LEAGILITY IN REVERSE LOGISTICS PROCESS: A CASE STUDY OF ELECTRONIC APPLIANCE MANUFACTURER

Ruth Banomyong
Vouravis Veerakachen,
Thammasat Business School
Thammasat University, Thailand
Banomyong@thammasat.net

Nucharee Supatn
School of Management
Assumption University, Thailand

Abstract

The importance of the topic of reverse logistics has increased gradually over the past few years. Some researchers have considered reverse logistics to be similar to green logistics, in particular when related to product recycling or re-use. This paper primarily focuses on another facet of reverse logistics, which involves the return of damaged products that need to be repaired by the manufacturer. This paper explores the possibility of applying the "leagile" paradigm in the reverse logistics process and its outcomes in terms of costs impact and lead-time reduction to consumers and the manufacturer.

The case study of an electronic appliance manufacturer based in Bangkok, Thailand is used to illustrate the possible impact of the "leagile" concept on its repair/replacement services. It was discovered that, with the application of the "leagile" concept in the reverse logistics process, lead-time for product repairs and return as well as costs involved with reverse logistics have been drastically reduced while customer satisfaction increased significantly.

Keywords: Reverse Logistics, Leagile, Thailand

Introduction

Reverse logistics management has become increasing important due to its ability to generate superior customer satisfaction, cost reduction, and more profit to a firm. While many studies on reverse logistics have focused on certain aspects of reverse logistics such as product life cycle management (Tibben-Lembke, 2002), information support (Daugherty et al., 2002), and total cost of ownership (Tibben-Lembke, 1998), none have applied concept of "Leagility" into the reverse logistic. The objectives of this paper are two folds. First, the paper is an attempt to demonstrate the application of leagility in the reverse logistics process. The second objective is to consider the impact of a leagile logistics strategy in the reverse logistics process in terms of time and costs in order to appraise the worthiness to implement such a logistics strategy. The paper describes a case study of an electronic appliance manufacturing firm in Thailand. Reverse logistics can be defined (Rogers & Tibben-Lembke, 2001) 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 or creating value or proper disposal".

When a returned product re-enter the distribution system, it frequently involves movement along the distribution chain back to a factory for after sales supports such as repairs, or reconfiguration (Giuntini and Andel, 1995), which may present significant problems. The challenge is to handle the returned products as quickly and cost-efficiently as possible. In this paper, the discussion will focus on how to apply a particular logistics strategy on the reverse logistic process to reduce costs and increase responsiveness to customer demand simultaneously.

Leagile Logistics Strategy

While lean and agile strategies are different in terms of their concepts, it can be accepted that both paradigm may coexist within the same logistics system (Fisher, 1997). Naylor *et al.* (1999) concluded that "leagile" is a particular way of exploiting both lean and agile paradigms. Based on Naylor *et al.* (1999), leagile has been defined as:

> ***Leagile*** *is the combination of the lean and agile paradigms within a total supply chain strategy by positioning the de-coupling point so as to best suit the need for responding to a volatile demand downstream yet providing level scheduling upstream from the de-coupling point.*

"De-coupling" is the point of differentiation between order driven and forecast driven plan, which is used to buffer against fluctuating customer orders or product variety. The application of agile principles is required for those players downstream in order to respond to volatile marketplace. The positioning of the decoupling point is also associated with the issue of postponement which increases the efficiency as well as the effectiveness of the logistics system.

The Leagile Paradigm in Reverse Logistics

Many companies have tried to set up centralized service center to support returned products in order to keep their costs down (Cohen and Agrawal, 1999). However, the most frequently cited problem with centralized service center is relatively poor level of customer service. In order to cope with return uncertainty and provide good customer service, some companies have tried to increase their ability, flexibility and agility to respond to customer needs against a backdrop of increasing customer service cost. In order to minimize the trade-offs between cost savings and enhanced customer service level, this paper will particularly focus on the application of a leagile strategy in the reverse logistics process where the main concern is the position of the decoupling point within the logistics system. Figure 1 and 2 illustrates the examples of decoupling point position in the logistics channel and reverse logistics structure.

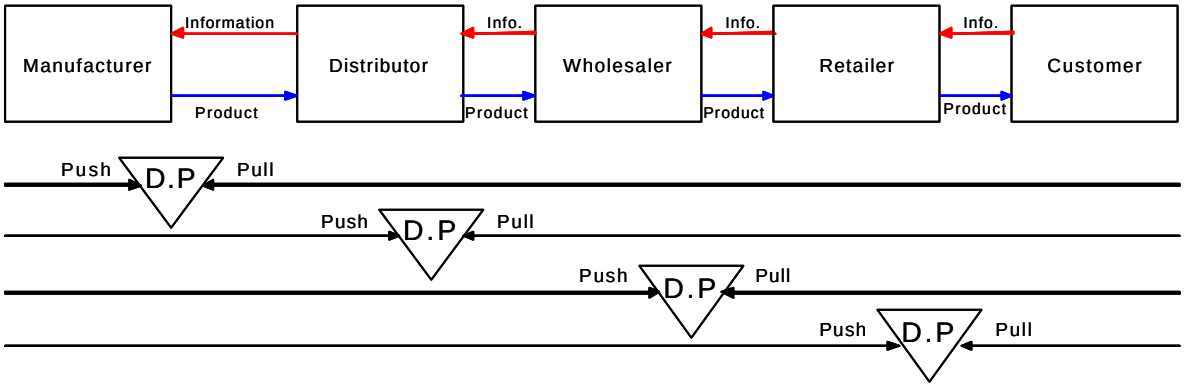

Figure 1: Supply Chain Structure and De-Coupling Point

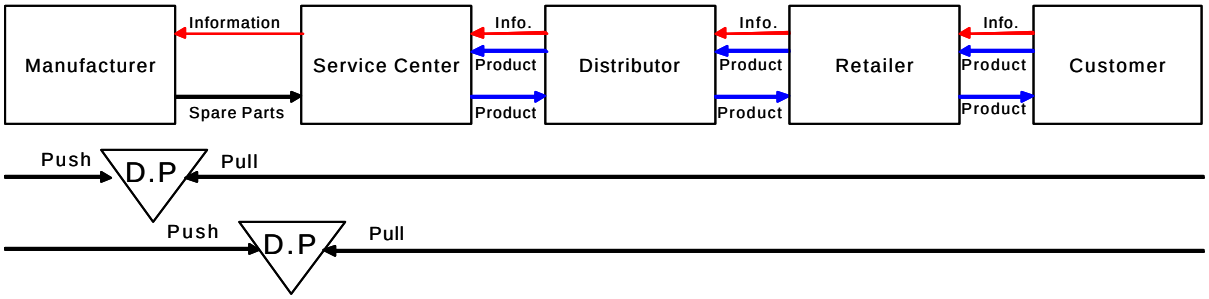

Figure 2: Reverse Logistics Structure and De-Coupling Point

One of the main objectives of reverse logistics is to provide after sales or repair service to customers. The setting up of service centers near customers in contrast to near the main factory or main distribution centre should be able to help minimize customers inconvenience in terms of time and cost involved with regards to access to after sales or repair services.

Research Methodology

This paper is a single case study that can provide an in-depth exploration of leagile strategy in the reverse logistics process. The results presented are derived from empirical data. The scope of the case study is one logistics channel consisting of one manufacturing firm and one large modern trade retailer that has 25 branches nationwide. The main analytical tool that will be used in this paper is process mapping. This will help in clearly explaining what is happening in the logistics channel under study. The use of process mapping will support the quantification of lead time and costs involved with each activity.

The Case Study

Figure 3 is the illustration of existing logistics channels for the electronic appliance manufacturer.

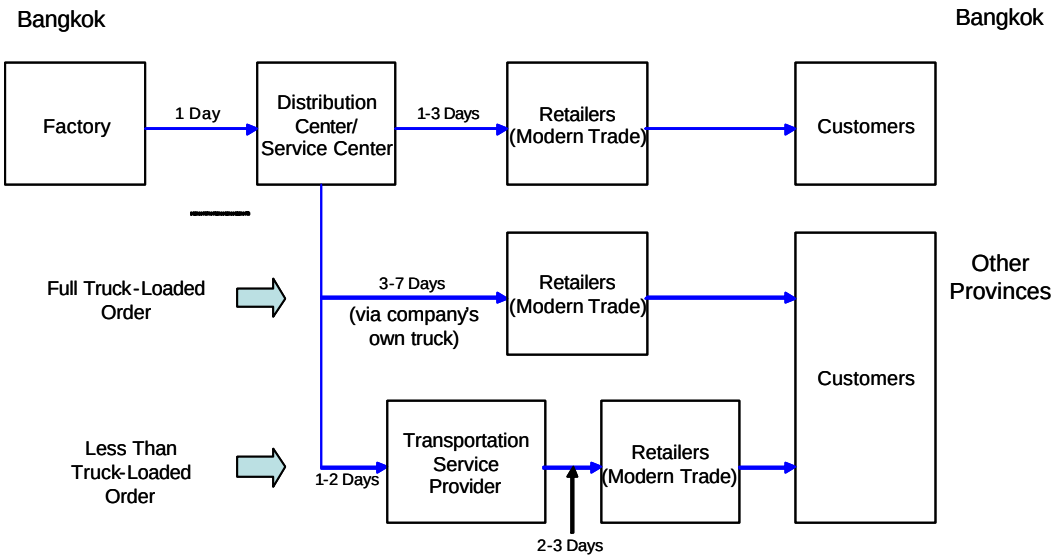

Figure 3: Logistics channel of electronic appliance manufacturer

The factory is based in Bangkok, and products are distributed through the main distribution center also located in Bangkok. The orders are then separated based on geographical location of customers. For Bangkok customer, the company will use its own truck to deliver the order to the retailer. For customers in other provinces, the selected mean of transportation will depend on the volume of the order. If the volume is large enough for a full truck load (FTL), the company will use its own truck to deliver the order. However, if the order is less than truck load (LTL), third-party transportation service provider will be used to deliver the order. The lead time for delivery is dependent upon truck routing, scheduling, and availability as well as final destinations.

When goods are in need of repairs, customers can use the company's reverse logistics channel. However, customers will be required to bring or send the goods to the main service center based in Bangkok for repair. The regional service center and the retailer are only capable of being a consolidation point to send the goods back to the Bangkok center. Another difficulty is the low frequency and lack of trucks that are returning to the Bangkok service centre. This causes long lead time before any repairs can be done to the damaged goods. The illustration of manufacturer's reverse logistics channel structure is represented in figure 4.

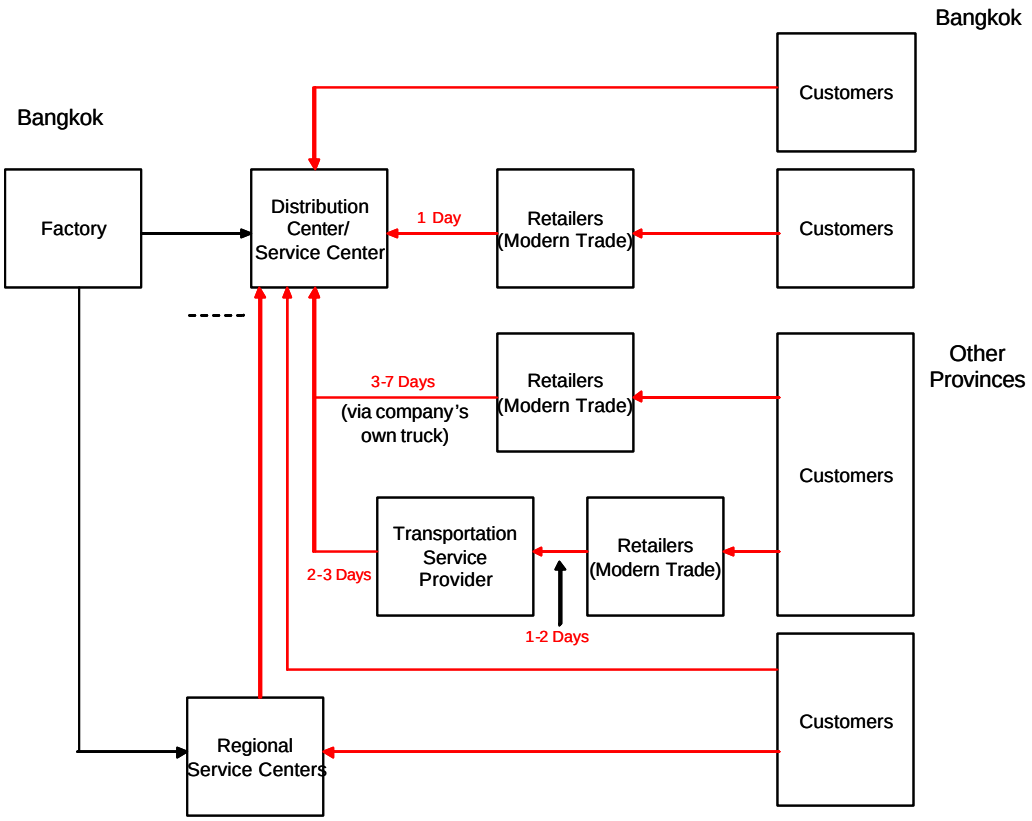

Figure 4: Reverse Logistics Structure

After repairs are made in Bangkok, the manufacturer will have to send back the goods to the customer. Figure 5, describes the current return system.

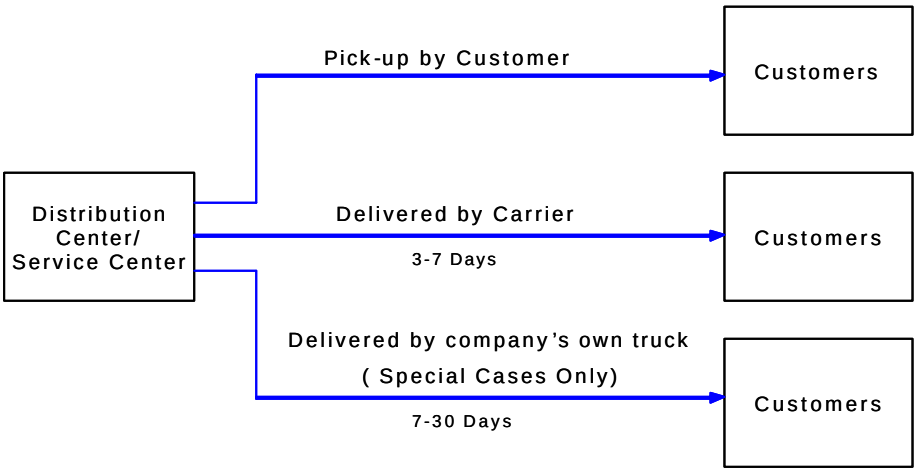

Figure 5: Return of repaired goods to customers

Under the current reverse logistics channel structure, the company has received many complaints on repair service lead time caused by long period of waiting time. Another problem is the costs of transport (to and from the manufacturer), which are considered a burden for both the company and its customers. It is normal practice for the company to pay third-party transportation service provider for returned product from its retailer to its service center. Customers also have to bear freight charges from the Bangkok service center to their home as the manufacturer does not pay for these charges. The only solution for the customer is to come and collect the goods himself at the Bangkok service center.

Applying a leagile strategy to a reverse logistics channel

In order to improve the efficiency of the manufacturer's reverse logistics channel, leagile strategy is applied and a number of decoupling points are established. Figure 6 presents the new leagile reverse logistic channel of the manufacturer.

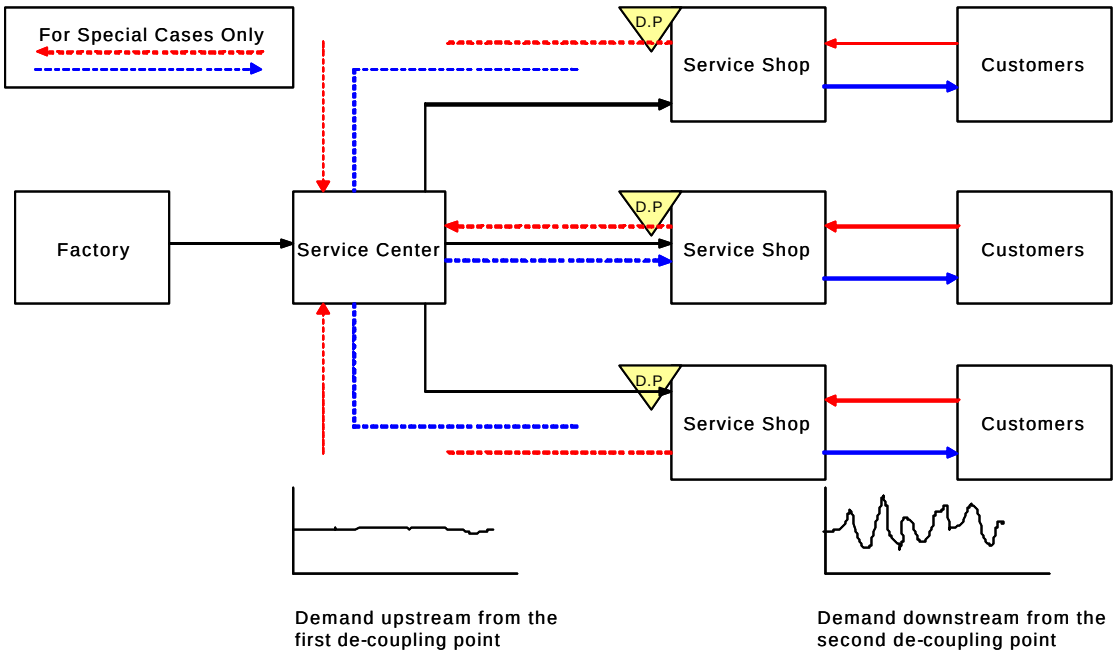

Figure 6: Leagile Reverse Logistics Structure

Under the new reverse structure, the manufacturer established service shops in all the retailer's outlets. These service shops serve as de-coupling points for customers' demand fluctuation. From the decoupling point, an agile strategy is applied to enhance customers' responsiveness. In conjunction with the establishment of service shops, an information technology system is also implemented to keep track of all information such as demand and inventory level for each spare part in total and at each service shop, order quantity and lead time to arrive, etc. This leagile reverse logistics channel has helped alleviate existing problems such as shortened lead time for repairs. In most cases, returned products can be repaired at service shops. This has lead to the reduction of lead time and waiting time. The lead time comparison between the previous structure and leagile structure can be seen in table 1.

	Previous Structure			**Leagile Structure**
	Bangkok	**Other Provinces**	**Other Provinces**	**Bangkok/Others**
Retailer to Service Center	1 day	3-7 days (via Company's Truck)	3-5 days (via 3rd party transport)	N/A*
Time spent at service center	2-3 days	2-3 days	2-3 days	N/A
Time spent at service shop	N/A	N/A	N/A	1 day
Service Center to Customer	3-7 days	7-30 days (via Company's Truck)	3-7 days (National Postal Service)	N/A**
Total Lead Time	6-11 days	12-40 days	8-15 days	1 day

*Customer walk-in at service shop **Customer pick-up at service shop

Table 1: Lead Time Comparison between Original and Leagile Reverse Logistic Structure

In addition to the improvement in lead time, cost impact of leagile reverse logistics is also considered. In this case study, the only difference in cost that can be quantified is the transportation costs for the company's major products: VCD players and Mini Stereos. The transportation costs for these two products back to the main Bangkok service center, by company's own truck are $0.20 and $0.79 per

box respectively and $0.75 and $1.75 per box respectively if a third party service provider is involved. In addition, the costs of freight to return the repaired products to customers are $2.50 and $3.75 per box respectively. Returns are usually sent through the national postal service. In the leagile reverse logistics structure, 95 percent of the returned products are being repaired at the service shop which eliminates most of the transportation. The rest of returned items are being sent to the main Bangkok service center as they are considered difficult cases and short lead time is seen as less critical. Table 2 provides a comparison in terms of annual cost involved with regards to the transportation of returned items.

	Previous Reverse Logistics Process		Leagile Reverse Logistics Process	
Item	**VCD/DVD Players**	**Mini Stereo Sets**	**VCD/DVD Players**	**Mini Stereo Sets**
Number of products sold annually	300,000	10,000	300,000	10,000
Average number of products returned and repaired at service shop	N/A	N/A	9,500	285
Average number of products returned to service center	10,000	300	500	15
via customer bring-in	1,000	30	0	0
via Company's own truck	7,000	210	500	15
via Transportation service provider	2,000	60	0	0
Costs of using company's own truck	$0.20 per box	$0.79 per box	$0.20 per box	$0.79 per box
Costs charged by transportation service provider	$0.75 per box	$1.75 per box	$0.75 per box	$1.75 per box
Total Costs for product returned to service center	$2,900	$271	$100	$12
Subtotal	$3,171		$112	
Average number of repaired product returned to customers	10,000	300	10,000	300
via customer pick-up at service shop	N/A	N/A	10,000	10,000
via customer pick-up at service center	1,000	30	0	0
via shipment by National Postal Service	9,000	270	0	0
Costs charged by National Postal Service (Freight collected)	$2.50 per box	$3.75 per box	$2.50 per box	$3.75 per box
Number of repaired product shipped from service center to service shop	N/A	N/A	500	15
Costs of using company's own truck	$0.20 per box	$0.79 per box	$0.20 per box	$0.79 per box
Total Costs for product returned to customers	$22,500	$1,013	$100.00	$12
Subtotal	$23,513		$112	
Total Cost of Transportation in the Reverse Logistics Process	$26,683		$224	
Annaul transportation cost saving from leagile reverse logistics process	$26,460			

Table 2: Annual transportation cost saving from leagile reverse logistics process

Summary

Table 3 illustrates the impact of applying a leagile strategy to a reverse logistics process.

Item	Previous Reverse Logistics Process	Leagile Reverse Logistics Process
Annaul transportation Cost of Returned Product	$26,683	$224
Customer Satisfaction Level	Low	High
Responsiveness to Customer Demand	Low	High
Lead Time for Product Repair (for 95 percent of cases)	6-40 days	1 days

Table 3: Impact of leagile strategy on reverse logistic process

The impact of a leagile strategy on the reverse logistics process of the manufacturer is very clear however, there are some limitations in this study. First, data for other costs involved with the reverse logistics was not made available for this case, while others costs, such as inventory carrying costs and warehousing costs, which are considered very important, have been omitted. It is also hoped that other researchers will be able to test the ideas of this paper with multiple cases methodology.

References

- Cohen, M.A. and Agrawal, V. (1999), “After-Sales Service Supply Chains: A Benchmark Update of the North American Computer Industry”, *Fishman-Davidson Center for Service and Operations Management*, The Wharton School, University of Pennsylvania.
- Daugherty, P.J., Myers, M.B. and Richey, R.G. (2002), “Information Support for Reverse Logistics: The Influence of Relationship Commitment”, *Journal of Business Logistics*, Oak Brook, Vol. 23, No. 1.
- Fisher, M.L. (1997), "What is the Right Supply Chain for Your Product?", *Harvard Business Review*, Vol. 75, No. 2.
- Giuntini, R. and Andel, T. (1995), “Advance with Reverse Logistics”, *Logistics today*, Vol. 36, No. 2.
- Naylor, J.B., Naim, M.M. and Berry, D. (1999), “Leagility: Integrating the Lean and Agile Manufacturing Paradigms in the Total Supply Chain”, *International Journal Of Production Economics*, Amsterdam, Vol. 62, No. 1,2.
- Rogers, D.S. and Tibben-Lembke, R.S. (2001), “An Examination of Reverse Logistics Practices”, *Journal of Business Logistics,* Oak Brook, Vol. 22, No. 2.
- Tibben-Lembke, R.S. (2002), “Life after Death: Reverse Logistics and the Product Life Cycle”, *International Journal of Physical Distribution & Logistics Management*, Bradford, Vol. 32, No. 3/4.
- Tibben-Lembke, R.S. (1998), “The Impact of Reverse Logistics on the Total Cost of Ownership”, *Journal of Marketing Theory and Practice*, Statesboro, Vol. 6, No. 4.