O-010

Studies on the Influences of Economic Responsibility under EPR and Producer's Adaptive Strategy

Yiping Zhao† Jun Ohya†

1. Introduction

With the in-depth understanding of the interrelationship between product's environmental performance at its post-consumption stage and its structure and material/component adoption at the design and production stage, it has been attached more and more significance to such strategy as source pollution prevention and life-cycle management etc. Under this circumstances, core manufacturers and importers have been assigned with more and more environmental responsibilities throughout the whole life cycle of the products they produced or imported, especially covering the post-consumption stages. This kind of environmental policy is widely known as the extended producer responsibility, or in short the EPR. EPR was originally forwarded by T Lindqvist in 1988 and then officially implemented among EU members [1]. Nowadays, EPR has been widely adopted by around 20 countries in the world. It was proved that EPR has obvious strengthens in terms of inducing higher collecting and recycling rate [2]. Meanwhile, EIR is also believed to have the potentiality to inspire eco-design improvement or promote the producers to take product's recyclability into the consideration of design and production [2][3].

In terms of applying EPR, there are quite a few questions of great interest for researchers and policy makers, including the product category, system boundary, specific policy instruments, design and optimization of the collecting network and so on. In spite of all the above questions, it is of no doubt that certain amount of monetary payment will be necessary for the responsible companies as long as an EPR program is set up. This payment will add extra pressure to the product cost on one hand and will become an up-going drive for the product price on the other. As a result, how to recover extra cost and at the same time to minimize the potential influence on product distribution are the major challenge before the responsible company. In other words, it is of great significance for the company to decide how to or to what extent to embed this extra cost into the product price.

In this paper, two basic ways to recover the economic responsibilities are studied based on the theory of economics. Benefits under each way are compared, on the basis of which the market/product differences are analyzed in terms of their impact on EPR application. Accordingly, producer's adaptive strategies are investigated and suggested with the consideration of collecting and recycling values of different product categories.

† Graduate School of Global Information and Telecommunication Studies, Waseda University

2. Economics Analysis on Plans of Economic Responsibility Assignment

By studying the existing EPR programs in the world nowadays, it is found that there are mainly two kinds of ways to recover the concerned economic responsibilities. The first way is to gather this part of expense directly from the consumer. For example, in Japan the end-users have to pay for the discarding charges when they return their used cars to specified collecting companies. It can be regarded as an increase to the price as consumers purchase their cars neither new nor second-hand ones. We call it plan A in the following analysis. On the other hand, according to the Act on end of life vehicles which is enforced from 25th Jan. 2005 in Germany, all the end-users could return their used car to qualified recyclers free of charge and the producers should pay for all the cost required. In this way, it can be regarded as a pure cost assigned to car manufacturers or importers. We call it plan B during the following analysis.

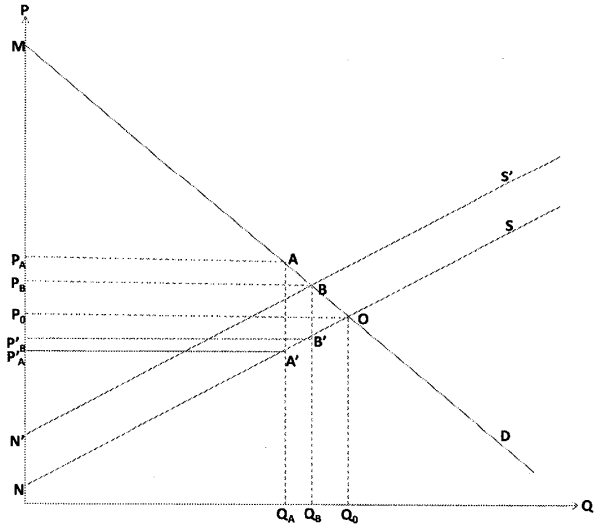

Fig. 1 producer and consumer's surplus under each economic responsibility assignment plan

In spite of the social differences between Germany and Japan, let's take a look at the influence of the above two plans on the benefits of both producers and consumers from the economics viewpoint. As shown in figure1, supposing the supply and demand on the market is balanced at point O before the application of EPR, then the original trading volume is Q_0 and the balance price is P_0. According to the micro economic, under this circumstance, the producer's surplus can be represented by the area of $\triangle ONP_0$ and consumer's surplus is that of $\triangle OMP_0$. In plan A, neither the supply curve nor demand curve will change, except the price of the product increase from P_0 to P_A by the range of p. The new balance trade volume changes to Q_A.

Accordingly the surplus of consumer reduces to$\triangle AMP_A$ and that of producer is $\triangle A'NP'_A$. Under plan B, producer's supply condition changed from the curve S to S'. The jump range is also p which can be shown by $(N'\text{-}N)$. In this case, the new trade balance point is B at the new balance price of P_B and amount of Q_B. The surplus of both customer and producer should be represented by the area $\triangle BMP_B$ of and $\triangle BN'P_B$. Furthermore, surplus of producer is equal to the area of $\triangle B'NP'_B$.

It can be clearly seen that: $\triangle OMP_0 > \triangle BMP_B > \triangle AMP_A$ and $\triangle ONP_0 > \triangle B'NP'_B$ $(\triangle BN'P_B) > \triangle A'NP'_A$. This is because under plan B, by producing a new supply curve, the impact of extra cost is counteracted by the market mechanism itself. Thus it can be concluded that compared with plan A, the plan B will cause the less loss to either producer's surplus or consumer's surplus. Or in other words, when the producers pay for the concerned economic responsibilities in a directive way, their profits will be less influenced even if their supply cost increased. So theoretically, the German model should be a sounder way to recover the economic burdens as implementing EPR.

3. Implications for Responsive Strategies by Core Companies

In this part, the implications of the above economics analysis in terms of priority responsive strategy by the core companies under two scenarios will be further discussed from three aspects. Firstly, given plan B is prior to plan A, the comparative change of consumer and producer's surplus is still unstable. According to the basic theory of microeconomic, the price elasticity of demand and supply will influence the comparative value of $(P_B\text{-}P_0)$, the smaller of which the less influence on consumer's and producer's surplus. As for the price elasticity of demand, the smaller its value is, the stronger the price rigidity will be. Meanwhile, the less the change of surplus as well as the smaller the impact caused by economic responsibility assigning requirement will be. For example, the producers of daily necessity could pay less attention to the cost control and on the contrary more to the management of collecting network and development of more recyclable products. Vice versa, as for luxury products, it will be more difficult to implement EPR. And the producers have to make more efforts to reduce the cost they actually contained, through such ways as cost control or share the cost with the recyclers etc. However, it could not be neglected that the luxury and necessity demand is quite a relative concept as considering the differences in purchasing power in different countries and areas. This means EPR will be more easily applied in developed countries compared with developing countries.

Distinct from the price elasticity of demand, the price elasticity of supply has the exact contrary impact on the change of surplus. The smaller the value of price elasticity of supply is, the larger the change on both consumer's and producer's surplus will be and the more difficult the application of EPR will be. Such as the vehicle production, sit will be quite difficult for manufacturers to increase the production capability in a short time and also quite dangerous if the production amount shrink suddenly since the fixed cost is quite higher in such factories. Therefore, the producers will be more reluctant to participate in EPR compared with those producers of package etc. Meanwhile, investment in new product R&D as well as closer cooperation with recyclers will be more preferred by these producers.

Secondly, it has been concluded at the end of part 2 that plan B is a theoretically optimal strategy. But the situation in Japan is quite an exception. Our study shows that the social factors are also significant in terms of designing EPR programs in short term. If the more readily the common citizens are to take more social and ecological responsibilities, the much easier the application of EPR will be and the more directly the economic responsibility assigning plan could be designed. This could also be illustrated by another example. In Japan, it has become a social habit to through all the soft drink bottles into specific collecting boxes free of charge. But in other countries where EPR is also working well in the package collecting such as Germany, pre-deposit is necessary to achieve expected returning. However, the future development of carrying either plan might reach at the same point in a long term run, including the development of more environmentally friendly social habits and more life-cycle-oriented product design and production.

4 Conclusions

In this paper, two plans to cover the economic responsibility under EPR in practice are studied on the basis of micro-economics. It is concluded that to cover the required economic responsibility directly by the producers is a theoretically priority strategy. Meanwhile, the price elasticity of both supply and demand has significant impact on the responsive strategy making by the core producers. The larger the price elasticity of demand and the smaller the price elastic of supply are, the more difficult the application of EPR will be. Therefore producers have to make more efforts for controlling the cost, developing more recyclable products and cooperating with recyclers. Otherwise, assigning comparative larger responsibilities to consumers will be feasible for producers. Besides, the economic development level and purchasing power in a certain country has large impact on the boundary of necessity and luxury products as well as the producers' responsive strategies.

On the other hand, social habits are another significant factor influencing the recovery plan of the economic responsibility under EPR. The higher the socially and environmentally responsible consensuses of common citizens are, the easier the application of EPR will be. As a result, the more customer involving programs could be carried out by the concerned producers as responsive strategy.

References:

[1] Lindhqvist, Thomas. "Extended producer responsibility in cleaner production: Policy Principle to Promote Environmental. Improvements of Product Systems," Doctoral dissertation, International Institute for Industrial Environmental Economics, Lund University, Sweden, 2000

[2] Tojo, Naoko, "Extended Producer Responsibility as a Driver for Design Change, Utopia or Reality?" PhD dissertation, Lund University, Sweden, 2004.

[3] Walls, Margaret, "Extended Producer Responsibility and Product Design: Economic Theory and Selected Case Studies," RFF Discussion Paper No. 06-08. Resources for the Future - Quality of the Environment Division, 2006. (Available at SSRN: http://ssrn.com/abstract=901661.)