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Promoting Recycling In E-Commerce: A Reward-Based Approach With Reverse Vending Machines

N Joshi, J Jino, A Joseph, Dr Amrutha K

Abstract

In alignment with the United Nations' Sustainable Development Goals (SDGs), this research explores a novel approach to promoting eco-consumer behavior through the linking of Reverse Vending Machines (RVMs) with online shopping platforms. The proposed method encourages people to minimize waste and conserve resources by giving them discounts on purchases when they recycle at RVMs. Basically, customers would get a code after buying something which they would use when recycling at specific RVM locations. They would then take a photo of their RVM receipt, with the code. Upload it for verification on the online shopping platform. This paper investigates the role of integrating RVMs in driving sustainable practices and shaping the overall sustainability of e-commerce. It also raises an issue with excessive discounts but promotes customer involvement in environmental responsibility. Multinational corporations may substitute discounts for rewarding behavior to influence customers to be proactive in engaging in environmentally friendly activities. The findings imply that the fusion of RVMs with shopping platforms might help attain more ecological awareness and boost loyalty and engagement levels among consumers.

Keywords- Reverse Vending Machines (RVMs), Eco-consumer behavior, Recycling incentives, Consumer engagement, Environmental responsibility

Literature Review

One of the major problems in our country today is the collection, transportation, and disposal of waste, which has started to become chaotic and unscientific. Such waste is usually transported to the outskirts of cities and landfills, making it impossible to reclaim. The absence of a proper waste management system makes it a task for the people from the informal sector to handle it with their outdated technology. When it comes to plastic, around 5.6 million Tonnes Per Annum (TPA) of plastic waste is generated India, which is about 15,342 Tonnes Per Day (TPD) waste^[1]. Nearly 1 million plastic bottles are sold every minute, and these usually end up in landfills or oceans. Study shows that in the next 20 years or so, plastic waste in the ocean is expected to outweigh marine life. Despite the efforts to reduce plastic consumption through policies or penalties, recycling seems to be the most viable option when it comes to separating plastic waste^[2]. The idea of RVMs was introduced in order to help tackle the challenges faced while dealing with waste management or rather to help reduce the hassle in finding ways to deal with waste. With RVMs, recycling activities are increased and promotes the idea of disposing waste appropriately^[3]. Despite the existence of such systems that help aid in recycling, citizens still seem to be either unaware or uninterested in the activity of recycling. Study shows that the reasons for this could include lack of knowledge in such technology, lack of convenience at which citizens can dispose off materials, attitude towards recycling, availability of incentives^[4]. In order to help increase the recycling rate, various recycling programs such as curbside/drop-off centers may help boost it. Most importantly, educating and bringing awareness of such recycling programs or technologies can significantly increase the recycling rate of the area^[5]. Qualitative research showed positive attitudes toward RVMs which were viewed as user-friendly and environmentally friendly. Citizens seemed to prefer financial incentives for such waste disposal methods. RVMs

can increase availability and pro-environmental behavior, especially among the younger citizens^[6].

Core Findings	Details	Literature Sources
Plastic Waste Generation	India generates about 5.6 million TPA of plastic waste, which is about 15,342 TPD.	[1]
Recycling Solutions	Plastic waste in the ocean is expected to outweigh marine life in the next 20 years. Despite efforts to reduce plastic consumption, recycling seems to be the most viable option.	[2]
Challenges in Recycling	Citizens' lack of awareness or interest in recycling is a challenge. This can be addressed by various recycling programs and education.	[3][4]
Attitudes Toward RVMs	Qualitative research shows positive attitudes toward RVMs, which are viewed as user-friendly and environmentally friendly. Citizens prefer financial incentives for waste disposal.	[6]

Table 1: Summary of key points of key points in waste management and recycling

Shifting from Excess to Eco: Rethinking E-Commerce Rewards for Sustainability

The e-commerce boom has completely changed the shopping experience in the most unprecedented manner; we now have a wide variety of options that are easily accessible and convenient. Nonetheless, this ease has its own downside, being a serious environmental liability. The protective packaging materials, mostly plastic, used for ensuring the safety of goods during their shipment result in an unusually high generation of waste. The plastic waste takes hundreds of years to biodegrade, posing a considerable danger to our ecosystems and animals.

Again, the pervading culture of consumerism today, which can be attributed to the convenience brought about by online shopping and tempting discounts, is also part of the problem. An issue that demands immediate attention is how buying more, using more, and as a result producing more waste has become a cycle.

Freebies and huge discounts on prices are some of the strategies used by e-commerce websites to attract and retain clients. This approach might work well in driving sales; however, it promotes excessive consumption and contributes significantly to the waste problem. Also, this may lead to a business model that is not viable in the long run, and, as such, irresponsible consumer actions.

This strategy is based on a change, but instead of giving price cuts and free promotions to all consumers irrespective of their actions, online stores can offer rewards to customers who perform sustainable practices. These include earning discounts by depositing plastic waste at an RVM or participating in other sustainability activities such as tree planting.

Instead of just offering discounts and freebies, this proposed system would make e-commerce websites focus on sustainable practices. A partnership with Reverse Vending Machines (RVMs) could actualize this idea. RVMs are automated machines which take Plastic bottles (PET bottles), Aluminum cans, Glass bottles Beverage cartons (Tetra Pak), Metal containers, etc. And on behalf it gives out a certain amount of money or vouchers in return.

Customers would be encouraged to deposit their plastic waste into the nearest RVM under this system. Once they have deposited their plastic waste, customers would receive a receipt from the RVM that has to be taken to an e-commerce website.

After the proof of purchase has been verified, the e-commerce company will then offer them a discount on future purchases. The discount could also be given depending on the amount of plastic that is recycled as it may encourage people to recycle more.

This essentially turns recycling into an online shopping currency; thereby incentivizing recycling and responsible disposal practices while at the same time promoting sustainable consumer behavior. By linking sustainability practices with discounts, this proposed system could completely change the way that online commerce operates, making it eco-friendly. If implemented, this concept could be a significant change in promoting sustainability in the e-commerce sector.

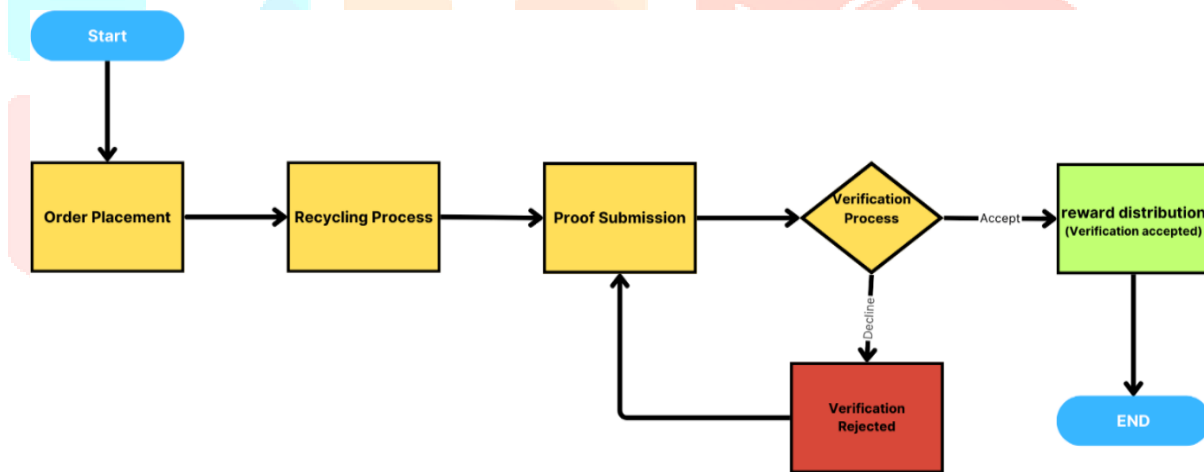
Methodology

i. Order Placement

Orders can be placed by the consumer visiting the e-commerce site to buy products of their choice. Upon confirmation of the order, the packaging slip will have a unique verification code that will be inserted into the delivered package.

ii. Recycling Process

Upon receiving the purchased product, the buyer then travels to their nearest Reverse Vending Machine (RVM) and puts a specified amount of plastic waste into it. The quantity of plastic that will have to be deposited depends on the nature of the discount announced by an e-commerce website. By providing a geo-location-based mobile app or website feature, this process can be streamlined by showing where RVMs participating in such programs are located. After making use of the machine for the deposition of plastic waste into RVM, one will receive a receipt with all necessary



details.

Figure 1: E-commerce RVM Recycling Program Interactions

iii. Proof Submission

The consumer takes a detailed image of the receipt that includes all details that need to be captured. The customer then submits the photograph of the bill and the photograph of the verification code, using either an e-commerce site mobile app or a special program participant's web page.

iv. Verification Process

A two-factor verification system is implemented by the e-commerce website. For RVM participation verification, the system checks whether the identification number on the receipt originates from an RVM that is part of the

program's network. In turn, the unique verification code found on the packaging slip (available in the uploaded receipt photo) is compared with order details recorded in the e-commerce website database. By doing so, it can be confirmed if a customer who performed recycling activity is also the person who actually placed an order.

v. Reward Distribution

After successful verification of both factors:

The e-commerce website will automatically apply either a discount or points (whichever scheme has been chosen) to their customer account for their next buying round.

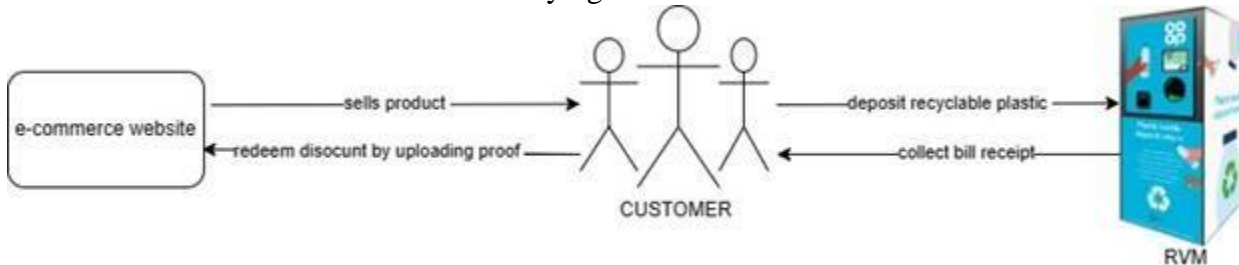


Figure 2: Customer Participation in E-commerce RVM Recycling

Benefits of Recycling Technology

The usage of a reverse vending machine to help dispose of waste correctly provides monetary gains or other rewards, which are one of the incentives that people expect when performing waste management activities. It also promotes the idea of recycling and, in turn, helps in disposing of waste in the right manner. An RVM also aims to provide a convenient and easy disposal method by just inserting the material(s) inside. No added efforts need to be put in.

The machine has incentives and ease of use for citizens to actively engage and participate in managing waste. There is another advantage that is the core principle of RVM implementation, which is to help protect our environment through such practices as recycling and proper disposal of waste.

Challenges

When it comes to RVM standardization, automated verification processes could run into obstacles if there are no standardized RVM receipt formats maintained by different operators. Data sharing agreements: E-commerce companies' collaboration with RVM operators might involve data-sharing agreements that could give rise to privacy issues. Regarding availability, it is not the case that RVMs can be found everywhere; only a few countries have them, and none among developing countries possess RVMs.

Challenges	Description	Potential Solutions
RVM Receipt Standardization	Inconsistent receipt formats across different RVM operators may hinder verification	Collaboration between e-commerce platforms and RVM operators to establish standardized formats.
Data Sharing Agreements	Sharing RVM data raises privacy concerns	Implementing secure data sharing protocols and ensuring transparency about data usage.
Limited RVM Availability	RVMs are not yet widespread and are not available everywhere particularly in developing countries.	Promoting and partnering with RVM manufacturers to expand accessibility globally, potentially through government policies, public awareness campaigns, or incentive programs

Table 2: Challenges and Solutions for Effective RVM Implementation with e-commerce

Conclusion

Thus, the suggested solution could bring change in the e-commerce industry with respect to sustainability. By partnering with Reverse Vending Machines (RVMs), e-commerce platforms can motivate recycling, which will help establish responsible waste management strategies among customers. This new and innovative approach deals successfully with the most hazardous environmental issues – the generation of plastic waste in e-commerce and serves as a reliable and real mechanism to address it.

The method and process established in the research paper can help establish a concrete framework for order placement and reward distribution for the suggested solution. E-commerce websites can verify, using a two-factor authentication process, whether the recycling is valid or not and provide proper rewards to customers accordingly.

The idea of offering reduced prices on future purchases to motivate recycling has been designed to encourage responsible consumer behavior. This approach also suggests breaking away from the dominant gift-giving and indiscriminate discounting culture that is one of the reasons for large consumption and consequently high waste generation.

Overall, sustainability-promoting factors can be found in the suggested approach and are potentially meaningful. This idea, by attaching discounts to environmental efforts, can stimulate the development of responsible consumer behavior and be a part of the reduction of the plastic waste crisis. In conclusion, it is apparent that if this novel methodology is carried out prudently, it could serve as a blueprint to promote sustainability across other sectors.

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