Plastic Use Among Sri Lanka's Metropolitan Population: A Study of Environmental Consciousness and Behaviour

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Abstract

This study seeks to evaluate customers' purchase and disposal patterns for plastic and polythene and whether their environmental consciousness matches with actual behaviour. Data were collected from 117 households in metropolitan areas in Sri Lanka and analysed using descriptive statistics and paired sample t-test. Before data analysis, the scales' reliability and validity were evaluated. Findings showed a significant gap between actual behaviour concerning plastic consumption and environmental consciousness. Although most customers have positive opinions regarding environmental awareness, these beliefs have not necessarily converted into the corresponding behaviour to the same degree. As per results, 39% of the respondents burn their waste, including plastics, in open, while 4% have engaged in open dumping. The findings of this study can be taken into consideration to minimize the harmful effects of plastic and polythene disposal behaviour in Sri Lanka through an understanding of consumers' actual behaviours. Especially relevant authorities shall initiate awareness campaigns and proper garbage disposal systems.

Keywords: *Plastic and polythene consumption, Environment consciousness, Behaviour, Behaviour attitude gap*

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Background of the Study

When considering Sri Lankans' historical dependency, people mainly depend on plants and animals for basic needs such as clothing, shelter, food, and water. Developments in technology, changes in culture and society, complicated lifestyles of people, and increasing needs led humans to manufacture and consume artificial products such as plastics. Consequently, plastic and polythene became essential in modern life. People tend to use cheap single-use plastics instead of clay, glass, metal, leather, etc. (United Nations Environment, 2018). However, this significant increment in global plastic and polythene consumption results in a global environment and waste crisis (Alam, Billah, and Yajie 2018).

The global population consumes five hundred billion to one trillion plastic bags annually, ten million plastic bags per minute. Consumption of plastic bags in one hour is enough to wrap around the earth seven times (United Nations Environment, 2018). On average, eight million tons of plastic enter our oceans (World Wide Fund (WWF) 2020). The increasing consumption of single-use plastics and polythene caused an increase in plastic and polythene waste generation. It was identified that 36% of total plastic and polythene production had been utilized for packaging purposes and a significant amount of packaging caused plastic and polythene leakages to the environment (World Wide Fund (WWF 2020). If the current pattern of plastic consumption continues, in 2025, 12 billion tons of plastic litter will end up in landfills and the environment (United Nations Environment, 2018). Countries with developing economies suffer more from the high volume of plastic and polythene waste generation (Menikpura, Gheewala, and Bonnet 2010).

The mismanagement and increasing consumption pattern of plastic caused severe damage to human health, the well-being of living species, the environment, air, water, and biodiversity (Dumbili and Henderson 2020). Those environmental problems need to be addressed at the individual level by developing, changing and creating environment-friendly behaviour among the public (Desa, Ba'yah Abd Kadir, and Yusooff 2011a).

Sri Lanka also maintained a similar pattern concerning the daily waste deposes, the same as other developing countries. As per the Central Bank statistics, a significant increment in plastic importation to Sri Lanka is noted (Central Bank of Sri Lanka 2019). Further, Sri Lanka has been identified as the fifth-highest country, mismanaging plastic and polythene waste and contributing to marine pollution (Tibbetts 2015). Thus, the high consumption of plastic and polythene became a national issue in the context of Sri Lanka. Polythene and plastics are essential useable products in Sri Lankans` daily routines (Palugaswewa 2018). However, this extremely high rate of consumption creates multiple negative externalities (Alam et al. 2018).

Currently, most countries in the world pay attention to reducing plastic waste and sustainable solutions for this excessive plastic and polythene consumption (Dilkes-Hoffman et al. 2019). Consumers play a considerable part in determining the consumption volume and disposing of plastic and polythene. People tend to change, modify or adapt their behaviours based on their changing needs and interests (Desa et al. 2011a). Changing human behaviour into plastic and polythene reduction/avoiding behaviour requires considerable time and more effort (Van et al. 2021). Educating people through written methods is identified as insufficient motivation for change. The help of the public, a high level of involvement, and the willingness to reduce plastic and polythene from the community are essential (Bandara 2010). Individuals who are highly knowledgeable and confident in their expertise have a more favourable

attitude toward recycling and reducing (Abdullah et al. 2022).

In order to provide an effective and practical solution for this issue, it is compulsory to identify the consumers' behaviour along with green attitudes. Through this study, it is intended to contribute towards developing adequate communication and governance strategies to reduce plastic and polythene waste pollution in Sri Lanka.

Numerous studies have been conducted to investigate consumer perceptions of pricing, quality, risk, and promotional strategies. Yet, we have limited knowledge about consumers' green attitudes and how these may impact their green consumption behaviour, either directly or indirectly (Johnstone and Tan 2015). Further, it is significant to note that, most of the studies concerned with the identification of attitude and consumer behaviour gap are performed focusing on developed countries (Dwiyanti and Jati 2020).

Conversely, in developing countries, the number is remarkably minimal, and it's abundantly obvious there is quite an extensive research gap in identifying consumers' environmental consciousness affecting the consumers' actual behaviour in day-to-day usage of eco-friendly products in Sri Lanka. Furthermore, it was noted that there have not been performed sufficient studies in the perspective of Sri Lanka.

Thus, the purpose of this study is to address a research absence by looking into whether environmental consciousness is aligned with consumers' actual behaviours and to obtain an understanding of plastic and polythene consumption and disposal behaviour.

However, even though most consumers hold positive attitudes towards reducing plastics, attitudes appear not to translate into respective behaviour to the same extent. Not all customers want to be sensitive to the environment. Some customers may be hesitant to buy sustainable items due to various concerns (Khan et al. 2020). Though there is evidence that customers value environmental and sustainability concepts, less than 5% of purchases represent this attitude (Davey 2021). Despite consumers' positive attitudes about the environment, and their growing environmental consciousness, several studies have revealed an inconsistency between green attitudes and behaviour (Pickett-Baker and Ozaki 2008). This issue is commonly referred to as attitude–behaviour gap. Regardless of how positive customers' attitudes toward the environment are, maximising self-interest has been demonstrated to outweigh the cost of cooperating. Various constraints and competing needs, such as the physical surroundings of a business, consumers' moods, the time of day, and so on, hamper consumers' behaviour (Johnstone and Tan 2015).

Therefore, the objective of this study is to understand the attitude toward plastic consumption and the actual behaviour of consumers in Sri Lanka. Particularly, whether their behaviour is reflected through their attitudes or whether there are any gaps. It would help to develop national-level strategies and take action to reduce plastic and polythene consumption by Sri Lankan consumers by obtaining a proper understanding of their actual behaviour.

Literature Review

Plastic Consumption

Polythene and plastic are the most commonly found non-degradable solid waste in Sri Lanka (Kariyawasam, Madhuwanthi, and Wilson 2019). Plastic and polythene can be classified as lightweight, sanitized, and resistant material forms as a by-product of the petrochemical industry, which is utilized for a wide range of purposes (UNEP 2018). The highest consumption of plastic and polythene is related to the packaging industry at micro and macro levels (Kariyawasam et al. 2019). One reason for increasing plastic and polythene consumption is the adaptation of

plastics to make life comfortable (Paterson 2019). Plastic and polythene items can be referred to the items manufactured by using polyethylene, terephthalate, high-density polyethylene, low-density polyethylene, polyvinyl chloride, polypropylene, polystyrene, biodegradable plastic, or any other similar raw material or any mixture (Gazette 2021).

Most of the productions relating to plastics and polythene are only designed for single-time usage, which causes significant adverse externalities to both environment and animals. Many contemporary products made out of plastics and polythene are not essentially to made out of plastics (United Nations Environment, 2018). The highest consumption of plastic and polythene can be noted relating to the packaging industry at micro and macro levels (Kariyawasam et al. 2019). Due to the inherent advantages of plastics, such as low cost in the manufacturing process, easiness of the manufacturing process, ability to use for multiple purposes, and versatility, plastics almost become 15 percent of urban waste. It was identified that the countries had successfully managed only 9% of the total world plastic waste (UNEP 2018).

Most plastics and polythene do not biodegrade but instead slowly photodegrade. Plastics are not just one material. Plastics and polythene are a family of hundreds of different materials with a wide variety of properties. They are constructed to achieve the needs of every single application in the most efficient manner. It takes thousands of years to decompose (especially the polystyrene form refers to as Styrofoam) when dumped into soil or water. However, multiple usages and consumption requirements create diverse waste streams (Hahladakis et al. 2017). Thus, it is vital to follow a standard method in disposing of plastics (UNEP 2018). Having mere knowledge about the environmental consciousness of consumers is not sufficient but identification of actual consumer behaviour is vital for implementing effective solutions.

Plastic Consumption in Sri Lanka

Excessive plastic and polythene consumption became a critical issue in Sri Lanka. Proving it, Kaluarachchi (2020) said, Sri Lanka generates around four hundred metric tons of plastic waste per day. Moreover, 90% of plastic waste is identified as single-use plastics that are used for packaging purposes (Central Environmental Authority, 2014). Moreover, the plastic consumption rate per capita of Sri Lanka is comparatively high compared with the other developing countries. The consumption rate of plastic maintains a positive relationship with the living standard and the strength of the country's economy (Palugaswewa 2018).

Sri Lanka ranks within the top ten countries that polluted the environment due to excessive plastic and polythene usage and waste mismanagement. The existing state of excessive consumption creates a significant impact on wild species and human health precautions, and the country`s economy (Gunawardana and Basnayake 2009; Hikmath and Arachchige 2020). Ninety percent of waste is openly burned or disposed of in a way of harms the environment (Arachchige et al. 2019). Open-air burning of plastics, especially PVC, caused toxic fumes to be released into the air, which caused severe negative externalities such as air pollution and lung cancer (Center for Environmental Justice 2019). All the uncollected household waste by the municipal council (non-collection areas) in the rural areas has been burned (Wijerathna 2013). Continuous leaching of non-biodegradable plastics caused a block of water flow and unfertile agricultural soil (Alam et al. 2018). Moreover, it is caused to transfer toxic chemicals into human and animal tissues eventually by entering a food chain. Further, wild animals such as elephants, cows, deer, Samba deer, wild boar, cattle, dogs, and sea animals like dolphins and turtles suffer from adverse externalities

due to inappropriate disposal methods (UNEP 2018).

As per the Socio-Economic information of the Central Bank of Sri Lanka, the manufacture of rubber and plastic products has gradually increased from 71,909 million to 83,009 million from the year 2014 to 2019 (Central Bank. of Sri, 2020). Even though no significant increase was identified in the total export earnings related to the rubber and plastic industry for the period from 2014 to 2019 (Central Bank of Sri Lanka 2019). It is noted that the import of plastics and other articles has been recorded at $ 928mn in the year 2019. There is a $ 664mn increase in the imports of plastic and rubber compared to the year 2000 (Alex 2021). Further, 70% of the total importation of plastic and polythene has been locally consumed (Palugaswewa 2018). Sri Lanka has imported around 160,000 metric tons of raw plastics and 100,000 metric tons of intermediary or final plastic products to Sri Lanka (Kaluarachchi et al. 2020).

Single-use items, short-live plastics, and polythene are identified as the types of plastics consumed in high volume (Paterson 2019). Mostly use sterilized plastics to reduce cross-infection, maintain hygiene, and control disease. Thus, plastic consumption cannot be eliminated, but replacing it with durable, high-quality, and cost-effective alternatives can reduce the consumption volume of plastics and polythene (Paterson 2019).

Plastic consumption varies based on lifestyle and income level. As per Paterson (2019), consumption patterns and trends have been associated with traditional and cultural perspectives. Extreme household plastic and polythene consumption were identified as the primary source of plastic and polythene waste in Sri Lanka (Gunarathna., N.J.G.J. Bandara, and Liyanage 2010).

Efforts in the Reduction of Plastic and Polythene Consumption

Most developing countries' solid waste composition is biodegradable waste (Dhokhikah and Trihadiningrum 2012). Solid waste in Sri Lanka has become a burden since late 1970. Small plastic packets (sachet) such as shampoo, toothpaste, washing powder, cosmetics, soap wrappers, instant food wrappers, yogurt cups, water bottles, and grocery bags became significant burdens when minimizing the daily consumption volume (Center for Environmental Justice 2019). 90% of plastic waste in Sri Lanka can be identified as single-use plastic or polyethylene used for packaging purposes. Urban waste became a huge problem compared to the waste generated from rural areas (Wijerathna 2013). The waste composition of the rural and urban areas is getting significantly different. 11% of rubber, leather, hard plastic, and soft plastic consist of urban municipal solid waste. 4% of rubber, leather, hard plastic, and soft plastic consist of rural municipal solid waste (Institute for Global Environmental Strategy & UNEP, 2020). The majority of the solid waste has been generated by the Colombo Municipal Council. Confirming that the urban areas generated more solid waste than the rural areas (Arachchige et al. 2019). Existing statistics of the daily solid waste collections by the local authorities are tabulated below (Central Environmental Authority 2015);

Table 01: Daily Solid Waste Collection Statistics

Local Authority	Quantity by a person (Kg/Day)
Colombo Municipal Council	0.80
Municipal Councils except for Colombo MC	0.75
Urban Councils	0.60

Pradeshiya Sabhas	0.40

Source : *(Central Environmental Authority 2015)*

However, it is identified that the relationship between consumption patterns and consumption volume, which should change, is complex and challenging to change (Paterson 2019). Sri Lanka has attempted to reduce and manage the volume of plastic and polythene waste and excessive consumption in various ways.

Projects and Strategies to Combat Consumption Volume

Sri Lankan authorities are mainly concerned with collecting municipal waste other than focusing on sustainable disposal procedures or effective waste management and recycling procedures (Wijerathna 2013). Mainly Sri Lanka has been attempting to implement the mechanical process of collecting garbage. However, multiple projects/ strategies can be identified as efforts to minimize plastic and polythene consumption.

National post-consumer plastic recycling project (NPCPRP) identified that the practical and straightforward project for waste treatment is crucial for effective waste management (Gunawardana and Basnayake 2009). The Ministry of Environment has initiated this project to address the required changes in the consumption patterns and disposal methods that have been practiced by consumers, which create harm to the environment. Imposing a tax of 1% on every plastic importation from 2017 and the contribution of particular tax income is considered an initial investment of the national post-consumer plastic recycling project.

To combat the plastic and polythene waste problem, it is noted the necessity of a technically feasible, economically viable, and socially acceptable mechanism (Dilkes-Hoffman et al. 2019). The adoption of reusable bags and biodegradable bags is a practical example that has been currently implemented by some of the supermarkets in Sri Lanka. The Central Environmental Authority had introduced Biodegradable products as an alternative to plastics and polythene. However, it was significant to note that only Four manufacturers have been identified as the recommended Bio-Degradable Manufacturers as per the registry (Registry of Recommended Bio-Degradable Product Manufacturers, 2021). Further, it was identified that biodegradable plastics promote by supermarkets operated within Sri Lanka are not genuinely biodegradable (Center for Environmental Justice 2019). Moreover, inherent limitations were noted with alternatives, such as practical reasonableness, quality, and durability.

It is identified that changing consumer patterns and attitudes are crucial. A gradual and continuous process is required to shape consumption and disposal behaviour. Sri Lanka has been promoting and making awareness about waste separation (Institute for Global Environmental Strategy & UNEP, 2020). Further, local authorities of Sri Lanka have introduced a concept of Siyapath Piyasa Centers– Recyclables collection centers to the Western Province. This project mainly focuses on effective methods of collecting domestic waste while raising awareness of the general public that domestic waste has a monetary market value that could be earned as revenue.

Even though Sri Lanka has initiated various projects, policies, and procedures, due to the inadequacy of financial resources, trained human resources, political influence, lack of proper commitment from authorities, and poor commitment from the public are caused ineffective and unsuccess of most projects (Wijerathna 2013).

Regulatory Bodies and Regulations in Waste Management and Reduction

Global and national policies and regulations have been enforced to manage solid waste

and protect the environment. The local authorities and regulatory bodies have governed laws and regulations that govern waste management and recycling.

As per the Local Government Act, the Local Authorities in Sri Lank have been responsible for collecting municipal solid waste in the respective territory (Bandara 2011). Further, the government spends 20% to 50% of the annual budget to manage waste in Sri Lanka, and only 20% to 80% of solid waste has been effectively managed (Eheliyagoda and Prematilake 2016).

Municipal Council Ordinance (29 of 1947 ~ 57), Urban Council Ordinance/Act (61 of 1939 ~ 22), and Pradeshiya Sabha Act (15 of 1988- 14 of 1999) provide necessary provisions to the local authorities. Apart from that, the Sri Lankan government has established different institutions to protect the environment and ensure the effective management of waste in Sri Lanka at different stages, such as the Ministry of local government and provincial councils, Ministry of Mahaweli Development and Environment, Ministry of Mega-Police and Western development, Central Environmental Authority (CEA), Urban Development Authority, National Policy on Solid Waste Management Support Center, and Western Province Waste Management Authority.

Under Act No. 47 of 1980, the Democratic Socialist Republic of Sri Lanka has established a Central Environmental Authority to make provisions to protect, promote, manage, coordinate, regulate, maintain, and direct environmental concerns.

In 1994, the minister of the environment initially attempted to impose guidelines and proposals to ban high-density polythene bags with a thickness less than 20 microns (Center for Environmental Justice 2019). Several years later, in 2007 Environment Minister imposed a ban on consuming polythene that thickness is less than 20 microns under section 23W of the National Environmental Act No 1466/5. Same as previously, regulating plastic usage based on the microns was not practical due to the incapability of measuring microns effortlessly.

In 2008, a conservation levy was introduced on high-density polyethylene bags under the Environment Conservation Levy Act, No 26 of 2008. However, a court order was issued against charging 2 rupees for a plastic bag.

Under the powers of the National Environmental Act, through an extraordinary gazette (Notifications 2008), it is prescribed that the activities: manufacture of polymer or polymer-based products, recycling industries, municipal solid waste, and other solid waste composting plants have a capacity of less than ten metric tons per day, solid waste recycling/recovery or processing plants have a capacity of less than ten metric tons per day, and solid waste disposal facilities have a disposal capacity of less than ten metric tons per day required to obtain a license to carry out operations within Sri Lanka.

A set of regulations has been introduced to reduce consumption volume by regulating consumption purpose, sales, offer for sale, offer free of charge, or exhibition in Sri Lanka. It is prohibited to manufacture polythene or any polythene product of twenty microns or below thickness. The polyethylene or any polyethylene product of twenty microns or lower in thickness may be permissible to be used with the prior written approval of the authority for the purposes stipulated in the Central Environmental Authority schedule of legislation (Notification 2007). Bans the manufacture of food wrappers (Lunch Sheets) and high-density Polyethylene bags from polythene as a raw material (Gazette 2017a, 2017b). Further, prohibit all forms of plastics, polyethylene, and polypropylene products for decorations in political, social, religious, national, cultural, or any other event within Sri Lanka (Gazette 2017c). And prohibit the manufacture of food containers, plates, cups, and spoons from expanded polystyrene.

Further, it is required to mark plastic material identification standards on every manufactured plastic item (Gazette 2021).

Environment-friendly Plastic and Polythene Consumption Behaviour

It is identified that behaviours, opinions, and attitudes that are rewarded and reinforced are likely to be repeated and ultimately incorporated into individuals` personal values and routine behaviour (Desa, Ba'yah Abd Kadir, and Yusooff 2011b). According to the theory of planned behaviour, it is identified attitudes, subjective norms, and perceived behavioural control are impacted in determining human behaviour. Behavioural intention can be identified as the willingness of an individual to perform a behaviour (Maria et al. 2020). It maintains a positive relationship between the strength of the intention and the potential to perform the desired behaviour. Nevertheless, people tend to act upon interests that their attitudes aligned with rather than considering the society or environment (Maria et al. 2020).

However, the theory of planned behaviour allows the expansion. The theory of planned behaviour does not consider awareness and knowledge (Boadi 2012). The additional variables can be integrated for better contribution (Khan, Ahmed, and Najmi 2019). By considering prior studies, utilized consciousness about the environment and the impact of economic factors to determine environment-friendly plastic and polythene consumption behaviour in this study (Van et al. 2021).

Environmental Consciousness

Researchers have looked at environmental knowledge and consciousness when exploring the gap between attitude and behaviour. Since the problem of environmental deterioration is worldwide, a coordinated effort must be begun to instill "environmental consciousness" in all and sundry before it is too late to correct the situation. Consciousness about the damage caused to the environment by plastic and polythene is considered a variable in determining the environment-friendly plastic and polythene consumption behaviour of consumers. Environment consciousness is something that should be seriously considered and instilled among generations (Gören 2014). Being conscious about the environment comprehend environmental habits, activities, and interactions among people and the consequences of immediate and long-term effects.

Consciousness is set in the context where events appear and are beheld. Environmental Consciousness argues that the key issue here is our understanding of nature and the ways in which they condition our relationship with it. (Bonnett 2021). Environmental concern is regularly associated with education, age, political ideology, demographics, Environmental attitudes, socio-demographic characteristics, personality, environmental knowledge, and environmentalism (Hiramatsu, Kurisu, and Hanaki 2016; Sánchez and Lafuente 2010; Sharma and Bansal 2013)

Making changes to environment related attitudes is one way of changing environmental consciousness. Environmental consciousness usually comprises an intellectual as well as an effective component, that is, knowledge of environmental issues as well as a way of responding and attitudes that information activates (Rannikko 1996). Some studies state that a high level of problem awareness related to plastic and polythene tends to initiate new behaviours (Heidbreder et al. 2019). Further, it is revealed that consciousness about the consequences causes behavioural changes (Maria et al. 2020). However, Van (2021) identified that environmental consciousness does not maintain a significant impact on behavioural intentions.

Further, as per the study of Hiramatsu (2016), women are more environmentally conscious than men. Females were more

likely to take waste prevention measures, and women often performed environmentally conscious actions based on custom rather than knowledge. Though men had more knowledge of environmental issues than women, it did not indicate that men were more environmentally conscious. Moreover, this study revealed that elderly people generally tended to be more environmentally conscious than the younger generation. So, it is stated that there is a positive correlation was shown between age, income, and environmental attitude. However, "Environmental knowledge is not a precondition for pro-environmental behaviour," since most individuals do not know enough about environmental concerns to behave responsibly (Johnstone and Tan 2015).

It is noted that many concepts such as Ethical consumers, pro-environmental products, green products, and green attitudes have emerged. And also while responding to environmental challenges, customers may have overstated their attitudes and buying intentions toward socially responsible behaviour (Johnstone and Tan 2015). However, based on the statistics above discussed, whether these concepts are in practice is questionable.

Hypotheses Development

Do consumers' green attitudes have been translated into respective behaviour to the same? This study proposes that exploring consumers' perceptions towards green consumption practices, may offer new insights into the green attitude–behaviour gap; and provide reasons for this gap. In doing so, our study aims to find a solution for the problem of whether there is a gap between environmental consciousness–behaviour and gain further insights into why there is a green attitude–behaviour gap.

Based on the past literature, most of the researchers have highlighted a gap exists between environmental consciousness and behavior concerning many areas.

Though most people are considered themselves as an environment concern persons, various plastic and polythene consumption was identified due to the various requirements, usages, lifestyles, and income levels. Thus, it leads to generating a massive amount of waste daily. It is estimated that 40% of the total production of plastic does not consume more than one month in Sri Lanka.

As previously established, attitudes, subjective norms, and perceived behavioural control have a significant influence on human behaviour. Yet, people tend to act on interests that correspond with their attitudes rather than considering society or the environment.

Based on these facts, the following hypotheses are advanced to examine the gap between environmental consciousness and Environment-friendly plastic and polythene consumption behaviour.

H1: There is a significant gap between consumers' environmental consciousness and Environment-friendly plastic and polythene consumption behaviour.

Accordingly, there is considerable debate in previous research findings regarding whether environmental consciousness is aligned with consumer actual behaviours concerning plastic and polythene consumption. However, it was noted that sufficient empirical studies have not been performed to examine whether environmental consciousness is aligned with consumer actual behaviours regarding plastic and polythene consumption in the Sri Lankan context.

Methodology

The present study employed a quantitative research design. Methodology planning involves the specification of the population to be studied, the treatments administrated, and the method followed in performing data analysis. By aligning with the developed research questions, this study is conducted to

identify the gap that exists between environmental consciousness and environment-friendly plastic and polythene consumption behaviour of Sri Lankan consumers based on the cross-sectional data obtained in a different context at a single point in time.

Moreover, this study intends to understand the discrepancy between consumer consciousness and behaviour rather than focusing on conventional problems identified concerning the infrastructure and procedural insufficiency in plastic waste management in Sri Lanka.

The paired sample t-test is utilized to analyse primary data gathered via a detailed questionnaire to assess the gap that exists between environmental consciousness and environment-friendly plastic and polythene consumption behaviour of Sri Lankan consumers. Once performing a pilot study to ensure validity and reliability, paired sample statistics and paired samples correlation tests were performed to identify the significance of the differences and the correlation among the variables. Afterward, by performing paired sample test, it is intended to obtain statistical evidence that the mean difference between paired observations to identify the average difference between constructed pairs.

There is considerable debate in previous research findings regarding whether environmental consciousness is aligned with consumer actual behaviours concerning plastic and polythene consumption. However, sufficient empirical studies have not been performed to examine this gap in the Sri Lankan context. Thus, this study attempts to obtain a clear understanding of whether the plastic and polythene consumers' environmental consciousness has been translated into respective behaviour to the same. The total population of Sri Lankan plastic and polythene consumers has been identified as a target population for this study. The target sample represents the population covering all districts in Sri Lanka. The non-probability sampling (convenient sampling) method was followed for a sample size of 117 households. The collection of data from the total plastic and polythene consumers is impractical due to budgetary constraints and time constraints. Based on the Sri Lankan Socio-Economic report, select respondents as proportionate to the population of Sri Lanka. (Central Bank of Sri Lanka, 2020). The sampling strategy is determined based on the population statistics of the census of population and housing in 2012. Obtain district-wise population (including estate population) and proportionate total sample size to the inhabitants of each district.

The primary data: non-numerical data gathered via a detailed online questionnaire. The responses were collected via google form in the manner of online questionnaires from November 2021 to January 2022. A questionnaire was developed to collect information/ data regarding the determined areas to accomplish the objectives of this study.

The total respondents represented both male and female participants above eighteen (18) years old. Further, information was gathered by conducting discussions and interviews with experts in environmental protection, waste management, recycling, and officers of the local authorities.

The questionnaire consisted of three parts. Part, one focuses on an introduction to the research and ethical principles involved in conducting the data collection process and conducting the research. Part two is for collecting the demographic details of the respondents. This part consists of eight (08) questions covering the residence area, household income, and occupation status. Part three focuses on the collection of data by covering all research objectives. Questions are in the form of a five-point Likert scale covering aspects of environment-friendly plastic and polythene consumption behaviour, social factors, economic factors, and environmental consciousness.

The guideline is developed by using Microsoft Word. Then translated into the Sinhala language for participants` convenience and to obtain clear ideas by eliminating language barriers. Thus, the option for selecting a convenient language is provided when filling out the questionnaire.

We would like to declare that no conflict of interest has been incurred in the conduction of this research. This research aims to enhance social well-being by identifying and reducing the plastic and polythene waste problem in Sri Lanka. Thus, this study does not engage in any unethical behaviours. Therefore, no ethical consideration is required for this research.

Further, throughout the research, respondents have been treated confidential and assured the privacy of their information by not disclosing it to any third party. Before initiation, inform the nature of the study to participants and provide an opportunity to decide on participation in this study. Not any kind of forced full action involves. Obtained consent before autosaving answers.

The research model is formulated to facilitate the determining research questions. It is used to develop a linkage between the literature review and the proposed model. A clear picture of the variables and measurements used in this study is given in Table 02.

The average variance extracted (AVE), is a measure of the amount of variance that is captured by a construct concerning the amount of variance due to measurement error to assess convergent validity. Refer to Table 02 to find the average variance extracted relevant to the variables.

Further, Table 02 provides information relevant to the Factor loadings of the variables. As per the rule of thumb, the factor extracts sufficient variance from all the variables.

Composite reliability is utilized to measure the internal consistency of items. From the results of Table 02, we could see all the composite reliability for the constructs indicate that all the items consistently measure their corresponding construct.

Table 02: Operationalization, Validity and Reliability of variables

Variable	Questionnaire Item	Source	Factor loadings	Avg. variance extraction	Composite reliability
Environment Consciousness	Plastic contamination in the ocean.	(Dilkes-Hoffman et al. 2019)	0.754	0.56	0.94
	The amount of plastic and polythene waste produced.	(Dilkes-Hoffman et al. 2019)	0.81		
	The amount of solid waste going to landfills without a proper recycling mechanism.	(Dilkes-Hoffman et al. 2019)	0.771		
	Water Pollution.	(Dilkes-Hoffman et al. 2019)	0.725		
	Endangered animals and biodiversity.	(Dilkes-Hoffman et al. 2019)	0.7		

	Natural resources depletion (Forest, water) due to plastic and polythene.	(Dilkes-Hoffman et al. 2019)	0.741		
	Air Pollution	(Dilkes-Hoffman et al. 2019)	0.801		
	Climate change (global warming)	(Dilkes-Hoffman et al. 2019)	0.793		
	Reduce the use of plastics by using other environment-friendly alternatives.	(Ogiemwonyi, O., Harun, A., Hossain, M. I., & Karim 2022)	0.726		
	Lowering the volume of plastic waste generated.	(Van et al. 2021)	0.814		
	Perception as an environmental concern person.	(Bamberg 2003)	0.78		
	Awareness of negative externalities	(Van et al. 2021)	0.618		
	Contribution to environmental protection campaigns.	(Maria et al. 2020)	0.726		
Environment-friendly Polythene and plastic consumption behaviour.	Reduce the use of single-use plastic and polythene by replacing water bottles.	(Dilkes-Hoffman et al. 2019)	0.704	0.57	0.01
	Reduce the use of single-use plastic and polythene by replacing takeaway containers/ Lunchboxes.	(Van et al. 2021)	0.676		
	Reduce the use of single-use plastic and polythene by replacing reusable bags.	(Van et al. 2021)	0.834		

Reduce the use of single-use plastic and polythene by reducing the usage of plastic spoons, straws, and forks while take-out any food.	(Van et al. 2021)	0.618
I reduce the use of single-use plastic and polythene by buying packaging-free products and bulk stores/loose items.	(Van et al. 2021)	0.628
I reduce the use of single-use plastic and polythene by avoiding sachet packets and small personal care products.	(Van et al. 2021)	0.853
I reduce the use of single-use plastic and polythene by purchasing large volumes at once.	(Dilkes-Hoffman et al. 2019)	0.843
I reduce the use of non-disposable plastics by replacing plastic containers with glass and buying wooden household goods instead of plastic goods.	(Van et al. 2021)	0.746
I choose to purchase environmentally sustainable products.	(Ogiemwonyi, O., Harun, A., Hossain, M. I., & Karim 2022)	0.716
Use labels that ensure environmental friendliness.	(Ogiemwonyi, O., Harun, A., Hossain, M. I., & Karim 2022)	0.807
Check the grade number of plastic items.	(Ogiemwonyi, O., Harun, A., Hossain, M. I., & Karim 2022)	0.841

Source: Author construct, 2023

Findings and Discussion

Sample Profile

According to the study, (Table 03) 59% of the respondents (the majority) are males. Female respondents are only representing 41% of the total population. The majority of the research participants are single, which is 81% of the total population. And most of the respondents are from families that consist of 3-5 members, which is 85% of the total population. Most of the respondents (55) are within the income level of less than the Rs.100,000 category. Further, most of the respondents obtained secondary, Bachelor's degrees, or postgraduate qualifications. Only 4% of the respondents hold Primary Education.

Table 03: Demographic profiles of the respondents

Area	Category	Frequency	Percentage
Gender	Female	48	41%
	Male	69	59%
Marital Status	Single	95	81%
	Married	22	19%
local administrative area	Pradeshiya Sabaha territory	80	68%
	Municipal council territory	37	32%
Average Monthly Family Income	Less than Rs 100,000	55	47%
	Rs. 100,001 - 200,000	49	42%
	More than Rs 200,001	13	11%
Highest level of education	Primary Education	5	4%
	Secondary School Education	37	32%
	Bachelor's degree or postgraduate qualification	75	64%
Number of members in family	1-2	6	5%
	3-5	99	85%
	5+	12	10%

Source: Adapted from the result of data analysis

Gap between Environmental Consciousness and Behaviour in Plastic Consumption

It is discovered that there is a difference between environment-friendly consumption behaviour and the environmental consciousness of consumers. According to Table 04, the environment consciousness variable obtained a mean value of 4.4 while environment-friendly consumption behaviour obtained a 3.55 mean value. Therefore, it is revealed that there is a difference of 0.8466 between the mean values obtained by the two variables. Hence it is discovered that there is a high environmental consciousness among the residents of Sri Lanka relating to the environment. However, the behaviour of the residents indicates otherwise.

Table 04: Mean values of the variables

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EC	4.3964	117	.61551	.05690
	EFB	3.5498	117	.83376	.07708

Source: Adapted from the result of data analysis

Table 05: Significant mean of the difference between variables

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 EC - EFB	.84656	.94208	.08709	.67406	1.01906	9.720	116	.000

Source: Adapted from the result of data analysis

According to Table 05, there is a significant difference between environmental consciousness and the behaviour of consumers (0.8466, P<.000). Therefore, we can accept the alternative hypothesis that there is a gap between environmental consciousness and environment-friendly plastic and polythene consumption behaviour.

The same findings resulted in Dwiyanti and Jati (2020) and Johnstone and Tan (2015), a gap between actual purchase behaviour and environmental conscience. Consumers are still lagging in terms of taking the necessary actions and following environment friendly behaviour to safeguard the environment. As per Johnstone and Tan (2015), there is a disparity between people who are concerned about the environment and choose not to buy green products regularly due to a notion that "becoming green is too difficult" due to a lack of time, money, education, and anticipated commitment.

However, it is not enough to say that there is a significant difference between environmental consciousness and environment-friendly behaviour. Since it implies that people won't behave according to their attitudes, it is needed to see their attitudes and behaviour in detail.

Perception of consumers as environment concern person:

It is identified that 22% of the respondent believe that they are fully environment concern persons. While 57% of the respondents think that they are environment concern persons to a certain extent. Which is more than half of the population. Only 10% of the respondents consider themselves as not filly/ partially environment concern person.

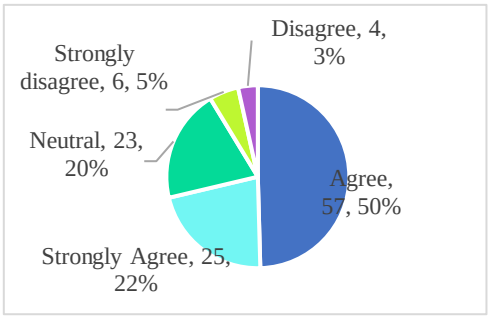

Figure 01: Perception as a complete environment concern person

Attitude regarding the level of responsibility for reducing plastic and Polythene:

As per the prior empirics, Sri Lanka was identified as a country that has not practiced waste separation at the household level, and households are unsatisfied with the current waste management process (Warunasinghe and Yapa 2016). To conduct effective waste management and recycling, stakeholders, including waste generators, collectors, recyclers, administrators, and agencies, have a vital role and central responsibility in effective waste management (Kariyawasam et al. 2019).

Figure 02, it is revealed that the combination of government, civil society, consumers, manufacturers, and non-governmental organizations is responsible for reducing the volume of plastic and polythene

consumption. Accordingly, consumers, manufacturers, and government hold a considerable responsibility to reduce and manage plastic and polythene waste. The majority of Sri Lankan plastic and polythene consumers have identified that all the parties including consumers are fully responsible for the reduction of plastic and polythene waste.

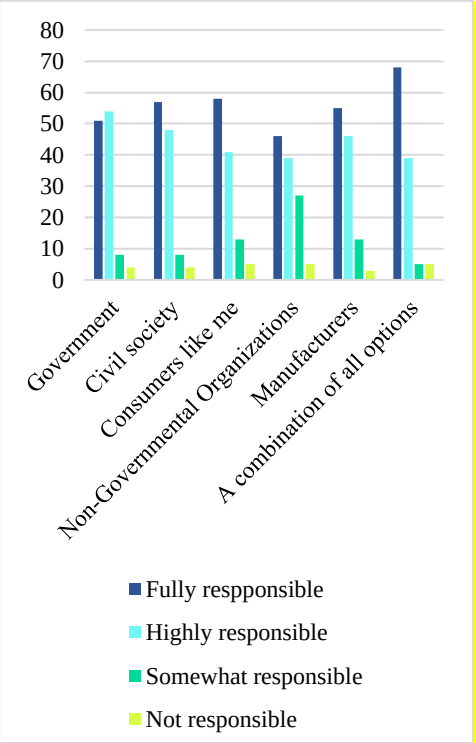

Figure 02: Level of responsibility for reducing plastic and polythene

Reasons for plastic and polythene consumption:

As per the responses in Figure 03, the majority of respondents mainly consider reusability when consuming polythene and plastics. Convenient and durability are the following most substantial qualities considered by polythene and plastics consumers. One reason for increasing Plastic consumption is the adaptation of plastics to make life comfortable (Paterson 2019).

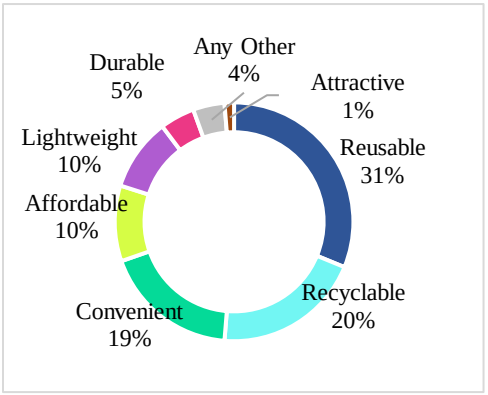

Figure 03: Positive reasons for plastic and polythene consumption

Repeat usage of single-use plastics:

Most people reuse single-use plastic and polythene without considering the health and environmental impact. The heavy metal contained in plastic gets uncovered in exposure to high temperatures. That causes adverse external leakages to the environment, food, and water. Toxic leakage is mainly caused due to the open-air burn of plastics, cooking food (heating) by using a plastic container, packing warm food over a long period by using plastic covers, and reusing single-use plastic for a more extended period. Thus, it was identified that leaching metal during the recycling process of plastic is conceivable and resulting adverse impacts on living species in the long run (Cheng et al. 2010).

37% of the population tends to reuse single-use plastics most of the time (Figure 04). Further, 21% of consumers always reuse single-use plastics without considering the impact caused on their health. Consumers shall develop the habit of checking labels and the level of recyclability before reusing. Further, try to follow the principle that "if you cannot reuse it, refuse it." Only 4% of the consumers never reuse single-use plastic and polythene, and 10% rarely reuse plastic: which is a very low percentage.

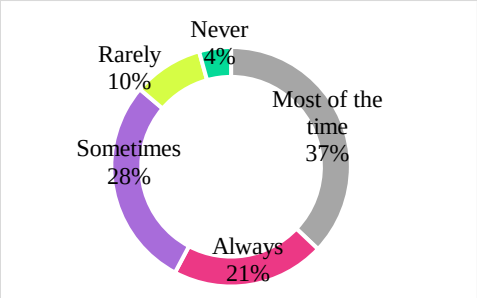

Figure 04: Frequency of reusing single-use plastics

Reasons behind the usage of plastic and polythene:

A complicated modern lifestyle and increasing needs became a reason for the excessive consumption of plastic-based products. Polythene and plastics are essential products in the modern standard of living in Sri Lankans` daily routine (Palugaswewa 2018).

It was identified that the busy lifestyle, lack of options in the market, and poor behavioural habits of the residents had greatly influenced the increasing consumption of plastic and polythene (Figure 05). Moreover, modern culture, the standard of living, and food habits also influence the volume of plastic and polythene consumption.

Socio-cultural differences lead to different activities, living patterns, events, and lifestyles. As per Peterson (2019), consumption patterns and trends have been associated with traditional and cultural perspectives (Paterson 2019). Thus, plastic consumption may vary and occur more damage to the environment based on the nature of the cultural and traditional events (Wijerathna 2013). Further, it is identified that the replacement of appropriate and sustainable alternatives are able to reduce the consumption volume (Paterson 2019). However, according to the results, the lack of suitable alternatives in the market causes an increase in plastic and polythene consumption.

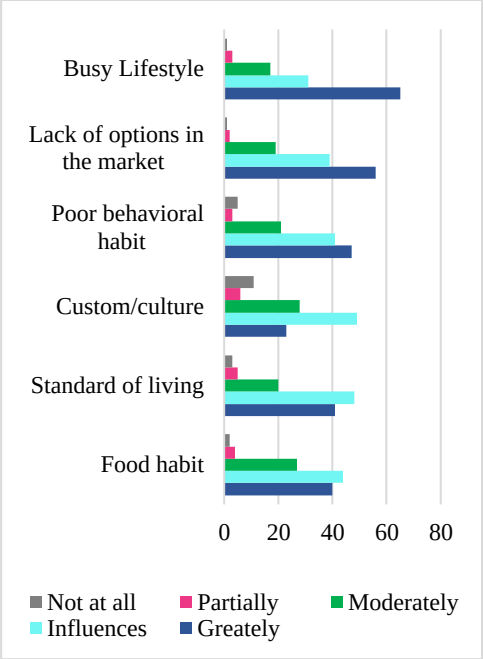

Figure 05: Reasons behind plastic and polythene consumption

Consumers' behaviour in plastic waste disposal:

In the Sri Lankan context, the promotion of waste separation started in 2011. The ones mainly engaged in recycling are the municipal councils of Sri Lanka. The municipal collectors have collected the majority of the waste. However, collectors only focus on collecting waste that involves high value. Thus, low-value recyclables remain uncollected and end up in dumpsites (Institute for Global Environmental Strategy & UNEP, 2020).

According to the results of the study (Figure 06), it is revealed that only 50% of the respondents handed over their waste to the municipal council or Pradeshiya Sabha collectors. However, it was significant to note that 39% of the respondents are engaged in open burning, while 4% have been engaged in open dumping. This waste mismanagement caused severe damage in several aspects, including living species and the environment.

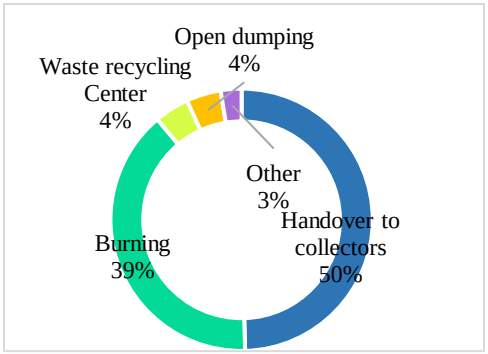

Figure 06: Method of disposing of plastic and polythene waste

However, the majority of the residents engaged in open burning and open dumping stated that the lack of appropriate options for disposing of polythene and plastic waste caused them to follow such methods (Figure 07). Further, 49% of residents are engaged in open burning and open dumping because of the convenience and practice. The chemical reactions that occurred due to the open dumping and burning caused gas emissions and pollution of primary water resources in Sri Lanka (Bandara 2011).

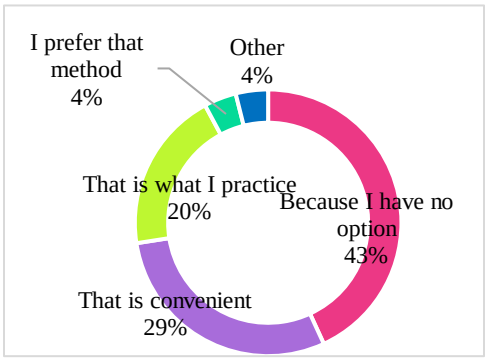

Figure 07: Reasons for open dumping and burning of plastic and polythene waste

Excessive plastic and polythene consumption became a national issue. Sri Lanka ranks within the top ten countries that polluted the environment due to excessive plastic and polythene usage and waste mismanagement. By confirming that, Sri Lanka generates around 400 metric tons of plastic waste per day (Kaluarachchi et al. 2020). Ninety percent of waste is openly burned or disposed to the environment (Arachchige et al. 2019).

53% of the population generally dispose of domestic waste once a week as a practice (Figure 08). Furthermore, 20% of the population dispose of waste every two days, while 18% dispose of waste every day. 26% of the population generates an average of 1kg of plastic and polythene waste per week (Figure 09). 24% of the population contributes less than 1kg of polythene and plastic waste per week. However, 41% of the population contributes more than 1kg of plastic and polythene waste per week. Moreover, 10% of the population does not have even a rough idea about the volume of their plastic and polythene waste generation.

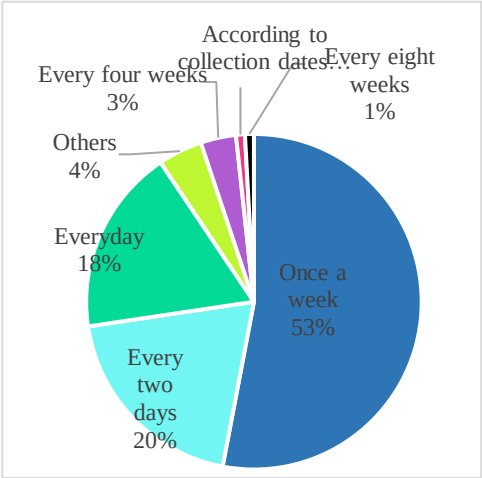

Figure 08: frequency of disposing domestic solid waste

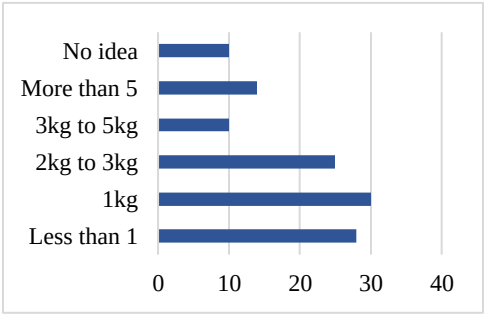

Figure 09: weight of plastic and polythene waste generation (per week)

Government shall set national targets for waste collection, segregation, recycling, and investing in national/regional waste management infrastructure. Further, ought to focus on establishing plastic collecting centers with the collaboration of plastic recyclers to expand the recycling and collection centers.

Further, Manufacturers and companies can explore, improve, and develop the potential of new materials which we can use as an alternative to plastics, such as biodegradable plastics, and reinstate some old products that we have replaced. It is identified that the lack of alternatives for plastic and polythene has been greatly influenced by excessive plastic and polythene consumption and waste generation.

Recycling facilities of plastic and polythene waste:

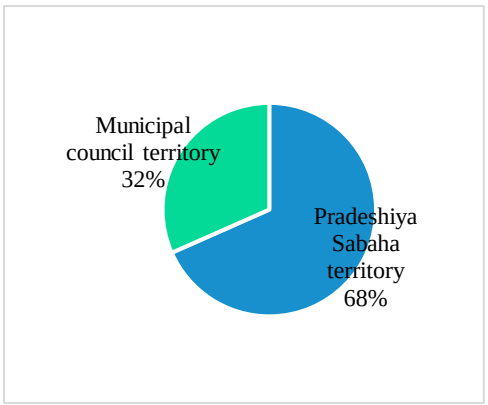

Figure 10: Territory

Urban waste became a huge problem compared to the waste generated in rural areas. The waste composition of the rural and urban areas is getting significantly different. (Wijerathna 2013). The majority of the solid waste has been generated by the Colombo Municipal Council, confirming that the urban areas generated more solid waste than the rural areas (Arachchige et al. 2019). Hence the majority of the respondents of the sample (68%) represented the Pradeshiya Sabha territory, while 32% represent the municipal council territory in this study (Figure 10).

It was significant to note that 36% of the population does not have a recycling facility in their living territory (Figure 11). Thus, they face multiple difficulties in disposing of their plastic and polythene waste. Further, it was noted a low level of awareness among the population regarding recycling facilities. 33% of the population does not have awareness about their local recycling center or the availability of such facilities. Moreover, 17% of the population state that they must travel 5km or more to find a recycling facility. Thus, it is concluded that sufficient recycling facilities and awareness are not provided to households in Sri Lanka.

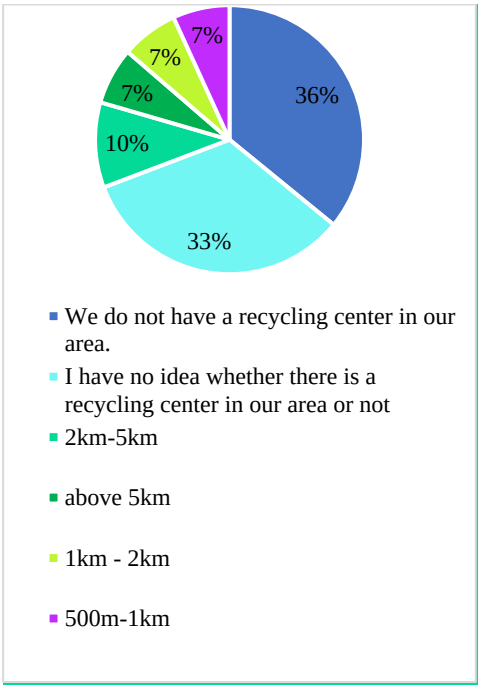

Figure 11: Distance from residence to the collection point/ Recycling center

However, the final disposing method for 95% of municipal solid waste is open dumping in Sri Lanka. All the uncollected household waste by the municipal council (non-collection areas) in the rural areas has been burned (Wijerathna 2013). Continuous leaching of non-biodegradable plastics caused a block of water flow and unfertile

agricultural soil (Alam et al. 2018). Further, it is noted that most of the dumping sites have been located nearby populated urban areas, and those sites are inadequate to handle municipal solid waste in the long run (Gunawardana and Basnayake 2009). Moreover, studies revealed that solid waste collection involves significant carbon dioxide emission and consumption of fossil oil during the transportation and collection of waste in Sri Lanka (Menikpura et al. 2010).

The majority of the responses state that the available methods of waste disposal are problematic in their living territory. Thus, a significant portion of respondents has been engaged in open burning or open dumping due to inadequate facilities (refer to Figure 05). Further, the majority of respondents state that local authorities have not collected their plastic and polythene waste efficiently. Thus, most respondents are not satisfied with the current facilities available for their waste management and disposal needs.

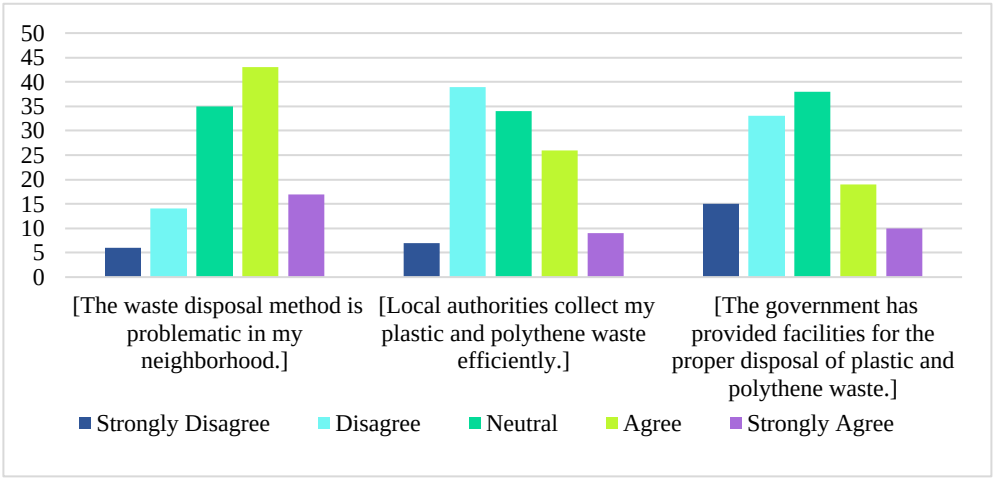

Figure 12: status of current waste disposal facilities

Unseparated household plastic and polythene waste can be identified as the main waste stream in Sri Lanka (Gunarathna. et al. 2010). Since 2011, the Sri Lankan government has promoted proper waste separation among households. Waste separation and cleaning of plastic items have begun with government assistance. Further, concerning the difficulties facing the separation, the government has advised the general public to segregate their household waste accordingly. Moreover, municipal councils do not collect non-segregated waste from households.

However, 13% of the population does not separate their household waste. Only 49% of the population maintained separate bins for waste disposal. Conversely, 85% of the population separately collects their waste from other solid waste, which is a remarkable improvement.

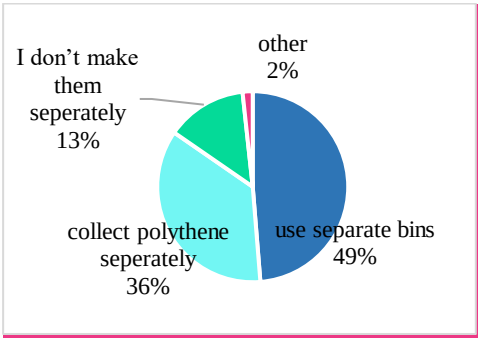

Figure 13: Method of separating domestic solid waste from other waste

Educate the public by conducting awareness programs regarding proper waste disposal, plastic consumption, and health issues (health issues due to the use of PET water bottles, juice bottles repeatedly, and using non-food graded packaging to store food

items) may facilitate in reduction of the information gaps causing asymmetry of information and poor awareness. Through proper education, this public attitude and waste disposal practices can be changed. Thus, education about the consequences and proper waste disposal practices from childhood seems a crucial requirement.

It is noted that very few people are willing to return their non-recyclable plastic to the shop without any incentive (Figure 15). A significant portion of the population is never willing to return their plastic items. However, it is noted that the majority of the population agrees to bring back their plastic waste if they receive any incentive in return (Figure 14).

Thus, Companies and manufacturers shall take responsibility for the product`s end-life impacts. That should be initiated by reducing dependency and unnecessary utilization of plastics from the point of design and choice of materials. This can be effectively implemented by providing financial incentives (reducing some amount from the final bill or collect as points in loyalty cards) for the consumers who return recyclables since consumers are highly sensitive to economic factors, people will be motivate and attempt to follow that.

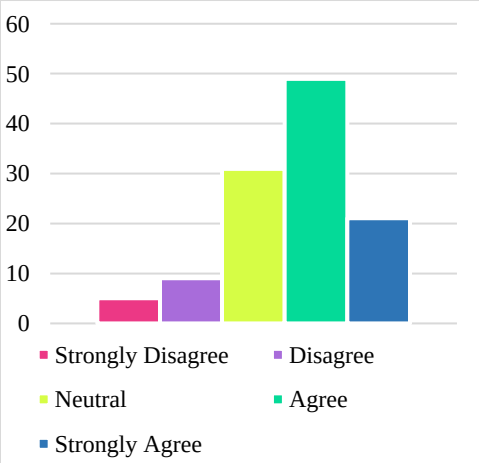

Figure 14: I take the empty bottle back to the supermarket; if they returned some of the money from the amount I had paid

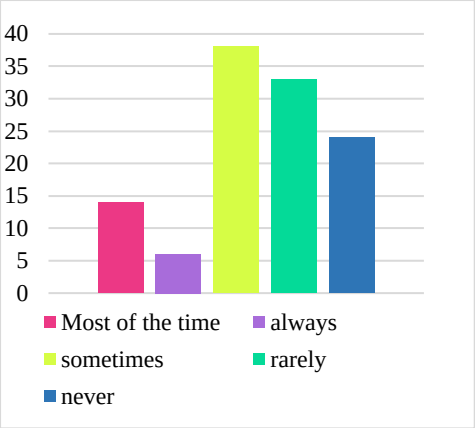

Figure 15: Return non-recyclable plastics to the shop

As per the results, it is revealed that consumers do not pay sufficient attention to the labels that are available to ensure environment-friendliness (Figure 16). Further, it is indicated that the majority of consumers do not consider recyclability when making purchases (Figure 16 and 17). Therefore, this confirmed that even though most people consume plastic and polythene because of the reliability of such items (Figure 02), they do not consider the recyclability grade of the item which they reuse. In contrast, very few consumers have considered labels that indicate environment-friendliness (such as CFC-free) and recyclability grade before making the purchases (Figure 17).

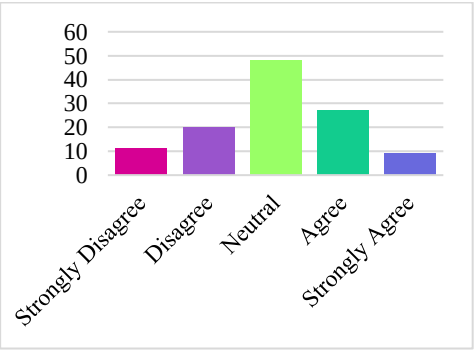

Figure 16: Usage of labels that ensure environment friendliness

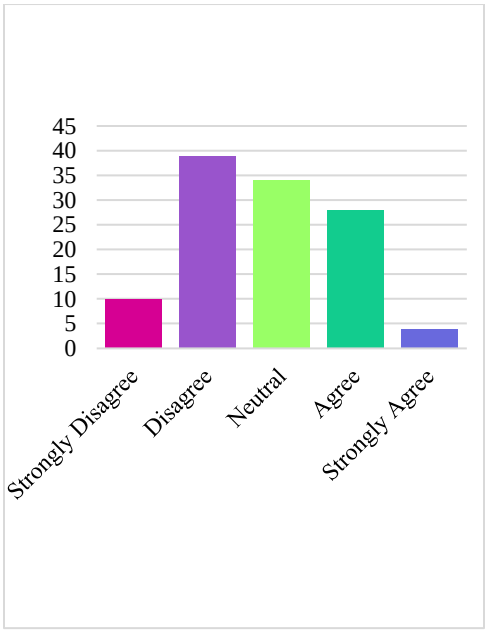

Figure 17: Examine the grade number that indicates recyclability

Practical Implications

The findings can be taken into consideration to minimize the harmful effects of plastic and polythene disposal behaviour among consumers in Sri Lanka. Especially if relevant government authorities, environment-conscious activists, and groups can implement proper strategies to increase consumer awareness regarding the harmful impacts of plastic and polythene usage along with proper garbage collection and recycling systems. Such initiatives will be able to enhance the image of Sri Lanka as one of the most beautiful places in the world.

Limitations Of the Study

Due to the COVID-19 pandemic, human interference with the participants was limited. Thus, the data was gathered via a detailed online questionnaire.

Conclusion

One of the main sources of intense plastic and polythene waste generation in Sri Lanka can be identified as the extreme volume of plastic and polythene consumption among the public. Plastic and polythene mismanagement and growing consumption have endangered the well-being of living creatures, the ecosystem, and biodiversity.

To provide an effective and practical solution for this issue, it is compulsory to identify the consumers' behaviour along with green attitudes. Through this study, it is intended to examine whether environmental consciousness is aligned with consumers' actual behaviours and to obtain an understanding of plastic and polythene consumption and disposal behaviour.

The knowledge obtained about consumers' actual behaviours, environmental consciousness, and interventions is necessary to scale up innovative practices in waste management and construct an effective solution in Sri Lanka.

According to the findings of the research, it is identified that the environmental consciousness among the people in Sri Lanka is very high (Mean Value =4.39). But a significant difference of 0.8466 between the mean values of environmental consciousness and their actual behaviour was identified from this study. Thus, it is confirmed that though most consumers hold positive attitudes towards environmental consciousness not to translate into respective behaviour to the same extent. Then what may be the reasons behind the difference between behaviour and attitude?

Further, most of the respondents consider themselves as environment concern persons to a certain extent and they are aware that everyone including the government and general public is responsible for reducing plastic and polythene consumption and waste generation. It is identified that the main reason for this behaviour-attitude gap is a busy lifestyle, lack of options in the market (eco-friendly alternatives), and poor behavioural habits. Though consumers have strong environmental consciousness and intention to purchase green products. While

purchasing, they usually prefer otherwise and do not pay sufficient attention to eco-labeled products. However, the intention or consciousness-behaviour gap is prominent.

Moreover, according to most of the residents who engaged in open burning and open dumping, the lack of appropriate options for disposing of polythene and plastic waste caused them to follow such methods. Further, the unawareness of the health risk of repeat usage of single-use plastics was highlighted in this study.

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