ reverse logistics looks like are various, and each case may have different uncertainties. However there are five different types of uncertainties in the 3PLs return/reverse logistics have been identified in this research as below

- 3PLs internal uncertainties
- The uncertainties between 3PLs and return customer/consigner
- The uncertainties between 3PLs and return receiver/consignee who is the receiver of the returning items
- The uncertainties between return customer/ consigner and receiver/consignee
- External uncertainties

The finding is significant in the 3PLs return/ reverse logistics. According to the different type of uncertainties, the companies and businesses could identify problem quickly and solve the problem in time.   Different types of uncertainties need different solutions and methods, so that companies and businesses can save lots of unnecessay costs and time. This finding also answered the first research question.

Relationships Among Three Parties in 3PLs

The relationships among three parties in 3Pls are another significant finding during this research. It is important to understand the relationships in 3Pls so that the companies and businesses could quickly identify the actual problems and issues. The finding provides a general guide and map of the typical relations in 3PLs. As pre discussing in Chapter 5, the figure 5.15 indicated a typical triangle, and the relationship between 3PLs Company and return receivers is a critical part in return/ reverse logistics services. Because the individual customers involve there considerable uncertainties; according to observations, there is significant trend that is 3PLs Companies try to improve and develop the relationship between 3PLs and return receivers to reduce the uncertainties; for instance, the NZC-Corporate Express return and TNT-NZC return, which represent one of advanced return models in current logistics and supply chain industry, tried to eliminate the uncertainties between return consigner and 3PLs. The figure 6.1 indicated the new relationship after eliminating uncertainties between return customer and 3PLs (see Figure 6.1).

Therefore, other 3PLs companies and businesses could utilize the finding to improve and optimize the relationships in 3PLs in order to improve the performance of entire services.
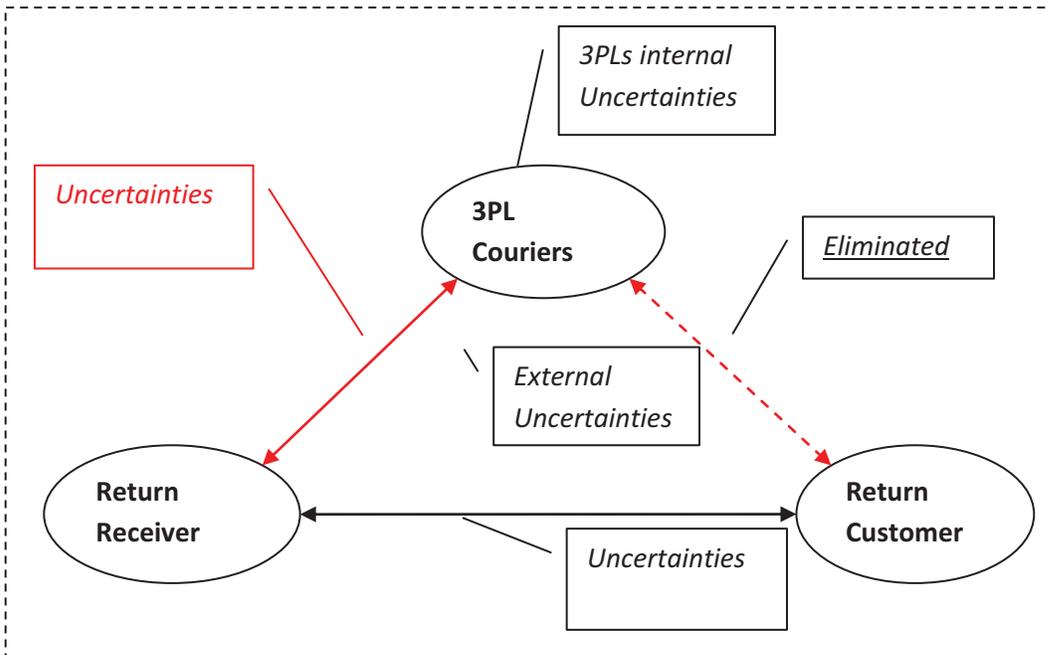
Figure 6.1 New relationship among three parties in 3PLs

Impacts of Uncertainties in 3PLs Reverse Logistics on the Performance of Reverse Logistics Service

The impacts of unceratinties are various depend on the different uncertainties. Generally speaking, most of the impacts of unceratinties are negative. The impacts of the different types of uncertainties have been discussed separately under different uncertainties, which were found in this research in Chapter 5. Some major impacts include increasing the lead time, increasing cost, reducing the efficiency of operations, disturbing relationships, and decreasing customer satisfaction. The impacts of uncertainties could help managements and researchers to identify and estimate the costs in certain cases. This finding also could be employed in other companies and cases for further researches.

Seven Different Types of Return Models in New Zealand Couriers

As per discussing in Chapter5, the return situation is normally complex and various. And accoring to the case study of New Zealand Couriers, there are seven different types of return models have been found and investigated in this thesis. Each type of return model is suitable for certain customers. The findings of seven types of return models are very significant, and also this one is one of the most important findings during the entire research, because the seven different types of reurn models could cover most of return situations, and each model's advantages and disadvantages have been deeply researched in Chapter 5. Moreover, the findings have high level of validity, due to this research based on third party logitsics model, in other words the findings can be widely employed in other companies and future studies.

Return/Reverse Logistics Strategy

The return/reverse logistics strategy is not a solution or method of supply chain optimizations for problems or issues in return/ reverse logistics, but the return/ reverse logistics could guide companies to find a correct direction and save lots of money and time. 5.6 Return/ reverse

logistics strategies Return strategies have been developed depending on the case of New Zealand Couriers. Two critical dimensions which include volume of return and return frequency determine the type of return. There are four different types of return including Efficient Return, Responsive Return, Efficient & Responsive return and Agile Return. Each type of return strategy has its own characteristics which are suitable for different return satiations in terms of the volume of return and the return frequency. Appropriate return strategy is an essential part in logistics and supply chain optimization.

Key Reverse Logistics Management Elements

Several key reverse logistics management elements have been found in the case of New Zealand Couriers, such as gate keeping, compacting cycle time, reverse logistics information systems and central return centers. Each key element strongly influences the performance of return/ reverse logistics. Good gate keeping is the primarily critical factor of making the entire reverse flow manageable and profitable. Another essential element of successful reverse logistics management is having short disposition cycle times. Besides, a problem that firms have to face in the execution of a reverse logistics operation is the dearth of good information systems. CRCs have been utilized for many years, but in the last few years, they have become much more popular as more retailers and manufacturers have decided to devote specialized buildings and workforces to managing and processing returns (Lembke, 1998).

6.3 Future Research

Return/ reverse logistics is new and emerging. However the trend of return /reverse logistics is obvious. Return/ reverse logistics optimization plays vital role in on-going development of return/ reverse logistics. There are many different kinds of methods and solutions of return/ reverse logistics optimization; however, the solutions are just general guide and maps, each of which has different merits and characteristics. The methods and solutions should match the certain case, and the appropriate strategies and the optimization method are critical factors in the optimization. Besides, the logistics and supply chain optimization is a complex project where there are many risks and uncertainties could be involved. And the costs of the optimization might be relative high and the duration might be long; however, a successful logistic optimization could fundamentally improve and change an entire company or business in the long run.

As mentioned above, the subject of return/ reverse logistics has a huge potential for the future development and research. There are many aspects of return/ reverse logistics have not been researched yet, for instance "Designing the return/ reverse logistic system," and "International reverse logistics."

Designing theRreturn/ Reverse Logistic System

Although return/ reverse logistic is a part of the logistics and supply chain, there are many different characteristics between return/ reverse logistics and forward logistics. With the increasing demand of return/ reverse services, the return/ reverse logistics have to be separated from traditional logistics, in order to maximize the efficiency, because currently the cost of processing a return can be two to three times that of an outbound shipment (Stock, 1998). Personally designing the separated return/reverse logistics system is one of the effective solutions to reduce the costs, and there are some examples, which include the CENZ returns in New Zealand Couriers, already showed the trend. Therefore "How to design an effective and efficient return/ reverse logistic system?" could become one of the significant issues in the future.

International Reverse Logistics

Personally, "International reverse logistics" is another important aspects in the future research. Globalization already became one of the most significant trends in today's world. As per discussing in chapter 2, the impacts of globalization also directly affect the logistics and supply chain industry, one of the examples is many developed countries moved their manufacturers to the developing countries, so that the cost of manufacturing could be reduced due to the low costs of operations, human resources etc. However the movements of materials, products and returns have to be involved internationally in different countries. Today, International logistics has been well developed, but the International reverse logistics is still insufficient to meet various requirements. There are many factors limited the developments of International reverse logistics, such as high costs of international shipping, regulations, laws, long transit time, physical distance, and low demand of international return/ reverse logistics services. However with the development of economy and globalization, the "International reverse logistics" will become one of the most potential aspects in return/ Reverse logistics in the future.

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Appendix

1.

New Zealand Couriers

Business	New Zealand Couriers is in the business of moving time sensitive small parcels and documents around New Zealand.
Vision	To be recognised as New Zealand's premier courier company.
Mission Statement	Provide customers, staff, contractors, suppliers and shareholders outstanding value through teamwork when moving information and physical product to our customers' customers, today and in the future.
Values	Respect, Integrity, Leadership, Teamwork, Initiative, Service
Owners	New Zealand Couriers Limited are part of Freightways Limited, a group of companies which is listed on the New Zealand Stock Exchange with over 7,000 shareholders.

2.

New Zealand Couriers Limited
Company Structure

3.
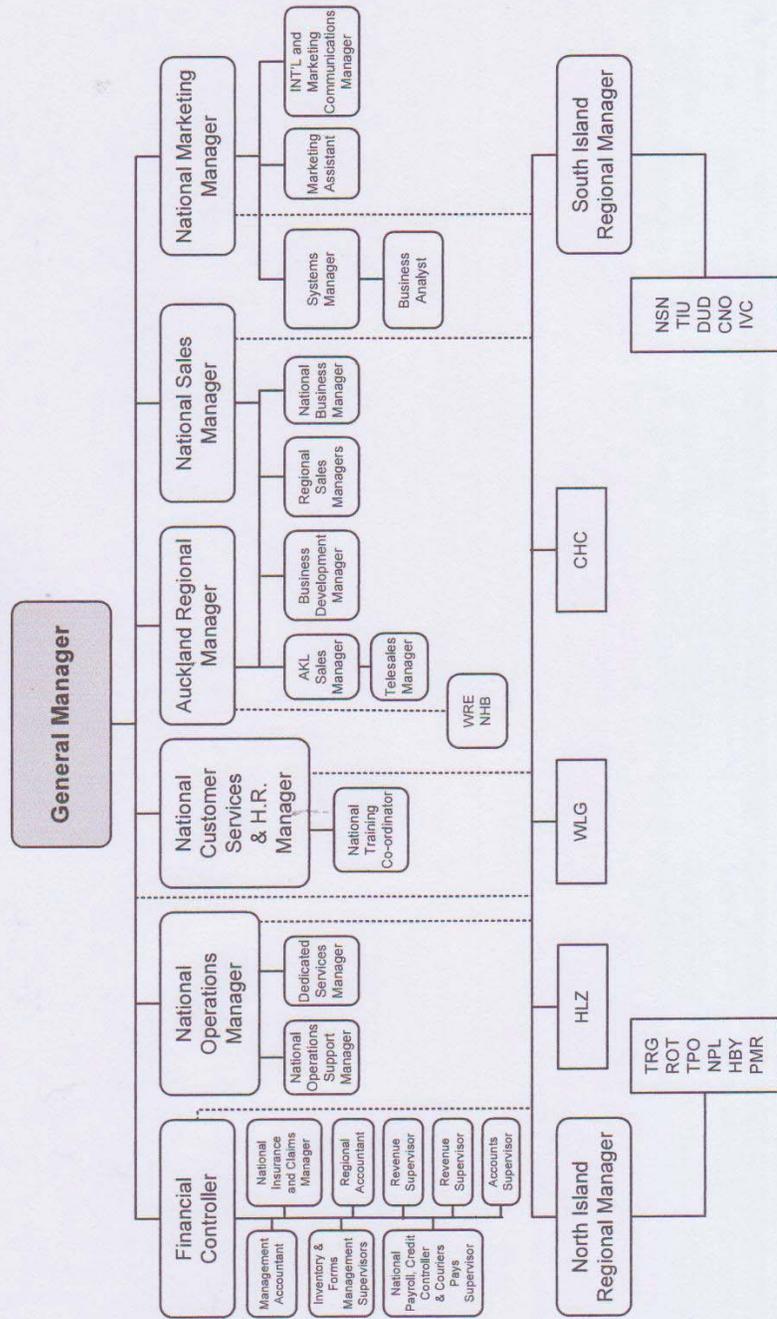
New Zealand Couriers' Branches
This is for Customer Services purposes only – please use the misdirect book for sorting

WHANGAREI - M-F 0800-1730; Sat 0800-1030

Awanui, **Bay of Islands**, Dargaville, Hikurangi, Kaeo, Kaikohe, **Kaitaia**, Kaiwaka, Kamo, Kauri, Kawakawa, Kerikeri, Mangonui, Marsden Point, Moerewa, Mokau, Ohaeawai, Okaihau, Opaihia, Opua, Paihia, Portland, Ruakaka, Russell, Waihou, Waipapa, Waipu, Waitangi

HAMILTON – M-F 0800-1800; Sat 0800-1200

Cambridge, Coromandel, Huntly, Kerepehi, Kihikihi, Matamata, Mercer, Morrinsville, Ngaruawahia, Ngatea, Ohaupo, Ohura, Otorohanga, Paeroa, Pauanui, Piopio, Raglan, Tairua, Tatuanui, Taumarunui, Te Aroha, Te Awamutu, Te Kauwhata, Te Kuiti, **Thames**, Turua, Waharoa, Waitoa, Whangamata, Whitianga

NEW PLYMOUTH – M-F 0800-1730; Sat 0730-1030

Bell Block, Eltham, Hawera, Inglewood, Kaponga, Kapuni, Manaia, Midhurst, Normanby, Oakura, Okato, Opunake, Patea, Stratford, Urenui, Waitara

PALMERSTON NORTH – M-F 0800-1800; Sat 0800-1100

Ashhurst, Bulls, Carterton, Castlepoint, Dannevirke, Eketahuna, Feilding, Foxton, Hunterville, Levin, Mangaweka, Marton, **Masterton**, Ohakune, Pahiatua, Patea, Raetihi, Rangitaiki, Shannon, Taihape, Waiouru, Waiwera, **Wanganui**, Waverley, Woodville

NELSON – M-F 0800-1730; Sat 0800-1100

Blenheim, Collingwood, Golden Bay, Motueka, Picton, Richmond, Takaka

CENTRAL OTAGO – M-F 0800-1800 (Not open Sat)

Alexandra, Arrowtown, Cromwell, **Queenstown**, Ranfurly, Roxburgh, Wanaka

NORTH HARBOUR – M-F 0800-1730; Sat 0800-1100

Algies Bay, Kaiwaka, Leigh, Matakana, Matakohe, Maungaturoto, Paparoa, Orewa, Ruiwai, Sandspit, Snells Beach, Topuni, Waiwera, **Warkworth**, Wellsford, Whangaparaoa

AUCKLAND – M-F 0730-1830; Sat 0730-1230

Franklin, Helensville, Manukau City, Maramarua, Pokeno, Pukekohe, Tuakau, Waiheke Island, Waiuku

TAURANGA – M-F 0800-1800; Sat 0800-1100

Bethlehem, Katikati, Mt Maunganui, Omokoroa, Papamoa, Te Puke, Waihi, Waihi Beach, Whiritoa

ROTORUA – M-F 0800-1800; Sat 0800-1100

Atiamuri, Edgecumbe, Kawerau, Kinleith, Mangakino, Murupara, Opotiki, Putaruru, Tirau, Tokoroa, Whakamaru, **Whakatane**

TAUPO – M-F 0830-1700; Sat 0900-1130

Rangitaiki, Reporoa, Tehoi, Turangi, Wairakei

HAWKES BAY – M-F 0800-1800; Sat 0800-1100

Gisborne, Hastings, Havelock North, Hicks Bay, Morere, Napier, Putere, Ruatoria, Te Puia Springs, Tokomaru Bay, Tolaga Bay, Tutira, Waipawa, Waipukurau, **Wairoa**

WELLINGTON – M-F 0730-1800; Sat 0800-1200

Featherston, Greytown, Kapiti, Kingston, Lower Hutt, Martinborough, Otaki, Newtown, Paraparaumu, Plimmerton, Porirua, Raumati, Upper Hutt, Waikanae, Wairarapa, Wakefield

CHRISTCHURCH – M-F 0730-1800; Sat 0800-1200

Akaroa, Amberley, Arthurs Pass, Barrytown, Belfast, Charleston, Darfield, Glentunnel, **Greymouth**, Hanmer Springs, Hokitika, Kaiapoi, **Kaikoura**, Lincoln, Lyttleton, Otira, Ngahere, Rakaia, Rangiora, Reefton, Richmond, Sheffield, Springfield, **Westport**

TIMARU – M-F 0800-1800; Sat 0800-1100

Albury, **Ashburton**, Clandeboye, Fairlie, Geraldine, Glenavy, Kurow, Lake Tekapo, Maheno, Methven, **Oamaru**, Omarama, Otematata, Pleasant Point, Rakaia, Richmond, Tekapo, Temuka, Twizel, Waimate, Washdyke, Winchester

DUNEDIN – M-F 0800-1800; Sat 0800-1100

Balclutha, Clinton, Ettrick, Hampden, Kaitangata, Lawrence, Milton, Momona, Mosgiel, Palmerston, Port Chalmers, Seacliff, Waikouaiti, Waitati

INVERCARGILL – M-F 0800-1715; Sat 0800-1100

Bluff, Edendale, **Gore**, Heriot, Lumsden, Manapouri, Mataura, Otautau, Stewart Island, Te Anau, Tokanui, Waverley, Winton, Wyndham

WRE
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NEW ZEALAND COURIERS

4.

TO IDENTIFY YOUR PICK UP & DELIVERY AREA PLEASE USE THE FOLLOWING CHART:

Cycle (times your courier is out on the road)	1	2	3	4	5
Your pick-up times					
Central (Penrose) Only	6am-10.00am	10.30am-12.00pm	12.30pm-1.45pm	2.15pm-3.25pm	3.50pm-6pm
City, West, East, South, Airport	6am-9.30am	9.50am-11.20am	11.45am-1.05pm	1.30pm-2.50pm	3.15pm-6pm

NORTH HARBOUR

- ALBANY (ALBANY ESTATE)
- ARMY BAY
- BEACHAVEN
- BELMONT
- BIRKDALE
- BIRKENHEAD
- BROWNS BAY
- CAMPBELLS BAY
- CASTOR BAY
- DEVONPORT
- FORREST HILL
- GLENFIELD
- GULF HARBOUR
- MAIRANGI BAY
- MILFORD
- MURRAYS BAY
- NORTH HARBOUR ESTATE
- NORTHCOTE
- OREWA
- RED BEACH
- ROTHESAY BAY
- SILVERDALE
- SUNNYNOOK
- TAKAPUNA
- TORBAY
- WHANGAPARAOA

WEST AUCKLAND

- AVONDALE
- BLOCKHOUSE BAY
- GLEN EDEN
- GLENDENE
- GREEN BAY
- HENDERSON
- HILLSBOROUGH
- HOBSONVILLE
- KELSTON
- LINCOLN
- MT ALBERT
- NEW LYNN
- PARAKAI
- RANUI
- SUNNYVALE
- SWANSON
- TE ATATU
- TITIRANGI
- WEST AUCKLAND

CITY

- CBD
- EDEN TERRACE
- EPSOM
- FREEMANS BAY
- GRAFTON
- GREY LYNN
- HERNE BAY
- KINGSLAND
- KOHIMARAMA
- MISSION BAY
- MORNINGSIDE
- MT ALBERT
- MT EDEN
- MT ROSKILL
- NEWMARKET
- NEWTON
- ORAKEI
- PARNELL
- POINT CHEVALIER
- PONSONBY
- REMUERA
- SANDRINGHAM
- ST HELIERS
- VICTORIA PARK MARKET
- WATERVIEW
- WESTERN SPRINGS
- WESTHAVEN

CENTRAL (PENROSE)

- ELLERSLIE
- EPSOM
- GLEN INNES
- GLENDOWIE
- GREENLANE
- HILLSBOROUGH
- MEADOWBANK
- MT ROSKILL
- MT WELLINGTON
- ONE TREE HILL
- ONEHUNGA
- OTAHUHU
- OWAIRAKA
- PANMURE
- PENROSE
- REMUERA
- ST HELIERS
- TE PAPAPA
- THREE KINGS
- WESTFIELD

EAST TAMAKI

- BOTANY DOWNS
- BUCKLANDS BEACH
- COCKLE BAY
- EAST TAMAKI
- HALF MOON BAY
- HIGHLAND PARK
- HOWICK
- MEADOWLANDS
- PAKURANGA

SOUTH AUCKLAND

- AIRPORT (INTERNATIONAL & DOMESTIC)
- AIRPORT OAKS
- CONIFER GROVE
- DRURY
- MANGERE
- MANGERE EAST
- MANUKAU
- MANUREWA
- OTARA
- PAPAKURA
- PAPATOETOE
- POKENO
- PUKEKOHE
- RAMARAMA
- TAKANINI
- WATTLE DOWNS
- WEYMOUTH
- WHITFORD

Delivery Standard (not including residential)

Every reasonable attempt will be made to deliver within your area: next cycle.
To other areas: next cycle + 1

PLEASE CONFIRM WITH CUSTOMER SERVICES ON 0800 800 841 FOR SPECIFIC DESTINATIONS

AUCKLAND LOCAL

Your last pick-up time is:

Overnight by 9.30am to main business centres. Some Rural & Residential deliveries may take longer.
All information was correct at the time of printing. For the most current schedule visit: www.nzcouriers.co.nz

5.

Auckland Branch - Operations

Last Drop Off times at Depot for O/N Delivery

The latest that an item can be dropped off in Auckland for an overnight delivery is as follows.

Depot	Time	Cash sales until:
Botha Road	7.00 pm	7.00 pm
Parnell	5.30 pm	5.30 pm
North Harbour	5.00 pm	5.00 pm
Manukau	5.15 pm	5.00 pm
East Tamaki	4.45 pm	4.45 pm
West Auckland	5.00 pm	5.00 pm
Airport Oaks	5.00pm	N/A

PCL Departure Times

Overnight PCL departure time from Botha Road is 7.00pm, Monday to Friday

Base Times

The in and out times for Auckland Cycles are:

Couriers in at SAK (Botha) Depot		Couriers in at NSH / WAK / CITY / MKC / EAST / APO		Shuttles in at Botha HUB	
In Times	Out Times	In Times	Out Times	In Times	Out Times
10:15am	10:30am	9:40am	9:50am	10:15am	10:40am
12:15am	12:30pm	11:30am	11:45am	12:15pm	12:40pm
2:00pm	2:15pm	1:15pm	1:30pm	2:00pm	2:20pm
3:40pm	3:50pm	3:00pm	3:15pm	4:30pm (onwards)	

Airport Clearance Times

The airport clearance times for Auckland Airport are Monday to Friday:

- 6.00am – 8.30am
- 10.00am – 10.40am
- 11.30pm – 12.40pm
- 1.45pm – 2.20pm
- 4.00pm – 5.15pm

6.

LOCAL SERVICES

Refer to pick-up times below for local and regional services

REGIONAL – SAME DAY SERVICES

your pick-up times and depot departure times

Times your courier is available to pick up:

Departs from Penrose Depot at:	10.30 (am)	12.30 (pm)	2.15 (pm)	Departs from Penrose Depot at:	10.30 (am)	12.30 (pm)	2.15 (pm)	Departs from Penrose Depot at:	10.30 (am)	12.30 (pm)	2.15 (pm)
Bell Block	•			Mt Maunganui	•	•		Te Aroha	•	•	
Cambridge	•	•		Ngaruawahia	•	•		Te Awamutu	•	•	
Coromandel	•			Ngatea	•			Te Kauwhata	•		
Dargaville	•			New Plymouth	•			Te Kuiti	•	•	
Edgecumbe	•			Omokoroa	•			Te Puke	•		
Hamilton	•	•	•¹	Opua	•			Thames	•	•	
Hikurangi	•			Opotiki	•			Tirau	•	•	
Huntly	•	•		Otorohanga	•	•		Tokoroa	•		
Inglewood	•			Paeroa	•	•		Turua	•		
Kaikohe	•			Paihia	•			Waitara	•		
Kaitaia	•			Papamoa	•			Waihi	•		
Kaiwaka	•	•		Piopio	•	•		Waihou	•		
Katikati	•			Putaruru	•	•		Waipu	•	•	
Kawakawa	•			Raglan	•	•		Waitangi	•		
Kawerau	•			Reporoa	•			Waitoa	•	•	
Kerikeri	•			Rotorua	•	•		Warkworth	•	•	
Kihikihi	•	•		Ruakaka	•	•		Wellsford	•	•	
Kinleith	•			Tatuanui	•	•		Whakatane	•		
Matamata	•	•		Taumarunui	•			Whangarei	•	•	
Moerewa	•			Tauranga	•	•					
Morrinsville	•	•		Taupo	•						

¹ Delivery to Hamilton CBD off the 1.30pm run and Delivery to Auckland CBD off the 11.00am run. Freight must have Same Day sticker.

Overnight by 9.30am to main business centres. Some Rural & Residential deliveries may take longer. Dangerous Goods where possible will meet service levels however, they may take longer.

AKL 0?

OVERNIGHT SERVICES

Your last pick-up time is:

Overnight by 9.30am to main business centres. Some Rural & Residential deliveries may take longer.
All information was correct at the time of printing. For the most current schedule visit: www.nzcouriers.co.nz

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7.

NEW ZEALAND COURIERS
SERVICE OFFER

(These prices are exclusive of a Flexible Fuel Factor)

Point of Origin ex Auckland

PRE-PAID TICKET SYSTEM RATE STRUCTURE

The following area definitions apply:

LOCAL : Auckland City to Orewa and Helensville, Bombay Hills and Clevedon
SHORTHAUL : North to Whangarei and Dargaville, Pokeno to Thames and Hamilton
LONGHAUL : All other North Island Destinations
INTER-ISLAND : All South Island Destinations and Waiheke Island
INTER-ISLAND ECONOMY: Two Day service to the South Island via Post Haste

Ticket	Local	Shorthaul	Longhaul	Inter-Island	Inter-Island Economy	Saturday Delivery	Rural Delivery
Ticket Colour							
Code	LT2	SH	LH	NZ	PHTD	SAT	RD
No of tickets per book	20	20	20	10	20	20	20
One ticket per	$0.1m^3$ / 25kg	$0.025m^3$ / 15kg	$0.025m^3$ / 5kg	$0.025m^3$ / 5kg	$0.030m^3$ / 10kg	Per Item (Main Centres) *	Per Item
Base Price (per ticket) (excludes FFF[2])	$ 4.95	$ 6.95	$ 10.43	$ 21.29	$15.01	$ 3.96	$ 2.96

* SATURDAY DELIVERY – Additional costs may apply, POA

PRE-PAID EXPRESS PACK RATE STRUCTURE

Express Packs are designed to be the most convenient way to send a consignment.

Express Packs come in a range of sizes. One price covers anywhere in the country **. Generous weight allowances apply. As an added service, we also offer you the option of a **free** signature on delivery.
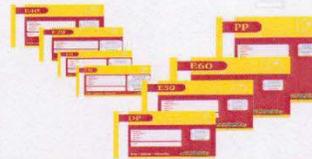
Packs	E10	E11	E20	E40	E50	E60	DP	PP	E25b
Description	DLE Paper	DLE Plastic	A5	A4	Foolscap	A3	Card A4+	Plastic A3+	Plastic Bubble
Size (mm)	225 x 115	225 x 115	260 x 190	325 x 235	390 x 280	415 x 360	379 x 260	440 x 450	280 x 210
Base Price (per satchel) (excludes FFF[2])	$ 2.36	$ 2.56	$ 2.88	$ 5.37	$ 6.95	$ 9.94	$ 4.78	$ 14.56	$ 4.08
Quantity (per packet)	20 satchels	20 satchels	20 satchels	20 satchels	10 satchels	10 satchels	10 satchels	10 satchels	10 satchels

** Note: For Rural and Saturday deliveries, you will also need to attach an additional ticket per item (refer to Pre-Paid Ticket base rates above for pricing).

[2] In addition to the **base price**, you will be charged a **flexible fuel factor** (FFF). The FFF will be applied from the actual date you ordered the relevant product or service. **Base price + (base price x FFF) = total price.** For more information, including current FFF, please go to our website www.nzcouriers.co.nz or talk to your New Zealand Couriers representative.

Prices are confidential and exclusive of GST.

Effective 28 June 2010

NEW ZEALAND COURIERS
SERVICE OFFER

HOW TO TICKET YOUR ITEM

MAXIMUM DIMENSIONS

1. Select the size	2. Select the destination	3. Select the weight				
		0-5kg	0-10kg	11-15kg	16-20kg	20-25kg
Up to 0.025m³	Local	1	1	1	1	1
	Shorthaul / Outer Area	1	1	1	2	2
	Longhaul / Inter-Island	1	2	3	4	5
0.025m³ – 0.05m³	Local	1	1	1	1	1
	Shorthaul / Outer Area	2	2	2	2	2
	Longhaul / Inter-Island	2	2	3	4	5
0.05m³ – 0.075m³	Local	1	1	1	1	1
	Shorthaul / Outer Area	3	3	3	3	3
	Longhaul / Inter-Island	3	3	3	4	5
0.075m³ – 0.1m³	Local	1	1	1	1	1
	Shorthaul / Outer Area	4	4	4	4	4
	Longhaul / Inter-Island	4	4	4	4	5

Maximum length = 1.8m   **Maximum Weight per item** = 25kg   **Maximum Volume per item** = 0.100m³

HOW TO CALCULATE SIZE AND WEIGHT

Take the measurements of each dimension in centimetres
Calculate size = Length x Width x Height (Max. = 0.100m³)
Eg: L 50cm, W 30cm, H 30cm = 0.5 x 0.3 x 0.3 = 0.045m³

If you don't know the weight you can estimate it
Calculating weight = Length x Width x Height x 200 (Max = 25kgs)
Eg: L 50cm, W 30cm, H 30cm = 0.5 x 0.3 x 0.3 = 0.045m³ x200 = 9kgs

C (50cm)   A (30cm)   B (30cm)   C (50cm)   A (30cm)

Note: *Items that are under-ticketed will be charged to a customer's account as follows:*

Local ....$5.70 (excludes FFF*)

Shorthaul..$7.99 (excludes FFF*)

Longhaul ....$12.00 (excludes FFF*)

Inter Island ....$24.48 (excludes FFF*)

* In addition to the **base price**, you will be charged a **flexible fuel factor** (FFF). The FFF will be applied from the actual date you ordered the relevant
product or service. **Base price + (base price x FFF) = total price**. For more information, including current FFF, please go to our website
www.nzcouriers.co.nz or talk to your New Zealand Couriers representative.

8.

Glossary of common terms in NZQA project

- NZQA: New Zealand Qualifications Authority
- Printlink: The Company who prints & sorts the exams
- EC's: The Exam Centres where exams are sat
- ECM's: The Exam Centre Managers
- Markers: The people who have to mark all the papers
- Kermits: Green packs used to return exams to Printlink
- Guinea Pigs: Pink packs that go direct to Panel Leaders
- G&T: Graphics and Technology
- Panel Leaders: Leaders of groups of markers
- Non-urban: Rural deliveries
- Control Branch: NZC Wellington who manage the whole project
- 0800 692 463:   The nationwide number for any enquiry or booking by NZQA personnel
  to you

9.

Block 1: Pack out of Graphics and Technology folders to Exam Centres

Packs are prepared by
NZQA for delivery to
exam centres

Packs are linehauled to branches, scanned on
board and delivered to schools

Items are scanned
and signed for on
delivery
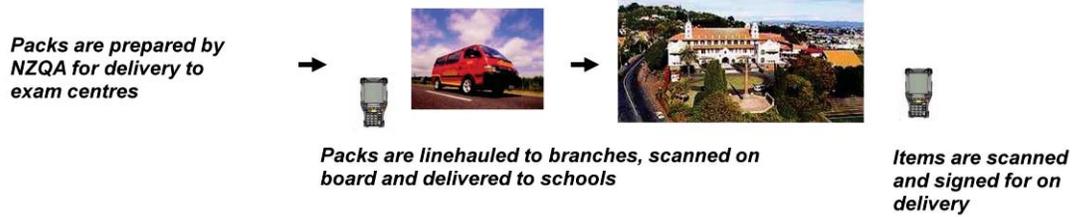
Block 1: Pick Up of exam papers from Schools

All G & T big orange or blue packs
will be picked up from Schools and
will travel to WLG.

Scanned and
collected

Packs are linehauled to
Wellington

Packs are scanned then
re-ticketed and prepared
for re-delivery to Markers

Block 1: Delivery to Markers of G & T packs

Packs are packed and scanned into TCP's.

Line haul to
Delivery Branch

Scan status "in depot" and then "on
board" to Courier, who delivers to
Marker, scans and gains signature
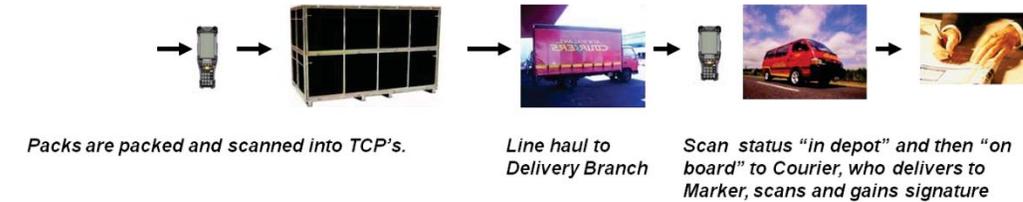
Block 1: Pick up and delivery of G & T packs from Markers to Schools

Markers:

Call the local NZQA number (you) to arrange a pick up or they will use their PIN for direct booking.

Items P/U & scanned then taken to branch for Consolidation (status scan into TCP's)

Linehauled to respective branches & scanned for status.

All packs to be delivered directly to Schools or held in storage and eventual returned to schools in January 2009.

Block 2: Pre Exam Distribution

Exam papers are packed into .025 boxes, labeled with a single address & bar code then scanned into TCP's for delivery.

Line haul to Delivery Branch

Scan "on board" to Courier, who delivers to Exam Centre manager, scans and gains signature and name!

Block 3: Pick up of Answer Booklets from Exam Centres

Daily Exam Centre seals Answer Booklets into green "kermit" bags addressed to Printlink.

EC prepares pink "Guinea Pig" packs for separate del to panel leaders nationwide

Scanned and collected

Kermits are Scanned & Consolidated at Branch into cloth "consol" bags then TCP's and go to WLG

Guinea Pigs are moved directly over night to all destinations through NZC network for delivery and scan next morning to panel leaders

"Consol" bags linehauled to Wellington & delivered direct to Printlink. Kermits scanned on arrival

Block 4: Delivery of Sorted Exam Papers to Markers

Exam papers are packed into .01 boxes, labeled with a single address & bar code and scanned into TCP's.

Line haul to Delivery Branch

Scan "on board" to Courier, who delivers to Marker, scans and gains signature

Block 4: Pick up and Delivery of Check Marker packs

1/ Marker 's will pack "test" papers in yellow *"check marker" packs*

2/ Marker will call to the Nat Call Centre to arrange a pick up who will notify the courier concerned

Scanned and collected on demand

Linehauled throughout the country then delivered as a standard item, scanned/signed for including name
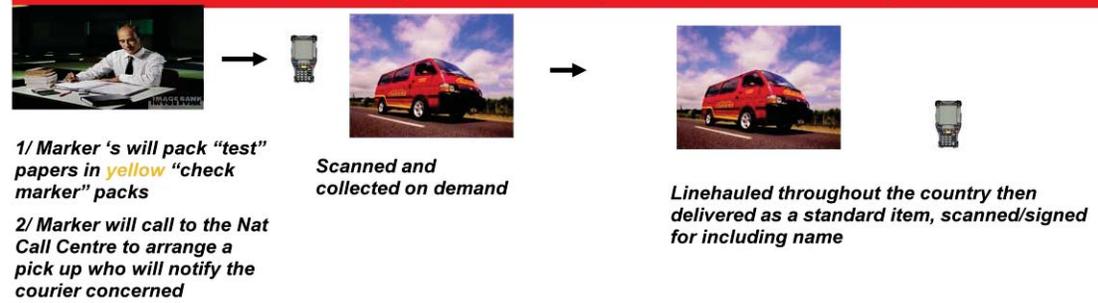
Block 5: Pick up of Answer Booklets from Markers

Marker seals Answer Booklets into box and calls to arrange a pick up

Items scanned and collected on demand

Linehauled to Wellington , delivered directly to Printlink and scanned

10.

Kermits: EC to Print Link: Packs for the return of exam papers.

FRONT

BACK

TO: Printlink
Jackson Street
WELLINGTON

New Zealand Couriers 0800 692 463
Logo

Guinea Pig/Supplementary's: EC to panel leaders

New Zealand Couriers 0800 692 463
Logo

Signature must be obtained

Check Marker: From Marker to Panel leader & return. Markers to address

Call 0800 692 463 to arrange collection
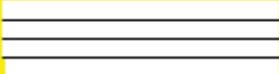
Please print name and address clearly

New Zealand Couriers
Logo

If undelivered:
Please return to Level 10, 125 The Terrace Wellington

Graphics & Technology: All movements

New Zealand Couriers 0800 692 463
Logo

Signature must be obtained
7 Kg Weight Limit
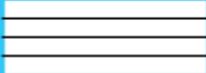
If undelivered:
Please return to Level 10, 125 The Terrace Wellington

11.

MICHAEL WANG

From:	Doreen Letalu [DOREEN.LETALU@CENZ.CO.NZ]
Sent:	Wednesday, 25 May 2011 2:09 p.m.
To:	MICHAEL WANG
Subject:	CE Return Advice 0060018919 Sent on 20110525
Attachments:	CE Return Advice 0060018919 Sent on 20110525

Dear Valued Customer,

Thank you for your enquiry.

We have processed your return,

Kindly print this document and attach it to the outside of the parcel being returned (please print a document for each parcel being returned) Our courier will collect from the delivery point within the next 3 working days.

If you have any further queries please contact our customer service team on 0800 800 547 or via email to salesak@cenz.co.nz

Kind Regards,

National Contact Centre - Customer Service Corporate Express NZ Limited
49 Waiouru Road, Highbrook Business Park, Auckland | PO Box 7126, Wellesley Street, Auckland
Ph: 0800800547 | Fax: 0800669977 | Email: salesak@cenz.co.nz www.cenz.co.nz | Online Ordering: http://netxpress.biz.

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12.

Return Advice: 60018919

Corporate Express

CORPORATE EXPRESS NEW ZEALAND LIMITED
A member of Staples Group
GST Reg. No. 10-342-600
Company No. 123410
PO BOX 7126
WELLESLEY STREET AUCKLAND NZ

www.cenz.co.nz   ENQUIRIES
TEL: 0800 800 547
FAX: 0800 669 977

CENZ Account No.:
10011795

Date: 25/05/2011   **Time:** 11:57:04 AM

Reference Invoice:
9000649006

RA Entered By:
00004993

Order Contact:
CUSTOMER SUPPORT 0800 800 547

CENZ Reference Order No.:
8850459770

Special Instructions

Charge To:
GMF - QUALITY BAKERS AUCKLAND
23 KERWYN AVE
EAST TAMAKI AKL 2013
A.B.N. 760021308

Pick Up From:
NZC
4 HARRIS RD
EAST TAMAKI AKL 2013
0800 692_254

A001

ITEM CODE	SUPPLIED	DESCRIPTION
33337514	40	A4 80GSM COPY PAPER WHITE

Credit Type: Reason: Customer Complaint

Cust. Contact Is: RETURN PROCESSED AS CUST REFUSED DELIVERY

RA Comments:

Page 1 of 1

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13.

14.