Roles of Third-Party Collection for Accelerating Circular Economy in India

Research Note

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Abstract

Various concepts, such as reverse logistics ("RLs") have been introduced to encourage Circular Economy ("CE") and Resource Efficiency ("RE"). RLs refers to set of activities needed to collect product. While the EU Directives placed responsibility for ensuring disposal of their End of Life ("EOL")/ End of Use ("EOU") products on manufacturers, the manner and responsibility of collection is still unclear. Resultantly, collection of waste products specially electrical products have not attained the level, as was expected. RE regulations in India are at nascent stages and are designed on principles of EU Directives. Collection is primarily driven by Indian government and the informal sector. The success of RE is essentially based on level of collection rates. Collection rates can be accelerated by putting an infrastructure conducive for collection. This paper studies the role of third party collectors for the purpose of accelerating CE and RE, for a developing country like India.

Keywords: Circular Economy, Third-Party Collection agents, Reverse Logistics, Collection, Takeback, Consumer Awareness, India

1. Introduction

India as a signatory to the United Nations Sustainable Development Goals is committed to sustainable use of natural resources and safeguarding environment. The material consumption is projected to more than double by 2030, in order to provide for increasing population, rapid urbanization and growing aspirations. This is going to put pressure on already stressed and limited resources and may lead to serious resource depletion, environment degradation and increasing wastes resources.

The OECD defines waste collection as the collection and transport of waste to the place of treatment or discharge (Han and Cueto, 2015). The collection system is often one of the most critical elements in a takeback system, as it could be very challenging to collect products from millions of residents or users of products and aggregate them for further processing (Esposito et al., 2018). In most developing countries, the waste industry mostly rely on informal sector. These people collect the e-waste from consumers' homes through door-to-door activities, separate the items themselves, and finally sell the separated items to city vendors to be refurbished or recycled (Balde et al. 2017; Islam et al. 2016).

Currently, in India, the manufacturing companies have assumed Extended Producer Responsibility ("EPR") by generally having their own collection centres where consumers can drop off their used products. Companies also have an arrangement with logistics companies or recyclers for dropping these used products from their own collection centres to authorized recyclers units. The companies may henceforth buy e-waste credits from recyclers/ refurbishers to meet their Extended Producer Responsibilities ("EPR"). Hence, within the formal sector, the collection, in essence is an obligation on to consumers in form of dropping off the products at the collection centres. There are currently not many registered independent third-party collectors. The informal sector or Government via Muncipality picks up the products directly from the consumer through door-to-door collection, segregates and drop it to recyclers.

Hence, Indian waste sector is primarily driven by informal sector. For formal sector to flourish, there is a need for more registered third party collectors or Producer Resposnibility Organizations ("PRO"). This paper studies the role of third party collector or PROs in the formal sector and the challenges faced by them in an Indian context. With an increasing role of third-party collectors and limited research on consumer behaviour, there is further research required on how third-party collectors can play a role in stimulating consumers to return their products and create a culture of return instead of storing and forgetting.

2. Literature Review

Collection Channel

From a collection channel perspective, manufacturer has always been regarded as a leader who takes responsibility for collection of EOL/ EOU products from consumers. However, some works have found a disadvantage where manufacturer is considered as a leader, such as lower collection effort (Choi et al. 2013) and a lower collection efficiency (Król et al. 2016). Giovanni and Zaccour (2013) considered a two-period closed loop supply chain and found that the retailer or third-party collecting is optimal only when they have a better operational and environmental performance than the manufacturer. Further, Modak et al. (2018) concluded that third-party collecting is always negative.

The timing of the collection of the products specially for ***remanufacturing*** is very important because some of them get in even worse shape if they are not recovered in time. There are often three ways for EOU/ EOL product collection, along with collection efficiency ("ClE") (ie quantity of collected EOU/ EOL products which can be remanufactured compared to total EOU/ EOL product collected) as identified by Król et al. (2016). First, collection through recycling centres which results in ClE of 75%. Second, collection through drop off points which results in ClE of 80% and third door-to-door collection which has ClE of 90%. Such high ClE in case of door-to-door collection is because the products are collected directly from the consumer and they have not been contaminated by other products. Hence from a remanufacturing and collection efficiency standpoint, a door-to-door collection may be considered as a better alternative. Savaskan, Bhattacharya and Van Wassenhove (2004) suggested that the player who is closer to the customer is most effective undertaker of product collection activity.

To establish efficient management and control of e-waste, EU has adopted the Directive on Waste Electrical and Electronic Equipment 2002/96/EC (also known as the WEEE Directive), which was supplemented by Directive 2012/19/EU. The Directive requires EU member states to impose all recycling and waste management costs of WEEE on the producers of the products, including transportation costs from collection centers. The WEEE Directive was mainly aimed at ensuring a take-back and collection system provided by producers and correct treatment of the collected WEEE by imposing recycling and recovery targets, but nothing was imposed in terms of the supply chain structure (Khetriwal et al. 2011). The Directive leaves to the producers the freedom to choose whether to fulfill their responsibility by implementing their own individual recovery system or participating in collective collection schemes or shared systems with other companies which are associated in order to reap the benefits of economies of scale.

According to Huisman et al. (2008), collection is the crucial point to the accomplishment of the policy objectives and only a small portion of electronic waste is actually collected in the EU. The financial responsibility of producers starts from the place of collection and not from households. This leaves the part of the responsibility to the municipalities and informal sector, which are usually in charge of e-waste collection.

Hvass and Pedersen (2019) presents a case concerning a partnership between a manufacturer and waste handler, in which the profitability of the manufacturer is linked to the collected volumes.

Through economies of scale, the PROs can provide more economically efficient recovery and recycling of products (Singh and Ordonez, ˜ 2016). For reverse logistics, the extant literature presents a primary trade-off between achieving economies of scale, e.g. by partnering with third party waste collectors, and maintaining control and IPR. While companies maintain IPR in isolated collection systems, lack of scale makes such systems costly to operate (Atau and Wassehove, 2012).

Consumer Awareness

Consumers are corporate organizations or individuals that own electronic and electrical equipment (EEE) considered to have ended its usefulness and value. Consumers can be organizations, end-users, agencies, or individuals that use EEE and then discard them as waste after the equipment has reached its end of life by either dumping the E-waste illegally, storing it, throwing it in the garbage, or recycling it (ILO, 2014; Manomaivibool et al., 2007).

Consumers' motivation to participate in returning products is a critical first step in a take-back programme. Several studies have attempted to understand consumer motivation and return practices (Agarwal et al., 2012; Jafari et al., 2017; Sari et al., 2021). While many studies have focused on technical aspects of reverse logistics such as types and location of bins, or on behavioural aspects such as values, behaviour can be influenced by the interplay of personal and situational factors (A-Jalil et al., 2014). Botelho et al. (2016) investigated the attractiveness of various incentives such as exchange of used equipment for money, home collection, exchange for new equipment, tax benefits, and discount coupons (Botelho et al., 2016). Ghoreishi et al. (2011) while modeling for cost benefit analysis of take-back, explored incentives such as cash incentive, discount of certain value for purchasing new products (usually of similar type), or percentage discount, for purchasing new products (Ghoreishi et al., 2011)

Poppelaars et al. (2020) investigated the effect of product design on consumer behaviour to return the product. Their study contributes to the CE transition by taking a user perspective and exploring how designers could stimulate users to return their products. They also identified various factors which could influence the divestment decision process and activities, including "Effortless Collection" ie unburdening users from the hassle of collection through omni channel, available and accessible collection centres. However, the study focussed only on design interventions at right time and intervals to influence the process of divestment by the user.

The consumers lack a designated collection point, limited consumer education, and awareness, and also lack incentives for E-waste collection services. Nicolescu and Jula (2015) find that consumers are more inclined to recycle E-waste where a larger number of collection points are available, after compensation, and where recycling is attractive, visible, and obvious.

3. Research Purpose

The literature has considered collection by third party collector as inefficient. However, certain studies have also provided benefits offered such as economies of scale. Practically from business standpoint, third party collectors as a door-to door collection agent (resulting in high collection efficiency) are rising. Considering that the Indian government policy initiatives are based on EU Directives, and similar social problems being faced within EU, however there is still limited research on third-party collectors as a door-to door collector, hence there is a gap that requires research on constraints of a third-party collection agent in value creation and accelerating CE/ RE in an Indian context.

Hong, Xu and Wang (2015) studied advertising, pricing and collection decisions in a CLSC and have concluded that local advertising is essential to augment the collection rate of used products and to

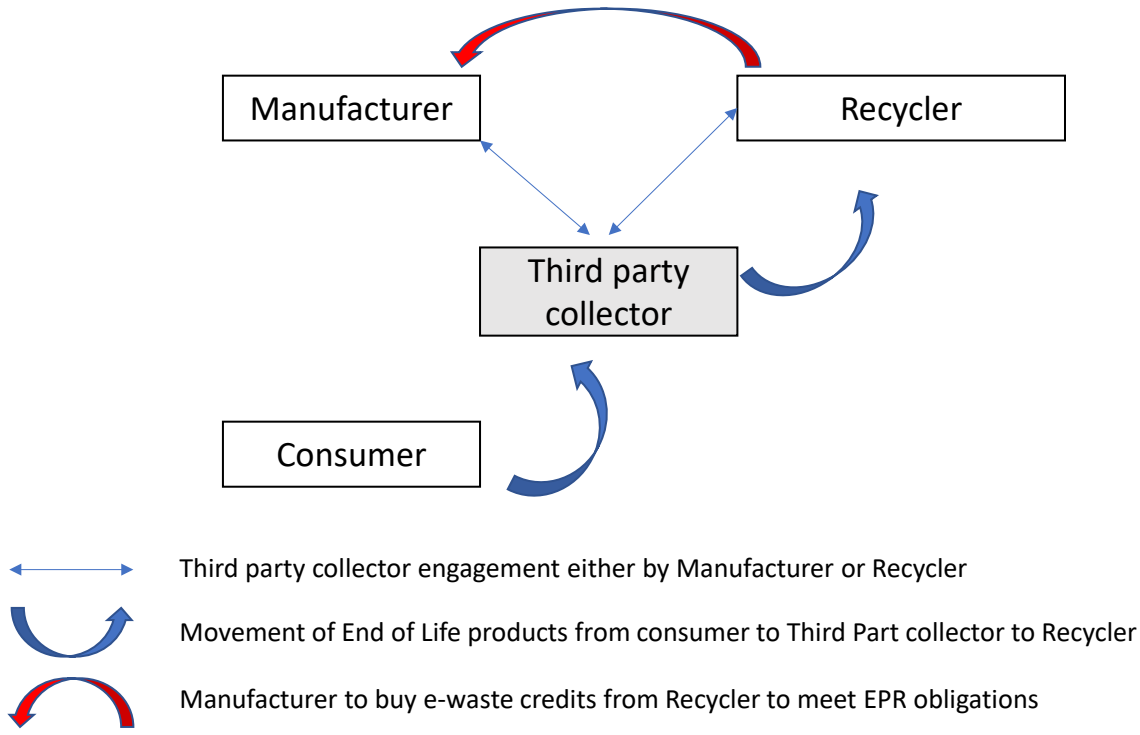
garner more profits in remanufacturing. With an increasing role of third-party collectors (as a door-to-door collector) and limited research on consumer behaviour, there is research required on how third-party collectors (as a door-to-door collector) can play a role in stimulating consumers to return their products and create a culture of return instead of storing and forgetting.

4. Study Gaps

The existing Literature discusses the importance of collaboration with third party waste collectors in the context of waste management, however there is still further research needed on how the third-party collectors may be better utilized in order to accelerate the CE and RE and what are the policy initiatives needed to achieve this. Additionally, in order to accelerate the CE and RE, the focus needs to be on consumer, he should be considered as the supplier of raw material and not the owner of waste products. Hence, research is needed on how the third-party collectors (as a door-to-door collector) can bridge the gap of treating the consumer as owner of raw material from owner of waste products and in stimulating consumers to return their products and create a culture of return.

5. Framework

Third party collector being a link between consumer, manufacturer and recycler can act as a powerful engine in the CE. The proposed framework is depicted as below:



Third party collector being a door to door collector, is closely associated with the consumer, in such a way that whenever consumer is of the view that the EOL product is to be disposed off, it connects with Third party collector. Third party collector gets the product picked, gets it dismantled either at its origination or at a dismantling unit (as may be required) and transfers the EOL product (which becomes raw material for recycler), to the recycler.

Further manufacturer to have two ways of meeting its EPR obligations: First, Third party collector along with Recycler to report on the branded products picked by Third party collector (on behalf of such manufacturer) and the quantity recycled by the Recycler; Second, Manufacturer to buy e-waste credits from Recycler (available with recycler on account of quantities recycled due to direct engagement with third party collector)
The paper further aims to undertake research on role performed by Third party collectors in the developed countries for increasing the collection rates and increasing consumer awareness. Such research can then be applied in context of Indian regulations and policy framework and identify what additionally can be done to accelerate CE and RE in developing country like India.

6. My Insights Gained through Literature Review

The Literature establishes that third-party collector can play a larger role in reverse logistics and in closed loop supply chain. EU Directives also acknowledges the importance of collection in waste management.

In India, role of third-party collectors (as a door-to-door collector) is required to be played by a registered PRO. The existing Indian regulatory guidelines for PRO defines PRO as a professional organization authorized or financed collectively or individually by producers, such PROs to take the responsibility for collection and channelization of e-waste generated from 'end of life' products manufactured by such producers. The existing guidelines further provide that PRO can assist manufacturers in meeting their legal obligations (ie EPR) by achieving collection targets, setting up collection centers, carrying awareness programmes, only if producer(s) engage that PRO. The new guidelines (in draft stage) however are silent on role of PRO, and provides that a producer can achieve its legal obligations of meeting EPR by purchasing e-waste credits directly from the authorized recyclers.

From the perspective of brand protection, manufacturers focus only on their own brands and hence a customer is required to drop the product in the collection centre owned by such manufacturer or the manufacturer can make an arrangement for picking up the product from the consumer. The PRO or a logistics agent then transfers the products to authorized recycler. The non-branded or also called orphaned products are handled by Local Urban Bodies (Municipal Corporations). A third party collector, who is not a registered PRO, in an informal/ unorganized sector may be engaged by recycler/ dismantlers directly. Recyclers/ dismantlers are more likely interested only in the products delivered to them for recycling and not on how these products were procured or in ensuring consumer awareness.

Hence the very purpose of introducing registered PRO gets marginalized on account of two factors: 1) With respect to branded products, Registered PRO is not obligated to pick up the products directly from the consumers as a door to door collector, the responsibility is primarily on to the consumer to drop the products to the collection centre 2) With respect to non-branded products, in urorganized sector authorized recyclers may engage third party collectors (whether registered or not), and such third-party collectors may not engage in consumer awareness.

In order to accelerate CE and RE, there needs more policy focus in stimulating consumers towards proper disposal of used/ EOL products. A registred PRO can be an effective catalyst in achieving such an objective, if their activities involve door to door collection, and they would be closest to the consumers. In the current framework, there is less role of a third party collector to enagage with consumers, as consumers are required to drop EOL products to producer owned collection centres and from such collection centres, the products are dropped by logistics agent to authorized recyclers.

A third party collector or a registered PRO needs to be incentivised to undertake collection, dismantling services with respect to branded products as well as non-branded products. Further, since the margins earned on unbranded/ orphaned products may even be lower than that received from manufacturer for branded products, there needs some subsidy/ tax incentives for undertaking such activities by third party collector. In existing policy, consumers are made responsible for proper disposal of products. However, practically, whether or not consumers drop their products depends on consumer willingness and awareness and whether or not product gets picked up, depends on the manufacturer and his operational policies. Hence, when a third party collector or a registered PRO picks up the products directly from the consumers, then he acts as a catalyst for meeting consumer obligations, and also facilitating consumer awareness.

7.Study Limitations

The above views are based on limited research available on the third party collectors, existing regulations in India with respect to waste management and limited operations in India being undertaken by a Registered PRO. The Indian Government has also in May 2022 introduced updated draft waste management regulations for public comments. Such draft regulations are silent on role of a PRO. The above views may undergo a change based on policy amendments/ initiatives taken by the Indian government with respect to third party collectors/ registered PROs.

8. Conclusion

To sum up, the Research Note dealt with role of third-party collector and consumer behaviour in CE ad RE. Through the literature review, it was explored how retailers and third-party collectors along with manufacturer have a prominent role to play in collection strategies. However, there has been limited research on independent third-party collectors (as a door-to door collector) and their role in stimulating consumer behaviour to return the products. Basis the research done and study limitations, The authors are of view that with growing ecommerce and technological and digital advancements, third party collectors (as a door-to-door collector) can play a significant role in advancing towards CE and RE. For such reasons it is necessary to deliberate on the role of third-party collectors (as a door-to-door collector) and how they can flourish and support CE and RE, including stimulating consumer behaviour.

References

A-Jalil, E.E., Grant, D.B., Nicholson, J.D. and Deutz, P. (2014), “Investigating household recycling behavior through the interactions between personal and situational factors”, WIT Transactions on Ecology and the Environment, Vol. 180, pp. 113–124.

Agarwal, G., Barari, S. and Tiwari, M.K. (2012), “A PSO-based optimum consumer incentive policy for WEEE incorporating reliability of components”, International Journal of Production Research, Vol. 50 No. 16, pp. 4372–4380

Atasu, A., Van Wassenhove, L.N., 2012. An operations perspective on product take-back legislation for e-waste: theory, practice, and research needs. Prod. Oper. Manag. 21 (3), 407–422. https://doi.org/10.1111/j.1937-5956.2011.01291.x

Botelho, A., Ferreira Dias, M., Ferreira, C. and Pinto, L.M.C. (2016), “The market of electrical and electronic equipment waste in Portugal: Analysis of take-back consumers’ decisions”, Waste Management and Research, Vol. 34 No. 10, pp. 1074–1080.

Central Pollution Control Board (2022). URL: https://www.cpcb.nic.in/

Choi, T.-M.; Li, Y.; Xu, L. Channel leadership, performance and coordination in closed loop supply chains. Int. J. Prod. Econ. 2013, 146, 371–380

De Giovanni, P.;Zaccour, P. A two-period game of a closed loop supply chain. European Journal of Operational Research 232 (2014) 22-40

Esposito, M., Tse, T. and Soufani, K. (2018), "Reverse logistics for postal services within a circular economy", Thunderbird International Business Review, Vol. 60 No. 5, pp. 741–745

Ghoreishi, N., Jakiela, M.J. and Nekouzadeh, A. (2011), "A cost model for optimizing the take back phase of used product recovery", Journal of Remanufacturing, Vol. 1 No. 1, pp. 1–15

Han, H. and Cueto, E.P. (2015), "Waste Collection Vehicle Routing Problem: Literature Review", PROMET - Traffic&Transportation, Vol. 27 No. 4, pp. 345–358.

Hong, X.; Xu, L.; Du, P.; Wang, W. Joint advertising, pricing and collection decisions in a closed-loop supply chain. Int. J. Prod. Econ. 2015

Huisman, J., Magalini, F., Kuehr, R., Maurer, C.: Lessons from the 2008 WEEE Review Research Studies. In H. Reichl, NF. Nissen, J. Muller, & O. Deubzer (Eds.), Proceedings of the Electronics Goes Green 2008+ Joint International Congress and Exhibition - Merging Technology and Sustainable Development, EGG2008 (pp. 33-39). Fraunhofer IRB Verlag (2008)

Hvass, K.K., Pedersen, E.R.G., 2019. Toward circular economy of fashion: experiences from a brand's product take-back initiative. J. Fash. Mark. Manag.: Int. J. https:// doi.org/10.1108/JFMM-04-2018-0059.

Jafari, A., Heydari, J. and Keramati, A. (2017), "Factors affecting incentive dependency of residents to participate in e-waste recycling: a case study on adoption of e-waste reverse supply chain in Iran", Environment, Development and Sustainability, Vol. 19 No. 1, pp. 325–338

Khetriwal, D.S., Widmer, R., Kuehr, R., Huisman, J.: One WEEE, many species: lessons from the European experience. Waste Manage. Res. (2011). https://doi.org/10.1177/0734242X11413327

Król, A.; Nowakowski, P.; Mrówczy ´nska, B. How to improve WEEE management? Novel approach in mobile collection with application of artificial intelligence. Waste Manag. 2016, 50, 222–233.

Modak, N. M., Modak, N., Panda, S., and Sana, S. S. (2018). Analyzing structure of two-echelon closed-loop supply chain for pricing, quality and recycling management. Journal of Cleaner Production, Vol. 171, pp. 512-528.

Ministry of Environment, Forest and Climate Change (2022). URL: https://moef.gov.in/en/s-o-360e-date19-05-2022-draft-e-waste-management-rules-notification-for-seeking-public-comments/

Poppelaars, F.; Bakker, C.; van Engelen, J. Design for Divestment in a Circular Economy: Stimulating Voluntary Return of Smartphones through Design. Sustainability 2020, 12, 1488

Sari, D.P., Masruroh, N.A. and Asih, A.M.S. (2021), "Consumer intention to participate in e-waste collection programs: A study of smartphone waste in Indonesia", Sustainability (Switzerland), Vol. 13 No. 5, pp. 1–28

Savaskan, R.C.; Bhattacharya, S.; Van Wassenhove, L.N. Closed-loop supply chain models with product remanufacturing. Manag. Sci. 2004, 50, 239–252

Singh, J., Ordonez, ˜ I., 2016. Resource recovery from post-consumer waste: important lessons for the upcoming circular economy. J. Clean. Prod. 134, 342–353. https:// doi.org/10.1016/j.jclepro.2015.12.020.