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THE ECONOMICS OF DEPOSIT-REFUND SYSTEMS: EXPLORING THE MARKET-BASED ENVIRONMENTAL POLICIES TO SUSTAIN THE ECOLOGICAL BALANCE OF DHAKA CITY

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Abstract

Bangladesh was not familiar with the uses of plastics as containers a few decades ago. However, in recent years, particularly its large cities like Dhaka have experienced a widespread and growing use of plastic products that posits the threat to pollute the environment as well as creates health hazards and hinders sustainable development. Furthermore, the unscrupulous traders who refill thousands of empty plastic bottles with unclean tap water make the situation worse. The country needs some adequate steps to restore and sustain the ecological balance and before taking any initiative it is imperative to explore the measures that the developed countries have employed to manage their plastic bottle disposals effectively. The Container-deposit legislation (CDL) is a widely used initiative that entails a series of financial refund on smooth-drink, juice, milk, water, alcohol-beverage, and other reusable packaging at the point of sale. When the bottle or container is returned to an authorized redemption center, or to the unique vendor in a few jurisdictions, the deposit is partly or fully refunded to the redeemer, presumed to be the unique purchaser. The study explores different schemes that the North American countries, European and the Scandinavian Nations have adopted, identifies the problems they faced, analyzes the present condition of Dhaka city and attempts to explain how and why the legislation need to be implemented in Bangladesh.

Key words

Plastic Bottles, Environmental Hazards, Deposit-Refund System, Container-deposit legislation, Dhaka

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INTRODUCTION

Dhaka, the eleventh largest and one of the fastest growing megacities, has millions of population who uses trillions of plastic bottles in a year (Demographia, 2015).The city, as like most of the densely populated metropolitans, faces tremendous challenges to manage the waste. Not surprisingly, the ever increasing, widespread usage of the plastic bottles of the city dwellers impediments to promote a healthy environment. Hence, environmental concerns have been raised, and necessary steps need to be taken to reduce the environmental hazards. 'Recycling' for sure, would be the best way to ensure the reduction of this risk as because plastics are non-biodegradable. However, getting the disposed bottles at the recycling plants poses challenges itself. The problem lies in the management, because the residents of Dhaka city are not very much familiar with the process of recycling and do not have a habit to care much about waste disposals as well. Plastic is undeniably a fantastic products due to their lightweight, relatively low production and transportation costs, and their superior resistance to breakage (Barett, 2015). Usage of plastics, for that reason, cannot be stopped, or even reduced. Further, the task would not be easy as people are not used to it and developing a habit that is not part of culture often requires extreme measures. One of the effective ways of making people do something is to encourage the people with some monetary benefits in return and include the act as part of legislation. Essential initiatives to get the used and disposed water bottle to the recycling need to be explored and the impediments need to be identified. Therefore, the first and foremost task is to analyze what are the measures that the developed countries have taken to manage their plastic bottle disposal effectively.

One of the fundamental and widely applied legislation acts is Container-deposit legislation (CDL) that entails a series of financial refund on smooth-drink, juice, milk, water, alcoholic-beverage, and other reusable packaging at the point of sale. When the bottle or container is returned to an authorized redemption center, or to the unique vendor in a few jurisdictions, the deposit is partly or fully refunded to the redeemer, presumed to be the unique purchaser. Deposits that are not redeemed are regularly used via the governmental entity involved to fund environmental packages. Every now and then, they may be used to cowl the costs of processing back the containers. The inherent problem of littering 'PET Bottle' or 'Can' which has adverse environmental impacts, is a consequence of moral hazard as people can dispose of the waste safely which is costly for them or can dump it illegally, which is costly to the society and also difficult to monitor. Taxing waste disposal will encourage illegal dumping. A potential solution is subsidizing proper (& verifiable) disposal. Nevertheless, a subsidy will encourage waste generation. A solution to this dilemma is to tax waste generation and subsidize waste disposal. The size of the deposit should be determined by the social cost of the product when disposed of illegally. The optimal level of subsidy would be set equal to the benefits of illegal dumping (Kolstad 2000, 200-202). First, the study explores different schemes that the North American countries, European and the Scandinavian Nations have adopted and identifies the impediments that they have faced. Second, the present condition of Dhaka city regarding the PET bottle refund is examined. Third, remarks of different scholars regarding the legislation are analyzed. Finally, the study concludes how and why the legislation needs to be implemented in Bangladesh.

DISCUSSION

Perhaps, 'A & R Thwaites & Co' in Dublin, Ireland, introduced in 1799 the provision of artificial "soda water" and for every dozen bottle refunded, they were paying 2 shillings. 'Schweppes' that still became in the enterprise of artificially made mineral waters had a similar recycling coverage approximately 1800, without any legislation (Chandler, 1997). Scottish bottled beverage businesses also voluntarily brought the sort of scheme to encourage the return of their bottles for reuse. In Sweden a trendy device for deposits on bottles and recycling changed into installed in 1884, finally with the aid of law. The popular demand for a deposit on aluminum cans to reduce littering in the nature caused law in 1984. In North the use, British Columbia's legislated deposit-go back system, enacted in 1970, is the oldest such procedures in North America (Chandler, 1997). In the USA, the major application of such refundable deposit has been in the form of state-level Bottle Bills to reduce litter from beverage containers and improve the quality of environment (through better waste management). Eleven states (Oregon, Vermont, Maine, Michigan, Iowa, Connecticut, Delaware, Massachusetts, New York, Hawaii and California) have such bottle bills. Deposits range from $.05 to $.15 per container. Oregon was the first state to introduce this system in 1972 while Hawaii was the last to join the line in 2005. The program can be voluntary or mandatory. Voluntary schemes became almost nonexistent after the advent of disposable containers. However, despite the early fervor of the 1970s, there is only one new state adopting it in the last 20 years. Some states have introduced the deposit-refund systems to promote lead-acid battery recycling. Usually the containers are returned to retail outlets or 'redemption centers'. If containers are in the retailers' product line, generally they take it back regardless of the location of purchase. In Maine, this led to more than 100% redemption for some products (EPA 2001, 57-66). Mandatory handling fees can generate profits for retailers/centers whereas distributors can retain the unclaimed deposits. Though adequate information is not available, empirically there is evidence that bottle bills have been successful to some extent especially in litter-reduction and in promoting recycling. In Michigan, after one year of implementation, return rate of containers was 95% (Porter, 1983). In Oregon, there was evidence of littering reduction and long-run savings in waste management costs (GAO, 1990). According to Wellman, Inc. (1994), the percentage of PET containers recycled in 1993 was above 70% in states with Deposit-Refund systems whereas the corresponding national figure was 53%. In addition, as GAO (1990) pointed out, more than 80% of USA's recycled glass came from those 10 states, which is disproportionately higher when compared to their share in total population.

Two different territories of the Canadian provinces have their own deposit refund system. They categorize the bottles or can depending on its size and the materials it contained such as alcoholic or non-alcoholic. Ontario's scheme for deposit refunds for beer bottles operates through the 'The Beer Store' that are owned by three international beer-making companies namely Labatt, Molson and Sleeman (Coutts, 2010). These returned bottles can be used up to 20 times. Some of the stores as such purchase returned wine bottles as well, but those are not re-used but recycled. The system does not offer any return benefits for non-alcoholic beverage containers like water bottles. The programs in other provinces vary, such as in Manitoba, merely beer containers are considered for deposit with a rate of 10¢, whereas other non-dairy containers are consigned a non-refundable 2¢ per unit. These are often recycled under the municipal curbside recycling programs. In Quebec beer and carbonated soft-drink containers are charged deposits up to 20¢ depending on the size, material and content of the container. Alberta State offers up to 10¢ to all beverage containers, such as glass or plastic bottles, jugs, metallic cans, Tetra-Packs, bags-in-boxes, gable-top cartons,

or even drink pouches (Jørgensen, 2011). Most of the provinces charge deposits on beverage containers, but not for milk and dairy products containers. The territory of Nuavut does not have any refund system.

The Southern part of Australia has a refund policy of giving 10 cents per can or bottle. Northern Territory introduced it in 2012, however due to a dispute with Coca-Cola Amatil, the policy was cancelled in the following year. Later, the NT government stepped in to sustain the system going until immunity to the Mutual Recognition Act ensured. This immunity was ensured on August 7, 2013, holding the CDL effectual over again and this time unchangeable (Tilley, 2015). The state of New South Wales has annunciated the beginning date of a state based system embarking on July 2017. The Queensland authority has indicated its firm support for schemes as such as well. Eighty-five percent of the Australians support the Container deposit legislation. However a national scheme has been delayed mostly due to unveiled threats from the beverage industry (Tilley, 2015). With 8 billion beverage containers land-filled or cluttered annually in Australia, proponents indicate that it is the best way to cut down such litter as well as improve recycling system.

Germany has container deposit legislation, called 'Einwegpfand' (single-use deposit). Although, the German lobby groups of bottling industry and retailers opposed its execution, the protest was unsuccessful and the legislation was passed in 2003 (Cantner et al., 2010). The deposit legislation does not cover containers for fruit juice, milk-products, and some dialectical beverages and even for some alcoholic containers like wine, spirits and liquors. The standard deposit for the single-use containers such as the cans, single-use glass and plastic bottles is € 0.25. Shops accept return merely the single-use containers. Most of the supermarkets have a reverse vending machine configured to be used by customers. The machines scan "Pfand" returns and give back a print receipt to the total amount of the items given that can be en-cashed. However, supermarkets near the Danish border exempt the Scandinavian residents from the "Pfand" by an "Export declaration". In Hungary, wine, beer, and standardized liquor bottlefuls offer a deposit; the beer bottles have 25 Forints, but the trader decides the deposit value for wine glasses and liquor bottles. Only few supermarkets like Lidl, Auchan, Tesco or Interspar have the reverse vending machines that take back the PET bottles and metal beverage containers. However, the monetary value of the return often not enough to inspire the people to re-vend these containers. There has been a universal deposit and recycling system operating In Republic of Estonia since 2005 (Fullerton & Wolverton, 1997). Due to so-called "alcohol tourism" a noteworthy number of beer cans and bottles are brought to neighboring Finland permanently (Alavaikko & Österberg, 2000). Around 2011, a donation buttons was introduced to show the deposit amount given to a charity has created a remarkable success as well. The Fijian Government in 2011 has approved two different the Environment Management regulations, namely 'Waste Disposal and Recycling Regulations 2011, and 'Container Deposit Regulations 2011' (Norrman & Soori, 2014).

Deposits upon beverage containers have a long history in Norway, starting with deposits on beer bottles in 1902. This deposit arrangement was later expanded to the soft drink bottles. Machine-controlled recycling of bottles has been used in Norway since the 1970's. The selling of aluminum beverage cans was prohibited up until the 'container deposit legislation' was passed in 1999. Norsk Resirk, a non-profit system founded in 1999 by various organizations in trade and industry, begin to handle the depositing and recycling non-refillable plastic bottles and beverage cans (Eik & Brekke, 2003). The system connotes that the return of disposable cans or bottles will drop-off the amount of tax. This system brings remarkable success; 93 percent of all recyclable bottles and 80 percent of all drink cans returned into the deposit and recycling system in 2005. Up until 1 January 2001 the *Vinmonopolet government* wine and spirits monopoly chain had deposits on products that are made only by the company itself (Jørgensen, 2011). Today, all sellers of deposit marked drinking containers are legally bound to accept returns of empty containers and need to pay back in cash. There are more than three thousand reverse vending machines where drink containers can be exchanged for revenue that can be en-cashed at the counter. Like Norway, the selling of aluminum beverage cans was also forbidden in Denmark up until the European Union law enforced to form the 'container deposit legislation' in 2002.

In Sweden, nearly all containers for consumption-ready beverages are returned due to the system administered by a company named 'AB Svenska Returpack'. A glass bottle recycling system was introduced in 1884 and the bottles were first standardized in 1885. Although, the aluminum cans have had a deposit since 1984 and PET bottles since 1994, but until 1998, due to the monopolistic attitude of the Systembolaget, the government owned alcohol retailer and the discriminatory position towards the competitors, no successful deposit system was formed (Tojo, 2011). The bottles could be returned and deposit refunded at Systembolaget until 1999. The regulation was updated in 2006, indicating that containers from other plastics and metals can be included in the deposit systems and it would be illegal to sell consumption-ready beverages in containers that are not authorized. However, private importations from primarily the Eastern European nations without deposit hamper the policy. The recycling of these contraband cans has been low. Hence, the Returpack made a campaign in 2010 offering 0.10 SEK for each imported can without deposit. In 2011, a similar campaign was repeated, retrieving almost 18 million cans. Non-deposit glass containers

are gathered up in heavy glass garbage bins, for clear or colored glass, located mostly in urban areas. Although Sweden is among the leading nations in recycling of beverage containers, Returpack uses TV commercials to promote more recycling (Tojo, 2011).

Bangladesh was not familiar with the uses of plastics as containers a few decades ago. However, in recent years, particularly its large cities like Dhaka have experienced a widespread and growing use of plastic products that posits the threat to pollute the environment. Further, it creates a tremendous health hazard and financial problems for different reasons. Unscrupulous traders refill thousands of empty plastic water bottles that are used and thrown to the garbage. Those traders fill these with tap water and fasten a fake security seals in order to sell them commercially. Everyday between three and five thousand empty bottles are purchased from garbage collectors, and the each 'flawless' bottle can be sold up to TK 0.30 each (Haq, 2015). After filling with tap, unclean and not pure water, the bottles are wrapped with transparent plastic sheet and put in boxes, just like the original manufacturers to look exactly like the original ones. Hundreds of such counterfeit water bottles are being distributed mostly at social gatherings, family festivities, retail shops and public meetings as to remain unnoticed. Where the original producers are losing financially as the fake products are distributed at almost half of the actual product price, the consumers may also lodge complaint against the original producers if they felt health problem. The brand name of the company can also be spoiled since the bottles carry the company labels. Undoubtedly, this booming illegal trade of fake mineral water is posing a major problem to business as well as creating health hazard and the concern authorities are very often reluctant. If the situation is as such, the concern authorities or the related business corporations need to take some initiatives to prohibit it. Steps can include (a) establishing the reverse vendor machines, (b) offer some deposit motivating enough to ensure the return of bottles after use, (c) make TV commercials to damage the plastic bottles as much as possible to make it unusable further, (d) produce the bottle that cannot be reused or (e) prepare the security seal as such that cannot be counterfeited.

The rational for undertaking any solid waste management program should be based on the benefit-cost analysis. EPA (2001, 57-66), Stavins (1998, 14-18) and Pearce and Turner (1992, 22-29) provide extensive analyses of such programs. The program should only be ventured if benefits outweigh costs. Also the economically efficient level of activity is determined by the equality of marginal benefits and marginal costs. A Deposit-Refund system should be evaluated on the basis of – its credibility and compatibility, administrative and compliance costs, consumer inconvenience (due to price increase, transaction cost), if regressive or not, if generates revenue etc. (Pearce and Turner 1992, 22-29). However, lack of sufficient information makes it very difficult to assess the deposit-refund system. Potential benefits of the program include reduction in household trash collection, less curbside recycling, less landfills and higher aesthetic values. Most of the benefits are indirect and are difficult to measure precisely. Often the bills treat all containers equally regardless of the types of materials thus providing no incentive for consumers to purchase containers that have the minimum product life cycle. Within the container market, the program may have distortionary impacts and may provide incentives to purchase containers that are less recyclable, for example, purchasing metal containers instead of plastic containers. In addition, it may cause competitive disadvantage for small retailer relative to large retailers. A Deposit-Refund system makes other alternative like curbside programs less viable (in terms of resource availability and cost-effectiveness). More importantly, the program involves transaction costs, as consumers are required to return containers to the collection center. Consumers bear the cost of deposit until they return the containers. Cost of implementation of the system is also higher due to infrastructure and labor requirements (collection centers and collectors) which may rise because of additional costs related to administration, monitoring, information circulation etc.

Empirically there is limited evidence that the Deposit-Refund programs are efficient and cost-effective. According to Ackerman et al. (1995), in the states with bottle bills, the average administrative cost per container is $.023 ($300/ton for steel containers and $1300/ton for aluminum cans) which is substantial. Pearce and Turner (1992) argue that if the observed price rise was resulted from the increased cost of real resources, the Michigan Deposit-Refund system cannot pass the benefit-cost analysis. Sjolander and Chen (1989, 24-34) found that Mandatory Beverage Container Deposit Legislation was having negative influence on beer consumption/sale. They attributed it partly to the consumer inconvenience and the observed increase in price (equal to the deposit). Calcott and Walls (2000, 233-237) argues that disposal fees can provide incentives for efficient 'design for environment' only if the recycling market is fully functioning and in real world the disposal fee is unlikely to generate the socially optimal outcome and also the system doesn't send signals to producers to shift to more recyclable products. As Stavins (1998, 14-18) has argued, the Deposit-Refund systems may be more appropriate if the goal is to reduce illegal disposal or to increase recycling and if the difference between the clean-up costs with or without the program is substantial. When compared to curbside recycling programs, under the deposit systems, material return is higher and contamination is lower but such programs are usually more costly to administer (EPA 2001, 57-66). However, some evidence suggests that disposal cost may be lower if both a bottle bill and a curbside collection program were in action (McCarthy, 1993).

Mainly due to high transaction cost, it is difficult to make a case for the Deposit-Refund programs. Hence, an extensive benefit-cost analysis should be carried out before introducing the program. It is important to study the market-share of the refillables and the policy's advantages or disadvantages compared to the existing systems or to other potential alternatives. States with deposit systems usually have higher market share for refillables. For nine deposit states, excluding California, the un-weighted average for refillables' market share was three times the national average (McCarthy, 1993). The Deposit-Refund system is likely to be less appealing if there is large number of market operators. Convenient cross-border shopping would make the system less effective. If neighboring Virginia and DC do not adopt the policy, introducing it in Maryland may induce consumers to make purchases outside of Maryland. In addition, the deposit should be clear and there should be no distortionary impact. It is unlikely that a Deposit-Refund system would meet all these criteria and pass the B-C analysis. In 1974, though the system was considered by the Council of Governments, the jurisdictions did not pass deposit legislations. It is comprised of Washington DC and its adjacent counties in Maryland and Virginia. The 1986-87 DC bottle bills initiative also failed.

CONCLUSION

If we compare the system with a program where consumers voluntarily bring containers to pick up stations, the relative advantage of a policy would depend on the transaction and administration costs and incentives involved. In general, the performance of a Deposit-Refund system would be better if the deposit is different for different types of containers. In countries with federal system, many of the products are nationally marked and people buy them out-of-state but return them in state. This can be avoided by a proper marking of products. However, for Bangladesh, this will not be a problem as the country has a unitary government system. Again, any adjustment to the system that would reduce the inconvenience would make the system more viable. This Deposit-Refund system is a market-based (economic-incentive) policy instrument aimed to promote socially desirable environmental outcomes. Though the mechanism can vary across products/states, the basic framework underlying the system is that consumers pay a surcharge when purchasing potentially polluting (if discarded directly into the environment) or potentially reusable products, and receive a refund when returning the product to an approved center (for recycling or disposal). It will encourage recycling and supplement current curbside recycling packages, to reduce energy and material utilization for containers. It will help to reduce beverage field muddle along highways, in lakes and rivers, and on other public or private residences (where beverage field litter happens, a nominal deposit affords an monetary incentive to smooth it up; this is in reality a good sized supply of income to a few terrible people and non-income civic organizations). It can be expected that the usable lifetime of taxpayer-supported community or nearby landfills will be increased and there would be less chances of glass lacerations to the kids and animals. Further, the law is designed to not to depend upon business entities for recycling, since the commercial pastimes can oppose the recycling for various reasons, even though they'll have an incentive to lessen the packaging value, and voluntarily, like by means of opposition, introduce money back for recycled bins. Moreover, the refund policy can be much simpler, such as no refund without new purchase.

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