MASTER THESIS

Master's Programme in Nordic Welfare, 60 Credits

Plastic Management for a Sustainable Future

An assessment on Plastic Management Systems and Strategies for Socio-environment Sustainability in Sweden

Health and Lifestyle, 15 credits
Halmstad 2023-08-23

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Thesis - Health and Lifestyle (HL8031)
Nordic Welfare, Halmstad University
23rd August 2023

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PREFACE:

We would like to thank our Supervisor, Åke Nilsén, for his valuable guidance and insight during the course of our work. Likewise, special thanks to our examiner Christopher Kindblad, whose comments opened our eyes to the various areas of improvement that were found to develop and polish this manuscript. We would also like to take this opportunity to thank our interviewees, opponent and all others who were instrumental in completing this research project.

ABSTRACT

Plastic waste management has become a global concern due to its adverse effects on the environment and human health and Sweden is no exception. Through this dissertation, the researchers intended to make a descriptive study regarding the mainstream introspection of plastic management and the outreach of current systems and strategies in Sweden. To review the matter in a detailed manner, the researchers formulated two research questions in which the first one stated the effectiveness of existing systems and strategies for managing plastic waste in Sweden and the other one was the social impacts of plastic mismanagement in terms of three pillars of sustainability. The researchers used the framework of risk society theory, theory of social practices and actor network theory to understand the matter in a more fruitful way. The dissertation was mainly developed through quantitative research methodology. As the thesis was focussed on socio-environmental sustainability, the researchers intended to collect the response from the public through survey questionnaires with the help of Google platform. The collected responses must be analysed through descriptive statistical method. The findings revealed that Sweden has implemented several effective systems for plastic management. Furthermore, collaboration between various actors like human and non-human agencies were needed to improve the successful implementation of sustainable plastic management systems. The conclusion of the study stated to integrate education, awareness programs, good sustainable choices like paper bags or biodegradable materials should be integrated into the system and strategies to foster behavioural change in consumers along with the improvement of other technological measures in handling plastic waste.

Keywords: Plastic, Plastic Management Systems, Recycling, Environmental Sustainability, policies and strategies, Circular Economy, health and well-being.

Objectives of the Study

1. To analyse the effectiveness of present systems and strategies of plastic management at southern part of Sweden in achieving sustainable well-being and environment in Sweden.

2. To understand the plastic waste treatment being followed in Sweden and how far they are effectively functioning to mitigate the risk factors of plastic management in the society.

3. To understand the people's attitude, behavioural practices and awareness about the plastic management for an environmental sustainability.

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1. INTRODUCTION

The growing nature of mismanaged plastic is a significant crisis to the environment as well as the human globally. Nature plays a major role in each individual's life to make their lives healthier and more sustainable in all respects. Each individual has a responsibility to keep the nature lively and protect it for long term sustainability. In spite of growing alarm about plastic pollution, the production and use of plastics is prognosticated to continue to expand over coming decades. Green Earth is polluted with different types of plastic wastes and it adversely affects the ecosystem and health. This growing issue and other relevant factors bring together the research on plastic management in the environment and discussion on long term sustainability through the use of sustainable plastics for future generation. Plastic is incredibly useful, practical and it is a part of everyday life. It's an indispensable fact and our modern life is very much depending on it. But the plastic mismanagement is growing rapidly as it becomes one of the most widespread pollutants on our planet. It is really a global crisis, which pollutes the rivers and ocean, contaminated the food, spoiled the fertility of soil thereby agricultural production loss, air pollution due to the gases formed and as a result it accelerates the climate change globally.

Plastic pollution is a global challenge. According to UNEP's report plastic pollution does not exist in a vacuum. Environmental, social, economic and health risks associated with plastics must be assessed in conjunction with other environmental stressors, such as climate change, ecosystem degradation and resource use. The plastics policy is a growing field of investigation, with the most rapid expansion in the fields of terrestrial, marine pollution and microplastics. Plastic pollution can change habitats and natural processes. It certainly will reduce the ecosystem's ability to adapt to climate change and consequently affecting millions of peoples' life and well-being (UNEP Report).

The negative effects of plastic mismanagement and its social impacts are a great concern for Nordic countries. The Nordic countries aim to play a leading role in the promotion of a sustainable approach to the production, utilization, waste management and recycling of plastics. Their common vision for the future is a vision in which plastic is produced, used and recycled without affecting the climate or posing risks to human health or the environment, plastic waste and microplastics are not allowed to enter the marine environment, lakes and

rivers. The Nordic programme will be a strategic tool for improving knowledge by developing measures and raising awareness about plastic management in Nordic networks. Sweden, one of the Nordic Countries, is aiming for zero plastic waste. They are stepping up from recycling to reuse, which shows a longer vision for sustainable environment. Eventually, it will move to the circular economy and become a key part of the Swedish Government policy in the plastic management (Nordic Council of Ministers, 2017).

The use and production of plastic is quite increasing nowadays. It is a ubiquitous element in day-to day life due to several reasons like its longevity, durability, mechanical properties, thermal properties etc. without any doubt. Literally it can be said that plastic is a sweet poison for both human and the environment. Plastic materials can be used as an alternative material in place for wood, metals, glass etc. in the initial period. But after the commercialisation of plastic in 1964, plastic occupied their place in every home, office, factory and vehicle and became an intrinsic part of human life. As per the recent studies, it is clearly evident that the plastic production rate is continuing to rise, and the global production has dramatically reached 368 million metric tons in 2019 from 50 million metric tons in 1976. However, a short downturn can be observed in annual production in 2020 (367 million metric tons), which was predominantly the result of the COVID-19 pandemic. Among the number of plastics cumulatively produced, approximately 30% of plastics are still in use. Whereas approximately 55% of the total plastics were discarded, were around 8% were incinerated, and only about 6% were recycled. These numbers show the significance of the importance of plastic waste management in a very sustainable way. Due to the population explosion, excessive extraction, negligence, non-degradable nature, physical and chemical properties of plastic waste have resulted in a massive pollution leaked into the environment. Consequently, it has entered into the food chain and other necessary living conditions which can lead to serious health problems to human, other living beings, nature and environment. Therefore, it is very important to reduce the plastic waste load from the environmental ecosystem (Pander, Human, et.al. 2023).

The waste management system and policy conditions in Sweden are largely embedded within the EU waste policy framework. Plastic waste in EU policy is largely addressed through the broad EU waste acquits. It has regulated different waste streams and general framework conditions, but there is no specific legislation targeting plastic waste. Like other EU countries, Sweden is also obliged to fulfil the EU mandated targets related to plastic. Recent studies show that recycling rate of post -consumer plastic waste is relatively high in Sweden

compared with other EU countries. But Sweden lacks policies specifically targeting the plastic waste stream (Millions, Dasani, et.al. 2018). This dissertation intends to make an understanding of the effectiveness of present systems and strategies in Sweden and the area needed to address for much development in plastic waste treatment for a sustainable future.

2. BACKGROUND

2.1 Research Background

There is no question about the prevalence of plastics in modern lifestyles. Plastic is a universal material that can be used in a broad range of applications, from single-use packaging to high-tech sustainable industrial applications. In recent decades, plastics have been key drivers of innovation and have contributed to social development and progress. In the last 50 years, plastic production has increased twenty-fold, reaching 322 million tonnes in 2015, and plastic production is estimated to double by 2036 and might even quadruple by 2050 (Dvorak & Kosior). A rapid increase in the world population and an even higher rate of consumption has accompanied this acceleration in production. Eventually, this results in large-scale production of plastic waste. Plastics have both positive and negative impacts. As the rate of production of plastics is nearly the rate of the world population, the management of plastic and its social impacts must be a thought-provoking area for the sustainable future. The background of the research is to learn about the plastic waste treatment in Sweden, its effectiveness, systems and strategies, behavioural practices of the public in using plastic products and how to make it a sustainable usage and eco-friendly. Sweden is highly working hard to attain all the 17 SDGs goals in 2030 agenda, an introspection on plastic waste should be a necessary area as it is related to almost 5 SDGs in many respects. This is the main thread to develop such a topic for research. The sustainable use of plastic means the use of plastics in the right place and in circular, resource-efficient, climate friendly, non-toxic with negligible leakage. This certainly will lead people to use resources more efficiently along with reducing societal and environmental negative impacts especially terrestrial, marine and climate change (Swedish Environmental Protection Agency Report, 2021).

2.2 Plastics, a ubiquitous element in present life: A Trajectory

Plastic, plastic everywhere

Bend me, shape me and you need me… these rhythmic words are so apt to describe the trajectory of plastic in everyday life. Plastics are versatile materials which we can mould and

reshape from machinery to toothbrush. When we travel to history, we can locate the Stone Age, Iron Age and Bronze Age. After these eras, the plastic age is coming and what we live at present is truly a plastic age which makes our lives more comfortable, easy and joyful. Since plastic was first developed in the 1800s, it has evolved to benefit all areas of manufacturing including medicine, transportation, technology, packaging, construction, sport and leisure, agriculture, and manufacturing. Plastics have brought about technological advances, design solutions, and financial savings. Plastic was produced in large quantities after the Second World War and then again during the 1960s and 1970s. Consumers sought to replace conventional and traditional materials because they are very cheap, versatile, sanitary, and easy to produce in a variety of forms. People chose plastics over steel in cars, paper and glass in packaging, and wood in furniture. According to CIEL, …plastic is now so ubiquitous in the environment that its presence can identify the age and character of sedimentary deposits in which it is buried. Plastic is a key geological indicator of the ―Plasticine Epoch, an era often termed the Anthropocene, the geological age in which humans have come to significantly impact terrestrial ecosystems. The ubiquitous status of plastic in present time eventually will lead to a large level of waste accumulation which is usually incinerated, and the energy recovered. It will certainly lead to great environmental and other social impacts. The central component of the impact of plastic on the environment is its strong dependence on fossil-based materials, as most plastic is produced from fossil oil and gas. The extraction and production processes require large amounts of power that is often fossil. Utilising the advantages of plastic while minimising its disadvantages is at the top of the agenda in Sweden, EU and globally. In Sweden, plastic is among the prioritised flows that are highlighted in the strategy for a circular economy. The government's action plan for plastic presents how work should be carried out to achieve a sustainable use of plastic, and the EU has highlighted plastic as one of the seven prioritised product value chains in its circular economy action plan.

2.3. The Swedish Plastic Revolution

Since the 1990s, the Swedish government has implemented an effective set of policies to reduce waste generation, raising awareness among manufacturers and citizens as well as drastically cutting emissions. To make a revolution in reducing plastic waste, Sweden has passed a new policy which is often known as Extended Producer Responsibility (EPR). The policy explains like that to make producers responsible for handling all costs associated with the collection and disposal of their products. After the revolutionary policy, Sweden has

targeted households by applying a weight-based waste charge to incentivise recycling. National laws that ban the landfilling of flammable and organic waste, along with more firm and rigid standards for hazardous waste, landfill, and incineration imposed by the European Union on all its member states allowed Sweden to drastically reduce emissions and total landfill waste. Since 1975, the recycling rate has quite increased to reach its zero-waste goal (Igini, 2022). According to the Swedish Waste Management Association, in 2020, 87% of PET plastic bottles and 87% of aluminium cans as well as 61% of all packaging material were recycled. This shows that recycling is another important measure Sweden has taken to reduce the plastic waste. Despite an average of 467 kg of waste per person and nearly 4.4 million tons of household waste being produced each year, high public awareness of the benefits of recycling and an efficient collection system are the keys to the country's success. Nearly 50% of household waste was turned into energy through an approach known as waste-to-energy (WTE) which was a great movement to produce useful energy and cut down emissions of gases into the environment to reduce atmospheric pollution. The ground-breaking process starts with households and businesses screening waste into hazardous and recyclable materials, separating food waste, packaging of metal, plastic, paper and glass, newspapers, electronics, tires, and batteries. Slowly, it pays a way to encourage the youth and public to do their part. As a result, Sweden has built waste collection stations within 300 metres of all residential areas. Circular economy, another effective tool to reduce plastic waste in the society is highly interrelated with collection stations and supermarkets. While a part of this trash goes into recycling and incinerators, nearly half of it–usually comprising a mixture of energy-rich materials such as paper, plastics, and biomass–is brought to a waste-to-energy facility where it is turned into electricity. Sweden's recycling efforts and its solutions to keep trash out of landfills and instead, convert it into clean energy are not only a smart alternative with a less environmental impact, but they also allow the exploitation of resources that would otherwise be wasted (Igini, 2022). This thesis attempts to make a study on how far the plastic management systems and strategies in Sweden are effective and attain the goal. To what extent, Sweden has to travel to reduce the challenge of plastic waste and its social impacts. How far the public is aware about the plastic waste and its negative impacts must be studied and evaluated in this research.

2.4 Plastic Waste Management and Policies in the EU and Sweden

The waste management system and waste policy in Sweden are highly embedded within the EU directives. Plastic waste policy in the EU is largely depends on the different waste streams

and general framework conditions. Apart from all these frameworks, the marked thing here is that there is no specific legislation targeting plastic waste. The collection and recycling of plastic waste is indirectly addressed as part of municipal solid waste and construction and demolition waste under the EU directive 2008/98/EC. Gradually all these policies were changed after the introduction of the EU Action Plan for a Circular Economy which was published in Dec. 2015. In the EU Action Plan, the Commission identified that plastic waste is a priority area for action. They prioritised a variety of actions that will facilitate the increase of plastic recycling, such as eco-design, a revised EU target on recycling of plastic packaging, quality standards, and actions to facilitate cross-border trade in recyclable plastics. The EU circular economy action plan was bundled with revision proposals for the EU waste related directives. It includes a proposal for amending Directive 94/62/EC on packaging and packaging waste introducing the significantly higher target for plastic packaging waste of 55% recycling rate by 2030. In the beginning of 2018, the European Commission followed with the European Strategy for Plastics in a Circular Economy setting up a roadmap for achieving higher re-use and recycling of plastics within a modern, competitive, low-carbon, resource and energy-efficient economy which will contribute to reaching the 2030 Sustainable Development Goals and the Paris Agreement (Milios, Davani, et.al., 2018).

Peeping into the policy in Sweden, the recent studies show that the recycling rate of post-consumer plastic waste is high in Sweden compared with other EU countries. This reflects the fact that Sweden has significant overcapacity and reliance on waste incineration. Apart from all these significant factors, the remarkable point highlighted here is Sweden lacks policies specifically targeting the plastic waste stream. In Sweden, plastic waste is not considered as a priority waste stream in the Swedish Waste Prevention Plan. Like other EU countries, Sweden is obliged to fulfil the EU mandated targets on plastic waste. However, these targets transposed to Swedish legislative waste ordinances. The interesting factor noted here is Sweden has introduced higher targets in the Packaging Ordinance compared with the EU legislation. Sweden has set higher targets of plastic packaging recycling which seems fully aligned with the recent revision of EU targets for plastic packaging recycling rate of 50% by 2025 and 55% by 2030 (Milios, Davani, et.al., 2018). In this scenario, it is important to make a study on how effective the present systems and strategies of plastic management at southern part of Sweden in achieving sustainable well-being and environment.

2.5. Research Significance

When we travel through the history of plastic, we can understand that it was developed with good intentions to *protect* nature. Scientists really thought they were able to use plastic to

preserve scarce natural resources like wood and stone and protect animals from being killed for products like ivory, tusk, horn, and tortoise shells. But the present-day status quo of plastic is quite ironical and distressing. When we evaluate the social impacts and other sustainable factors of plastic usage, these positives quickly turned to negatives as plastics began harming our environment by polluting our oceans, soil, and air. As with many environmental challenges we have faced like climate change, global warming, marine pollution etc. it is important to find new solutions to help keep our ecosystem in balance.

Although plastic is deep-rooted in our daily routines, we all should play a role in tackling the plastic problem by refusing, reducing, reusing, repurposing, and recycling plastic every single day. This research throws a spark to change the behaviour of everyday life. We have taken plastic for granted for so long, but we all have the power to continue to make change happen. This dissertation is based on all the key factors associated like age, educational level, occupation, plastic consumption habits, behavioural practices etc. to understand the effectiveness of the current measures for a sustainable and eco-friendly future. This itself is the significance of this research as it delves into the current plastic management systems and strategies and how effective in achieving sustainable health and environmental goals.

3. PROBLEM DEFINITION AND AIMS OF THE STUDY

3.1 **Problem Definition**

Plastic is a versatile material and indispensable part of modern everyday life. It is an undisputable reality. At the same time, it is important to conscious about how we design, produce, consume, plastic handling etc. for a sustainable future. Because all these factors point towards the environmental problems and other health problems associated with them. Through this dissertation, the researchers try to address the environmental challenges of today's Sweden in handling plastic wastes so that it can use sustainably by coming generation (Sweden EPA, 2021). The Swedish EPA road map clearly explains the sustainable use of plastics to meet 2030 agenda. It is very important to understand the effectiveness of waste management infrastructure. Insufficient or inadequate measures may create drastic problems in waste management infrastructure like recycling, collection systems, waste treatment technologies etc. So, this research tries to delve the challenges and limitations of current systems in effectively managing plastic waste (Sweden EPA, 2021). With the help of Google survey, the researchers try to understand the behavioural social practices and the public

awareness regarding the environment impact of plastic waste and sustainable plastic management practices. It will certainly help to find out the reasons behind the lack of awareness if any existing and the consequences it has on achieving sustainable plastic management. The core part of this thesis is to analyse existing policies, systems and strategies regulating the plastic waste management and how effective in promoting sustainable practices. Furthermore, the plastic waste management is a matter of risk emergence and uncertainties in modern societies. It believes that this thesis definitely will help to analyse how the production, consumption and disposal of plastics have created various risks in Swedish societies.

3.2 **Aims of the Study**

The study aims to understand the plastic management in Sweden along with the level of government policies and rules to reduce the waste. Moreover, this research makes a thorough analysis of the responses about the impacts and management of plastic waste, collected through the survey. All may know, usage of plastic in general form is not so good. So, it is high time to inculcate future generation about alternative for plastic usage in their daily life as youngsters compared with elders are mostly unaware about the harmful effects of the mismanagement of plastics and also its economic significance. Furthermore, this study shows current practices of circular economic aspects in recycling processes and to make a true reflection on the possible strategies for sustainable health, environment and well-being. Thus, the research questions are:

1. How effective the existing systems and strategies for managing plastic waste in Sweden and to what extent does Sweden meet the objective of a sustainable future?

2. What are the social impacts of plastic mismanagement in terms of three pillars of sustainability such as the environment, economic and social sustainability?

4. THEORETICAL FRAMEWORK

4.1 Risk Society Theory

The risk society theory focuses on the emergence of risks and uncertainties in modern societies and considered as one of the most ambitious, expansive and debated social theories of risk. A risk society is a social formation in which vulnerability to, and responsibility for, hazards are the object of calculation and calculated distribution across populations (Beck, 2009). The risk society is concerned with the transition from the modern industrialized

society to the more technologized hazards. It is defined not by the distribution of goods but by the distribution of 'bads' like pollution, contamination and other by-products of production. Basically, these are technological hazards which can be preventable and entirely different from the natural hazards. Both types of hazards have impacts which are intensified or mitigated by social, cultural, political and economic systems (Baxter, 2020). In short, all are aligned with society and environmental health risk is viewed as a social construction.

Plastic waste management is a global challenge due to the significant increase in the production and consumption of plastic. Its persistence in the environment, ecological degradation, harmful impacts to human health, climate change etc. might be a significant concern in the modern societies and certainly it will lead to risks and uncertainties. The recent studies show that the excessive production and improper disposal of plastic waste create great environmental risks. Risk society theory helps to analyse how plastic waste poses risks to the stability and sustainability of ecosystems. Apart from the environmental concern, plastic pollution poses greater threat towards human health through various factors. Technological risk is another important factor when discuss about plastic pollution. Because recycling, waste to energy conversion without gas emissions, resource consumption etc. has its own risks existing in the society (Kibria, Masuk, et.al., 2023). So, with the help of risk society theory, the researchers can study the matter of plastic waste management for a sustainable future in Sweden effectively.

4.2. **Theory of Social Practices**

The theory of social practices focuses on the everyday practices and routines that shape societal behaviour. More specifically it refers to the way these practices typically and habitually performed in a society. Practices are similar because they are similar for different individuals at different points of time and locations (Holtz, 2014). As Tim Jackson puts it: "Consumer behaviour is key to the impact that society has on the environment" (Jackson, 2005). Many models of consumer behaviour exist which may inform policies aimed at less and different consumption. Most of these models neglect the fact that the preferences, habits and behaviours of consumers develop in a social context. Now a days social practice theory has received growing attention as a promising approach to address and study in particular routine, collective and conventional consumption (Holtz, 2014). The term 'social' is constituted by the behaviour of individuals who have some freedom to choose among different alternatives. Hence, the individual, his or her priorities and incentives, other decision- making strategies should be considered. The other element 'practice' can be defined

as the routinized type of behaviour which consists of several elements which are interconnected to each other (Holtz, 2014). In the context of plastic management in Sweden, this theory helps to understand how plastic consumption, waste generation, and recycling behaviors are embedded in various social practices. Furthermore, it highlights the roles of individuals, households, communities, and institutions in influencing plastic- related practices and the interconnection between them as all these together constitute the broad term 'social'.

4.3 Actor- Network Theory (ANT)

Actor-network theory focuses on the central concept that everything in the natural and social world existed in a regularly shifting networks of relationships. All factors are important and interrelated to create social situations as humans (Bencherki, 2017). Hence this theory stresses the view point that nothing existing outside of those network relationships and the actors in the relationship may be humans or non-humans. This theory will help the researchers to map the actors involved in plastic waste management system in Sweden. The actors include both humans and non-human actors such as recycling facilities, regulations, plastic waste itself, other waste management infrastructures etc. Another notable factor is that this helps to understand the power and functional relations between different actors such as manufacturers, consumers, government agencies and other waste management facilities. The socio- technical systems and its interconnections are important factors while studying plastic waste management in Sweden. The social factors like consumption and other behavioural practices interconnect with technical aspects like waste management systems and strategies must be highlighted in this research (Sage Pub, 2004).

5 IMPLEMENTED RESEARCH:

5.1 Research Method: Quantitative

Research methodology in any research study is considered as an important element and analyzing research data by applying appropriate methodology is critical for assuring the findings, cogency and dependability. This thesis' research was based on a 'Quantitative' method that applied to measure the attitude, behaviour and approach towards plastic and the effectiveness of plastic waste management systems and developments in Southern part of Sweden. Consequently, it was planned and carefully executed to address the research questions and key objectives of the study *(*Khalid, Khawaja & M.,Dileep (2012). This quantitative research was a social research that involved empirical methods which is the

foundation for any investigation and empirical statements that brought out information is condensed statistics. Quantitative method elicits detailed information through statistics as its variables are numerical (Bluman).

The data was collected as accurately as possible to obtain definitive and standardized result to measure different levels of experiences, trends and activities of people in Sweden with regard to present-era-usage of plastic in their daily life and its effective management for a sustainable future. There was feasibility barriers for researchers to include entire population and members of the target population could not all be identified, 'sampling' was selected to collect data that were presumed to be representative of the target population. Researchers used 'convenience sampling' technique, a non-probability sampling method to conduct this study (Stratton, S., 2021), (Bluman). This technique is also known as haphazard or accidental sampling, wherein selected people (sample units) are conveniently available (Zikmund, 2000).

If no other method is feasible, convenience sampling can be used to develop objectives for use in more rigorous research studies. Researchers announced about the study and participants expressed their wish to take part in the study and self-selected for it. Convenience sampling is a common type of sampling found in population research and is popular because it is inexpensive, relatively simple and less time consuming. It is subject to forms of bias and allow for statistical measurement of sample error or statistical validity. In this technique, the sample result's analysis can be applied to study participant group (Stratton, S., 2021),

The 'Survey' one of the most widely used quantitative research methods (*Christine Davies, 2021)* was used in this social contexts and researchers used the 'Survey Questionnaire' (appendix 1) to conduct the research survey. By using a structured questionnaire, it guaranteed the questions to be asked in the same order and way thus increasing reliability of the research (Bryman, 2016, p-276). The selected sample unit had the accessibility to internet facility so as to participate actively in the survey. An online questionnaire offers opportunity for wide geographically spread population to be contacted (Bowling, 2014, p-278) which facilitates to decrease sampling error.

5.2: Data collection:

The implementation of 'Survey Questionnaire', the data collection tool applied for this quantitative research study was through online in order to reach out to target group conveniently. The 3 pages long questionnaire, consist of 20 numbers of questions were designed in 'Google Form' software platform. All the questions were related to prevailing plastic management systems and associated socio-environmental factors in Sweden. The link of this form was uploaded in social media and other online based facilities such as emails to announce the study survey. All the questions were closely connected to research objectives and aim of the study and the questionnaire included both categorical and numerical types of data (Bryman 2016). In order to get the categorical data for effective analysis; respondents were requested to fill in their age, gender and area of residence, employment and education status. Other variables were included in numerical pattern. Questionnaire was structured to enable unambiguous and easily countable answers for the analysis. (Bowling Ann, 2014).

Questionnaire included closed, multiple choice and rating choice questions in the survey. (Elizabeth Martin, 2006). Closed questions provide standardized data investigated statistically and it stays efficient and consistent over time. The timeframe given for final submission of the survey was two weeks and the survey-link was circulated among self-interested target people. Researchers could receive total of 220 valid and fully filled up responses (sample unit) for the study.

Anonymity of the participants was taken into consideration and therefore the questionnaire did not include any option for revealing their name. By giving a cover note about the topic and researcher's identity, all respondents were well informed about the purpose and importance of the survey. The duration of the survey was around up to 5-8minutes. Authors tried to keep questions as clear and simple as possible in order to get genuine and increased response rates (Bowling, 2014, p-277) without losing the core focus of the survey. All the responses were collected and collated the complete data in Microsoft Office package. The same information is used by researchers for further statistical review and graphic presentations to display results of the survey and evaluated how far Sweden's systems and strategies for plastic waste management reached and also it displayed level of socio-environmental challenges for a sustainable environment in Sweden.

5.3. Data processing and Analysis:

For data measurement, this research study has applied descriptive technique and the survey questionnaire included all the three broad levels of measurement scales namely nominal, ordinal and continuous (interval/ratio). “Descriptive statistics consists of the collection, organisation, summarization and presentation of data” (Bluman, p-43). To score population in non- hierarchical, exhaustive and exclusive categories, the survey absorbed questions on respondents’ gender, geographical location etc. that are nominal level type of measurement to segregate the population variable (Bluman, p-47). Participants’ age etc. were explored by an ordinal type of question and scored by a hierarchical order category which cannot be directly measured. Likert type of numerical scale was used as an indicator for low to high scoring according to their magnitude in a particular order (Christine Davies, 2021, p-13). Question to rate the people’s satisfaction level of municipal plastic waste management was absorbed through a continuous(interval/ratio) level type of questions in which the interval level of measurement ranks data and accurate differences between units of measure. The interval data is measured along a numerical scale that has equal intervals between adjacent values. It is vital to understand the nature of data as it ascertains the sort of analysis that can be conducted in a research study (Khalid, Khawaja & M.,Dileep 2012). By these descriptive statistics data collection and using ordinal and nominal data types of questions, researchers obtained frequency distribution, central tendency (mean, median & mode). Measures of dispersion (standard deviation, variance and range) were obtained by using interval data type of questions.

5.4: Validity and Reliability

The accuracy and consistency of a survey/questionnaire forms a significant aspect of research methodology which is known as validity and reliability. It examines the fitness of measure’. One of the important aspects of instrument development is checking for its validity and reliability through pilot testing (Khalid, Khawaja & M., Dileep, 2012). As a pilot study, the questionnaire was put into a trial among a small group of ten people who were as similar as possible to the target population, to confirm the reliability and validity of the data. It helped to assess the feasibility and internal validity of the survey and identified problem that might have occurred using proposed types of questions. It also helped to restructure some of the questions more simpler and fruitful manner and checked whether it could give adequate range of responses in a time frame. It validated how well the collected data covers the actual area of

the research (Van Teijlingen, E., & Hundley , V. (2001). The pilot survey also provided a review of comprehensiveness, and clarity and brought to a clear level of agreement as to which items should be included in the final version of the questionnaire. Researchers made sure that each respondent filled he form only once and multiple entries were restricted. Questions were carried out in English language.

6. RESULTS AND ANAYSIS:

6.1: Demographics:

Data was collected from south part of Sweden for the study current effectiveness of the country's plastic management and people's approach towards its consumption and awareness for a sustainable environment. By using convenience sampling method, two hundred and twenty people were selected and actively participated by attending all the questions given in the form. The empirical strength (sample unit) of 220 people consisted male representation of 107 members (49%) and female representation of 113members (51%). People from different educational qualification, employment status, age and geographical area (urban and rural) took part in the survey (table 1). All questions were mandatory to attend so that all the population attended every question without missing any of them. To take part in the survey, they had given the opportunity to respond spontaneously, quickly and conveniently.

Below Table1 shows the participants' (Sample unit size of 220 participants, n=number of people) general information used for the research study.

Gender	Male 49% (n=107)	Female 51% (n=113)			
Education	School & Elementary 8% (n=18)	College/Uni. 92% (n=202)			
Area	Urban Apartment 50% (n=112)	Urban Villa/house 12% (n=24)	Rural Apartment 18% (n=39)	Rural Villa/house 20% (n=45)	
Employment	Skill Employed (n=119) 54%	Unskill Employed 6% (n=14)	Self Employed 7% (n=16)	Unemployed 10% (n=21)	Student 23% (n=50)
Age	15-24 Yrs 15% (n=34)	25-34 Yrs 35% (n=78)	35-44Yrs 34% (n=74)	45-54Yrs 14% (n=29)	55-70Yrs 2% (n=5)

Table 1: Sample Unit(population) general information from S.Sweden

The above data shows that 62% of the population of the sample size were from Urban area and 38% of people represented from Rural area. From the total population, 67% were employed in difference level of skill capacities and 54% of them were skill- employed. Unemployed category was comparatively smaller in number (n=21, 10%) and 23% students category took part in the survey (n=50). Majority of them (92%) were educated with college /University level of education. Even though, different age group of people took part in the survey, 69% of them were from the age category of 25 to 44years old (ie.35% from 25-34yrs and 34% from 35-44yrs range). Overall, it was inferred that, this study absorbed substantial amount of information from almost equal level of gender participation with fairly good education and employment in Sweden. The mean age of the participants was 44years (in the category range of 15 to 70yrs of age) All of them; one way or the other had contact with plastic substances in their daily life.

6.2: Socio-Environment Impact in Plastic Consumption and Attitude

6.2.1: Motivating Factors for the Plastic Choice & Dependency

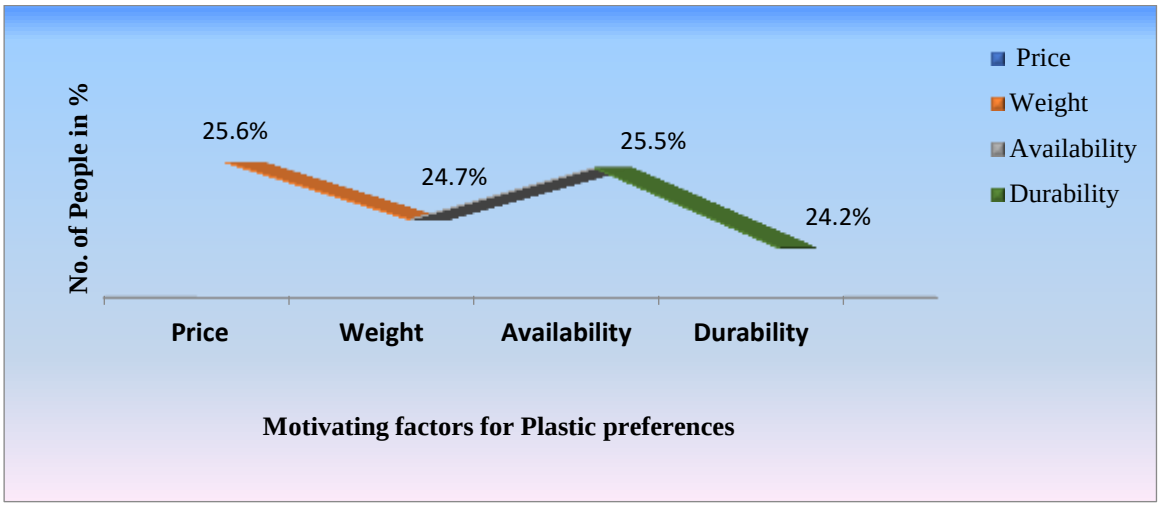
The key motivational factors that affect people's attitude towards plastic purchases were explored by asking their preferred rating (from 1(lowest) to 4 (highest) marks) on key elements while purchasing plastic natured materials.

Frequency distribution (Table 2) showed the total number of people who rated from lowest preference (1) to the highest preference (4) against each benefit criteria (price, weight, availability, and durability) for plastic material purchases in their life. In the analysis, (graph 1), it was noticed 25.6% of people preferred price as the most beneficial factor for plastic. 24.7% of total people preferred weight as the best beneficial element, 25.5% chose availability factor and 24.2% of the population thought durability is the best motivating factor for plastic procurements as against other types of materials that are available in the market. Overall, the highest rating was for price (25.6%), second for availability, third for weight, and lastly for durability (24.2%). It was evident that there was only a minimal variation between each element (almost equally distributed) and all these four elements are more or less equally affecting each individual's decision making. Therefore it was inferred that people's attitude on plastic choice preferences were high and competitive. People's liking towards positive side of this material is high and their preference of each element is varied from individual to

individual. Also, it gave an observation that result was a combination of different levels of people needed different levels of products with different qualities. For instance, a car manufacturer might prefer durability of the plastic part that he uses in the car whereas, for a plastic bottle user, it may be the grade of it that determines his decision. Therefore, it could be measured that various types and qualities of plastic products are available for public today. This evidenced that people have their own choices among various beneficial alternatives and reasons for choosing plastic substances are on different level of importance in their life. Plastic industry is giving these benefits to people through various needy products so that their inclined attitude to plastic never seemed to be changing as long as it was available in the market.

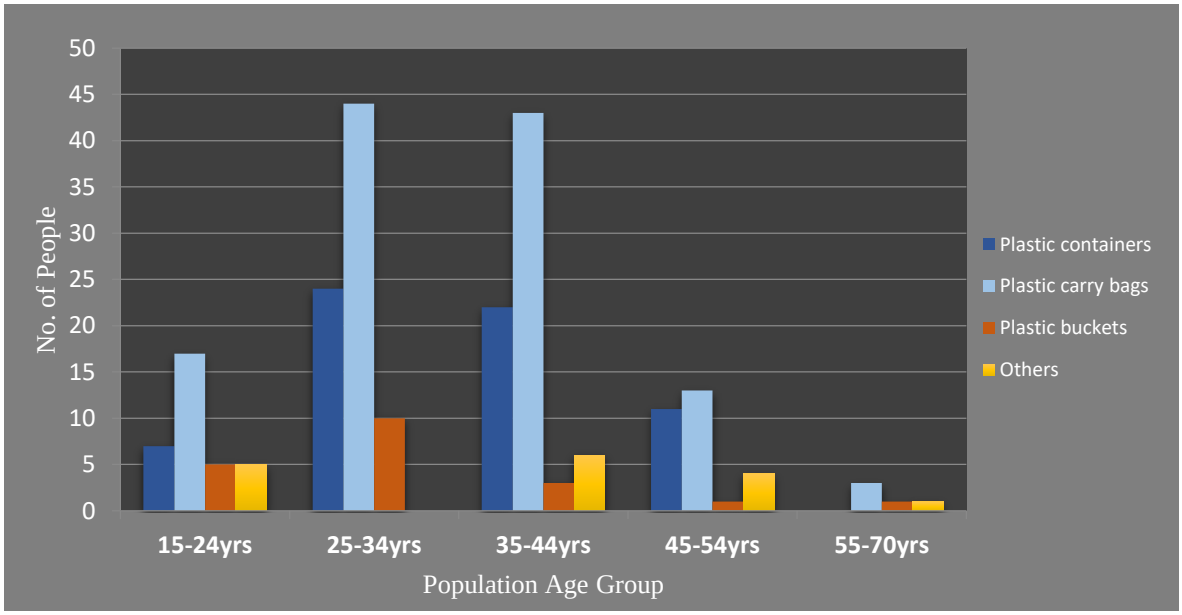
Preference attitude	**Rating (1(low) to 4(high)**			
	1	**2**	**3**	**4**
Price	53	61	52	54
Weight	60	56	61	43
Availability	48	72	47	53
Durability	70	58	37	55

Table 2: Frequency Distribution of plastic choice preference of 220 participants in South Sweden.



Graph 1: Motivational attitude difference of population in Sweden in selection of plastic substance.

Through the literature reviews and earlier sessions of this study reading, all know that, massive use of hazardous plastics such as shopping bags (especially single use plastic bags) bring massive challenges to solid waste disposal in Sweden. It has significant role in plastic waste management, environmental pollution and sustainability. In order to measure if any changes have happened to this scenario today, researchers asked participants about their experience about which plastic category cause them more which prone to polluting the environment by using it excessively. The data was measured based on the five 'age' categories of the sample unit. The below graph 2 depicts the details of more polluting category of plastic in Sweden among different age level group.



Graph 2: Age group wise comparison of most used plastic category causing hindrance to plastic management and the environmental sustainability

The above graph indicated that people of age range of 25-34yrs and 35-44yrs, rely more on 'plastic carry bags (56%, 58% respectively) compared to any 'other' substances of similar category. The mode is 44(n) and it is in 25-34yrs age category. Similarly, in the case of 'plastic container' usage it showed 31% in group 25-34yrs and 30% in 35-44yrs group. The mode is 24(n)) in age group 25-34yrs. Also, the key observation was that almost double amount of the total population used carry bags than containers in their daily life. In all age group, it was observed that plastic carry bags dominated in plastic waste accumulation and therefore problem for its daily waste disposal, littering habits and environment imbalance. Overall, the key assessment was that; compared to other options, 'plastic container and carry bags' was still the leading items in plastic waste accumulation in Sweden.

The study also tried to measure people's experience about the level of changes in plastic usage habits in Sweden by asking a question that, over the past years, had they noticed any changes in plastic consumption habits in people in Sweden (table 2). The result showed that 19% (n=48) of participants opined that there is a significant increase and 33% (n=72) of the sample population believed that there was a slight increase. 26% (n=52) percentage of people responded that there was no change at all. On the other hand, 19% (n=42) reported that there is slight decrease and a very minimal rating (3%) was given for significant decrease in plastic circulation in the society. Table 2 shows the gender wise rating of opinion.

Gender	Sig. Increase	Slight Increase	No change	Slight Decrease	Sig. Decrease
Male	20	42	22	16	1
Female	28	30	30	26	5
Total	28	72	52	42	6

Table 2: frequency distribution of level of changes experienced over the years in plastic consumption habits of people in Sweden

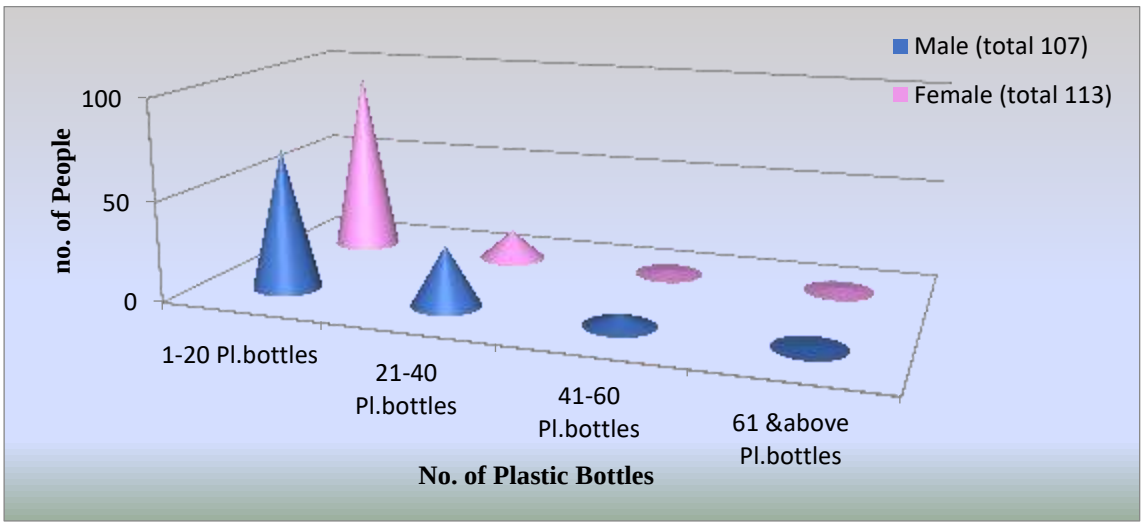
Overall, all the above mentioned three areas of observations conducted to study socio-environment impact in plastic consumption and people's attitude. All observations were connected to the theories mentioned in this study i.e. theory of Risk society, Actor-network theory and theory of Social practices.

6.2.2 Nordic Lifestyle Habits And Behavioural Practices on plastic material

The habit of carrying and consuming soft drinks, water etc. in public places are a common lifestyle of people in Sweden. These drinks are available in bottles of various materials such as plastic, glass aluminium etc. In order to measure any changes in terms of Nordic habits in consuming drinks, beverages, water etc. in plastic bottles, a question was asked about total number of plastic bottles that are purchased or consumed in a month, approximately.

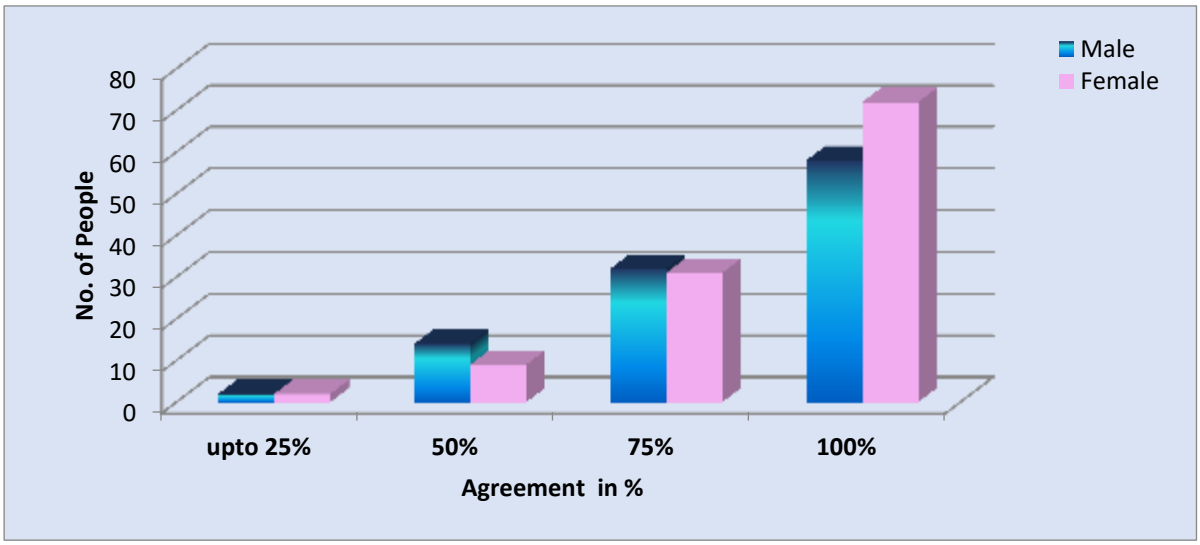
The graph 3 below showed that majority of population in gender category uses plastic bottled beverages in their daily life. It showed the reducing tendency in usage pattern from first category (1-20bottles) till the last group (61 and above). In the first group, 70 male and 94 females utilized plastic bottles. By analyzing this, researchers noticed the relevance of further study in understanding whether this positive scenario of reduced use of plastic material is because of lifestyle change or because of the policy implementation (SDGs) to mitigate

plastic substances by encouraging more 'can' bottles/container (made out of non-plastic materials' based mechanism instead of plastic in Sweden.



Graph 3: Nordic lifestyle on plastic bottled beverage usage (monthly) in S.Sweden.

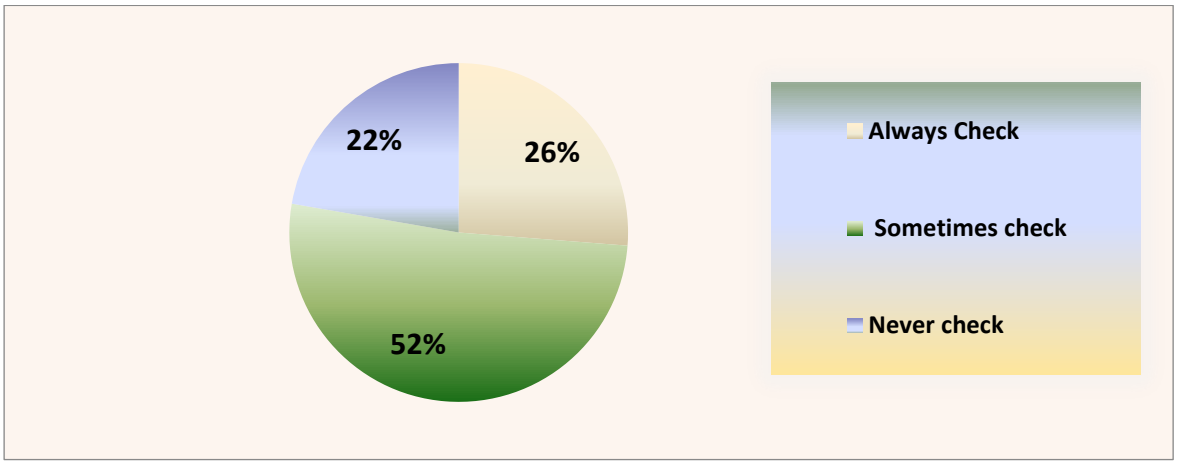
In view of Nordic culture and presence of high level of plastic in the society researchers asked participants to rate their opinion about did they think that 'human behavioral practice' was one of the key factors for our 'Environmental Sustainability'. Substantial number of respondents positively reacted to this question by rating 100% agreement. 58 female participants and 72 male participants voted cent percent agreement to this query. Also, 75% rating was given by 31female and 32male respectively. 14 female and 9male gave 50% agreement and 2% of the sample gave 25% agreement to this factor (graph 4).



Graph 4: Opinion level on relation between 'human behavioral practices' vs. 'Environmental Sustainability

6.2.3 Nordic health and Environmental factors

For measuring the concern of Nordic population in Sweden, towards health consciousness in handling plastic items on daily basis; a question was put-forth that, before using plastic items, how often do you check the quality/ grade /bio-degradability of the plastic container. As the graph 5 below indicates, among 92% (n=202) of population who are well educated (college/Uni.) in the sample population, more than 52% (n-104) of the total respondents opined that they check the quality of the plastic product before consumption only at sometimes. There were 22% (n=45) members who were generally not bothered about the quality grade checking. However, 26% of the sample population always attempted to check the grade and biodegradability of the plastic items. This showed the general understanding about the health and environmental concern among people. People's approach on this hazardous material handling and environment pollution concern is relatively at moderate level.



Graph 5: Educated (college/Uni.) people's habit/behavior on plastic item's quality checking in Sweden.

6.3 Nordic Behavioural Practices and attitude in various Plastic Waste Management mechanisms In Sweden

6.3.1 Plastic Waste Collection and Disposal Methods efficiency

As discussed earlier, there are various methods people adopt to dispose their plastic waste. To evaluate the current systems adopted for their plastic disposal, people were asked to respond on which method they follow to discard their plastic waste. The sample unit category selected

to assess this was based on their residing area in Sweden. The following frequency distribution Tables (3, 4, and 5) shows the key analysis of this factor.

Table 3: Table shows total number of individuals who depend on four various systems for disposal of their daily plastic waste

Type of Plastic waste disposal	Total people (n)	Total people(% of n)
Burn	2	1
Landfill(open dumping)	4	2
Recycle	94	43
Municipal Waste system	111	50
Do not know	9	4
Total	**220**	**100**

Table 4: Table shows the geographical area-wise distribution of data of individuals who depend on four various systems for their daily plastic waste disposal

Area of residence	Burn	Landfill	Recycle	Municipal collection	Do not know
Urban area- Apartment	0	0	49	56	5
Rural area - Apartment	0	0	15	19	3
Rural area - Villa/house	2	4	19	24	1
Urban area- Villa /house	0	0	11	12	0
Total	**2**	**4**	**94**	**111**	**9**

Table 5: The following frequency distribution Table shows geographical area-wise satisfaction rate of individuals, in current system of plastic waste disposal

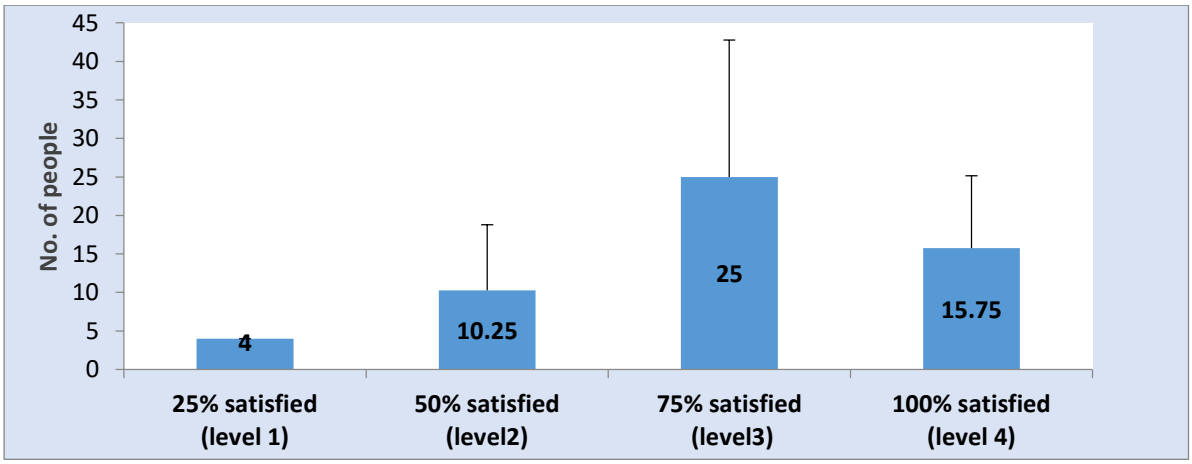
	satisfactory attitude level of various plastic disposal methods				
Area of residence	**0%**	**25%**	**50%**	**75%**	**100%**
Urban area- Apartment	1	8	24	49	30
Rural area - Apartment	0	2	7	17	12
Rural area - Villa/house	1	7	17	12	10
Urban area- Villa /house	0	1	4	8	10
Total	**2**	**18**	**52**	**86**	**62**

Following information were observed from the above 3 tables:

a. Individual disposed their plastic waste through Municipal waste collection system (50%) and recycling units (43%). b) All the geographical areas depended on common system facility (municipal & directly to recycling units available in their areas), c) Ignorable number of individuals depended on open dumping and burning of their plastic waste. d) Individuals tried to avoid hazardous ways of plastic elimination treatments such as land fill and burn which increases plastic pollution to environment. e) In total, 93% of people prefer to use systems of either municipal or recycling unit's facility. f) While 9 individuals (n=9) doubtful about the whole system of plastic waste handling systems, rest of the population is well aware about their system of disposal. g) The most utilised system for waste disposal was municipal collection and individual who reside in apartments in urban areas depended more on this system network.

6.3.2 System efficiency of Municipal Plastic Waste Management

In specific, to assess the current efficiency of plastic management system and government support to its people, being one of the key objectives of the research, and how it helps the lifestyle and health of the Nordic people was explored by collecting public opinion about the key mechanism 'municipal plastic waste disposal management'. A question of how satisfied the participants were with the service from the Government for overall Plastic Management in Sweden including household Municipal Plastic Waste collection systems gave varied level of rating. Below shown is the central tendency (graph 6) of people's attitude towards plastic waste collection and treatment system efficiency in Sweden.



Graph 6: Mean and Standard deviation of people attitude about Plastic Waste Treatment efficiency in S.Sweden

The arithmetic mean (average) of each level varied from 4 to 25, and the standard deviation also showed variance. The highest range (46) showed was in in third level (75%satisfaction) with a Standard deviation of 17.76. The Standard deviation of second level (50% satisfaction) and fourth level (100%satisfaction) showed 8.56 and 9.39 respectively. 25% satisfaction level showed 2.24 as standard deviation.

This was analysed by category of geographical area of residence i.e., Urban area- Apartment, Rural area – Apartment, Rural area - Villa/house & Urban area-Villa /house. Overall, around 29% of population rated 100% satisfaction, 45% reported 75% rating, 19% of people rated 50% and 7% gave 25% satisfaction level. The following table-6 depicts the frequency distribution and measures of dispersion.

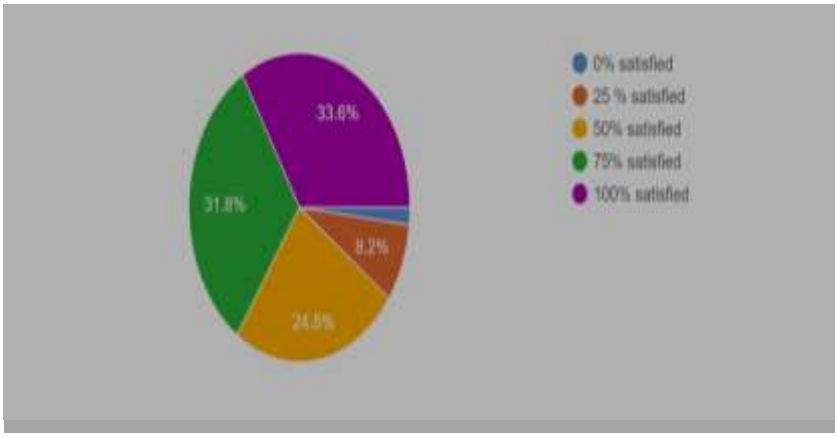
Area of residence	**Frequency Distribution**			
	Efficiency rating of Municipal Plastic Waste Management			
	25%	**50%**	**75%**	**100%**
Urban -Apartment	7	21	55	32
Rural - Apartment	3	0	20	10
Rural - Villa/house	5	16	16	11
Urban - Villa /house	1	4	9	10
total in %	**7**	**19**	**45**	**29**

Measures of dispersion	**Efficiency rating of Municipal Plastic Waste Management**			
	25%	**50%**	**75%**	**100%**
Range	6	21	46	22
Mean	4	10.25	25	15.75
Count	4	4	4	4
Variance	5	73.19	315.5	88.19
Standard Deviation	2.236	8.555	17.762	9.391

Table 6

6.3.3 System efficiency in public spaces to control plastic littering habits

Apart from household waste management system, efficiency of plastic at public places such as bus/train stations, supermarkets, school, parks was also inspected through the survey. Government initiative about reducing public's habits of plastic littering at public spaces was evaluated by inquiring how far the present facility of trash boxes or similar arrangement for plastic waste collection is effective in Sweden. The observation is given in the below pie chart. (Graph 7).



Graph 7: people rating on efficiency of public space plastic management system in S. Sweden (Graph taken form Google form survey questionnaire report of this research)

Around 92% of the population were satisfied by with above 50% level satisfaction. 8% of population are satisfied with 25%. Current facility provided by the government bodies to maintain social and environmental sustainability was well accepted by 33.6% population in Sweden with 100% satisfaction. 32% respondents with a rating of 75% satisfaction and 50% with 25% satisfaction indicated the scope for improvement in the system. Whereas, 8.2% population rated only 25% satisfactory about the open space plastic littering control measures.

6.3.4 Deposit Return system efficiency

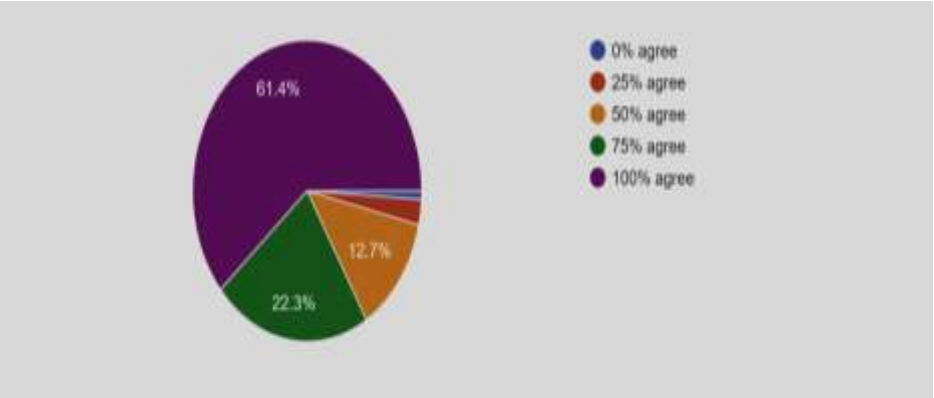
Researchers checked DRS; one of the most recycling strategies of plastic waste bottles is helping the Nordic in managing their plastic stuff. The public attitude in cooperating with the prevailing system of returning PET bottles after use for recycling to reduce environmental pollution were assessed. They had given four choices (a. concern to plastic littering habits, b. interest in getting refund of deposit, c. system convenience) to select as what was the best motive for them to utilize this facility. Out of four levels of satisfaction rating, the result showed 11% variation between lowest (1) and the highest level(4) in the case of concern to plastic littering habits, 8.6% variation in the case of interest in getting refund of deposit, and system convenience showed 14% of variation. So, it was inferred that system convenience needs more attention for making Nordic more comfortable.

6.4. Strategies for Environment Sustainability & Nordic Health and Lifestyle

6.4.1 Reduce-Recycle-Reuse (Circular Economy 'The Cradle to Cradle System)

In order to assess people's preparedness to shift to alternatives and good lifestyles practices that enable reduced plastic's circulation in Sweden, promote plastic reduction from the

society for a good cause. Their understanding of the need and significance of 'Reduce-Recycle- Reuse' (Circular Economy) concept in Plastic management for supporting a sustainable future was sought in the survey. From the sample unit, 62% of population totally agreed to it with cent percent rating. 75% satisfaction rate was reported by 22% of population and 12% of the population believed 50% rating and minimal rate was reported with 12% rating (graph 8).



Graph 8: People rating on Significance of Circular Economy Concept in S. Sweden (Graph taken form Google form survey questionnaire report of this research)

6.4.2 Awareness on Plastic hazards and risks

Participants' responses to the inquiry about any feel that there is lack of awareness exists in switching over from excessive plastic usage to more sustainable materials like Bioplastics/paper bags etc. It was observed that population of 20% strongly agreed, 43% agreed, 22% of population at neutral condition, whereas 15% of population were in disagreement status. Overall, 65% people opined that there is a need to equip people to be more vigilant about the plastic risk society if people do not act in present scenario.

In the present era of Nordic's strive at various realms for attaining its goals of plastic waste mitigation, researchers wanted to assess how general public, today, feel about the importance of this drive and did they think that plastic is a problem for health, wellbeing and environment. The response were quite positive that 78% (n=170) of the sample unit strongly agreed that plastic is presently a risk for the country. Again, 18% (n=40) opined that it is definite depends upon the circumstances. From balance of 10 opinions, 8(n) people noted as, it is not a major concern and 2 members in the group could not say any opinion in this regard.

6.4.3. Better product choices for sustainable future

Looking better choices for substituting plastic natured consumable goods are necessary today for building a sustainable future. To know how effectively people in Sweden would participate in the battle of no-to-plastic world, an inquiry was made to the population whether one of the most common plastic substance such as carry bags need to be avoided and receive more eco-friendly items (paper, cloth etc.) for environmental conservation. From the given 4 options; paper bags, cloth bags, bio-degradable bags. 99% of the population gave these better choices. Best among four options was cloth bags (52 %,), paper bags preference for 26% and 21% for bio- plastic bags. It indicated people's urge for a shift from plastic to other alternatives if available beneficially.

Result Summary

This research study included analysing 3 main factors that related to theories of this research and objectives; 1) Socio-environment impact in plastic consumption and Nordic behavioural practices, 2) system efficiency of Plastic management, and 3) development strategies for the risk avoid.

The study revealed that one of the reasons for increase of plastic demand is because of its benefits. This means its merits overweigh its demerits. People's preferential factors on plastic are found variant therefore there was no significant difference in rating between its features (all rating remained within 24-25 % level). To a small level, price and availability factors found to be the better attractive features for the 'plastic' choice. The attitude of checking plastic quality before using was not favourable as half of the population not very particular about looking at its grade and biodegradability all the time. Therefore, it was inferred that people's behaviour practices and attitude perhaps, boost increase of plastics in the society. 19% people opined there was significant increase and 33% said there was a slight increase in plastic movements compared to earlier years.

Efficiency of Systems such as Municipal plastic waste collection, PET bottles deposit refund system and waste bin facility at open spaces were assessed by getting opinion from the sample population. In a nutshell, there found a need for improvements in all these systems for a socio environment sustainability and healthy lifestyle of the Nordic. For example, in the case of open space facility only 33.6% population in Sweden are 100% satisfied and 32% respondents with a rating of 75% satisfaction and 50% with 25% satisfaction. This indicated the scope for improvement in the system. Also, out of 220 people in the sample population

only 62 people are 100% satisfied with the various methods of waste disposal mechanism of the government. Efficiency of MPWM was rated only around 29% of population with full satisfaction, 45% reported 75% satisfaction rating and 19% of people rated 50% level satisfaction. This result showed that systems need to be improved. All these systems are there for the well-being of Nordic and sustainability.

However, majority opined for a shift to more sustainable items such as cloth bags for conserving Sweden a plastic free country. Also they concurrently expressed the opinion on giving more and more awareness among public about plastic risks at various levels. In Nordic perspective, 62% of population agreed 100% the need to have developmental strategies like circular economy. Furthermore, the study attempted to analyse people's impression and knowledge about its impact. It aimed to assess whether people in Sweden identified this scenario as a risk to society in relation to Nordic health and lifestyle and finally how cooperative they were to take corrective measures put-forth by the government. Plastics, being the ubiquitous element in present life, 78% (n=170) of the sample unit strongly agreed that plastic is presently a problem for the country.

7. DISCUSSION

7.1 Understanding Plastic Consumption Habits and Waste Generation in Sweden

Plastic Consumption habit is steadily growing day by day and so is the increase in amount of waste generation. Now a days, issues related to the wide extensive use of plastic materials and the concern on environmental problems have gained attention of the researchers as well as public around the world. Plastic is an indispensable part of modern societies and it is an indisputable reality. To study the plastic consumption and waste generation in Sweden, the researchers conducted a survey among the public in southern part of the Sweden considering the background variables of age, gender, occupation, education etc to make the data more reliable and valid. In the survey, the researchers asked a question regarding the plastic usage in daily life. The figures showed that around 70% of respondents were likely from the age group of 25 to 44yrs and majority of them were from the background of university level of education, responded positively for the same. From the collected data, it is clearly inferred that plastic is an indispensable part of modern life due to so many positive qualities of plastic. The background variables have no such significant role in categorising the extensive use of plastic among particular group or gender as the figures are almost equal when the data

analysed. It points towards the social practices and behaviour of the public. More than 50% in the survey opined that there were significant increases or slight increase in plastic consumption habits over the past years.

Plastic usage became a routinized behaviour of the public which constituted many elements within it. The theory of social practice is very relevant here to understand the practice of plastic usage in everyday life and how far people are aware about the interconnectedness of other elements including waste generation, quality of plastic materials, recycling measures, economic significance etc. According to the Swedish EPA, around 4 million tons plastic waste generated during the year 2019-2020 and recent updated figure is uncertain. Plastic waste is categorized on the basis of various needs like packaging, construction, vehicles, electronics etc. Another significant factor in the consumption of plastic noted in the survey was the extensive use of plastic carry bags. The single use plastic bags create a great challenge to solid waste management in Sweden. The data clearly showed that the age group between 25 – 44yrs were extensive users of plastic bags and containers in Sweden. This habit of single use certainly will create serious environmental issues, climate change and other serious health problems. Plastic bag usage becomes a part of normal life in Sweden. But Sweden has attained a better position in recycling and managing plastic wastes when compared with other European countries. Sweden is much more concerned about the consequences of too much plastic waste as the new tax on plastic bag use aims to decrease the number of plastic bags for consumer use.

Furthermore, the study found out that for household disposal of daily waste, paper bags are supplied by govt. bodies like municipalities in Sweden and these paper bags are made available to all household for their convenient usage. It is experienced as an excellent initiative to reduce throwing culture of use and throw plastic bags. A systematic monitoring and maintenance of MPW collection makes a lot of positive effects in public and environment sustainability. In addition to all these facts, it was clearly evident that the packaging category is dominant in plastic consumption pattern in Sweden. Around 80% of the people opined that they depend for plastic bags for packaging and carrying things in day-to-day life. Even though several measures were taken by governmental actors in plastic network to meet the 2030 agenda and sustainable goals, the plastic usage is still existing as a social practice in Sweden. Its high time to switch over to other more sustainable alternatives in everyday life.

From the survey, it is clearly evident that the habit of carrying and consuming soft drinks, and other bottled water etc. in public places are very common and it became a part of their routine life in Sweden. From the survey, it is very clear that this argument is true as more than 80% people were responded in a way that almost 20 bottles were used per month. It showed the way to reduce plastic consumption even though it is a part of behavioural practice. Preferring 'pant' bottles or 'can' is a positive sign. The concept of social practice which focuses on the social and cultural aspects that shape individual behaviours and routines should be considered very important. People were aware about the environmental impacts of plastic, but it seems there is a lag in switching over to more greener and sustainable alternatives. Almost hundred percent respondents in the survey agreed with the fact that human behaviour practice was a major key factor for the environment sustainability. At the same time, around 70% people opined about the lack of awareness in switching over from the current social practices. This may be one of the genuine causes in present day to reduce plastic consumption habit. Moreover, it throws the spark on to improve the awareness campaign, system efficiency and individual responsibility to practice sustainable routines in daily life. In this scenario, the researchers believe that education plays a major role to improve the behavioural practices by including plastic sustainability in the national curriculum from the school days itself. To understand the plastic consumption habit, the researchers used the theory of social practice to delve deep into the matter.

7.2 Ecological Degradation and Risk Society Factor

The ecological degradation due to excessive plastic usage is a significant factor when analyzing the matter in the context of risk society. The high level of plastic consumption leads to serious environmental problems throughout its all areas of life cycle from extraction of raw materials to waste treatment and leakage to nature. In the last 50 years, plastic production has increased twenty-fold, reached 322 million tonnes in 2015 and plastic production is estimated to double by 2036 and might be quadrupled by 2050 (Milios, Davani, 2018). This is a serious factor considering the sustainability of the future. Inspite of all the benefits of plastic to the society, it has serious environmental threats throughout the life cycle. Traditionally, plastic production is completely based on the fossil resources, crude oil and natural gas as raw materials. Fossil based resources are finite and its impact to the environment is really hazardous throughout the extraction, production and utilization process. Here, the management of plastic needs more importance as the unsound management results in leaking

plastics to the environment and contaminated terrestrial, marine and atmosphere. Recent studies show that approximately 150 million tonnes of plastic wastes end up in the ocean and marine environment. Due to the chemical nature of plastic, its degradation process is very slow and can take centuries. While degrading, these plastics are broken down into small pieces of micro and macro plastics which slowly entered into the food chain. After sometime, these particles slowly entered into the world of all living beings including human life and poses high risk to the health and well-being of the whole society. In addition to the health problems, it poses disaster to the ecological balance, serious environmental and marine pollution and also climate change.

This thesis tried to understand the risk factor in the excessive plastic usage and how could be improved the status. The researchers believed risk society theory is very apt in understanding the hazardous disaster by human. Above all the negative impacts, plastic has a potential to be recycled many times and it can be considered as a favourable solution to the risk factors existing. Unfortunately, the figures shows that the recycling rate within EU is comparatively low and around 70% of plastic wastes end up in landfill or for incineration and energy recovery. The case of Sweden is not so different. Compare to other Nordic countries, Sweden has attained a better place in recycling but it is not a safe position to meet the sustainable goals. Moreover, plastic waste is not a priority agenda in waste legislative policy in Sweden. Due to several market hindrances and other technology- related barriers, Sweden did not reach a better recycling rate compared with the amount of waste generation in Sweden. As 2030 agenda is fast approaching, recent studies show that Sweden is striving hard to improve the recycling rate up to 55% by 2030.

From the survey, it was evident that cent percent people were concerned about the health and other risks and uncertainties due to excessive plastic waste generation and accumulation. But a lagging in switching over to sustainable means is clearly evident. The urgency of awareness campaign and other policy improving measures is needed to attain a sustainable level in Sweden. To improve the recycling infrastructures and upgrade the circular economy might be considered as an appropriate solution to reduce the risk factors in plastic management. The social and economic risks associated with plastic management in Sweden should be considered as risk in plastic management is purely a societal construction. So, the society, individual and stakeholders have equal responsibility to reduce the risks factors for sustainable future in Sweden. The role of public awareness, education, importance of raising

awareness about the environmental and health impacts of plastic as well as promoting behavior change and responsible consumption should be considered as a serious solution to reduce the risks and uncertainties in Sweden.

7.3 Assessing System Efficiency and Plastic Waste Management in Sweden.

To study about plastic management in Sweden, it is very important to analyse the system efficiency. The first and foremost assessment must be on the existing waste management infrastructure in Sweden. How effective in handling plastic waste especially the collection, sorting, and recycling processes, as well as the capacity and effectiveness of public awareness campaigns and behavioural interventions in promoting system efficiency should be analyzed. The survey clearly showed that around 90% of people were depending on municipal waste collection system and other accessible recycling units nearby. But the rate of satisfaction among the public was only 75% and it shows the need and urgency to improve the handling of waste management. Recycling of packaging, the intention to change the current system of collection, with an emphasis on recycling stations, to a system is based mainly on kerbside collection. Kerbside collection will be expanded and become the primary collection method in accordance with the Government's decision in 2022. The Government wants to increase recycling by shifting the responsibility for collecting packaging to the municipalities, while responsibility for material recycling remains with the producers. Under producer responsibility, the producers will also bear the costs. The transition to collection closer to the home is well in line with the EU Waste Framework Directive, which requires plastic packaging and food waste to be collected separately across the EU. Responsibility for collection and recycling of recyclable paper has been transferred to the municipalities since 2022 through the lifting of producer responsibility. At present, over 60 percent of the apartment blocks have kerbside collection of packaging and recyclable paper, where the fractions are collected in separate bins or underground containers. There is also collection with different coloured bags for different fractions by means of optical sorting. It is both for apartment blocks and single-family houses. In addition to all the facts, the present statistics presses the need to improve the efficiency of kerbside collection and recycling process.

Another significant system noted in Sweden is Extended Producer Responsibility (EPR). The role of EPR in promoting system efficiency in plastic waste management in Sweden holds producers responsible for the entire lifecycle of their products including the management of plastic waste. This is a revolutionary policy making in the history of Sweden regarding plastic management. The Swedish Environmental Protection Agency has been commissioned by the

Government to run a coordination node – National Plastics Coordination – which is a collection point with up-to-date knowledge and information that businesses, municipalities, regions, researchers and authorities need in their work for sustainable plastic use. When researchers discuss the efficiency of the system in handling plastic waste, it is vital to examine the recycling rates of plastic waste in Sweden. The recent statistics showed that the overall recycling rate of plastic deduced during the time period between the year 2016 and 2019. However, after the break in time series in 2020, there is a significant drop. The recycling rate in Sweden now is 38.3% in 2020 which is 16.7 percentage points below the 2025 target of 55% (European Environment Agency). This indicates that not so many supporting measures were introduced to increase the recycling rates in Sweden. It is very important that clearly defined responsibilities, enforcement and support mechanisms for meeting the targets across different entities and governance levels are needed for achieving high recycling rates in Sweden. Here, the relevance of actor network theory is high to understand the role of all actors both human and non-human to ensure a sustainable environment for future. The roles of government through policy amendments and decision making, role of waste management companies, producers, consumers, and environmental organizations in working together to optimize the system efficiency is needed to increase the recycling rates and meet the 2030 agenda.

The adoption of a circular economy approach and DRS in plastic waste management is other important factors to reduce plastic waste in Sweden. In Sweden, all producers should be connected to a PRO or be able to provide a way of collecting and handling the waste from their products. The major PRO in Sweden is FTI that collects packaging from households and businesses. TMR is the other PRO with the same responsibility. Except from these, there are systems for the reuse of packaging, of which the biggest are Svenska Retursystem and Norrlandspall. For plastic beverage bottles and metal cans, there is a mandatory deposit return system and the responsible PRO is Returpack. The PRO´s report collected amounts to the Swedish EPA. The Sweden has no enforcement mechanisms if the municipalities do not take sufficient measures towards increased material recycling, but according to legislation, the municipalities are obliged to describe their measures and results in follow-up of local or regional waste plans (European Environment Agency, 2022). The weak enforcement mechanism understanding through the research study in meeting the recycling rate should be changed or improved for better future.

To be concluded by assessing the data collected, the researchers like to express some important thoughts whether the Sweden is at risk or not in the case of plastic management. Based on the available data, it is concluded that Sweden is at risk for not meeting the MSW recycling target in 2025. Based on current data, Sweden's recycling rate was 38.3% in 2020, which is 16.7% below the 2025 target. It is very important to improve the enforcement mechanism to meet the MSW management targets as Sweden is lacking in these measures. Even though the recycling rate is a slight low in status, it is concluded that Sweden is not at a risk level for not meeting 65% recycling target for packaging waste in 2025. Another factor noted here is Sweden is not at risk for not meeting the 2035 target to reduce the amount of municipal waste landfilled to 10 % or less of the total amount of municipal waste generated. In short, it is believed that the possible and needed system efficiency can help Sweden to achieve the goal of zero waste and a sustainable future. The role of all actors is very important to ensure a sustainable zero plastic waste in Sweden. Hence, the researchers selected actor-network theory to analyze the matter as it clearly defined the role of both human and non-human roles to function a society sustainably. This itself is the purpose of this thesis to analyse the effectiveness of current systems and how far Sweden achieve the level of sustainability in plastic management.

8. Research Quality and Limitations:

Participation to this research was voluntary and anonymity was considered. Proper information about the purpose of the study and details of the researchers were announced beforehand. Each participant expressed their interest in participating and got self-selected. The questionnaire was fully designed by the researchers based on the research questions, objectives and background. The questionnaire was in English language and did not face much difficulty for not having it in local language Swedish. All the 20 questions were set mandatory to attend, and all respondents attended all questions carefully. Suitable theories were selected through literature review.

Sampling chosen was non-probability method (convenience) because of researchers' time, cost constraints and moreover, the inaccessibility to reach out to each and every population's information in Sweden. Therefore, it may not allow researchers to extend the results of a study to a general population; rather it can only apply to the study participant group. The interest-expressed respondents for the survey participation were from south side of Sweden, the sample unit strength was confined to this region and therefore; the study had to be conducted representing population in South Sweden.

9. Conclusion

The plastic mismanagement and its social impacts are a great concern for Nordic countries. While Sweden endeavouring to attain stipulated SDGs goals (by 2030), which also includes plastic waste mitigation concerns; through this study researchers attempted to understand the effectiveness of this struggle by assessing the prevailing Plastic Management Systems and Strategies and people's perception on mismanagement of plastic and readiness for substitutes for a sustainable future in Nordic context. The context of the research discussed health and socio-environmental factors in Nordic perspective, in specific, South Sweden in the spectrum of 'plastic consumption, mismanagement, waste disposal possibilities and necessity of betterment for 3pillar sustainability. Sweden has regulated different waste streams and general framework conditions, but there is no specific legislation targeting plastic waste.

By analysing sample population of 220 people from Nordic perspective, the study findings gave varied results (very low to very high) in many respects such as satisfaction level of people in waste disposal methods/ government systems, determinants of plastic choices of individual, receptiveness of SDG strategy of 'reduce-reuse-recycle' concept, need for awareness about plastic mismanagement, plastic quality checking attitude before utilising etc.. In view of Nordic culture and presence of high level of plastic circulation in the society, researchers inquired, whether they had a notion that 'human behavioral practice' was one of the key factors for our Environmental Sustainability'. Nearly 60% of the population (male 72(n), female 58(n)) responded with 100% agreement. However, the study affirmed that knowing impacts of plastic consumption does not really affect the real mental shift from plastic era to more sustainable living conditions due to the fact that plastic availability and other benefits are dominating human minds till the shift happens from plastic to no/alternative plastic society.

Overall assessment of waste management systems (in collaboration with government municipalities and producer responsibility) in Sweden, disclosed that both urban and rural residents highly depended on these system of collection of plastic waste disposal for their health and well-being. However, in Municipal plastic waste management system only 29% of population rated 100% satisfaction, 45% reported 75% rating and 19% of people rated 50% level satisfaction. This result expressed that there is need for improvement for well-being

and environmental sustainability. Therefore, the government need to enforce improved systems and strategies atleast to prevent further contamination of three pillar–sustainability.

Public should be provided with good choices and knowledge to make this plastic battle to be achieved. People are aware about the consequences of this plastic current scenario the production, use and waste generation of plastic products is expected to rise in the future and therefore, it is vital to increase the re-use and recycling of plastic waste for transitioning to a resource efficient Circular economy in Sweden. Being plastics, a ubiquitous element in present life, 78% of the sample unit strongly agreed that plastic is presently a problem for this Nordic country. Results revealed the strong opinion of the public that there is a need for more public awareness about the risk of this hazardous material. Risk society theory helped to analyse how plastic waste poses risks to the stability and sustainability of ecosystems. All observations were well connected to the theories mentioned in this study i.e. theory of risk society, actor-network theory and theory of social practices. The role of all actors is very important to ensure a sustainable zero plastic waste in Sweden. Hence, the researchers selected actor-network theory to analyze the matter as it clearly defined the role of both human and non-human roles to function a society sustainably. This itself is the purpose of this thesis to analyse the effectiveness of current systems and how far Sweden achieve the level of sustainability in plastic management.

10. Abbreviations

CE - Circular Economy
DRS - Deposit Return System
EC - European Commission
EEA - European Economic Area
EPR - Extended Producer Responsibility
MPW - Municipal Plastic Waste
SDGs - Sustainable Development Goals
SEPA - Swedish Environmental Protection Agency
PRO - Producer Responsibility Organization
FTI - Förpacknings-och tidningsinsamlingen (the packaging collection service)
TMR - Transparency Market Research

11. Reference:

- *Actor Network Theory. (2004). Sage pub, https://www.sagepub.com/sites/default/files/upm-binaries/5222_Ritzer__Entries_beginning_with_A__%5B1%5D.pdf.*
- *Anderson, Sara. Plastic in Sweden – facts and practical advice. (2022). Swedish Environmental Protection Agency, Naturvårdsverket,*
- *Baxter, Jamie. (2020). The Risk Society, International Encyclopaedia of Human Geography, https://www.sciencedirect.com/topics/social-sciences/risk-society.*
- *Beck, Ulrich, Ritter, Mark. (2009). Risk Society: towards a new modernity, Sage Publications, London.*
- *Bencherki, Nicolas. (2017). Actor-Network Theory, International Encyclopedia of Organizational Communication, International Encyclopedia of Organizational Communication, researchgate.net/publication/ 314389404_Actor-Network_Theory.*
- *Bluman., Elementary statistics A step-by-step Approach, 8th edition*
- *Bowling, Ann, Research Methods in Health: Investigating Health and Health Services 4th edition, 2014. https://edisciplinas.usp.br/pluginfile.php/4374657/mod_resource/content/1/Research%20Methods%20in%20Health.pdf*
- *Bryman, Alan, Social Research Methods, 5th Edition, Oxford University Press, 2016.*
- *Christine Davies, A Quick Guide to Quantitative Research in the Social Sciences, last update 2021, publisher: University of Wales Trinity Saint David*
- *Dvorak, R., Kosior, E., Hopewell, J. (2009). Plastics recycling: Challenges and opportunities. Philos. Trans. R. Soc. B Biol. Sci., 364, 2115–2126.*
- *Elizabeth Martin, 2006, Research Report Series (Survey Methodology #2006-13) Survey Questionnaire Construction, Director's Office U.S. Census Bureau Washington, D.C. 20233.*
- *ETC. Environment European Agency, April 2022.*
- *Holtz, Georg. (2014). Generating Social Practices, Journal of Artificial Societies and Social Simulation, https://www.researchgate.net/publication/285047144_Generating_Social_Practices.*
- *Igini, Martina. (2022). How Sweden is Successfully Turning Waste to Energy. May.26, Earth.Org, https://earth.org/sweden-waste-to-energy/.*
- *Jackson, T. (2005). Motivating Sustainable Consumption: a review of evidence on consumer behaviour and behavioural change, Report to the Sustainable Development*

Research Network, http://www.sustainablelifestyles.ac.uk/sites/default/files/motivating_sc_final.pdf.

- *Khalid, Khawaja & M.,Dileep (2012), Get along with Quantitative Research Process.2.15-29., International Journal of Research in Management ISSN 2249-5908 Issue2, Vol. 2 (March-2012)*

- *Kibria, Md. Golan, Masuk, Nahid Imtiaz, Safayet, Rafat, et.al. (2023). Plastic Waste: Challenges and Opportunities to mitigate Pollution and Effective Management, International Journal of Environmental Research, Jan.20, ps://link.springer.com/article/10.1007/s41742-023-00507-z?awc=26429_1692655427_e92d79390ea372b43d9703c33469c3e9&utm_medium=affiliate&utm_source=awin&utm_campaign=CONR_BOOKS_ECOM_DE_PHSS_ALWYS_DEEPLINK&utm_content=textlink&utm_term=1035097.*

- *Milios, Leonidas, Davani, Esmailzadeh Aida, Yiyu. (2018). Sustainability Impact Assessment of Increased Plastic Recycling and Future Pathways of Plastic Waste Management in Sweden, Recycling 2018, Jul.20, Vol.3, Issue.3, https://www.mdpi.com/2313-4321/3/3/33.*

- *Nordic Council of Ministers. (2017). Nordic Programme to reduce the environmental impact of Plastic, https:// Norden.diva-portal.org/smash/get/diva2: 1092150/FULLTEXT01.pdf.*

- *Pandey, Prashant, Dhiman, Manisha, Kansal, Ankur, et.al. (2023). Plastic Waste Management for Sustainable environment: techniques and approaches, Waste Dispos Sustain Energy, Mar.6, https://pubmed.ncbi.nlm.nih.gov/37359812/.*

- *Plastic Pollution. UN Environment Programme. https://www.unep.org/plastic-pollution.*

- *Plastics Europe. Plastics—The Facts 2016. An Analysis of European Plastics Production, Demand and Waste Data; Plastics Europe—Association of Plastics Manufacturers: Brussels, Belgium.*

- *Stratton, S. (2021). Population Research: Convenience Sampling Strategies. Prehospital and Disaster Medicine, 36(4), 373-374. doi:10.1017/S1049023X21000649*

- *Suphat Sukamolson, Ph.D. Language Institute Chulalongkorn University Fundamentals of quantitative research*

- *Swedish Environmental Protection Agency. (2021).Naturvårdsverket, https://visita.se/app/uploads/2021/06/Fardplan-Hallbar-plastanvandning_eng.pdf.*

- *Van Teijlingen, E., & Hundley, V. (2001). The importance of pilot studies. Social research update, (35), 1-4.*

- *Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). Business research methods. Cengage learning.*

12. APPENDICES

1. SURVEY QUESTIONNAIRE

1 Please specify your Age
Between 15-24yrs

- 25-34yrs
- 35-44yrs
- 45-54yrs
- 55-70yrs

2 Gender?
- Male
- Female

3 What is your Educational level?

- Elementary school
- High school
- College/University

4 Your Area of Residence in Sweden?

- Rural area - Apartment
- Rural area - Villa/house
- Urban area- Apartment
- In Urban area- Villa /house

5 Your current Occupation/employment?

- Skilled Employment
- Unskilled employment
- Self-Employment/business etc.
- Unemployed
- Student

6 In a month, approximately, how many plastic bottles of water/soft drinks do you purchase/consume?

- 1- 20 bottles
- 21-40 bottles
- 41-60 bottles
- d. 61 -80 bottles and more

7 Before using plastic items, how often do you check the quality/ grade /bio-degradability of the plastic container?

- Yes, always
- Yes, sometimes
- No, never

8 Over the past years, have you noticed/experienced any changes in ‘plastic consumption habits’ in Sweden?

- significant increase
- slight increase
- No change
- Slight decrease
- Significant decrease

9 Please rate your preference while purchasing plastic items. Please select the favorable number from 1 to 4

- Price : 1-2-3-4
- Light weight : 1-2-3-4
- Availability : 1-2-3-4
- Durability : 1-2-3-4

10 Which of the below plastic products do you use excessively/ more often?

- Plastic carry bags
- Plastic containers
- Plastic buckets
- Others

11 Please rate your interest to why return the empty plastic PET bottles to its Collection Point (eg. Returstation near supermarkets) from various spaces? Please tick on the favorable number from 1 to 4.

- Plastic littering concern : 1-2-3-4
- Deposit Refund concern : 1-2-3-4
- Convenience of Disposal System:1-2-3-4

12 Do you feel any lack of awareness exists in switching over from excessive plastic usage to more sustainable materials like Bioplastics/paper bags etc.?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

13 Which among below is the general disposal process of your Plastic Waste?

- Burning
- Open dumping(Landfilling)
- Recycling
- Municipality Waste Collection point (kerbside)
- Do not know

14 How satisfied are you with the service from the Government for overall Plastic Management in Sweden including household Municipal Plastic Waste collection systems?

- 0% satisfied
- 25% satisfied
- 50% satisfied
- 75% satisfied
- 100% satisfied

15 Please rate your satisfaction level for facilities such as waste bins and similar arrangement made available at PUBLIC PLACES such as bus/train stations, supermarkets, school, parks etc.

- 0% satisfied
- 25 % satisfied
- 50% satisfied
- 75% satisfied
- 100% satisfied

16 How satisfied the current system of segregating plastic waste by household before disposing household waste at Municipal Waste Collection Point (Kerbside)

- 0% satisfied
- 25 % satisfied
- 50% satisfied
- 75% satisfied
- 100% satisfied

17 Do you agree the need and significance of 'Reduce-Recycle- Reuse' (Circular Economy) concept in Plastic management for supporting a sustainable future?

- 0% agree
- 25% agree
- 50% agree
- 75% agree
- 100% agree

18 Do you think plastic waste is a problem for health, well-being and environment?

- Yes, definitely
- yes, depending on circumstances
- Not a major concern
- Do not know

19 Which of the below carry bag do you suggest more eco-friendly and safe for environment conservation?

- Single-Use-Plastic bags
- Bio-Plastic bags
- Paper bags
- d. Cloth Bags

20 Do you think that 'human behavioural practice' is one of the key factors for our Environmental Sustainability'?

- 0% agree
- 25 % agree
- 50% agree
- 75% agree
- 100% agree

2. COVER LETTER FOR THE SURVEY PARTICIPATION

Cover Letter

Hey!

We, Darsana Anilakumari and Sindhu Sanish are currently studying at the Halmstad University, Sweden and doing a Master's degree Programme in Nordic Welfare. We are doing academic research about the plastic management in Sweden for a sustainable future.

We are collecting data from people in Sweden through online 'Google Form'. This survey is used for the fulfillment of our thesis work. We would really appreciate if you could spend a few minutes to answer the questionnaire and mark your opinion. The data gathered through this survey will be kept confidential and used for academic research purposes only. Here is the link to the questionnaire: (link). Your responses are completely anonymous.

Thank you very much for your participation!

Best Regards,

Darsana Anilakumari, Sindhu Sanish