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## Strategic management for environmental logistics channel

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### Abstract

This paper suggests the important role of trust as a governance mechanism for the successful logistics channel. Two types of the circulated logistics channels are discussed. The first is the recycle channel, where an actor (a firm) can govern total channel and its flow. In this channel, an actor bears the role of entrance and exit, and processes goods, resources, and waste. It may be called as the closed circulated logistics channel. The second is the recycle channel of kitchen garbage, which is governed by plural actors, such as firms, consumers, and governments, based on trust. This channel may be called as the open circulated logistics channel.

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*Keywords:* environmental logistics channel; governance mechanism; recycle

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### 1. Introduction

It has been becoming a serious social and economic issue that the enormous abandonment of products, materials, and wastes from the mass production and consumption has been bringing the destruction and contamination of the earth environment. The recycling and reuse of these enormous wastes can economize the social useful resources. It can also solve the problems of facility shortages and the increasing cost for processing wastes.

In Japan, the Law for Establishing the Recycling-based Society has been enacted in May, 2000. Before and after this Law, related laws in several products categories, packages, home electronics, foods, automobiles, are enacted. Along with these laws, companies and local governments have been working in recycling. However, recycling still has not performed the enough achievement.

For supporting and promoting the recycle and reuse of wastes and materials, the conventional distribution channel concept, which only considers the one-way process from production to consumption, is not sufficient. The backward or reverse channel, which includes the collecting and recycling process of resources and wastes after consumption, has to be considered. It is important that two types of channels are not only recognized respectively, but that they are tied up effectively. If this combined channel is called as environmental circulated logistics channel, it has some different features from the conventional channel.

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The new circulated logistics channel (CLC after this) will include various members and need the long-range perspective for the efficient and effective operation. It will also need the governance mechanism for interorganizational factors.

This paper explores the importance of trust as the governance mechanism and fundamental features of CLC from the several examples in Japan.

## **2. Framework of CLC**

After reviewing many literatures, Carter and Ellram (1998) concluded that most of literatures was descriptive and exploratory, and examined only relatively narrow aspect of reverse logistics, such as recycling. They also examined the internal and external constraints and drivers as critical factors in the reverse logistics process (also see Carter and Carter, 1998). The reverse logistics is also attracting attentions from the business strategy. Tibben-Lembke (1998) approached from the viewpoint of the total cost of ownership. Blumberg (1999), Inman (1999), Mayer (1999) and Schwartz (2000) stress that the managing, handling, and disposition of materials and returned goods can bring business opportunities and/or strengthen the market position. According to Caldwell (1999), not only in the conventional commodity flow channel, the reverse logistics is becoming the important part of the business in the online sales and direct marketing of digital contents like as music CD. The free return strategy and the environmental concerned disposal of materials can increase the customer satisfaction (DiMaggio, 2000).

Zikmund and Stanton (1971) is the first consideration of the distribution of wastes on the concept of the backward channel (BWC). They defined BWC as the return channel of reusable packages and materials from consumer to producer. There is an only difference from the conventional forward channel (FWC) in that the typical consumer does not emulate the proactive role of the commercial channel member in spite of his role to sell and distribute waste materials to the market (see Fuller et al., 1996). From the antecedent researches, several features of BWC and CLC can be pointed out.

First, consumers are not only a consuming actor, but also the producer of resources after consuming and the promoter of its recycling. Whereas consumers have not been considered as the proactive member in FWC, they are considered as the proactive members in BWC and CLC. Second, BWC and CLC will include public organizations, such as national and local governments and various non-profit organizations. Third, BWC and CLC are not for the narrow profit of specific organization. They are operated for the sustainable economic and social development of our ecosystem. Last, the channel consisted of such a constituent needs to have the governance mechanism, which function based on not the conventional authority nor the market-price mechanism, but the long-range trust.

Fuller et al. (1996) describes a typology of reverse channel networks as the following: (1) corporate-integrated networks, (2) waste hauler-public recovery networks, (3) specialized reverse dealer-processor networks, (4) traditional “forward” wholesaler-retailer networks, and (5) temporary-facilitator networks. They also suggest the concepts of the closed-loop and open-loop application.

In this paper, two types of the circulated logistics channels are discussed. The first is the recycle channel, where an actor (a firm) can govern total channel and its flow. In this channel, an actor bears the role of entrance and exit, and processes goods, resources, and wastes. It can be called as the closed CLC. The second is the recycle channel of kitchen garbage, which is governed by plural actors, such as firms, consumers, and governments, based on trust. This channel can be called as the open CLC.

## **3. Typology of Governance Mechanism**

After the Williamson’s transaction cost economics, the third mechanism has been recognized between markets and hierarchies. Arndt (1981) described three types of economic control systems as markets, politics, and hierarchies, and coordinating mechanism as price, bargaining, and direct assignment (command). Powell (1991) suggested three systems as markets, networks, and hierarchies, and methods of resolution as price, reciprocity, and administrative fiat. In Bradach and Eccles (1991), coordinating mechanisms are described as price, trust and authority. Whereas these three coordinating mechanism seem to be independent and mutually exclusive, they can be related each other in various ways as pointed out. For example, the price mechanism can only be operated with trust for prices, products, and behaviours of members. Among of three coordinating mechanisms, trust occupies the important position especially in the open network. Whether it is operated in success or not is depend on the degree of trusts of network members. The importance role of trust as a governance mechanism for CLC will be discussed with introducing several cases.

#### 4. Cases of Closed CLC

In the closed CLC, an actor can control the entrance, process, and exit of goods and materials. In the convenience store in Japan, unsold lunch baskets and daily dishes are collected and processed into manure or feed. Vegetables and meats, which are produced using these manure and feed, become raw materials of lunches and daily dishes again. In this recycling system, a convenience store and /or its group operates the circulation of production, distribution, selling, abandonment, and reuse. It can avoid the difficulty of collection, sorting, assortment and disposition from the aspect of health administration. The other example is CLC for disposal cameras. Consumers bring their disposal cameras to DPE stores for development. Manufacturers of disposal cameras can certainly collect finished disposal cameras through DPE stores. These two cases are relatively successful, because wastes and materials are restricted and members of CLC are strongly tied up.

Another example is the closed CLC based on the Specific Home Electronics Re-commercialization Law, the so-called Home Electronics Recycling Law, which has been enforced since April 2001 in Japan. This law has imposed a duty of recycling of main four items of home electronics, air-conditioner, television, washing machine, and refrigerator, to the manufacturer or importer. It is based on the consideration that those who have the specialized knowledge about the contents of products can accomplish the recycling properly and efficiently. The fact that about 80 % of retailers already had been taking over used home electronics at the time of consumer's replacement could act to impose retailers to collect and convey used home electronics. Consumers, on the other hand, are responsible to use their home electronics longer for restraining product abandonment, hand over their used home electronics to proper retailers, and respond to a claim for payment of predetermined charge required for recycling.

The last CLC has several different characteristics from the former two CLC. First, consumers have to bear costs for recycling used home electronics, which used to be collected by local government or specialized dealer-processor without costs for consumers. It means that manufacturer and retailer can claim a payment for consumers to abandon their home electronics. It can bring the consumers' illegal abandonment and the increasing monitoring cost for local government. It is depending on the moral and self-consciousness of consumers. Second, there is the problem that products from the recycled materials can obtain sufficient demands and markets in the competition with products from new virgin materials. It cannot be denied that recycled products tend to be in the disadvantage position in price and quality compared to new products. Third, the last CLC is difficult to be controlled by one actor. Manufacturers and retailers will not cooperate without economic incentives, such as reservation of the technical innovation and competitive advantage by recycling activities. Consumers will have no tangible profit. They only have the psychological factor of duty and solidarity. Whereas the local government can enforce its mandatory control power, there is a limit for its effective enforcement.

#### 5. Cases of Open CLC

Wastes and materials, which cannot be circulated in the closed CLC, have to be disposed by the local government. While most of wastes have been disposed as the incineration and/or reclamation disposal, the open CLC is a trial for recycling reusable wastes. In the open CLC, manufacturers and retailers have no strong commitments. Local government also has no strong enforcement based on the institutional law. Consumers have no economic incentives and legitimate duty to cooperate with the open CLC. In this situation, trust seems to be important role for the open CLC. Price, which has its base on economic incentives, and command, which has its base on authority and legitimacy, cannot be expected to be an effective governance mechanism for the open CLC. Trust can support other two mechanisms in their base and operate the open CLC effectively. For exploring it, the recycling of kitchen garbage in Asakura town in Fukuoka is discussed.

Asakura town has the population of 10,690 and the 2,680 families. To construct and maintain the circulated channel of kitchen garbage, Asakura High-speed Compost Processing Center (AHCP Center) has been operating for collecting, processing, and reducing kitchen garbage since 1983. It has been considered as tender for the earth environment that kitchen garbage can be recycled as compost not to be incinerated and reclaimed. Figure 1 depicts the brief process of CLC in Asakura town.

Vegetables and fruits, which are produced by farmers flow in the FWC to townspeople. After consumption, wastes as kitchen garbage is collected by specialist dealers, and carried to AHCP Center. AHCP Center processes kitchen

garbage to compost for around one month without smoke and sewage. Compost from this CLC is marketed at 150Yen per 8 Kg for farmers and personal uses of townspeople.

A half of families co-operated the collection of kitchen garbage in 1999. Taking account that a half of families in this area are farmers, residents are highly cooperative with this local CLC. Townspeople is considered to have cooperated based on the joint consciousness to the environment, in spite that they have to go to a local government office to take purposely the bag into which kitchen garbage is put, and have to classify kitchen garbage and other garbage. Farmers as producer also have no responsibility for recycling and using resulted compost.

The other substantial problem is the gap of supply and demand for compost. Whereas kitchen garbage and compost produced from it are annually constant, demand for compost is seasonally inclined. As demand for personal use increases, farmers become difficult to get their necessary compost. It needs the collection of kitchen garbage from outside of Asakura town for increasing production of compost to the necessary amount. It will prevent the successful recycling system in Asakura town.

Based on the annual maintenance and administrative expenses of AHPC Center and considering expenses and sales amount, AHPC Center is in the red economically. It comes from the high processing cost. The processing cost of recycling kitchen garbage is estimated 50,000 Yen per ton, while the cost for incinerating kitchen garbage is several hundreds Yen per ton. The cost for rebuilding the existing center is also hitting hard on the local government budget. Asakura town is faced with a decision whether participating in the enlarged recycling project with neighbour areas or keeping on the independent recycling system.

For farmers, the use of compost from the recycling system has several problems. They have to use a lot of compost, which has no immediate effect compared with a chemical fertilizer, with hard work and special knowledge though they know the use of compost is better for lands and the earth environment. Compost is also restricted in its usage. Unfortunately, because of the high costs and conflicts with next towns, AHPC Center and the recycle system had been closed in 2002. It means that the successful system of recycling in the large regional network is difficult without the mutual understanding of its importance. There needs the change of consciousness for consumers and the promotional effort of the local government. They are suppliers of kitchen garbage and also purchasers of farm products produced from the recycling compost. Consumers have to be the ecological and green consumer without avoiding the share of environmental expenses.

## 6. Concluding Remarks

The discussion of cases with the framework of the closed and open CLC can suggest us to consider and explore the importance and problems of CLC.

First, although the locus of responsibility is clear in the closed CLC, it is not clear in the open CLC. In the case of Asakura town, farmers and townspeople have no clear responsibility for the recycling kitchen garbage and compost. If anything is pointed out, local government has the responsibility to operate the recycling system and bear most costs of the system. However, the enforcement power of local government is weak, and the successful operation of the open and unstable CLC is depends on voluntary wills and trusts of participants.

In conventional FWC and closed CLC, firms and public governments have been controlling channels with coordination mechanisms as price and/or authority as a proactive actor. In contrast, consumers will be expected as a proactive actor to participate in and operate CLC. Coordinating mechanisms of price and authority cannot be denied and excluded as CLC includes economic activities of participants. However, it is also clear that CLC cannot be successfully operated only with price and authority. Cases may suggest the importance of trust for operating CLC and combining markets and hierarchies as the economic and social embedded bond.

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