Citizen Attitude and Policy for 3R (Reduce, Reuse, and Recycle) Behaviour in Japan

Tomohiro Tasaki*, Hajime Yamakawa**, Daisuke Numata***
** National Institute for Environmental Studies*
*** Kyoto Prefectural University*
**** Fukushima University*

Abstracts

It has been a prioritized environmental policy in Japan to shift a society from mass-production and mass-consumption to sound material use and circulation for the last decade, and "3Rs (reduce, reuse, and recycle)" has become a popular keyword in waste management. Legislation for recycling has established and perception of Japanese citizens for environmental issues has also been changed; however, actual behaviors for 3Rs have not been changed as much as expected.

This study presents current state of Japanese citizen perception and attitude for 3Rs. The purchase of refill products is a widely-spread behavior that contributes to waste prevention at present. Reuse has increased for the last decade. Recent economic downturn as well as shopping on Internet has influenced the increased reuse. Reduced use of free plastic bags, use of refillable PET bottles, and meat with plastic wrapping seem recent, remarkable movements in Japan. This study also presents recent 3R policies, especially a new economic, environmental policy with point systems, which are applied in retailers in Japan to attract consumers, like flight mileage. This new economic policy instrument is beginning to be used in Japan for collection of reusables and recyclables, etc.

***Keywords**: waste prevention, reuse, motive, incentives, point-system, waste management*

1 Introduction

"3Rs (reduce, reuse, and recycle)" is one of the important keywords for environmental policy as well as waste management in Japan. For the last decade, Japan enacted the Basic Act for Establishing a Sound Material-Cycle Society in 2000 and implemented/revised six recycling acts. Japanese waste management hierarchy in this Basic Act, like the EU Waste Framework Directive, sets the following priorities in waste management: 1) waste prevention, 2) reuse, 3) recycling, 4) energy recovery, and 5) disposal. 3Rs are given higher priorities in waste management.

Regarding recycling, Japan has taken many policies and gained experiences. For instance, packaging and container, electric home appliances, personal computers, small secondary batteries, end-of-life vehicle, construction materials, and food waste are being

recycled under recycling acts. Voluntary recycling schemes and campaigns started for recycling of motorbike, lead-acid battery, and cellular phone. Industries collect and recycle their industrial waste, and reduce the amount of waste directing to final disposal. However, issues relating to recycling still remain. From 2006, Japanese six recycling acts came to the time of revision one by one, and in national governmental counciles in charge of respective recycling acts, various issues were presented and discussed. Among them, two of common, fundamental issues are relating to collection of waste from citizens (consumers). Collection of cellular phones to the recycling scheme has been declining from 13.6 million units in fiscal year (FY) 2000 to 6.9 million units in FY 2009. Collection rate of small secondary batteries is considered to be low (the amount of collection in FY 2009 was 3.4 thousand tonnes. That of Ni-Cd battery was 984 tonnes compared to an estimate of 8.1 thousand tonnes in FY 2002 by Oguchi et al. (2004)). That of personal computers is low as well. In addition, the number of them (including displays) has been decreasing from FY 2006, when reaching 919 thousand units, to 586 thousand units in FY 2009. In the discussion of revising Electrical Home Appliance Recycling Act, 11.6 million units among 22.8 million units of discarded electronics were transferred to the recycling plants under the act in FY 2005 (Central Environmental Councile, 2008). Japanese saw ineffective collection of recyclables. Another issue about collection is purity of collected recyclables. Especially packaging recycling is the case. Contamination of foreign objects (e.g. food waste) into recyclables and unsuitable separation of the kinds of packaging materials have been reported. These increase recycling cost. Although there would be many reasons that recycling cost of packaging waste is high, it is supporsed that cost-efficiency of recycling of packaging waste can be improved by citizen cooperation in collection.

Regarding reduction (waste prevention) and reuse among 3Rs, measures and actions lag behind. During discussions for revising recycling acts, it was routinely pointed out that little progress in those measures had been made. On the other hand, outside of Japan, the current EU Waste Framework Directive states that member states shall establish waste prevention programs not later than December 2013. National government officers in charge of 3R in Japan took these into account and started an investigative committee about reduction and reuse last year. This can be interpreted that, as Japanese government has promoted recycling, it tries to step toward higher in the waste management hierarchy. Tasaki and Yamakawa (2009) pointed three key elements of promoting reduction as shown in Figure 1: promoting mechanism, behaviour and outcomes. Behaviour is central among them, and citizen cooperation is, in this sense, important for reduction and reuse as well.

Citizen cooperation in 3Rs would thus play an important role in 3Rs for upcoming years. It is not easy nor simple to promote citizen behavior toward 3Rs. For instance, several behavioural studies showed that even though citizens appreciate pro-environmental behavior, they do not necessarily take actions (e.g. de Young, 1986; Hirose, 1994; Nishio and Takeuchi, 2005). Ministry of Environment, Japan (hereinafter “MoE”) is also monitoring such gaps between interest and behaviors as shown in Table 1. Certain impediments prevent citizens from taking 3R actions. Elements of modern life style including work style, spending of time, roles of citizens at home, shopping style are

ones of such impediments, which have been changing in time. But changes are not only that. Policies taken up to affect citizens behavior also have been changing. This study explores recent citizen attitude/behaviour for 3Rs and 3R policies designed to affect citizens attitude/behaviour, focusing on Japan.

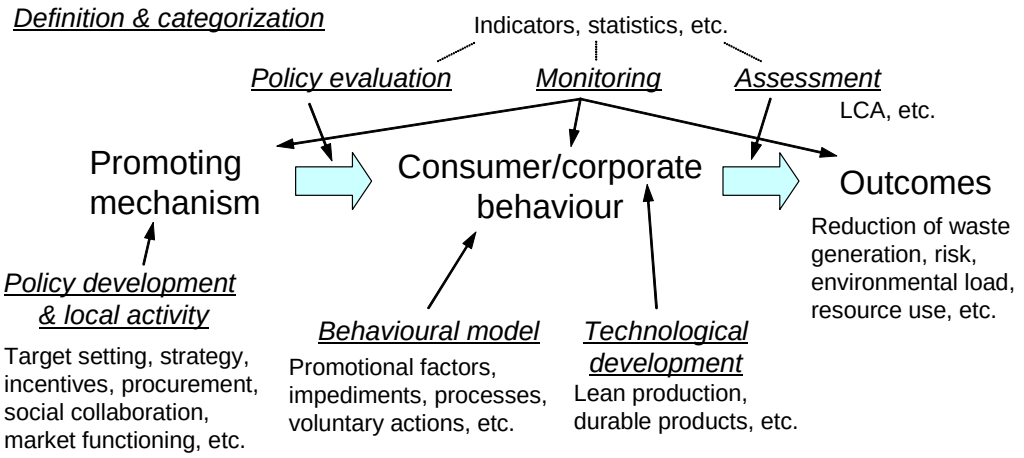

Figure 1 : A conceptual framework of the three key elements of promoting the 2Rs (reduction and reuse) and the types of research (Tasaki and Yamakawa, 2009)

Table 1 Gaps between citizen interest and behaviors regarding 3Rs and waste (adapted from MoE (2010a))

		2007	2009*
Interest	Have interests in waste issues fairly or to some extent	85.9	82.1
Reduce	Refuse plastic bags and overpackaging	45.2	69.1
	Choose shops which apply simple packaging and avoid use of one-way plates and utensils	11.5	13.5
	Refuse to receive one-way chopsticks and avoid using one-way plates and utensils	6.9	(12.0)
Reuse	Buy and sell products on Internet auctions	23.9	28.4
	Buy and sell used products at second-hand shops and flea markets	22.5	21.0
	Buy products that can be reused such as glass bottles for milk	17.7	11.7
Recycling	Cooperate in collection at shops for used white tray, used mobile phone, etc.	45.8	(41.4)
	Buy recycled products frequently	19.9	14.6

* Figures in parentheses are those in 2008. Year represents Japanese fiscal year.

2 Citizen attitude and behaviour in Japan

We summarize citizen attitude and behaviour for 3Rs in Japan, focusing on plastic bag, refillable PET bottles, refill products, meat with plastic wrapping, and use of reuse shops, which have drawn public attentions in Japan recently.

2.1 Plastic bags

Plastic bag is a symbolic packaging waste in Japan. The revised Packaging Recycling Act, as explained in Section 3.3, promotes waste prevention measures against waste plastic bags, etc. The plastic bags used to be provided free of charge by retailers as a service to their customers. According to a questionnaire survey (MoE 2007a), 55% of consumers received 5 or more plastic bags per week. Charging for the plastic bags is considered to be an effective measure for reducing waste: 46.4% of consumers supported the idea of charging for plastic bags and 28.9% opposed it. The primary reason given by 90.6% of consumers supporting the policy was “because it reduces resource consumption”. The primary reason given by 90.8% of consumers who opposed it was that they are “necessary for reuse” (e.g., the bags can be reused for garbage disposal). According to a survey of retailers in March 2007 (MoE 2007a), current waste prevention measures for plastic bags taken by retailers include a stamp service (i.e., a given number of stamps can be used as a voucher at the retailer; 70.7%), distributing “my-bags” (reusable bags that are owned by consumers; 42.7%), asking the customer whether they would like a bag before using one (34.3%), charging a fee (9.4%), and others (14.1%).

2.2 Refillable PET bottles

Use of PET bottles has been increasing in Japan like in most other countries. That for soft drink was 119 thousand tonnes in 1995 and increased more-than-four times to 511 thousand tonnes in 2009 (Councile for PET bottle recycling). PET bottles used in Japan are one-way bottles. Although most of them are being collected separately and recycled, the current state is criticized for mass consumption and mass recycling, which is not corresponding with the waste management hierarchy. MoE thus started to examine possibilities of introducing refillable PET bottles in Japan. The pilot project was conducted in FY 2008 for purchase of water in refillable bottles at three shops in Chiba and Yokohama and at home deliveries in Chiba, and citizen attitude and behaviour were investigated (MoE, 2007b). As results (further analyzed by Numata and Managi, 2010, 2011), the demand (percentage of respondents who want to buy at store) for water in refillable bottles increased by adding information about reuse of bottles and refill of the content from 20% to 24% (n=495). In case that they are delivered to citizens houses, the percentage was 35% (n=884, different respondents from the above-mentioned figure). In the both types of purchase, only “attitude to flaws and stains in containers” was a common factor with statistical significance of 10% to refrain from using refillable PET bottles (Numata and Managi, 2010, 2011). Other factors with statistical significance of 10% or less for either type of purchase were awareness of reuse, sex of respondents, and product price.

Return of refillable bottles is another important element for promotion of refillable bottles. As pointed out in Introduction, effective separate collection is needed for recycling. Tasaki, Numata, and Tojo (2010) summarized factors for collection as shown in Figure 2.

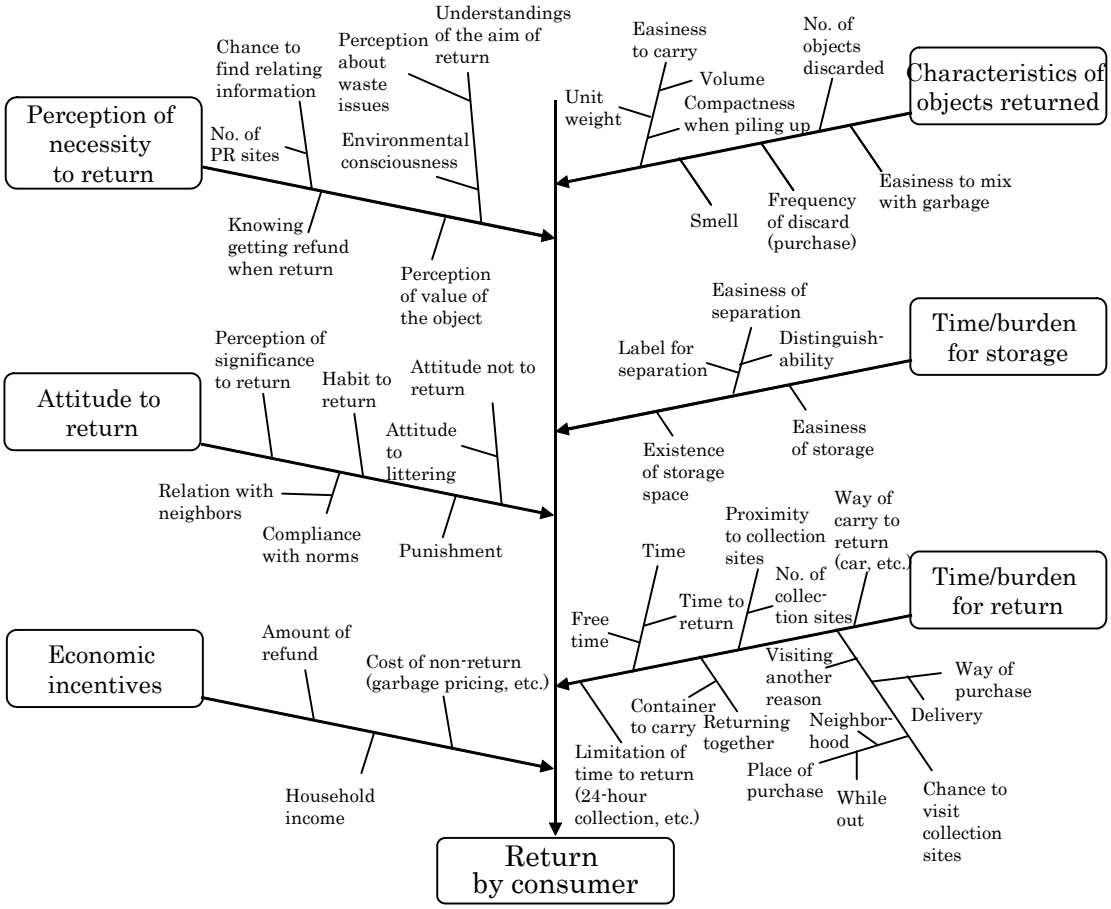

Figure 2: Fish-bone diagram of consumer behavior of returning items (Tasaki, Numata, and Tojo, 2010)

2.3 Refill products

For the last decade, refill products successfully spread in Japan, especially for the bottles of shampoo, rinse, and conditioners. A survey by MoE (2001) showed that 60 refill products in 10 product categories reduced the use of packaging materials by 77% (to 23%) compared to non-refill (ordinary) products. Tokyo Metropolis (2001) conducted a questionnaire survey and examined whether consumers considered refill products or not when they purchased such products. Among three groups of citizens with different levels of environmental behaviour, approximately 50% of the highest group who acted environmental-friendly considered selecting refill products. Even among the lowest group,

approximately 30% of them considered that. Selection of purchasing refill products was one of most popular behavior for waste prevention in Japan.

We estimated the outcome of waste reduction by spread of refills for the last decade by using point-of-sales (POS) data. Nikkei POS data from 2000 to 2008 were used because it covered many supermarkets in entire Japan and various supermarkets from hypermarkets to small stores. The data includes name and types of products, the number of products sold, sales, unit price, volume of contents, etc. Combining those data with data of packaging weight per product content, the result shown in Figure 3 was obtained. For shampoo, the share of refill products accounted for 70% in 2008, resulting in waste prevention by 56% compared to the case that there were no refill products sold and used. Main reason of the successful spread of refill products would be that those were beneficial to reducing spending for household. Table 3 shows our calculation of the unit price of both refill and non-refill products. The prices were lower even for unit price. It makes refill products appear more economical at store. Besides, the individual sales volume of refill products has to be smaller than that of non-refill because citizens often add the content before they use up products.

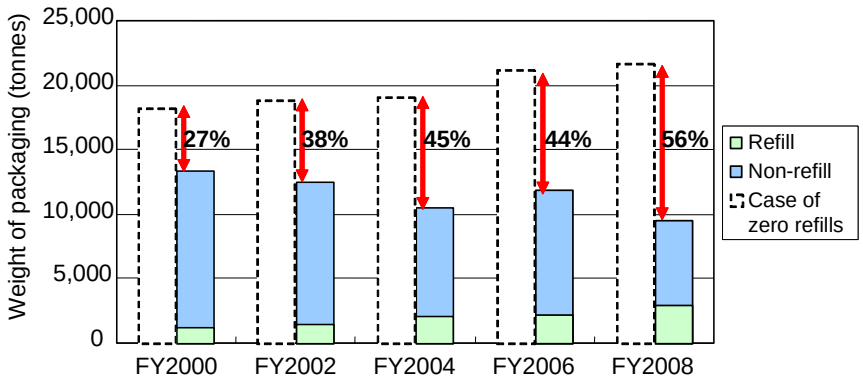

Figure 3 Waste prevention of shampoo bottles by spread of refill products

Table 3 Calculated unit price of refill and non-refill products (yen/100mL)

	Shampoo		Rinse	
	Refill	Non-refill	Refill	Non-refill
FY2000	85.7	131.5	79.6	135.4
FY2002	82.9	145.6	77.8	144.4
FY2004	87.6	146.1	86.1	149.5
FY2006	90.3	154.7	88.5	159.2
FY2008	95.0	174.5	95.2	178.6

* 100 yen = 1.2US$ = 0.89 Euro as of the end of January 2011.

Recently, refill was applied to most high-graded products (e.g. TSUBAKI by Shiseido Co., Ltd. in 2008). Refill products might have seen as cheap for citizens and

producers; however, citizens do not think so at present. According to an interview with a person from Shiseido, consumer wanted refill products for high-graded products and they started to sell refill products for high-graded products too. This suggests that if waste prevention is perceived in such a way, there would be large potentials for reduction of waste without compromising quality of life of citizens and sales of retailers.

2.4 Meat with plastic wrapping

In Japan, most meat is sold on PSP (polystyrene paper) tray. A survey by MoE (2010b), found that percentage of meat products sold with PSP tray were 73% to 100% for four different retailers. Among 126 thousand tonnes of production of PSP tray, approximately 20% (30 thousand tonnes) of which were estimated to be used for meat and livestock processed food (Nihon Keizai Sougou Kenkyu Center, 2009). Voluntary collection and recycling of trays, especially collection of white trays at stores, has been promoted. Nonetheless, the amount was estimated at 16 thousand tonnes in 2008 (MoE, 2010b) and the large fraction was not recycled.

Recently, several retailers started to sell meat (mainly chicken) with plastic wrapping rather than on tray, reducing the use of packaging materials. Yamakawa et al. (2010a) reported that such shift of packaging reduced the use of packaging material to from a half to a quarter. At shops which regularly sell meat with plastic wrapping, presumably 15% to 30% of meat is sold in that way. Yamakawa et al (2010b) showed that the reasons of citizens to buy meat with plastic wrapping were “economical” (40% to 50%, at a shop which sold them at lower prices), “troublesome to dispose of waste trays” and “feel that environmental impacts are low” (approximately 20% each, at shops which sold them at the same price as meat on trays).

2.5 Use of reuse shops

According to Japanese Commercial Statistics, reuse market has been expanding. Reuse (secondhand) market can be divided mainly into four different commodities; house, automobile, antiques and the others (hereinafter, “general reuse goods”). General reuse goods are mostly relating to citizens daily life. The size of reuse market of them (except for books and bikes) was surveyed by Japanese Commercial Statistics. It was 90.8 billion yen (1.1 billion USD) in 1997 and increased approximately four times reaching to 345 billion yen (4.1 billion USD). It would result from economic downturn for the last years in Japan. A survey commissioned by MoE (2010c) showed that the primary reason to purchase reuse goods was “can buy them at lower price” for all of 14 types of general reuse goods surveyed. Contrastingly, reasons why some citizens did not purchase reuse goods were “concerns about guarantee and a support system when products have trouble” accounting for 51.6%, “reuse goods seem become failure soon” for 38.4%, “do not want to use products that others used” for 31.7%, and “mind dirt and smell” for 21.7%. Risk of mechanical failure and perception of cleanliness were the crucial factors for Japanese.

In order to obtain secondhand product, it was usual to visit reuse shops (In Japan, they are called “recycle shop”). Recently the use of Internet for buying and selling used products has been becoming more usual as seen in Table 1. The same can be applied to

reuse shops. They become to gather and sell used products more frequently. According to a MoE (2010d) survey, 8.2% of their sales were through Internet selling. Rakuten research (2009) showed existence of citizens who would like to sell or give their used products rather than dispose of them. Both supply and demand of used products would be expanded by the use of Internet. The use of Internet can reduce transaction cost for reuse, making it easier to find a person who wants or sells reuse goods, and also reduces consumer's concern about appropriate price of reuse goods. Akerlof (1970) noted that asymmetrical information leads to adverse selection of commodities in reuse market. Such negative influences can be undermined by the use of Internet. Another trend would be that as Matsuda (2009) pointed out and shown by a phenomenon which the young refrain from purchasing a car, citizens would spend their money on what they are particular about.

3 Policies to Affect Citizens Behavior in Japan

We review recent 3R policies in Japan which target at changing citizen and business behaviours. We explain point systems and also measures under the packaging recycling act.

3.1 Eco-Point System

Eco-point system in Japan is a green replacement program, which is based on an idea that old energy-consuming products should be replaced with new energy-efficient products and governments should support it by providing subsidy or rebate to persons who replace their products accordingly. It started in May 2009 and will end by March 2011 after two extensions of the period. The aims of it are (1) reduction of GHG emission, (2) economic stimulus, and (3) promoting terrestrial digital broadcasting. Target items are refrigerator, air conditioner, and TV with energy-star label of four or more till the end of 2010 and the label of five for 2011. Mechanism of the system is that customers who buy energy-saving products get points from the government, and can use the points like air mileage, e.g. to get designated products and services. The points given differ according to what size of a product citizens buy. Maximum points per purchase till the end of November 2010 was 10,000 for refrigerator, 9,000 for air conditioner, and 36,000 for TV set; and after December 2010 those are 5,000, 5,000, 17,000 respectively. One point is usually worth of one yen (approximately one cent in USD and Euro).

As a result, sales of these three items, especially TVs, have increased. TV sales increased 1.4 times for the 1st year. A study on evaluation of replacement with such energy-saving products (Tasaki et al., 2010) showed that replacement conditions were various, e.g. purchase of different size/type of products, different time of using products, and energy-saving level of products in possession at the time of purchase, which affected appropriateness of replacement. Policies for citizens would need consideration about such variety in some cases.

3.2 3 R Point System

MoE had been interested in applying point systems to environmental policies before Eco-Point System started. There was "Eco Action Point System", which takes account of reduction of GHG emission mostly, and examination of

3R point system just started almost the same time when Eco-Point System started. Basic idea of 3R point system is a rewarding system for a person who conducted 3R behaviors. As a reward, points (like air mileage) are used. Use of point can be beneficial for private companies to gather customers and increase their sales. That is, point systems can give higher incentives for business to participate in the system. In this sense, point systems can be seen as one of policy instruments used in Green New Deal policies, which combine environmental policies and economic policies. In addition, point systems are easier to combine an environmental program with social programs such as boosting community development. Theoretically speaking, point systems can be regarded as combination of economical instruments and informational instruments because environmental information is transmitted through the system and can serve as a motivator for 3R behaviours.

Investigating committee on 3R point systems (2010) reported several existing 3R policies. Some are led by municipalities and others are led by private companies. Examples of the former are: Shin-juku Ward applies a point system to refusal of plastic bags and Adachi Ward to collection of PET bottles for recycling. Examples of the latter are: a convenience store, Lawson, applies a point system to refusal of plastic bags and a dry cleaner, Koseisha, to collecting reusable hanger. Table 4 summarized examples of behaviours that can be promoted by 3R point systems. Because behaviours have to be observed by a stakeholder in point systems, 3R behaviours subject to point systems are mainly those behaviours to pass products/materials.

Table 4 Examples of 3R behaviours that can be promoted by 3R point systems

	Type of behaviour to be promoted (examples)
Reduce	- Refusing free services (plastic bags) - Buying products/services with less materials (lightweight goods, refills such as shampoo, concentrated products)
Reuse	- Returning reusables (glass bottles, hangers of dry cleaning shop) - Buying reusables (refillable bottles)
Recycle	- Returning recyclables (PET bottles, plastic trays) - Buying recycled products (recycled paper, recycled plastics)

3.3 Use of charging fee or voluntary agreement

Packaging Recycling Act of Japan was revised in 2006 (cf. Tasaki, 2008). The major revisions to the Act are (1) to strengthen measures for reducing the use of plastics bags and other similar materials, (2) to create a funding mechanism to provide economic incentives to municipalities to perform higher levels of separation of waste packaging such as increased purity, and (3) to strengthen punishments and fines against packaging business entities that do not fulfill their obligations (i.e., that do not pay the recycling fee). After the revision, municipalities have supported and promoted such actions for (1), as shown in Table 4. In these cases, stronger measures such as charging a fee for the bags are included.

Table 4 Recent waste prevention measures taken by municipalities and businesses for plastic bags (MoE 2008).

	Strong ← Involvement of municipalities → Weak		
Pricing type	Pricing based on bylaw 1	Pricing based on voluntary agreements between business and municipalities 25	Pricing based on requests from municipalities 2
Non-pricing type	Introducing local eco-money 1	Introducing local points (exchangeable for products, etc.) 11	Promotion of voluntary measures urged by voluntary agreements 5

Note: Number of municipalities that have applied the measure.

3.4 Informational governance for waste prevention by private companies

As a measure for (1), which is mentioned in the previous section, a new scheme was established and put into force since April 2007 for designated retailers for which waste prevention is required. Under the revised Packaging Recycling Act, they are obliged to make their target for reducing the use of packaging and take actions to meet the target. Large retailers (annual use of packaging is 50 tonnes or more) are, in addition, obliged to report the state of their actions annually. If the progress in action is significantly unacceptable, the ministers in charge can make recommendation, publicize the progress, and give them order. This scheme can be regarded as mandatory PDCA cycle with involvement of informational policy and a type of reflective policies. Packaging is used for various products, and so are functions provided by packaging. It is therefore difficult to set a common, minimum or average requirement for waste prevention. The current state of implementing this reporting scheme has not been publicized by ministries yet. As Mol (2006) pointed out, informational environmental governance, in which information generation, processing, transmission, and use become fundamental (re)sources of power and transformation in environmental reform, is emerging. This scheme can be regarded as such informational governance.

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