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Importance of Design in making Extended Producer Responsibility (EPR) work for Circular Economy

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The Circular Economy brings forward the need for better use of various resources, including materials and energy. It prolongs product life cycles through durability, reuse, repairability, and the return of materials to new uses. Thus, the Circular Economy is much more than just recycling; it effectively secures secondary materials.

What role can Extended Producer Responsibility (EPR) play in facilitating such a shift to the Circular Economy?

Brief history of the principle of EPR

EPR was formulated as a strategy in 1990 and, some years later, defined as a policy principle that guides the development of policies and legislation. From the first set of documents and subsequent discussions, EPR was especially brought forward when elaborating measures to improve waste management, though it has also been discussed for other life cycle phases. EPR is implemented using the most appropriate policies and policy instruments, which are determined based on the types of products, local conditions, and experiences.

EPR proposes that special responsibility should be given to actors that have the greatest opportunity to make improvements. For a more circular society, products need to be collected and sorted at their end-of-life, and materials need to be recovered and recycled from there. To improve the possibilities of achieving this, product design needs to be enhanced, for example, to improve durability, allow repairability, and enhance recyclability.

EPR also aims to signal consumers about environmental management costs through the price of products. The price paid by consumers should be seen to include environmental costs arising from activities to return products and their materials to the technosphere for reuse.

Lessons from EPR implementation

When the EPR principle was used to form policies and laws, many actors expected that EPR would be implemented wherein producers would be responsible for the end-of-life costs of their own products. In other words, such costs would be added to product prices and therefore influence market competitiveness. This gave many companies clear incentives to develop design improvements for their products. This was evident in many articles in trade journals and other publications, where car manufacturers, electronics manufacturers, and packaging producers reported on various design improvements they had developed and included in their products, typically citing future EPR legislation as the main driver.

However, when EPR laws were put into practice, the implementation was largely through what came to be known as collective systems. End-of-life treatment was implemented by organisations, Producer Responsibility Organisations (PROs), that had producers as members. Governments steered the work by demanding collection and recycling levels but without defining high-quality recycling as a requirement. Producers paid fees that were equal for the same type of products, with products categorized based on use, size, and similar qualities. Specific environmental improvements were, by and large, not included in such fees, substantially lowering the costs of responsibility borne by producers.

Low fees paid to PROs provided no incentive to induce design improvements. Instead, such investments had to rely on market rewards, but reaching the market with the necessary information and achieving a good response was most often not possible. The proposed solution of individual responsibility was often unappealing for producers, as obtaining economic rewards was difficult under the existing legislation and the limits of requirements placed on the collective systems (which sometimes even included more or less clear prohibitions of individual EPR systems or similar constraints). Thus, EPR-induced product design improvements became less obvious and feasible, and the role of EPR as a rationale for product design improvements came into question.

In practice, the positive results from EPR were mainly related to the amount of selective collection, dismantling, and sorting of collected products. For instance, in the European Union (EU), it is evident that much more of the targeted products, particularly packaging, WEEE (Waste Electrical and Electronic Equipment) or e-waste, cars, and batteries are collected and treated in a responsible way. While much more is collected in an organised manner and largely in ways that could promote good further treatment, the sufficiency of results can be questioned from the perspective of the Circular Economy. The fact that substantial amounts of the collected materials are exported to markets without good control makes circularity even less realistic in today's systems.

What is collected and dismantled is generally sold to recyclers. The fact that much of the material can be sold means that only limited efforts are made to improve the quality of such materials before they are returned to the market. Such materials are generally downgraded compared to the original input used for the products from which the recycled materials originate. This means that new raw materials are not substituted for many purposes, as the quality of the recycled materials is not good enough. Better recycled materials would allow such use and enable more continuous cycles of use for future products.

Moreover, the price of primary raw materials is usually more competitive than recycled materials, even when the quality is comparable. The reverse supply chain, technology for processing recovered or recycled materials, logistics of procuring them, and the available quantities in desired qualities are less mature than those for primary raw materials, which contributes significantly to the price differential.

Each of these cost contributors requires measures that effectively change the price differential equation between primary and recycled materials and make product design improvements economically viable.

Approaches to make product design improvement viable

A way of promoting a market for high-quality recycled materials is to demand a certain percentage of recycled materials in new products. Legislation should then demand post-consumer recycled materials, that is, not just processing waste to promote the recycling of old products. Other approaches include various design requirements, such as specifying what materials are used (and not used) for manufacturing and ensuring materials are easier to dismantle. Such legislation is included in the Eco-design directive developed in the EU, which is continuously being improved.

Another approach is to adjust EPR fees paid to the PROs to reflect a set of standards. Products with desirable qualities would incur lower fees, while products with negative properties would face higher fees. This approach is often referred to as the modulation of EPR fees. However,

such fees are often a percentage of an already low EPR fee. This means that savings from lower fees may not cover the costs of implementing design changes.

A different approach, proposed by the IIIEE (Industrial Institute for Industrial Environmental Economics), is to create mandatory standards for the quality of recycled materials that must be achieved to avoid specific environmental fees. These fees would not be paid to the PROs but rather to the government or society, which is the entity responsible for a country's environmental status and which may need to address cleanup measures and manage the economic and social costs of lower environmental quality.

Implications for the EU and Asia

The EU and its member countries are likely more prepared to implement measures that ensure better and cleaner materials from recycling activities compared to other regions around the world. This also has significant implications for access to clean materials that support initiatives promoting local manufacturing in Europe. It underscores the fact that EPR plays a more central role in advancing the Circular Economy in Europe.

In Asian countries where EPR is still not implemented or is in its early developmental stages, the challenges faced in Europe will eventually be encountered. Therefore, it would be wise to develop understanding and capacities to address the limitations of a waste-management-focused EPR system that lacks the important driver for design change. A product design-oriented EPR system that includes requirements for the quality of waste and the recovery of materials should be considered.

Some Asian countries already have Circular Economy strategies, roadmaps, or guidelines that emphasize the importance of material recovery and value retention in materials collected through EPR systems. This provides policy legitimacy for EPR principles but requires specific rules and regulations to ensure effective implementation.

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