FACTORS INFLUENCING ON SUCCESSFULNESS OF THAILAND'S BANNING POLICY ON SINGLE-USE PLASTIC CUPS AND STRAWS

Mr. Natcha Stithyudhakarn

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ปัจจัยที่มีผลต่อความสำเร็จของนโยบายเลิกใช้ถ้วยและหลอดพลาสติกใช้ครั้งเดียวของผู้บริโภคในกรุงเทพมหานครและปริมณฑล

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต
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Thesis Title	FACTOR INFLUENCING ON SUCCESSFULNESS OF THAILAND'S BANNING POLICY ON SINGLE-USE PLASTIC CUPS AND STRAWS
By	Mr. Natcha Stithyudhakarn
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Thesis Advisor	Assoc. Prof Dawan Wiwattanadate, Ph.D.

Accepted by the Graduate School, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

…… Dean of the Graduate School
(Assoc. Prof. Yoothana Chuppunnarat, Ph.D.)

THESIS COMMITTEE

…… Chairman
(Asst. Prof. Suthirat Kittipongvises, Ph.D)

…… Thesis Advisor
(Assoc. Prof Dawan Wiwattanadate, Ph.D.)

…… Examiner
(Wilailuk Niyommaneerat, Ph.D.)

…… External Examiner
(Assoc. Prof. Petchporn Chawakitchareon, Ph.D.)

ณัชชะ สถิตยุทธการ: ปัจจัยที่มีผลต่อความสำเร็จของนโยบายเลิกใช้ถ้วยและหลอดพลาสติกใช้ครั้งเดียวของผู้บริโภคในกรุงเทพมหานครและปริมณฑล (Factors influencing on successfulness of Thailand's banning policy on single-use plastic cups and straws) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร. ดาวัลย์ วิวรรธนะเดช, 103 หน้า

งานวิจัยนี้มีเป้าหมายเพื่อหาปัจจัยที่มีผลต่อความสำเร็จของนโยบายเลิกใช้ถ้วยและหลอดพลาสติกใช้ครั้งเดียว ซึ่งมีผลบังคับใช้มาตั้งแต่ต้นปี พ.ศ. 2565 โดยกลุ่มเป้าหมาย คือ ผู้บริโภคในกรุงเทพมหานครและปริมณฑล (นนทบุรี ปทุมธานี สมุทรปราการ สมุทรสาคร นครปฐม) ทำการสำรวจระหว่างวันที่ 18 เมษายน ถึง 16 มิถุนายน พ.ศ. 2565 ซึ่งยังอยู่ในช่วงวิกฤติโรคระบาดโควิด 19 จึงสำรวจด้วยแบบสอบถามออนไลน์บนกูเกิลแพลตฟอร์ม และได้ทำการสำรวจเพิ่มเติม ณ โรงเรียนแห่งหนึ่งในกรุงเทพมหานคร ณ วันที่ 16 มิถุนายน พ.ศ. 2565 ซึ่งสถานการณ์โควิดเริ่มคลี่คลาย งานวิจัยนี้มีผู้ตอบแบบสอบถามที่เป็นคนในพื้นที่ศึกษารวมทั้งสิ้น 718 คน อยู่ในกทม. 75% และจากอีก 4 จังหวัดรวม 25% เพศหญิง 66% การศึกษาระดับปริญญาตรีขึ้นไป 80% ขณะที่มีการกระจายทุกอาชีพ ทุกช่วงอายุและรายได้ ในสัดส่วนที่ใกล้เคียงกัน ผลการสำรวจพฤติกรรมบริโภคพบว่า 47.2% ชงดื่มเอง และส่วนใหญ่เป็นกลุ่มผู้ใหญ่ ขณะที่อีก 52.8% ซื้อจากร้านค้า มีทุกวัย ทุกระดับรายได้ ทุกกลุ่มอาชีพ และทุกระดับการศึกษา ผลการสำรวจความถี่การซื้อเครื่องดื่ม พบว่า 44.2% ซื้อนานๆครั้ง และอีก 44.7% ซื้อ 1-5 ถ้วยต่อสัปดาห์ มีเพียง 11.1% ที่ซื้อมากกว่า 5 ถ้วยต่อสัปดาห์ นอกจากนี้จากการสำรวจความคิดเห็นของผู้บริโภคและข้อเสนอแนะจากรายงานวิจัยอื่นๆที่เกี่ยวข้องพบว่าปัจจัยที่มีผลต่อความสำเร็จของนโยบายเลิกใช้ถ้วยและหลอด SUP คือ ระงับทั้งการผลิตและการบริโภค SUP โดยแนะนำให้มีการบังคับทางกฎหมาย สำหรับผู้ผลิตและผู้ขายเครื่องดื่มที่ฝ่าฝืน ขณะที่ฝ่ายผู้บริโภค ควรเน้นมาตรการที่ไม่มีการจ่ายเพิ่มและไม่มีบทลงโทษทางกฎหมาย ซึ่งเหมาะสำหรับบริบทไทย

สาขาวิชา สิ่งแวดล้อม การศึกษา และความยั่งยืน **ลายมือชื่อนิสิต**.....

ปีการศึกษา 2564 **ลายมือชื่อ อ.ที่ปรึกษาหลัก**.....

#6288005920: FACTOR INFLUENCING ON SUCCESSFULNESS OF THAILAND'S BANNING POLICY ON SINGLE-USE PLASTIC CUPS AND STRAWS

KEYWORDS: SINGLE-USE PLASTIC, SUP CUPS AND STRAWS, BIODEGRADABLE PLASTIC, CONSUMPTION BEHAVIOR

The present research aims to find out factors influencing on successful implementation of Thailand's SUP cups and straws banning policy which has been implementing since January 2022. Target groups of the study are consumers in Bangkok and vicinity (Nonthaburi, Pathum Thani, Samut Prakan, Samut Sakhon and Nakhon Pathom). As serious Covid-19 pandemic situation during the data collection period (April 18- June16, 2022), the questionnaire survey was conducted via Google form online survey platform, but additional onsite survey at a school in Bangkok was conducted on June 16, 2022, where the pandemic situation has become better. Total 718 respondents in the study areas were achieved, but up to 75% of which are those living in Bangkok, 66% are females and 80% are those having bachelor degree and higher, while similar distribution in occupation, age, and income. Regarding beverage consumption behavior, the study found that about 47.2% prefer self-prepare at home, and most of which are senior and elderly. While another 52.8% who prefer buying at shop are those in all age ranges, income, occupation, and education level. The study on beverage buying frequency found that up to 44.2% buy once in a while, another 44.7% buy 1-5 cups per week, and only 11.1% buy more than 5 cups per week. By the way, PR or campaign on the banning policy together with building knowledge about microplastic from SUP and oxo-plastic via social media are recommended. Upon the survey of consumer's opinion as well as reports from other relevant studies found that effective factors for the banning policy should be stop both production and consumption. Legal enforcement is recommended for producers and beverage sellers, while any measures without extra payment and penalty are recommended for consumers in the Thai context.

Field of Study: Environment Development and Sustainability

Student's Signature……

Advisor's Signature……

Academic Year: 2018

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Chapter 1
Introduction

This chapter briefly presents background and problem statement to inform why this research topic has become important. Followed with research questions and objectives of the study, scope of the study and expected outcomes.

1.1 Background and Problem Statement:

Plastic is a material having various advantages for goods, food and beverage containers. It is tougher, lighter weight and more hygiene when compared with containers made from other materials. Therefore, plastic packaging and containers have become more and more popularity; hence, resulting to huge amounts of plastic wastes which are non-biodegradable and create a lot of negative impacts on ecosystem. In particular, recycled plastic is not allowed to produce packaging and/or containers for food and beverage; while reusable packaging or container is not comfortable. However, single use plastic (SUP) container has become the most popularity for food and beverage, especially in big city. Therefore, wastes of SUP food and beverage containers have become common concerns for all countries.

As SUPs are mostly used only one time and become waste suddenly, resulting to huge number of plastic wastes to be managed. In addition, if improper disposal, the SUP may contaminate in marine and degraded into small pieces, which is so-called microplastics, causing severe impacts to marine animals. Most countries, including Thailand, has initiated policy to ban using SUP in order to minimize both plastic wastes and microplastic impacts. The policy on ban using of SUP in Thailand is a part of National Plastic Waste Management Roadmap 2018-2030 (2018, Ministry of natural resources and environment) The roadmap consists of 3 phases starting from banning of SUP since 2019, followed with the ban using of SUP shopping bags (thinner than 36 microns), Oxo-plastic and SUP cups (thinner than 100 microns) and straws since 2022, and then moving towards circular economy by 2030 in the third phase. By the way, the ban using of SUP shopping bags has been campaigned 2-3 years before legally implementation, while very few campaigns on the ban using of SUP cups and straws have been observed. It seems most people do not know details of the policy on SUP cups and straws banning. In case of shopping bags, there are generally 3 choices being practiced in Thailand: stop providing SUP or Oxo-plastic bag from retailer, using paper or biodegradable plastic bag instead, and customer bring their own personal cloth bag when shopping.

There are various options to replace using SUP cups and straws. The most practical option would be using personal cup and/or straw. By the way, the personal cup is not allow using during COVID-19 Pandemic.

The only options left are biodegradable plastic (BDP) cup, thick reusable cup, and paper cup. However, both BDP and reusable cups are more expensive than SUP cup, while the paper cup is not comfortable. This research aims to investigate which option would be Thai consumer's preference and how much are they willing to pay extra for non-SUP or environmentally friendly cups. In addition, whether consumers having different age would have different preference and willingness to pay for the non- SUP cup was also investigated in the present study.

1.2 Importance of this research:

As the SUP cups and straws banning policy has been implemented since January 2022 which in line with the COVID-19 Pandemic where personal cup is not allow using, it seems difficult for successful implementation of the banning policy. Outcomes of this research would provide effective factors for the successful implementation.

1.3 Research Questions:

- What would be current beverage consumption behavior of consumers in the study areas and how does it relate with demographic factors?
- What would be consumer's preferred choice to replace SUP cup and how does it relate with demographic factors?
- What factors would influence on successfulness of the SUP cups and straws banning policy?

1.4 Research Objectives:

- To survey beverage consumption behavior of consumers in Bangkok and vicinity.
- To explore consumer's perception on SUP impacts as well as perception and attitude on the SUP banning policy.
- To explore consumer's preferred choice and willingness to pay extra for non-SUP cup.

1.5 Scope of the study:

This study focused only SUP cups and straws for cold beverage and conducted via online questionnaire survey without interview and observation due to the situation of Covid-19 pandemic except additional onsite survey at Pathumwan Demonstration School. All questionnaire answers were selected only consumers living in Bangkok and Vicinity.

1.6 Expected outcome

The study was expected to deliver the following issues.

• Relationship of demographic factors with the current beverage behavior as well as preferred choice to replace SUP cups among consumers in Bangkok and Vicinity.

• List of factors influencing on successfulness of the SUP cups and straws banning policy.

Chapter 2
Literature Review

This chapter presents overview of plastic consumption and its impacts. Followed with overview of single-use plastic (SUP), its impacts and alternatives to replace the SUP. Related policy both in Thailand and some other countries. Some related studies are also briefly described.

2.1 Overview:

Plastic waste problem is mainly caused by mostly ill behavior in plastic consumption and lack of awareness about existing plastic waste crisis. Recognizing that plastic generation for each litter is important for commending the mitigation policies in order to reduce the plastic wastes remaining in the targeted areas (Lebreton L. & Andrady A., 2019). The plastics in the worldwide are dispensed into 3 categories which are plastic in use, post-consumer managed plastic and mismanaged plastic waste (Geyer et al., 2017). With more advanced technologies in the modern era, many products with environmentally friendly elements are increasingly produced elsewhere but the plastic products remain as a product type that produce with mass numbers and pose a threat to the societies despite the rising of environmentally friendly products and advancement of environmental development (Huysman et al., 2017). Due to this, the plastic consumption remained as one of the most consumed materials rather than eco-friendly products as the plastic items are convenient in terms of usage which leads to the people keep consuming the plastic products (Alam et al., 2018).

2.2 Plastic consumption and problems around the world

This section will mention the collection of literature about the plastic consumption, and its problematic issues across the world to analyze this problem from different perspectives among several authors. The reason to review this section is to notify the significant culture and habits of plastic consumption that lead to its current lifestyle consumption among consumers and problems that is caused by plastic consumption across the world.

Plastic consumption and pollution problem

Plastic consumption is widely spread across the world due to the plastic itself is a material made of strong and durable which makes the plastic itself able to storage food for packaging and beverage for consumption with cups and straws without difficult condition as the plastic is a material easier to be made or found than other materials. Because of this, plastic consumption become more popular among many societies in the contemporary world. As the plastic consumption is rising because of association with modern cultural values and lifestyle, it also leads to many problems with plastic issues such as plastic littering on the ocean which affect the marine life and plastic pollution in the city due to mismanagement of consumers for plastic consumption.

Currently, the world has produced many plastics with total amount of 380 million tons per year compared to in 1950 when the plastics were created with total amount of 2 million of tones per year. However, not all plastic ends up in the ocean as many plastics still end up on landfill. In the statistics showed that 8 million tons of plastics has entered the ocean. For the methods of plastic disposal, the statistics shows that although there are other options which are recycled and incinerated, discarding plastics is still the most popular method for plastic disposal as the statistics reported that 55% of global plastic disposal is plastic discarding, 25% of plastics were incinerated and 25% of plastics were recycled in 2015 (Our World in Data, 2018).

Although, 8 million plastics are littered across the ocean by yearly which impacts on aquatic life and its climate. The plastic littering rate keep increasing continuously which leads to the waste generation being hard to avoid it due to plastic itself took many years of lifespan to be degradable into nature. Importantly, the reason why plastic is hard to be generated is the material itself is sturdy and long lasting with being made of about 7 million of hydrogens and carbon molecules thus, making the plastic itself hardly being breakable. Besides plastic degeneration problem, another problem of plastic consumption and overflowing is not all plastics are made for being degradable and decomposed into nature (Advancebio, 2020).

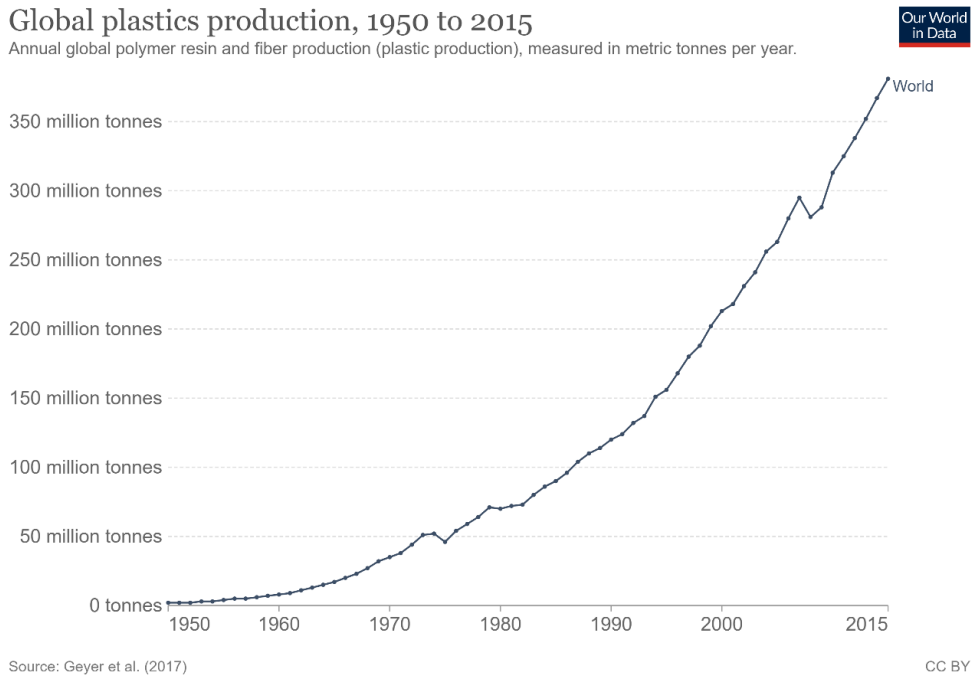


Figure 1 Global plastic production in the year of 1950-2015, Our World Data (2015)

From the Our World in Data for plastic waste generation by the industrial sector in 2015, packaging generated the most plastic wastes with 141 million tons (Figure 2).

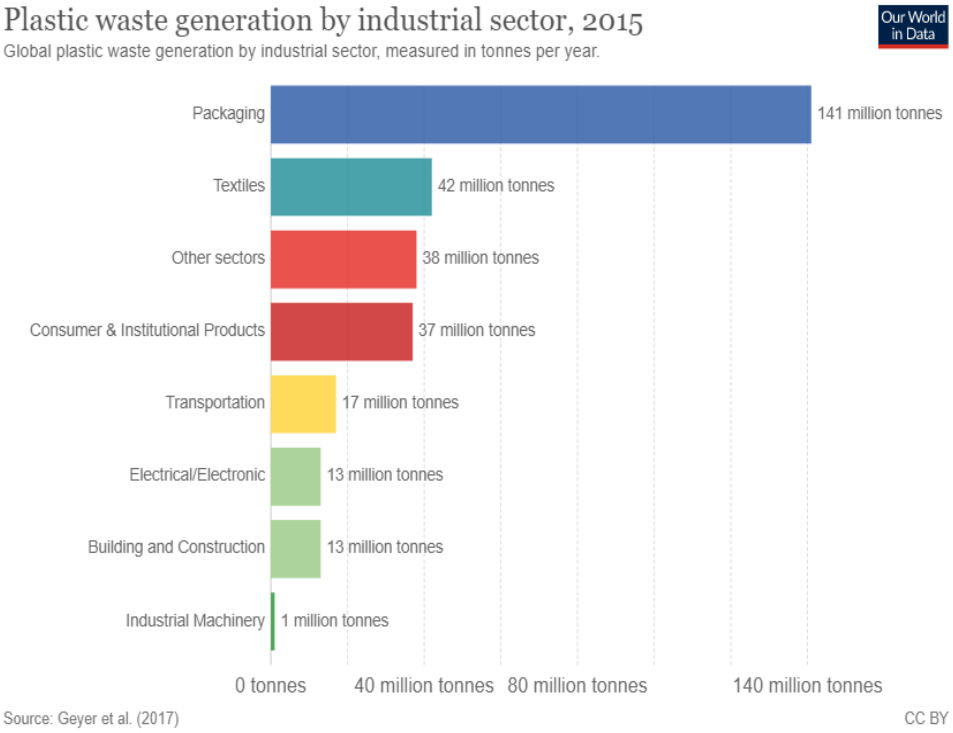


Figure 2 Total plastic waste generation by industrial sectors in 2015, Our World in Data (2015)

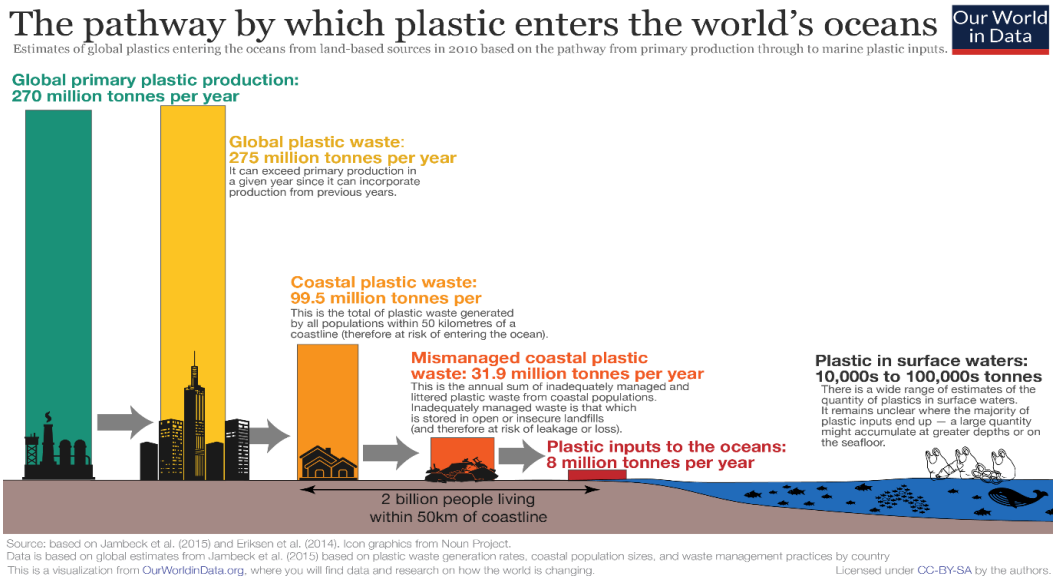


Figure 3 Total plastic littering into world's ocean, Our World in data (2015).

2.3 Plastic consumption and problems in Thailand

This section will mention the collection of literature about the plastic consumption, and its problem in Thailand to see the different authors analyze this problem with different views and descriptions. The reason to review this section is to state how this problem is very significant to the societies and environment in the country which will affect the people's attitude and health as this will also impact on the entire country's function.

Plastic waste crisis situation in Thailand

Currently, plastic waste problems in Thailand are a serious issue due to some factors that leading to plastic waste scattering across the country such as less awareness about plastic waste effects on the society and environment and unrestricted enforcement of the laws that regard environmental protection. As a result of no or weak enforcement of the law, the behavior of plastic consumption with wrong purposes by the consumers frequently occurs due to this, the consumers believe that throwing the wastes into random spots is not a serious matter to them.

However, Thai government has initiated campaign to encourage many shops not to provide the single-use plastic bags since 2020 which is considered a successful campaign. And, the extension bans on providing single-use plastic including straw and cups will be in effect by 2022 in order to completely eliminate single-use plastic items usage inside the country. Mangmeechai, A. (2022) Although future ban will be implemented soon, plastic wastes issue is still problem in Thailand, which is influenced by materialist culture and consumerist culture as both have little regard about protecting the environment from negative risks that posing a threat to nature and human's health.

Thailand was in the 6th rank for the top 10 plastic polluter countries which top 3 countries for being most polluted with plastics are China, Indonesia and Philippines, Thailand had imported the plastic wastes with 481,381 tons as the second most plastic waste importer in ASEAN countries. The other top plastic importers are Malaysia as rank 1 for total plastic importation with 872,797 in 2018 and Vietnam as rank 3 with 492,839 plastic imports (See also figure 4).

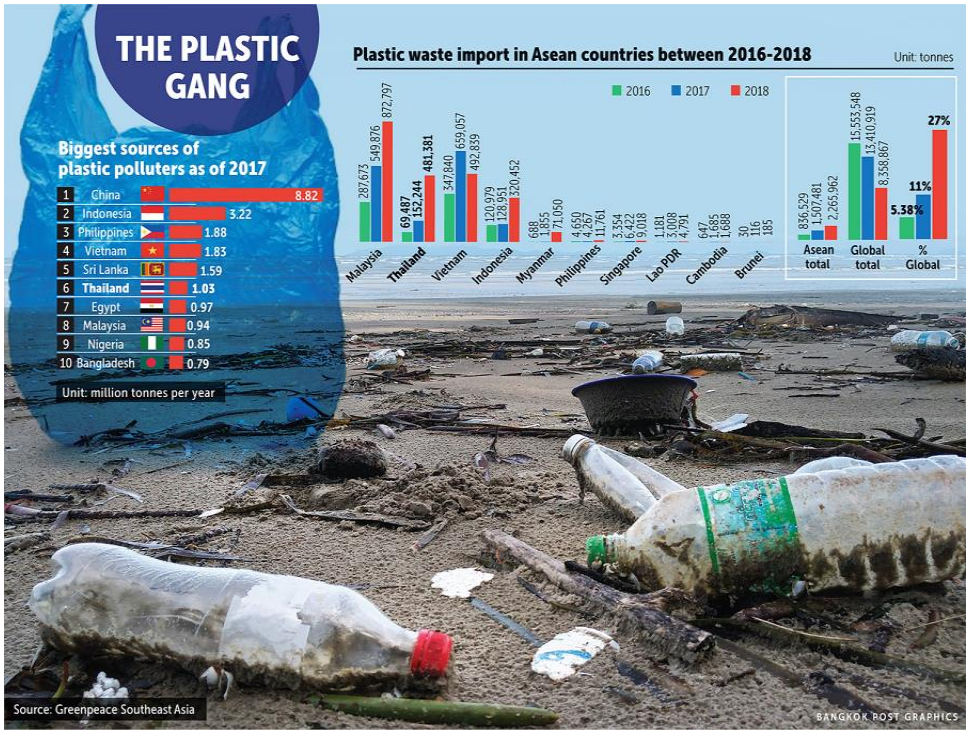


Figure 4 Statistics of plastic polluter countries in 2016-2018, Bangkok post and Greenpeace Southeast Asia (2017)

Plastic waste generation in Thailand

Thailand is one of important plastic producers in Asia which in the year of 2015, Thailand has produced many plastics about 6.1 million tons, the total of plastic consumptions by people in Thailand is about 4 million of tons and total plastic packaging generated for plastic production is about 2.1 million of tons. Thailand has a serious issue about plastic management which is municipal solid waste management as the society in the country has the issue about waste mismanagement as a result of lack of knowledge about proper management of the wastes including plastic one Pariatamby, A., Hamid, F.S. and Batti, M.S. (2019). For the statistics about numbers of plastic waste generation in Thailand, its show that according to 4 departments which are Pollution Control Department, Custom Department, Department of Marine and Coastal Resources and Department of Environment Quality Promotion, Thailand has produced about 8 plastic bags per day per person which is equal to produce with 500 million plastic bag usage per day. Total plastic wastes were imported to Thailand in the year of 2018 about 571,000 tons. About 2,7 million tons of total plastic waste was produced in a year. About 50,000 tons or total plastic waste items of 750 million plastic items were stopped in 23 coastal provinces in 2018 (See also figure 5).

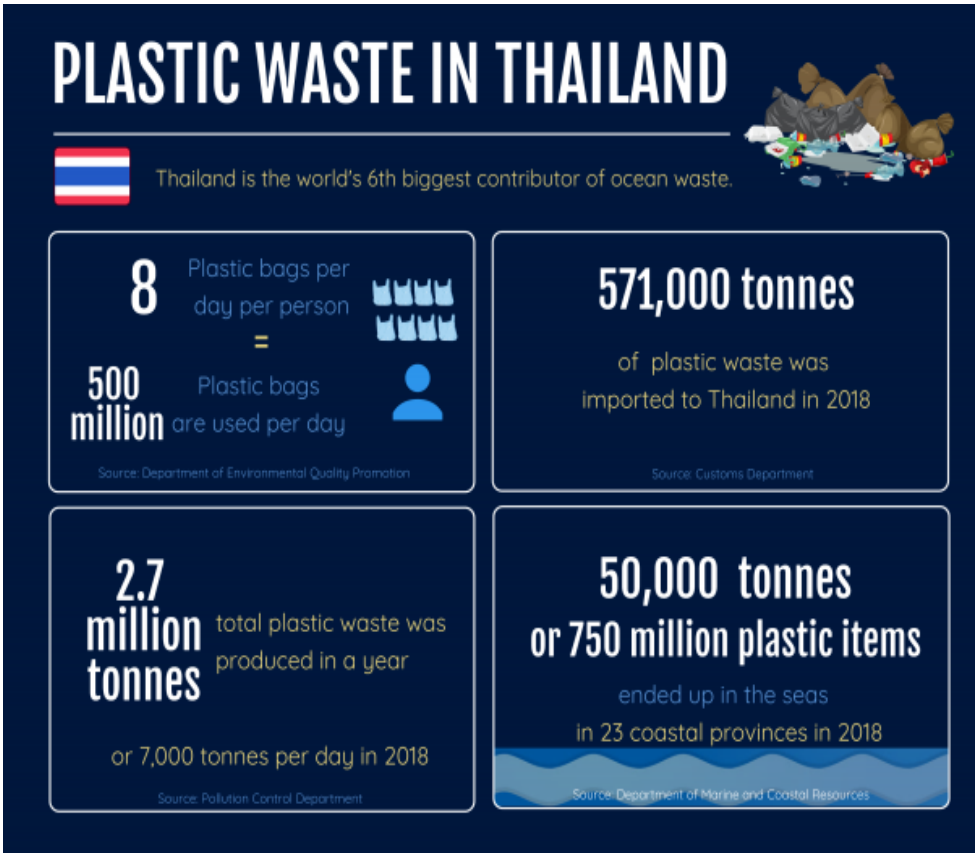


Figure 5 Total amounts of plastic wastes in Thailand, Pollution Control Department, Custom Department, Department of Marine and Coastal Resources and Department of Environment Quality Promotion (2018).

2.4 Single-use plastics and its impacts

Single-use plastics (SUP) is plastic popularly used for producing packaging, cutlery, food and beverage containers which are usually one-time using; hence, huge amount if SUP wastes are accumulated anywhere, especially in big cities like Bangkok NRDC (2020). The SUP is non-biodegradable, but gradually breaking down into small pieces which is so-called microplastics. Marine animals like fish may be harmful by eating the microplastics Greenpeace (2021). The microplastic impacts have become a serious issue in all countries across the world. Recently, most countries, including Thailand, try to campaign minimize or ban using the thin SUP packaging as well as food and beverage containers.

The data from Ocean Conservatory states that single-use plastic items such as drinking bottles, bottle caps, straws, bags, food wrappers and plastic lids are listed as top 10 frequent items that are collected by people (IEEP, 2016).

According to UNEP (2018), Single-use plastics is a representative for being an example of throwaway lifestyles in the contemporary society. UNEP reported that about 9 percent from 9 billion tons of world plastics are recycled. However, many plastics are end up on oceans, water ways and surrounding environment as single-use plastics are not biodegradable within nature. Single-use plastics are instead slowly broken into smaller pieces of plastics which is known as microplastics. By the year of 1950, the plastics has replaced almost several other materials. However, much of plastic is designed to be single-use for consumption and throw away after finishing the usage of the plastic. This results plastic overflowing elsewhere on Earth due to the plastics tend to be single-use which do not biodegrade but instead break into several small pieces known as microplastics.

Examples of SUP items widely consumed across the world and cause serious negative environmental impacts are plastic cup, straw, cutlery (fork, spoon, knife), and food foam containers (Greenpeace 2021).

It is reported by the website named Green Child Magazine (2020), that single-use plastics is not a manageable matter because the single-use plastic is thin size which can be scatter across many areas with further travel distance by wind itself. Manufacturing of single-use plastic is even a problem for a source to harming environment as the single-use plastics are the plastic that can be used by only one time which create more plastic pollution in the environment.

Manufacturing of single-used plastic needs high consumption of petrochemical products from petroleum industry which also creates pollution during production process. After end-using, if improper disposal, some of SUP will contaminate in nature, either on land or in marine and gradually breaking down into small pieces which are high risk to both human society and the ecosystem, animals on air, land, and sea (Global Citizen, 2018).

Examples of SUP cups and straws are shown in figures 6-7.

Figure 6 Example of single-use plastic cups, KCCfoods (2018), Pearl Lemon Boba (2022) and Pennlive (2020).

Figure 7 Example of single-use plastic straws, Edules (2022) The Guardian (2018) KCRA (2018) and World Economic Forum (2020).

Single-use plastic impact on environment is a serious matter because the SUP impact itself can cause many problems like polluting water which can cause problem for impacting on marine animal on ocean or water consumption among livings. As single-use plastic is disposable but it can not be biodegradable as when SUPs are to be decomposed into small pieces which is called microplastic thus making it harmful impact on the environment. For negative impacts of SUP on environment, the prominent example is harming marine animal's lives which makes the animal being suffered from an effect with plastic remaining items that were littered into ocean. Biological Diversity (2019) Another example that is impacted by SUP littering is on food, the reports about salt being covered with microplastics on the article of Greenpeace's website that over 90% of salt global brand contained microplastics. It is reported by recent studies that microplastics were also found in seafood, wildlife on sea and land and tap water. (Greenpeace 2018).

2.5 Alternatives to replace SUP cups and straws

In general, there are various materials can be used to replace SUP. This study will focus only materials popularly used for beverage containers. Alternatives to replace SUP can be either bioplastic, degradable or oxo-plastic, biodegradable plastic, reusable or paper plastic. They are either compostable (so-called biodegradable) or non-compostable (degrade with non-biological process). Information of which are briefly described below. (See also figures 8-9)

What are bioplastics?

Bioplastics is a plastic type that are made from organic materials especially agricultural byproducts like plant-based origin which the bioplastics itself are usually made from sugarcane and corn starch, biomass resources like oil, sawdust, woodchip or even microbe like yeast. And also made from renewable resources that are able to be naturally assimilation into an environment which allows the bioplastics has limited usage of fossil fuel and being eco-friendly instead. This makes the bioplastics are sustainable which bioplastics are consisted of biodegradable and compostable plastics Ashter. S. A. (2016) The definition of bioplastics according to European Bioplastics, the categorization of the bioplastics is based on different types like PE, PET, PA and PTT are non-biodegradable and biobased bioplastics.

What is OXO-Degradable plastics

Oxo-biodegradable plastic is petroleum-based plastic mixed with small amount of oxo-additive to make the plastic molecule broken down to small pieces, which is so-called microplastic, when exposed to heat and oxygen. These microplastics are usually discarded to contaminate in nature and very harmful to small animals, especially fish in river and marine. The oxo-biodegradable plastic is frequently referred to as 'degradable plastic' because it does not require a biological process to degrade Greencompostables (2022). As most people get confuse and misunderstand that the oxo-degradable plastic is biodegradable, most countries, including Thailand, have started banning the use of all types of oxo-plastic to safe our ecosystem.

Difference between biodegradable plastics and bioplastics

Although many believed that biodegradable plastics and bioplastics are always same plastic type for using both former and later as a interchangeable term, the actual fact is all biodegradable plastics are bioplastic but not all bioplastic are biodegradable which it should not be confused for differentiate between both plastic types. Bioplastics are the plastic that produced from organic materials like planted based materials which usually contain polylactic acid (PLA). While biodegradable plastics are produced from petroleum-based materials that includes with additional substances in order to break down the plastic easily. (Borhauer S., 2019).

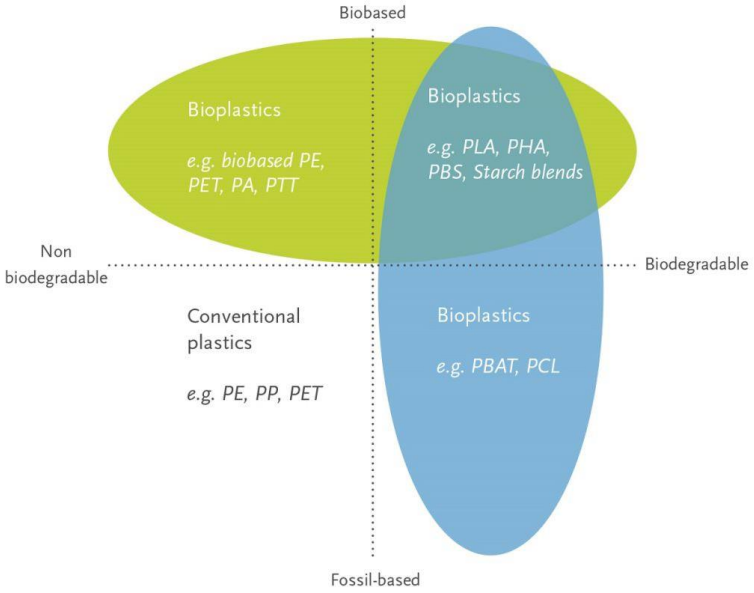


Figure 8 Definition of bioplastics and biodegradable, European Bioplastics (2021).

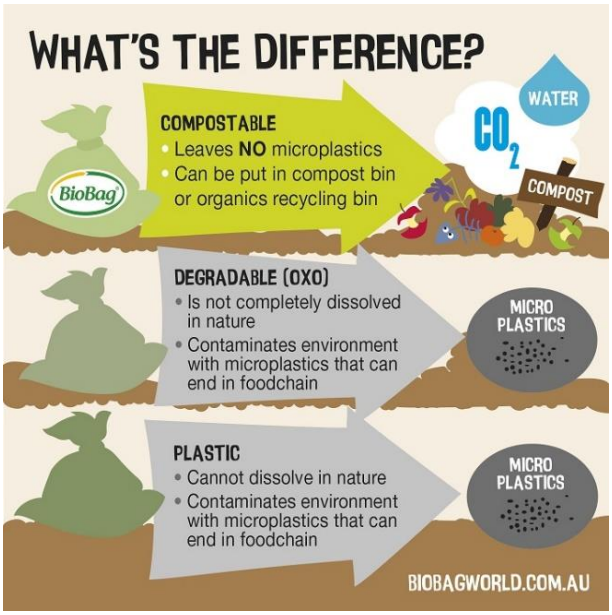


Figure 9 Difference among Compostable, Degradable (OXO) and Plastic, SA Polymer Technology (2022)

2.5.1 Degradable plastic cups and straws

Degradable plastics can be either biodegradable or non-biodegradable. The non-biodegradable plastics can be classified to 5 types according to method of degradation as following. By the way, the non-biodegradable plastics mostly consisted of oxo compounds to accelerate degradation into small pieces, which is so-called microplastics, contaminating in nature and harmful to small animal, especially fish in river and marine. Therefore, most countries, including Thailand, have started banning the use of oxo-plastics. Degradation of the plastics has 5 types to reduce the plastic into several small molecules which are:

- Photodegradation which occurred with an insertion of light-sensitive elements by reducing the chemical nexus in polymer. When the plastic is unveiled by UV rays it will be reduced into free fundamentals.
- Mechanical degradation is a procedure that require to reduce a plastic into several small pieces
- Oxidative degradation is a degradation that occurred when the polymer has included with an oxygen which hydroperoxide (ROOH) is created. Without a compulsive stable plastic, ROOH will be heated into RO and OH which will become unstable substance for creating new links in the polymer chain as it will lead to disintegration.
- Hydrolytic degradation is a degradation procedure that happens in acetate and peptide group types for examples, polyester, polyanhydride, polycarbonate and polyurethane. This degradation can be divided into 2 types which are catalytic hydrolysis and non-catalytic hydrolysis. Catalytic hydrolysis has 2 subtypes which are external catalytic hydrolysis and internal catalytic hydrolysis.
- Biodegradation is a degradation procedure for assimilating the plastic with microorganisms which has 2 stages for degradation process. The first stage is to reduce a long term non-polar polymer which the microorganism will release out both endo-enzymes and exo-enzymes by reducing polymers chain and molecule bonds. The second stage starts when the molecules become smaller enough to enter cell membrane (AdvanceBio, 2020).

Examples of oxo-plastic products are in figure 10.

Figure 10 Example of Oxo plastic products (bags), T Rex Metalware (2018) and Alpha packaging (2022), Natur Bag (2020) and Purearth (2022).

2.5.2 Biodegradable plastic cups and straws

This section is about the collection of the literatures regarding biodegradable plastics, bioplastics and its impacts by several authors to see their review about their description or definition of biodegradable plastics and bioplastics.

Biodegradable plastics are the plastics that created from Bio-based materials or natural products so that it can be decomposed or degraded by biological process with microorganisms. Bioplastic, likes polylactic acid (PLA), which is made from bio-based materials is also biodegradable T. Iwata (2015).

The plastic that can be considered as a biodegradable plastic for regarding the biodegradability according to the standard that is recognized by European EN 13432, the features need to be like:

- Having a volatile rate of at least 50% minimum
- Able to be fragmented at least about 10% of its original weight above 2mm
- Need to be biodegraded at least 90% in the length of no more than 6 months

The outcome of composition needs to be done at least 90% in contrast to the one that is denoted for composting. One of reduction at sources measures is ban using of SUP, and biodegradable plastic has become an option to replace the SUP for its consumption **(**European Bioplastics, 2016).

Examples of BDP cups and straws are shown in figures 11-12.

Figure 11 Examples of BDP cups, Pakchn (2020), Chiran Group (2005), Ecomaniac (2022) and Tspaperstraws (2020).

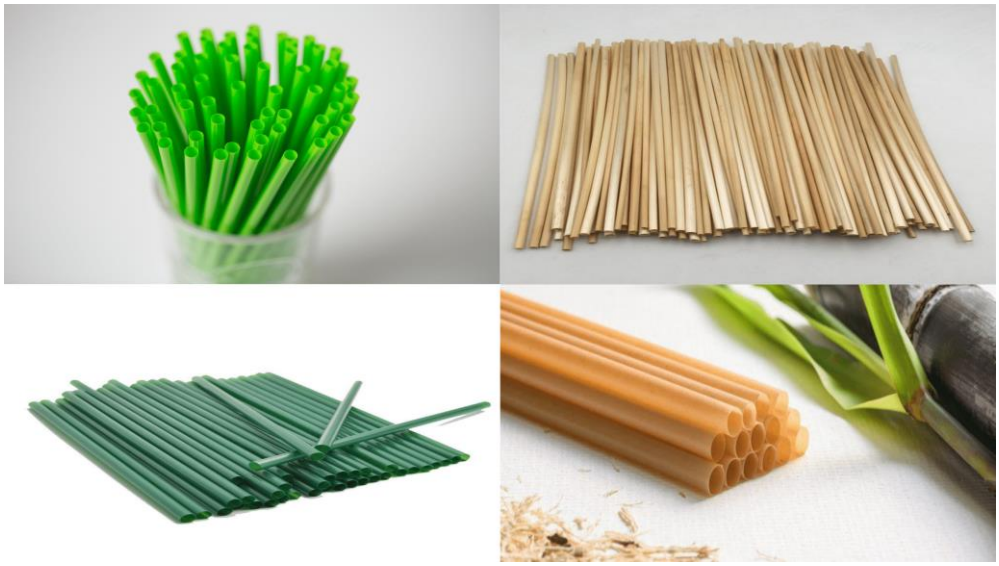


Figure 12 Example of BDP straws, Food Service Director (2018), Sugarcanestraw (2021), Alibaba (2018) and Hydepackage (2011).

2.5.3 Reusable cups and straws

This section is about reviews about (thick) reusable cup by various authors. Thick reusable plastic (RUP) cup definition in this research means plastic cup thicker than 100 microns and can be reusable.

Reusable cup's material has it less impact on the environment which is made from PP (Polypropylene), however it can not be recycled as it does not use raw fossil materials. Reusable PP cup characteristics has described by PlasticPromise that reusable PP cup is a lightweight cup, has well-cleaned efficiency and Reusable cup's impact factors is depended on the environment advantages from combination of factors such as loss rate and washing efficiency (PlasticPromise, 2018).

According to the research by N. Garrido and M. Dolors Alvarez del Castillo (2007), the research showed that the reusable cup has contained more energy than single-use (plastic) cup, also for raw materials, reusable cup has PP, Cardboard boxes and colarant more than single-use cup but single-use cup has PP sheet while reusable lacks it.

According to the article in Aeerem written by P. Kradin (2021) Reusable cup has many benefits in the consumption which the author stated that reusable cup is an good alternative choice to replace disposable cup (SUP cup) because reusable cup can be used more than once a time and also able to bring their own which remarks that some reusable cup could be personal cup. It is also able to keep the hot and cold longer compared to SUP cup, this makes consumers able to save money by using reusable cup longer instead of buying large amounts of SUP cups. Examples of reusable cups are shown in figure 13.

Figure 13 Example of Reusable cup, Anthropocenemagazine (2017), Poland's Best (2022), Independent (2022) and Bangkokbiznews (2021).

2.5.4 Paper cup and straws

This section is about the collection of literatures regarding paper cups by various authors to see how the authors describe the paper cup with their own definitions. There are two type of paper cups that are popular produced which are PLA and PBS.

The paper cups are the cups made of paperboard, and the paperboard itself is coated with plastic lining thus making the layer able to control the heat. This makes the paper cup able to retain the hot beverage as long as possible. The materials that covered paper cup for well-being circumstances with a role of barrier to make sure that food hygiene and cups are liquid proof. The plastic lining material itself can increase strength and resilience of the cup. In the present days, paper items are not serving only hot and cold beverage but also for food such as ice cream and soups. Many places and events like restaurant and parties start to serve paper box and cups instead of disposable cups (Huhtamaki, 2019).

In the recent research, the researches proved that paper is a material that end up as solid waste as the paper is considered as a fastest decomposing waste material and easier to be recycled Greenotechindia (2019).

Examples of paper cups and straws are shown in figures 14-15.

Figure 14 Example of paper cups source: Biobasedconsultancy.com (2022), Pando (2017) Recycle Coach (2019) and Eateryassentials (2020)

Figure 15 Example of paper straws, Replanet.me (2019), Triplepundit (2018), Economic times (2022) and Paper straw machine by CMCC (2018).

2.6 Policies relevant to plastic consumption and wastes in Thailand

In this section, it states about the number of sources regarding the issue of the plastic management policies in Thailand to deal with the plastic problems inside the country for the improvement of the environmental, economic and social perspectives in order to remove the plastic wastes that are still scattering which is negatively impact on 3 perspectives of sustainability.

According to Wichai-Utcha, N. and Chavalparit, O. (2018), Thailand has launched National 3Rs Strategy, National Master Plan for Waste Management and Plastic Debris Management Plan of 2017-2021, these plans promote and advocate the eco-friendly approaches in plastic substitutions and packaging design with fulfilling the concept of 3Rs/5Rs and to promote more effective plastic waste management in order to remove several plastic wastes with better plans and methods.

Currently, Thai government decide to completely eliminate the plastic consumption including plastic cup in the country by 2022 in order to reduce the plastic wastes and plastic products with total 780,000 ton per year, decrease the budget of the garbage elimination 3,900 million baht per year, save the landfill areas and elimination of the plastic garbage with total 2,500 rai and reduce the amounts of greenhouse gas with compared to Carbon dioxide about 1.2 million ton. However, despite of this plan to completely remove the plastic wastes but there are some populations inside the country still use plastic items too much comfortable which leads to mismanagement of plastic items consumption for increasing more plastic wastes which cause more plastic waste disasters on the sea, land and air.

According to Greenpeace Thailand, In February 2021 the organization reports that following by the Thai council of ministers for coming up with the policy of plastic waste elimination in phase 1 by 2 goals. The first goal is about to reduce and stop using 4 product types which are plastic bag with not being less thick than 36 microns, foam box for containing food, plastic cup thicker than 100 micron and plastic straw. (Only allows for consumption by kids, elder people and patient people) and the second goal is to bring the plastics to be used for benefits in circular economy which is less than 50 percent of the targeted plastics until 2022.

Following by the plan of the roadmap in elimination of the plastic 2020-2030 in all phases. However, there is worrisome about measurement in plastic waste elimination especially in the reminding of ideas and definition of the circular economy that is based on bringing the plastic waste to be burnt for generating the energy by the measurement under the operational plan in the field of plastic waste elimination. The first phase of the policy's objective is to encourage people to bring the plastic waste to be produced in refuse derived fuel (RDF) which can be estimated for reducing the amounts of plastic wastes about 0.78 per year. Translated and paraphrased from Greenpeace Thailand 2021.

According to Bangkokbiznews, the meeting of Cabinet of Thailand has approved the plan of reducing and stop production of plastic waste by issuing the policy of completely elimination of 4 plastic types in 2022 alongside with destinating the 7 plastic types for the road into circular economy with rotating not less than 50% in 2020. the meeting of cabinet in Thailand has discussed for the approval of ministry of natural resources and environment's proposal in regard of the policy for plastic waste elimination with following by:

I. Approval by the cabinet for drafting the action plan of the plastic waste elimination in order to implement the framework of prevention and solution about plastic waste's impact on the environment that has to be operated under the roadmap of plastic waste elimination 2018-2030
II. Assigning to the agencies that works in the issues related to operating the task of action plan

The cabinet has approved the upcoming plan named "Elimination of plastic wastes phase 1 2020-2022 for reducing the number of plastic wastes including the removing of plastic wastes with efficient ways. The details of the plan following by:

I. 100 % Relinquishing 4 types of plastic items consumption in 2020: The cabinet concludes that reduction and cessation of plastic items by replacing it with 100% eco-friendly products. 4 plastic types that need to be eliminated and cessation in the year of 2020 which are plastic bag, foam box containing with food, plastic cups and glass, and plastic straw
II. Conveying the plastics into circular economy by reusing it not less than 50% in 2022: which consists of thicker plastic bags, single layer film packaging, all kinds of plastic cutlery.

By 2019, the usage of 7 plastics about 1,341,688 tons which is targeted plastic items to be reused about 50% or 670,834 tons

The details of measurements follow by

I. Measurement of plastic waste reduction in the original places

II. Measurement of relinquishment in plastic usage by steps

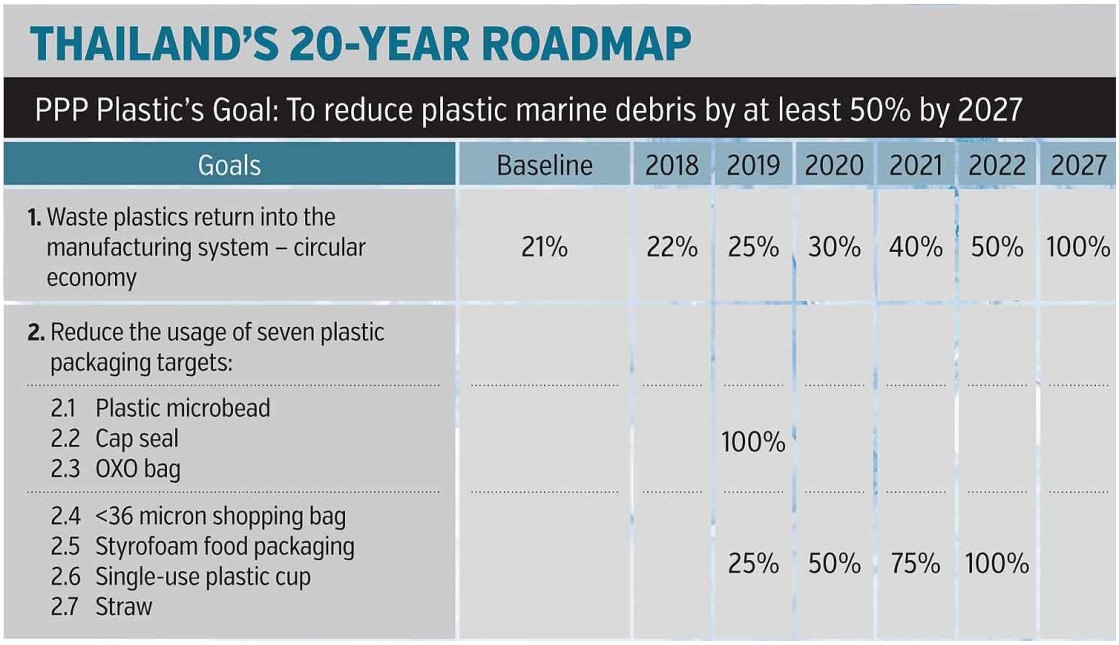
III. Measurement of plastic waste elimination after consumption

As the plans from measurements states from above, it can estimate that the number of plastic wastes can be reduced about 780,000 million tons/year.

Translated and paraphrased from Bangkokbiznews 2021.

According to Bangkok Post, the cooperation idea creates more effective method to end plastic waste generation in Thailand with sponsored by the public private partnership for Plastic and waste management or known as Thailand PPP Plastic. The partnership was begun in 2018 to state about plastic waste problems in Thailand. About 15 organizations join the partnership's program. The partnership's program has extended with addition of more memberships from new organizations into 33 members as an extended member.

The PPP Plastic has created with an objective is to reduce plastic marine debris by 50% of all plastic wastes on the water and all of plastic wastes in Thailand to be recycled by 2027 which is the date when all plastic wastes are to be eliminated. PPP plastic also have goal to create a circular economy by reducing the single-use plastic. As the shopping bag is about to be banned for providing to customers at shopping mall in the year of 2020, the next target plastic item for removing plastic consumption are plastic container, plastic cup and plastic straw. (Bangkok Post, 2019).



THAILAND'S 20-YEAR ROADMAP

PPP Plastic's Goal: To reduce plastic marine debris by at least 50% by 2027

Goals	Baseline	2018	2019	2020	2021	2022	2027
1. Waste plastics return into the manufacturing system – circular economy	21%	22%	25%	30%	40%	50%	100%
2. Reduce the usage of seven plastic packaging targets:							
2.1 Plastic microbead 2.2 Cap seal 2.3 OXO bag			100%				
2.4 <36 micron shopping bag 2.5 Styrofoam food packaging 2.6 Single-use plastic cup 2.7 Straw			25%	50%	75%	100%	

Figure 16 Thailand's Roadmap for Public Private Partnership for Plastic Waste Management for setting up with a goal to reduce seven plastic types that are focused to be reduced by PPP with years as a destination for reaching the goals. Source: Bangkok Post

Thailand's roadmap on plastic waste management 2018-2030

Thailand roadmap on plastic waste management 2018-2030 is a plan advocated by Thai cabinet to aim the goal by reducing all plastic consumption in the country and convert total plastic wastes of the country into circular economy. The roadmap traced back in 2018 when the cabinet had set up the meeting on 17th April 2018 as the Thai government noticed that pollution problem has seriously impact on the country's environment. There was a report about plastic waste problem that Thailand has total plastic wastes about 2 million which is 12% of total waste generation, thus leading to birth of the roadmap on plastic waste management. During the meeting, the prime minister has provided an assignment to the ministry of Natural Resources and Environment with an objective to cooperate with all sectors in order to create a plan for solving the plastic pollution problem by elimination of plastic consumption in the country. The roadmap is recognized by cabinet on 4th January 2019 and on 17th April 2019, the roadmap was accepted as a framework policy in order to make the policy being useful to prevent plastic waste generation increasing.

The roadmap has 3 phrases to eliminate plastic consumption which are

- Stop using cap seals, Oxo and microbead in 2019
- Stop using plastic bags that are lower than 36 microns, food foam container, plastic straw and plastic cups that are lower than 100 microns in 2022
- Totally plastic item elimination in 2027 in order to achieve Circular Economy Principle by recycling the plastic wastes. Source: Ministry of Natural Resources and Environment (2018).

Figure 17 Thailand's roadmap on plastic waste management 2018-2030, Ministry of Natural Resources and Environment (2018)

Figure 18 Thailand's 3 phrases for single-use plastic banning policy, Thailand's roadmap on plastic waste management 2018-2030, Ministry of Natural Resources and Environment (2018)

2.7 Policies relevant to plastic consumption and wastes in other countries

In this section, it states about the number of sources regarding the issue of the plastic management policies in other countries for comparison the case of in Thailand and outside Thailand to see how the government or private sectors in other countries manage to deal with various plastic type of products which includes SUP.

EU Directive on Single-Use Plastics

According to C. Mo (2020), Single-use plastics are banned in European Union (EU) since July 2021 when the policy of single-use plastic ban was enforced. Following the requirement of the Directive (EU) 2019/904 which was also known as Single-use Plastic-Directive for the prohibition of single-use plastic products consumption by the people.

The measurement of the plans for banning single-use plastic products consumption to make each member states of EU to enact the policy which consists of:

I. Complete elimination of many single-use plastic products by the year of 2021.
II. About after 2025, the capacity of beverage bottle with lower than 3 liters that having PET (polyethylene terephthalate) needed to be recycled for 25% of recycled plastics from the average calculation of the market from each EU member states.
III. About after 2030, the percentage of recycled plastic on PET will be risen to 30%.

The directive has issued the policy of plastic bottles to be recycled to EU member states which by 2025, EU member states will recycle 77% of plastic bottles on a market, by 2029, amount of recycling plastic bottles to be increased by 90%.

EU directive has marked the following by SUP products on EU market which are

- Cups
- Straws
- Cutlery
- Cotton bud sticks
- Expanded Polystyrene food containers
- Expanded Polystyrene beverage containers
- Oxo degradable plastic products
- Balloon’s plastic stick

Apart from EU coordinated directive, some EU countries have already started the enforcement of the law or regulations regarding the single-use plastic products ban or reduction such as Austria, France, Italy and Spain. In Capri Island, Italy, the enforcement of ban on single-use plastic items was introduced in May 2019 which the banning will apply to the products such as cups, straws, cutlery and dishes that are made up of single-use plastic. The visitors to island who offend the banning for bringing single-use plastic items will have a penalty with fining about €500 (18,941 Baht) (Agencia EFE, 2019).

In my opinion on EU directive on reducing SUP consumption is neutral because although the directive has encouraged EU member states to reduce SUP consumption among consumers but the effective of the measurement has no effective on SUP consumption reduction yet.

SUP consumption penalty law in Canton of Geneva, Switzerland

According to Le News (2019), the law of the penalty for consuming single-use plastic products was enforced in the Canton of Geneva, Switzerland since January 2020 which the enforcement of this law is canton-wide (provincial-wide) implemented across the Canton of Geneva to prohibit of using or providing single-use plastic products like cups, bags, straw, cutlery, sachet and plate. This law was passed from the approval by Geneva's cantonal parliament in 2019 with an objective to reduce the amounts of wastes by 25% inside the Canton between 2020 and 2024. The offenders will have risk for penalty with fining about CHF 100 (34.22 Baht) like those who provide single-use plastic items to the public will have risk for fines with at least about CHF 100.

In my opinion of canton of Geneva's implement of penalty for SUP consumption is positive because law penalty in canton of Geneva has good intention to prevent more SUP consumption (including cups and straws) among consumers in canton-wide level which will encourage people to reconsider about SUP consumption and opt it for eco-friendly product consumption instead.

Singapore's law enforcement of plastic littering penalty

In Singapore, although there is some plastic littering on the beach but according to Environment Health Public Act (EHPA) the penalty for littering is paying for fines with $300 (7,091 Baht) if the offense is first time. The offenders those who keep breaking the law for littering the plastics twice, they will be commuted to community cleaning service with the length of 3 to 12 hours. For those who keep offending for many times, the penalty of the fining will be $2,000 (47,279 Baht) for first court sentence, $4,000 (94,558 Baht) for second sentence and $10,000 (236,396 Baht) for third and upcoming of future sentence. As a result of strict law enforcement on reducing the plastic wastes, Singapore prevents many offenders who try to litter the plastics on the grounds. The Finder (2019).

The enforcement on eliminating the littering offense was enacted in 1992, in 2018 the enforcement is increased with 22% which the tickets are issued for people who commit a littering offense about 39,000 tickets compared to 2017 which issued around more than 32,000 tickets but less than 39,000 tickets. The amount of Corrective Work orders is risen in 2018 more than in 2017 about 30% with the cases in 2017 is about 2,000 cases and in 2018 is about 2,600 cases. (National Environment Agency, 2019).

In my opinion of law enforcement of plastic littering penalty by Singapore, I agree with Singaporean method of penalty for plastic littering because the law enforcement encourage the consumers to remind their consumption behavior of plastic proves that an enforcement of a policy in Singapore has very effective on Singaporean society due to strict measurement implemented by Singaporean authority.

Single-use plastic ban policy in Japan

Japan has issued the enforcement of disposable plastic ban policy in the country by environmental and industrial ministries since April 2022. After the successful of plastic waste recycling, the cabinet decided that remaining plastic items should be ceased providing it to customers in order to reduce plastic waste generation in the country. The policy requires the business sectors like restaurant, hotel, convenient stores and laundries to reduce 12 kind of single-use plastic items usage in order to reduce single-use plastic consumption and encourage the retailers to provide non-single-use plastic items to customers in lieu of single-use plastic items. Before that, Japan also had plastic bags providing banned among retailers in 2020 with an objective to concern about worldwide serious marine plastic pollution with 8 million tons on the ocean that many parts in the world still facing (Kyodo News, 2022).

Japanese government also banned single-use plastics items such as cups, straws and cutlery in governmental cafeteria such as in ministries, courts and local bureaus and stop providing bottles to participants in the conference meeting. This motivation by government is to promote eco-friendly approach during hosting of G20 summit in June 2019 (Kyodo News, 2019).

The plastic items that are included in certain places to be banned by Japanese government in 2022 which was approved in the legislation by the cabinet to cease providing these items to customers by retailers and consumption among consumers since April 2022 which are

- Restaurants, supermarkets and convenient stores
    - Plastic forks,
    - Plastic spoons,
    - Plastic knives,
    - Straws
    - Coffee stirrers

- Hotels
    - Combs
    - Razors
    - Shower caps
    - Toothbrushes
- Laundries
    - Hangers
    - Garment covers

Source: Ikidane Nippon (2022).

2.8 Related studies

This section mentions about the studies that are related to this study in regard of influencing in SUP reduction and policy of banning SUP consumption.

A study by S. Thamma-apipon, J. Thongrod, and N. Sarapon (2019) to survey motivation to reduce using SUP cup with the concept of personal cup exchange drink discount with a university's students and found that up to 60% of 253 respondents never use personal cup and 41% of which selected the reason of uncomfortable. Most of the respondents agree that discounting 2 THB is suitable, but some found it is not enough motivation.

Another study by P. Areethamsirikul (2018) titled "Factors influencing Thai consumers' behavior on reducing single-use plastic cups" was conducted with 236 online respondents. The study found that about half never use personal cup and most of the respondents considered the discount benefit as a more effective solution than the penalty, which is opposing to other some countries. It is also suggested that only environmental concern raising is insufficient to motivate using personal cup, but combination of both environmental concern and monetary incentives need to be applied. It is also analyzed by same author that psychographic factors have significant influences on consumption behavior with different belief and attitude towards on single-use plastic cup consumption by describing the consumers with the issues of environmental awareness, exposing to nature, price sensitivity, convenient values, socialization’s stage.

These issues can lead to the consumer's changing their attitude on their consumption behavior toward single-use plastic cup consumption to describe how they will go to the path of single-use plastic cup consumption reduction or continuing single-use plastic cup consumption. The author used theory of planned behavior to describe the attitude and behavior of the consumers with an objective to categorize consumers into different population groups based on factor analysis and cluster analysis with 4 psychographic factors (Environmental concern, high spending, socially active and egotism).

In Factor analysis with psychographics the author described that how the consumers with different psychographic background effect on their attitudes towards the environment and interaction with the people. This factor analysis reflects that the consumers with different psychographic react with the single-use plastic cup consumption. In cluster analysis with psychographic factors shows that each psychographic factors affect the consumer's attitude and behavior on single-use plastic consumption with each different segmentation (non-conformist, self-centric, price sensitive environmentalist and big spender).

A study conducted by A. Khoironi, S. Anggoro and S. Sudarno (2019) titled "Community behavior and single-use plastic bottle consumption", the greatest barrier to change social habits and behavior of SUP consumption is social culture as a factor in local community which is influenced by a practice that is done by a majorities inside a local community and also by education and employment inside community level.

Bubble tea consumption becomes popular in Thailand due to the widespread of bubble tea business across the country which shows that many bubble tea shops are open in many parts of Thailand. Bubble tea consumption by the consumers can influence the consumer's behavior and intention especially among the teenagers due to the bubble tea itself can be considered as an alternative beverage to coffee and even other teas. The statistics about bubble tea consumption shows that many consumers consider the flavor of bubble tea to be delicious as they consider the importance of bubble tea's flavor can make it as their free time beverage, easily to find for purchasing a beverage and having a fleshing mood for consumption (P. Kukkong, N. Sangsom, P. PinTonod, N. Nambut and P. Apichainapakul, 2019).

The consumption of bubble tea can correspond to the consuming behavior in the way of consumption of plastic cup with bubble tea by the consumers to describe that the popularity of bubble tea drinking by the consumers especially teenagers influence the behavior and intention of the teenagers for increasing the plastic wastes.

According to the data from study by University of Alabama at Birmingham shows that how the teenagers regularly consume the soft drinks can lead to the current aggressive behavior in their daily routines. The past researches have proved the connection between soft drink and teenager's mental health that it can predict for causing aggressive behavior among them. Soft drink consumption during 11-13 years old estimate it can lead to aggressive behavior which having an aggressive behavior during 13 years old will have more soft drink consumption during age of 16. Several studies links to teenager's consumption of soft drink leads to several mental health problems like depression, oppositional behavior, hyperactivity and suicidal behavior. High amount of soft drink consumption by American youths which estimate that about 20% of soft drink consumption for total caloric intake are consumed by high school students. Hence, consumer's age is expected to be a key factor influencing on consuming behavior (UAB, 2018).

According to S. Leelahawong (2004), Coffee and tea are beverages that have a history for being consumed for long time, both beverages have a good flavor and diverse types of seeds for spreading the flavors. This makes both coffee and tea become more popular among many consumers regardless of age and genders especially in the present days, both coffees and teas become more widespread for healthy reason due to the trend of worrying about health is increasing. The growth of coffee and tea consumption also lead to the rise of the business in regard of the coffee and tea market with more additional support from the government to encourage the people to drink more coffee and tea.

According to P. Kotler and G. Armstrong (2008), there are many key factors that significantly influences the consumption behavior of the consumers but Kotler and Armstrong categorized with 4 major factors which are

I. Psychological factor: which is based on consumer's belief and attitude towards on certain issues and their motivation to advocate for something they would like to do.
II. Demographic factors: which is based on personal background of consumers like age, education, lifestyle, residence, personality and educational level.
III. Social factor: which is based on consumer's social status or groups like being part of reference group that is mentioned by the authors to describe their factors based on certain issues that affect their consumption behavior.
IV. Cultural factor: which is based on consumer's cultural background like how the consumer's culture effect on consumption behavior to make a decision to buy something for bargain or necessary reason.

For the demographic factors that effects consumption behavior, it is stated by R. Hohmann, C. Wattana, P. Sracheam, C. Siriapornsakul, V. Ruckthum and R. Clapp (2014), that 4 factors of gender, nationality, age and occupation, all are significantly impact on consumption behavior for an intention to reduce plastic bag consumption.

The study shows an outcome from the survey by the people who have an intention to reduce plastic bags that females are more likely to reduce plastic bags due to their roles in the family shopping to provide a support to the family. It is reported that in the occupation has proved that independent variables of awareness of plastic bag overuse and alternative promotion in lieu of plastic bag effect the demographic factors which point out that employers are more likely to stop using plastic bags more than the employers do.

According to S. Vassanadumrongdee, D. Hoontrakol, and D. Marks (2020**),** it is stated that respondents answer in the survey about the primary reason to use reusable or cloth bags is to have an intention to reduce the numbers of plastic waste bags as a key factor to influence the consumer's behavior in reusable or cloth bags usage, which is 45% of all respondents who participate in this survey. The following reason to use reusable or cloth bags is the awareness of the plastic bag impacts on the environment which is 28% of all respondents who participate in this survey and the third reason that is chosen by respondent is aware about reusable or cloths bags promotion among the department stores to stop giving a plastic bag away to the consumers. This proves that the demographic factors in the issue of awareness and knowledge about plastic bag can influence the consumers to start using reusable or cloth bags.

In the research about single-use plastic online delivery consumption by B. Wongprapinkul (2021), it is stated that consumer's attitudes play important role in consumption behavior of single-use plastic items for analyzing the different consumption behavior among different consumer groups when comes to order delivery regarding the type of items. The research shows that the demographic, psychological and behavioral factors can influence the clusters for describing the consumer's consumption behavior in ordering the delivery in cluster analysis with 3 clusters which are moderate environmental attitude (Cluster 1), low environmental attitude (Cluster 2) and high environmental attitude (Cluster 3). In demographic factors the research shows that females are likely to be in group of moderate to high environmental attitudes while males are likely to be in group of low environmental attitudes. For generational groups in demographic factors, younger generation consumers tend to be grouped in low environmental attitudes.

In behavioral factors, it is reported that behavior in ordering delivery during before covid-19 pandemic and covid-19 pandemic. People who are in the group of moderate environmental attitudes are reported to be receptive to catalyst while the people in the group of low environmental attitudes are less likely to challenge the new situations for ordering behavior and people who are likely to change their behavior regarding ordering the delivery during covid-19 pandemic. In psychological factors the variables are depended on sustainable consumption dilemma, perceptions on food packaging and willingness to pay to determine the consumer's ordering behavior with psychological factors whether they are willing to change their attitudes and behavior or not.

It is reported by various authors that key factors influencing on consumption behavior are based on demographic factors (Vassanadumrongdee, S., Hoontrakol, D. and Marks, D., 2020) it psychological factors (P. Areethamsirikul, 2018); and; other factors like price, quality, habit, etc. (T. H. Al-Gahaifi, and J. Světlík, 2011)

The study data that is conducted on 2nd-6th June 2020 by Oceana Canada showed that about 86% of Canadian citizens support the government to ban single-use plastic items comparing to previous survey in 2019 that 81% of Canadian citizens supporting the ban. Oceana Canada reported that majority of Canadians want a better green future for Canada without being ruined by SUP as Canadians expect their government to decrease SUP consumption by banning SUP items with a purpose to end plastic disasters. This could be proved from the evidence of Oceana Canada launched a petition for seeking Canadian Prime Minister and Environmental minister to start their commitment on banning SUP items that are deem unessential like cups, bottles and straw. However, the petitions were signed by many people around 50,000 people to call for reducing single-use plastic consumption. (Oceana Canada, 2020).

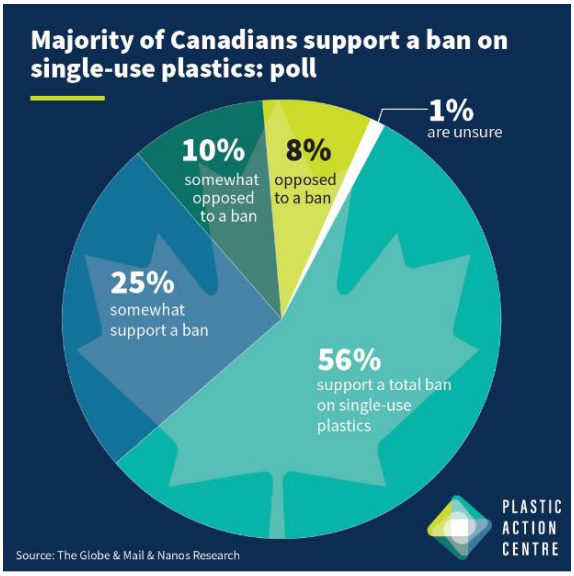


Figure 19 2019 Survey regarding Canadian's opinion on SUP ban, Plastic Action Centre (2019).

The survey in regard of Canadian citizen's opinion on single-use plastic showed that more than half of total Canadian citizens support about 56%. This survey can be a relevant to this study because it is about how the citizens in Canada expressed their opinion on single-use plastics which can be related on how this research survey the consumers for stating on perception and opinion on single-use plastic banning policy. However, Thailand does not have conduct an official survey on the citizens for stating their opinion on single-use plastic ban yet.

Blackbox shows the opinion of Singaporean citizens for which plastic item should be banned first. 30% of Singaporeans answered that plastic cups, forks and plates should be the first plastic item should be banned, 24% of Singaporeans answered that plastic bottle should be the first should be banned first, 18% of Singaporeans answered that plastic bag should be banned first and another 18% of Singaporeans answered that plastic straw should be banned first. The reports from Blackbox (2019), states that the current condition of plastic consumptions cause many Singaporeans serious to consider about plastic overflowing problem despite Singapore has currently no plan to ban plastic item consumption. However, currently level of plastic consumption made many Singaporean worried about plastic pollution. Blackbox shows the result of the opinions about plastic consumption in Singapore that: 83% of Singaporean population say that they are concerned about conditions of plastic consumption in the country. 62% of Singaporean population supports banning of plastic bags usage. 45% of Singaporean population are unhappy with their process on limiting plastic items

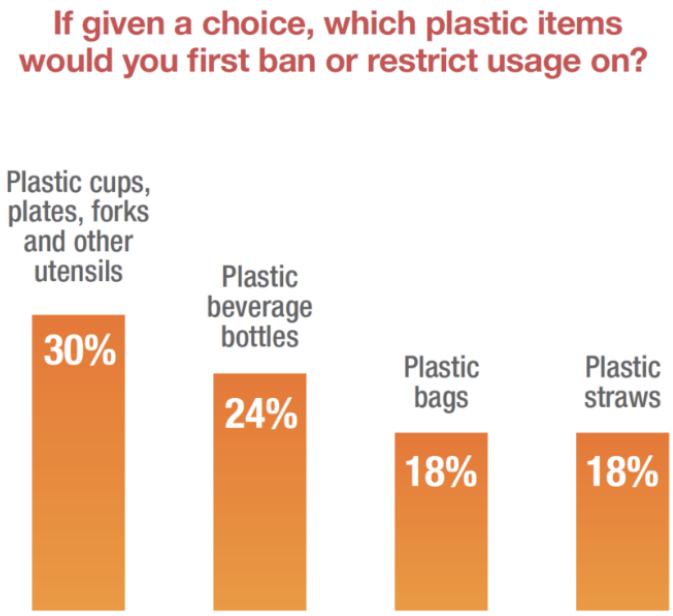


Figure 20 Statistics of the people's view on plastic item bans if they have choice to select what plastic items should be banned or restricted for consumption, Blackbox (2019).

The poll on Singaporean citizen's opinion on which items should be banned first can be relevant to case in Thailand because it is about how the citizens believe which plastic item is troublesome to plastic pollution the most and it should be banned in the first place.

Global Survey has reported the data regarding people's attitudes on single-use plastic ban around the world that the IPSOS's poll stated that 75% of the world population supports banning single-use plastic items consumption which makes 3 of 4 in world population supports the ban. The survey was conducted by IPSOS showed that 75% of 20,000 people who participated the survey from 28 countries support SUP ban. Compared to previous survey which has less percentage of world population which was 71% in 2019. The survey revealed that highest support for banning SUP items come from BRICS (Brazil, Russia, India, China and South Africa) and Latin American countries which is about 88% and 80% while North America has lowest support for banning SUP from population which is 61% respectively. The highest level of supporting for banning SUP among population in the country are from Colombia (89%), Chile and Mexico (88%), Argentina and China (84%) and lowest support among population in the country are in the Canada (66%), United States (55%) and Japan (37%).

88% of the world population stated that they believed that SUP ban is a necessary to solve the plastic pollution problem. For the percentage among populations in the region for this issue, it is shown that highest percentage from this position is from Latin American countries (93%), BRICS countries is the second highest (91%) and third highest is from Middle Eastern/African countries (90%). Among the countries, the highest percentage in agreement level of the SUP ban among populations are Mexico (96%), Brazil (95%) and Colombia (94%) which all of 3 countries are Latin American countries and the lowest percentage. The lowest are Japan (70%), the United States (78%) and Canada (79%) which the latter 2 countries are North American countries.
85% of the world population by average believed that the retailers and manufacturers should take a responsibility for solving the plastic pollution problem by recycling, reusing and reducing the plastic items. 82% of the world population by average believed that people should prefer to use fewer plastic items for its consumption as possible. (IPSOS, 2022). and (My Modern Met, 2022).

The reason why demographic factors are only focused than other factors because in this research is about how the factor will make the consumers to reduce single-use plastic cups and straws based on personal background rather than focusing on behavior and attitude which are based on social and psychological factors.

In this research exploring the demographic factors like knowledge about single-use plastic and biodegradable plastic, preferred options, environmental awareness, price mechanism and legal enforcement which proves that these factors can change the consumption behavior in regard of single-use plastic consumption reduction because this research do not analyze about consumer’s attitude based on psychology but analyze how much they recognize about single-use plastic problem based on personality, lifestyle and origins to see how they deal with single-use plastic cups and straws.

Chapter 3
Research Methodology

This chapter presents research design and methodology. Methods used for data collection and data analysis. Hypothesis and hypothesis test.

3.1 Overview:

The present research was conducted with quantitative approach using online questionnaire survey. The questionnaire was distributed through various line groups to achieve maximized demographic distribution, especially age of the respondents having wide range from below 20 to higher than 60 years old. It was supposed that different groups of respondents would have different awareness and different preferred choices to replace the single-use plastic cups and straws, and also having different willingness to pay extra for non-SUP or environmentally friendly cups and straws

3.2 Conceptual Framework and Hypothesis

The present study was designed to investigate consumer's beverage consumption behavior, preferred choice for non-SUP cup, willingness to pay for non-SUP and willingness to cooperate implementation with the banning policy, and also the variable relationship with either demographic factors or perception on related issues (see also figure 21). Hypothesis of each relationship was proposed as follow.

H1: Beverage consumption behavior would relate with consumer's age.

H1.1 Self-prepare vs. Buy at shop

H1.2 Buying behavior

H2: Preferred choice for non-SUP cup would relate with consumer's age.

H2.1: If not during Covid-19 pandemic

H2.2: If during Covid-19 pandemic where personal cup is not allowed.

H3: WTP for non-SUP cup would relate with consumer's perception on SUP impacts and BDP.

H3.1: WTP for BDP cup vs. perception on SUP impacts

H3.2: WTP for reusable cup vs. Perception on SUP impacts

H3.3: WTP for BDP cup vs Perception on BDP

H4: Willingness to cooperate implementation with the banning policy would relate with consumer’s perception on SUP impacts

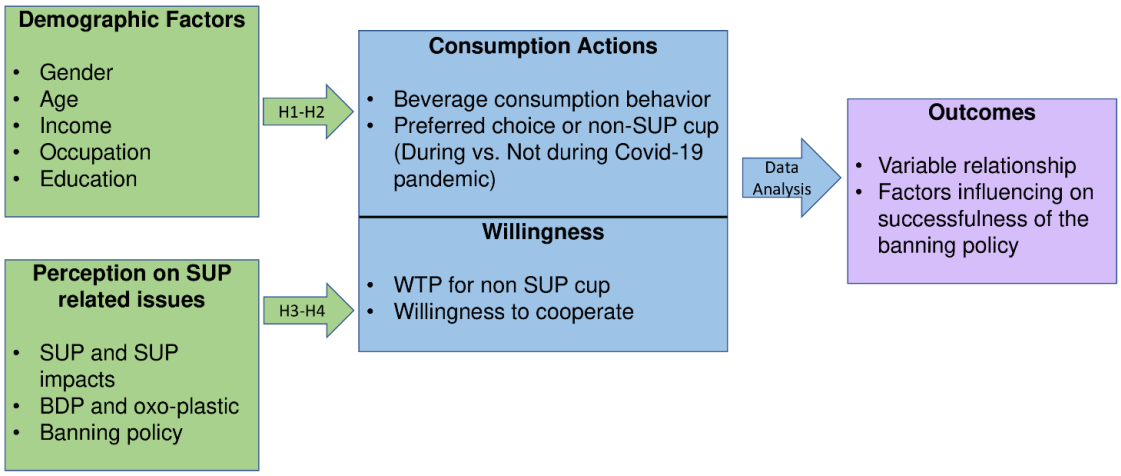


Figure 21 Research Framework

3.3 Data collection and analysis

As mentioned earlier, Online survey was conducted during April-June, which are during serious situation of Covid-19 pandemic in Thailand, and additional onsite survey was conducted at Pathumwan Demonstration School on 16th June 2022 where the Covid-19 pandemic has become slow down. All received answers were selected only those from respondents living in Bangkok and Vicinity (Nonthaburi, Pathum Thani, Samut Prakan, Samut Sakhon and Nakhon Pathom) All data was then analyzed using SPSS (Statistical Package for the Social Sciences) to identify variable relationship as well as effective factors for successfulness of the banning policy. While all information from literature reviews were used for identifying policy recommendation. The data collection and analysis flow chart were summarized and shown figure 22.

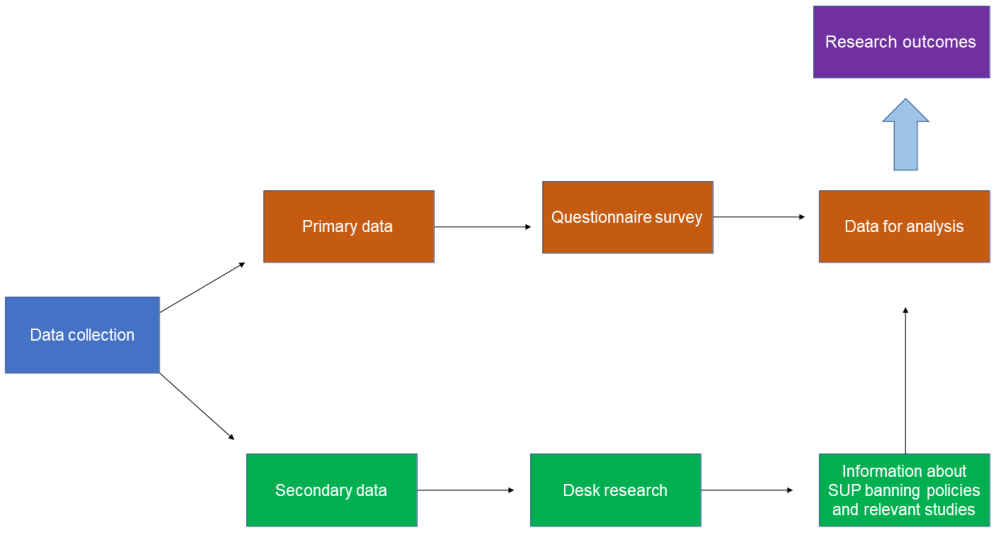


Figure 22 Data collection and analysis flow chart

Sampling size

According to statistic reported by Citypopulation.de as of July 2019, total population in Bangkok and Vicinity are 16,255,000 the sample size of which should be 400 Yamane (1967). Therefore, sample size of each province calculated based on population would be as follow.

Table 1 Populations and sample size of provinces in Bangkok Metropolitan region

Provinces	Populations	Sample size
Bangkok	8,883,000	130
Samut Prakan	2,159,000	80
Nonthaburi	1,611,100	70
Pathum Thani	1,541,100	60
Nakhon Pathom	1,118,600	40
Samut Sakhon	922,100	20
Total	16,255,000	400

Size of Population (N)	**Sample Size (n) for Precision (E) of:**			
	±3%	**±5%**	**±7%**	**±10%**
500	A	222	145	83
600	A	240	152	86
700	A	255	158	88
800	A	267	163	89
900	A	277	166	90
1,000	A	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100

A = Assumption of normal population is poor (Yamane, 1967). The er

Figure 23 Sample size according to Yamane, Yamane's formula table (1967).

Statistics Model

The present study used SPSS and non-parametric Chi-square for data analysis because data from the study are non-normal distribution and most questions are categorized or multiple choices.

SPSS

SPSS (Statistical package for the social science) A software that can be used for data collection in statistics by many methods such as regression analysis model which the research uses it as research model in order to show the analysis of the answers from the questionnaires that have been done by customers. The reason why this research SPSS model for doing research because in SPSS, it allows to show the choices by many factors to see the answers from various groups in regard of opinion of SUP banning policy implementation and non- SUP cup and straw consumption, awareness and perception about single-use plastic wastes and their daily routines in willingness to pay for preferred choices to replace SUP cups and straws consumption Levesque, R. (2007) and Field, A. (2013).

Chi-square test

Chi-square test is a non-parametric method for statistics test in categorial data by using descriptive statistics in testing of independence and testing of a goodness of fit. Chi-square test shows the frequencies in 2 or more variables which the statistics has 2 types of variables are numeral variables and non-numeric variables such as nominal and ordinal because in Chi-square test or non-parametric test can test distribution of categorical variable. Chi-square test are used in hypothesis test for examining whether the factors are related each other or not based on sig more or less than .005. If the sig is more than .005 which makes the hypothesis is unacceptable and if the sig is less than .005 which makes the hypothesis is acceptable. Chi square goodness of fit test is a test for describing that if the sample data can represent actual population by determining whether it is from given distribution or not. While Chi-Square Test of independence is a test to determine whether the two variables are related or not which is usually use in hypothesis test. JMP, Statistic Discovery (2022).

3.4 Questionnaire Design:

The questionnaire has 28 questions dividing into 3 sections which are demographic factors, respondent's beverage consumption behavior and respondent's perception on SUP and willingness to pay for non-SUP cups All are closed-end questions

The questions about demographic factors, consumption behavior, and preferred choices to replace SUP cups are multiple choices. While questions about perception and willingness are 5-level Likert scale where 1 was minimum, 3 was moderate, and 5 was maximum.

The questionnaire has been approved by the office of research ethic review committee for research involving human subjects: The second allied academic group in Social Science, Humanities and Fine and Applied Arts in 12th April 2022, No. 650039. And the revision has been approved by the committee in 18th April 2022.

Chapter 4
Results and Discussion

This chapter presents results of the study which was firstly conducted via Google form online survey during April 18 - June 25, 2022. Total respondents are 724 but 101 of which are those outside the study areas (Bangkok, Nonthaburi, Pathum Thani, Samut Prakan, Samut Sakhon and Nakhon Pathom); therefore, total 623 respondents were used for result discussion. By the way, as of May 30, population of respondents younger than 20 years old were only 2 respondents. Therefore, additional onsite survey was conducted with primary school students at Pathumwan Demonstration School on June 6, 2022 and 95 respondents were achieved. At the end of online survey, 57 respondents younger than 20 years old were achieved. The online and onsite survey results were separately evaluated and compared with the results of the integrated respondents. Therefore, results of key questions were illustrated with 3 pie-graphs: Online, Onsite, Online + Onsite.

The results and discussion include respondent's demographic profile, consumption behavior, perception on SUP, SUP impacts, BDP, microplastics from degradable or oxo-plastics, and also perception and agree on the SUP cups and straws banning policy. Willingness to pay extra for non-SUP cup, willingness to cooperate implementation, and also respondent's opinion on factors and measures to minimize the SUP impacts are also presented. Followed with normalization and hypothesis test results.

4.1 Demographics profile of the respondents

As shown in Table 2, it is observed that majority of 623 respondents from the online survey are females (66%), living in Bangkok (75%) with bachelor degree and higher (80%), but minority with those younger than 20 years old. While 95 respondents from the onsite survey are all primary school students younger than 20 years old, and most if which are living in Bangkok, only 9 respondents from outside Bangkok. Upon integration of the two groups to achieve total 718 respondents, it is observed that majority are still females living in Bangkok with bachelor degree and higher, but better age distribution.

Table 2 Demographic profile of 718 respondents in Bangkok and vicinity.

Residence						
Methods	Bangkok	Nonthaburi	Pathum Thani	Samut Prakan	Samut Sakhon	Nakhon Pathom
Online	540	88	35	28	4	14
Onsite	86	6	1	1	-	1
Total	540 (75%)	94 (13%)	36 (5%)	29 (4%)	4 (1%)	15 (2%)

Online Survey (#623)										
	Gender		**Age Ranges**				**Monthly Income (THB)**			
	Male	Female	< 20	20-40	41-60	> 60	<10,000	10,001-30,000	30,000-50,000	>50,000
N	195	428	57	159	248	159	102	150	150	221
%	31.3	68.7	9.1	25.5	39.8	25.5	16.4	24.1	24.1	35.5
	Occupation					**Education**			
	Govt Official	Private	Freelance	Student	Retired	Primary School	High school	Bachelor	Masters-PH.D.	
N	145	144	66	103	165	2	53	256	312	
%	23.3	23.1	10.6	16.5	26.5	0.3	8.5	41.1	50.1	

Table 2 (continue)

Onsite Survey (#95)										
	Gender		**Age Ranges**				**Monthly Income (THB)**			
	Male	Female	< 20	20-40	41-60	> 60	<10,000	10,001-30,000	30,000-50,000	>50,000
N	46	49	95	-	-	-	92	1	-	2
%	48.4	51.6	100	-	-	-	96.8	1.1	-	2.1
	Occupation						**Education**			
	Govt Official	Private	Freelance	Student	Retired		Primary School	High school	Bachelor	Masters-PH.D.
N	-	-	-	95	-		95	-	-	-
%	-	-	-	100	-		100	-	-	-
Online + Onsite Survey (#718)										
	Gender		**Age Ranges**				**Monthly Income (THB)**			
	Male	Female	< 20	20-40	41-60	> 60	<10,000	10,001-30,000	30,000-50,000	>50,000
N	241	477	152	159	248	159	194	151	150	223
%	34	66	21	22	35	22	27	21	21	32
	Occupation						**Education**			
	Govt Official	Private	Freelance	Student	Retired		Primary School	High school	Bachelor	Masters-PH.D.
N	145	144	66	198	165		97	53	36	312
%	20%	20%	9%	28%	23%		14%	7%	36%	44%

4.2 Respondent's beverage consumption behavior

The consumption behavior was investigated in 4 aspects: Self-prepare vs. Buy at shop, buying frequency, Plastic straw receiving when buying cold beverage, and Personal cup using when buying beverage at shop. Results of each behavior were shown with 3-Pie graphs: Online survey (A: 623 respondents), Onsite survey (B: 95 respondents), and Online + Onsite (C: 718 respondents).

4.2.1 Respondent's beverage consumption behavior (Self-prepare vs. Buy at shop)

Results shown in figure 24 indicate that nearly 51% of 623 online respondents (A) prefer beverage self-preparing, while nearly 77% of onsite respondents (B) which are all young students prefer buying beverage at shop. Resulting to 53% of the total 718 respondents (C or A + B) prefer buying at shop. These results imply relationship between buying behavior and respondent's age. If considering answering population in each demographic factor in Table 3, it is observed that those prefer beverage self-prepare are mostly senior with age higher than 40 years old. While those buying at shop consumers with all age ranges and also no majority among occupation. By the way, statistical test should be conducted and reported in the next section.

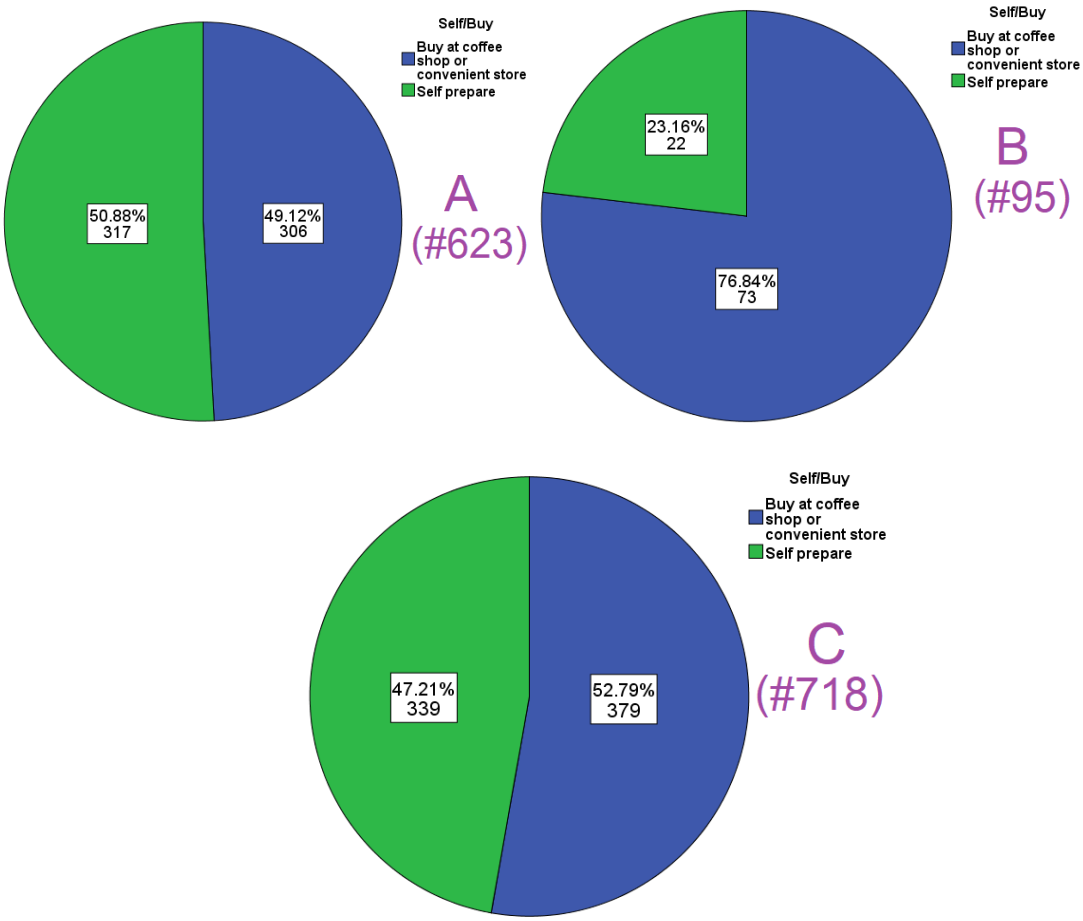


Figure 24 Respondent's Beverage consumption behavior (Self-prepare vs. Buy at shop) A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 3 Respondent's beverage consumption behavior (Self-prepare vs. Buy at shop)

Factors		Self -prepare		Buy at shop	
		N	%	N	%
Gender	**Male**	106	31.3	135	35.6
	Female	233	68.7	244	64.4
Age	**< 20**	41	12.1	111	29.3
	20-40	36	10.6	123	32.5
	41-60	130	38.3	118	31.1
	> 60	132	38.9	27	7.1
Monthly Income (THB)	**< 10,000**	62	18.3	132	34.8
	10,000-29,999	60	17.7	91	24
	30,000 – 50,000	87	25.7	63	16.6
	> 50,000	130	38.3	93	24.5
Occupation	**Governmental officials/State enterprise employee**	59	17.4	86	22.7
	Company/private employee	62	18.3	82	21.6
	Freelance/own business	42	12.4	24	6.3
	Student	45	13.3	153	40.4
	Unemployed /Retired	131	38.6	34	9.0
Education	**Primary school**	24	7.1	73	19.3
	Secondary school/vocational	19	5.6	34	9
	Bachelor degree	108	31.9	148	39.1
	Masters-Ph.D. degrees	188	55.5	124	32.7

4.2.2 Respondent's frequency beverage cup purchase from shop

Results shown in figure 25 indicate that about 47% of 623 online respondents (A), mainly higher than 20 years ago, buy beverage once in a while, another 41% buy beverage 1-5 cups per week, while 12% buy beverage more than 5 cups per week. Meanwhile up to 67% of onsite respondents (B) which are all young students, buy beverage at shop 1-5 cups per week, only 27% buy once in a while, and only 6% buy more than 5 cups per week. Resulting to 45% of the total 718 respondents (C) buy beverage 1-5 cups per week, another 44% buy once in a while, and the rest 11% buy beverage more than 5 cups per week. These results imply relationship between buying frequency and respondent's age. If considering answering population in each demographic factor in Table 5, it is observed that those buying beverage once a while is mostly senior with age higher than 40 years old and some young students While those buying 1-5 cups per week are all age ranges and also no majority among income and occupation. By the way, statistical test should be conducted and reported in the next section.

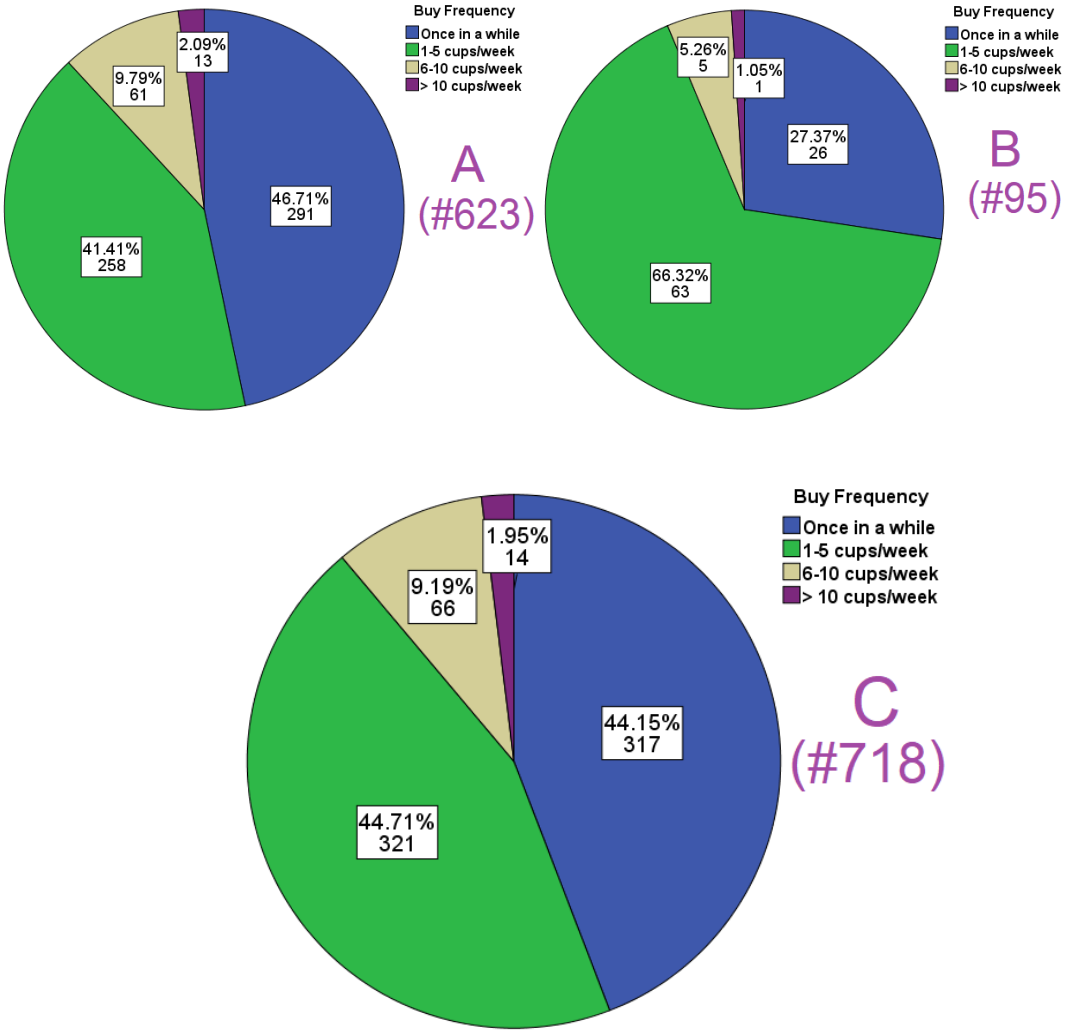


Figure 25 Respondent's frequency beverage cup purchase from shop A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 4 Respondent's frequency beverage cup purchase from shop

Factors		Once in a while		1-5 cups/weeks		6-10 cups/weeks		> 10 cups/weeks	
		N	%	N	%	N	%	N	%
Gender	**Male**	99	31.2	109	34	28	42.4	5	35.7
	Female	218	68.8	212	66	38	57.6	9	64.3
Age	**< 20**	47	14.8	90	28	13	19.7	2	14.3
	20-40	45	14.2	87	27.1	22	33.3	5	35.7
	41-60	102	32.2	110	34.3	29	43.9	7	50
	> 60	123	38.8	34	10	2	3	-	-
Monthly Income (THB)	**< 10,000**	72	22.7	106	33	14	21.2	2	14.3
	10,000 – 29,999	61	21.1	66	20.6	14	21.2	4	28.6
	30,000 – 50,000	78	24.6	56	17.4	13	19.7	3	21.4
	> 50,000	100	31.5	93	29	25	37.9	5	35.7
Occupation	**Governmental officials/State enterprise employee**	48	15.1	73	22.7	18	27.3	6	42.9
	Company/private employee	55	17.4	63	19.6	23	34.8	3	21.4
	Freelance/own business	29	9.1	32	10	4	6.1	1	7.1
	Student	59	18.6	119	37.1	17	25.8	3	21.4
	Unemployed /Retired	126	39.7	34	10.6	4	6.1	1	7.1
Education	**Primary school**	27	8.5	64	19.9	5	7.6	1	7.1
	Secondary school/vocational	23	7.3	22	6.9	8	12.1	-	-
	Bachelor degree	118	37.2	107	33.3	23	34.8	8	57.1
	Masters-Ph.D. degrees	149	47	128	39.9	30	45.5	5	35.7

4.2.3. Plastic straw receiving when buying cold beverage

In addition to beverage buying behavior mentioned above, plastic straw receiving and using personal cup are also important behavior. The survey on receiving plastic straw when buying beverage found that only 4.3% deny receiving the plastic straw, 33.8% receive sometime, and 58.9% always receive (see also figure 26). Meanwhile, its relationship with each demographic factor, as shown in Table 5, seems not significant. By the way, the young student group (B) tends to have higher percentage of sometime receiving and never receiving plastic straw when buying cold beverage.

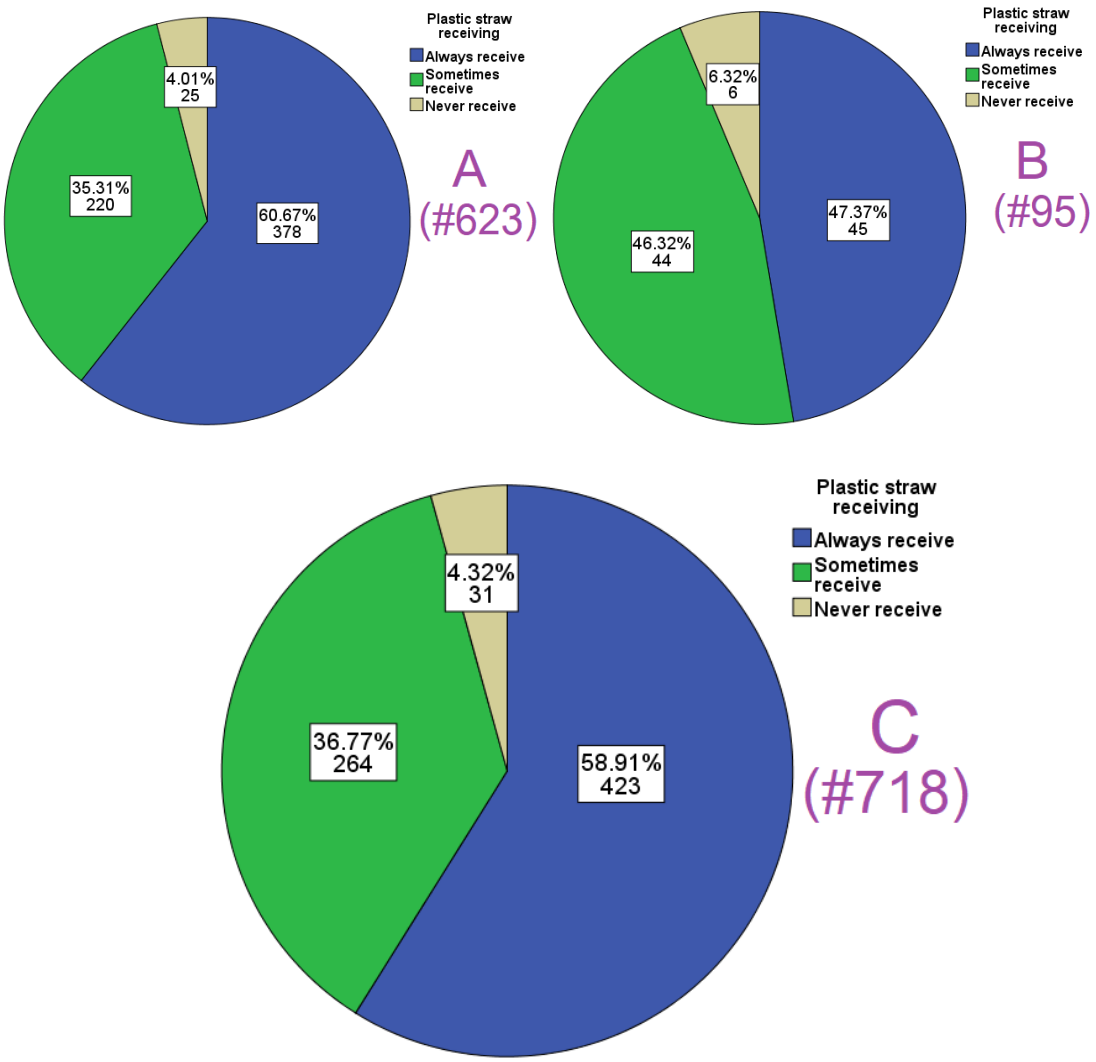


Figure 26 Plastic straw receiving when buying cold beverage A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 5 Plastic straw receiving when buying cold beverage

Factors		Always		Sometimes		Never	
		N	%	N	%	N	%
Gender	**Male**	136	32.2	88	33.3	17	54.8
	Female	287	67.8	176	66.7	14	45.2
Age	**< 20**	74	17.5	69	26.1	9	29
	20-40	105	24.8	53	20.1	1	3.2
	41-60	146	34.5	89	33.7	13	41.9
	> 60	98	23.2	53	20.1	8	25.8
Monthly Income (THB)	**< 10,000**	105	24.8	79	29.9	10	32.3
	10,000 – 29,999	92	21.7	54	20.5	5	16.1
	30,000 – 50,000	87	20.6	54	20.5	9	29
	> 50,000	139	32.9	77	29.2	7	22.6
Occupation	**Governmental officials/State enterprise employee**	90	21.3	50	18.9	5	16.1
	Company/private employee	92	21.7	47	17.8	5	16.1
	Freelance/own business	37	8.7	25	9.5	4	12.9
	Student	106	25.1	83	31.4	9	29
	Unemployed /Retired	98	23.2	59	22.3	8	25.8
Education	**Primary school**	47	11.1	44	16.7	6	19.4
	Secondary school/vocational	32	7.6	20	7.6	1	3.2
	Bachelor degree	168	39.7	80	30.3	8	25.8
	Masters-Ph.D. Degrees	176	41.6	120	45.5	16	51.6

4.2.4 Personal cup using when buying beverage at shop

The survey on behavior of using personal cup when buying beverage (if not during Covid-19 pandemic) found that only 16.6% always use personal cup, 40.8% sometime, and 42.6% never (see also figure 27). Distribution of these behaviors among each demographic factor (as shown in Table 6) seems not significant. By the way, the young student group (B) tends to have lower percentage of always using personal cup when buying beverage.

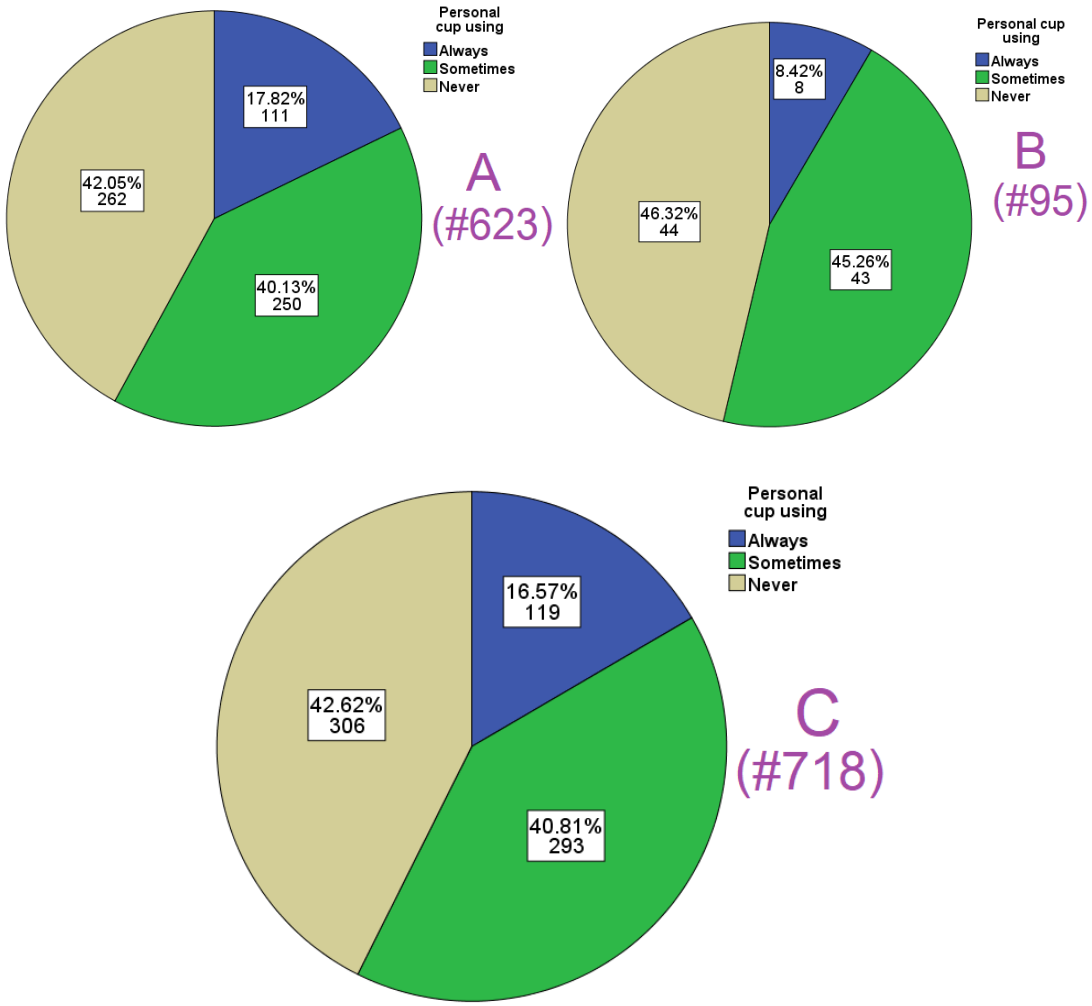


Figure 27 Personal cup using when buying beverage at shop A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 6 Personal cup using when buying beverage at shop

Factors		Always		Sometimes		Never	
		N	%	N	%	N	%
Gender	**Male**	37	31.1	94	37	37	35.9
	Female	82	68.9	199	82	82	64.1
Age	**< 20**	15	12.6	69	15	15	22.2
	20-40	64	21.8	73	64	64	19.6
	41-60	56	47.1	96	56	56	31.4
	> 60	22	18.5	55	22	22	26.8
Monthly Income (THB)	**< 10,000**	22	18.5	82	22	22	29.4
	10,000 – 29,999	25	21	65	25	25	19.9
	30,000 – 50,000	29	24.4	60	29	29	19.9
	> 50,000	43	36.1	86	43	43	30.7
Occupation	**Governmental officials/State enterprise employee**	35	29.4	58	35	35	17
	Company/private employee	30	25.2	63	30	30	16.7
	Freelance/own business	8	6.7	59	8	8	10.5
	Student	19	16	87	19	19	30.1
	Unemployed /Retired	27	22.7	59	27	27	25.8
Education	**Primary school**	8	6.7	44	8	8	14.7
	Secondary school/vocational	8	6.7	24	8	8	6.9
	Bachelor degree	38	31.9	104	38	38	37.3
	Masters-Ph.D. degrees	65	54.6	121	65	65	41.2

4.3. Perception on SUP, BDP and Degradable plastic

4.3.1 Perception on SUP

The survey results of respondent's perception on the SUP indicate that most of the respondents know about SUP quite well at level of perception 3-5 or at an average of 3.79 (see also figure 28). It was observed that even most respondents have perception at level 3-5, number of respondents having perception below average are still aw high as 59.89% of total 718 persons (see also Table 7). It was noticed that those having perception at the level below average are mostly those having income below 10,000 THB per month or primary school students, while those having perception above average are mostly those having age 41-60 years old or working generation. These results imply relation between the perception and any demographic factors; however, it should be confirmed with statistical test.

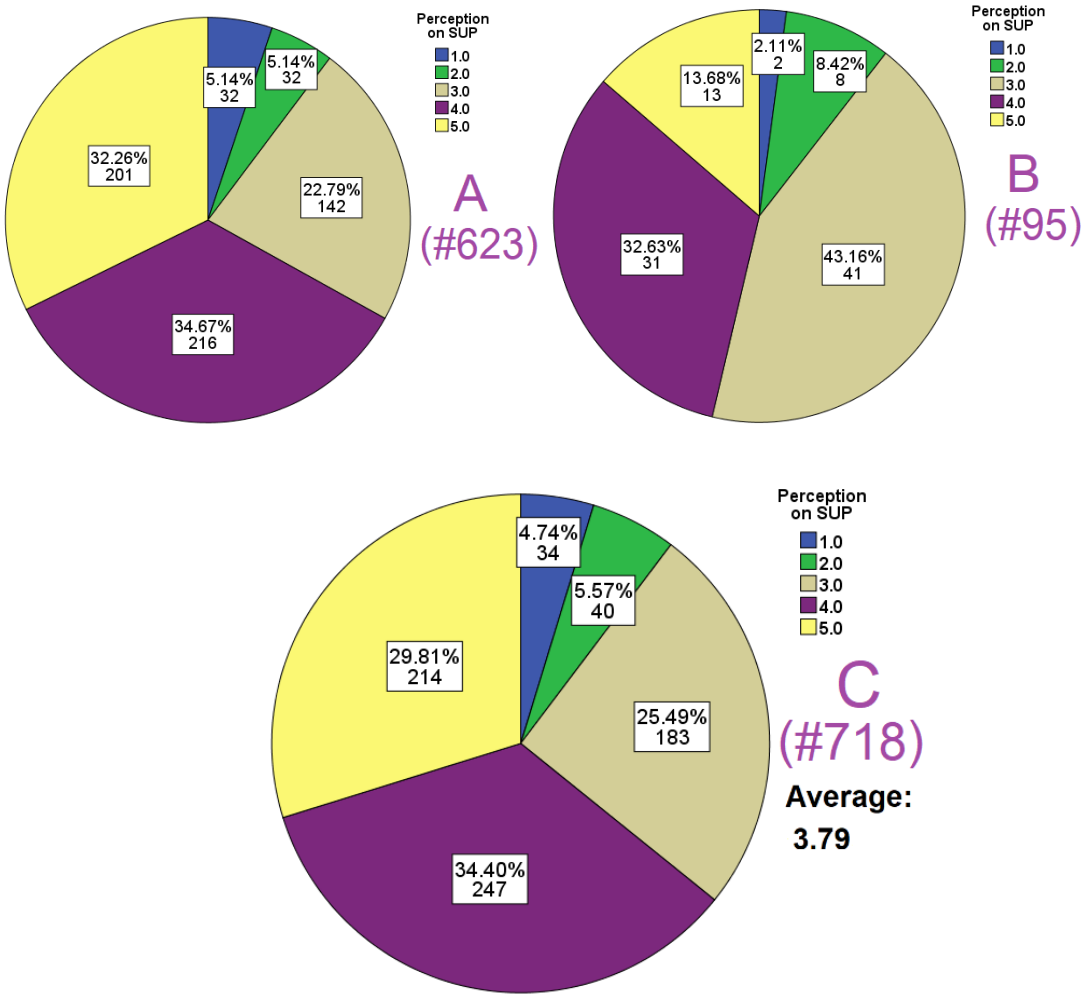


Figure 28 Perception on SUP A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 7 Perception on SUP

Factors		Below average				Above average			
		N	%	$\bar{x}$	SD	N	%	$\bar{x}$	SD
Gender	**Male**	88	34.2	2.50	.7731	153	33.2	4.47	.5008
	Female	169	65.8	2.62	.6804	308	66.8	4.46	.4993
Age	**< 20**	72	28	2.75	.5241	80	17.4	4.36	.4838
	20-40	35	13.6	2.68	.6761	124	26.9	4.48	.5018
	41-60	25	32.3	2.53	.7705	165	35.8	4.50	.5015
	> 60	67	26.1	2.40	.7989	92	20	4.45	.5008
Monthly Income (THB)	**< 10,000**	90	35	2.65	.6388	104	22.6	4.47	.5016
	10,000 – 29,999	48	18.7	2.58	.7390	103	22.3	4.41	.4956
	30,000 – 50,000	49	19.1	2.53	.7101	101	21.9	4.46	.5013
	> 50,000	70	27.2	2.65	.7939	153	33.2	4.49	.5015
Occupation	**Governmental officials/State enterprise employee**	49	19.1	2.61	.6713	96	20.8	4.47	.5022
	Company/private employee	35	13.6	2.62	.7311	109	23.6	4.50	.5023
	Freelance/own business	22	8.6	2.45	.8004	44	9.5	4.47	.5053
	Student	79	30.7	2.73	.5479	119	25.8	4.42	.4970
	Unemployed /Retired	72	28	2.40	.8335	93	20.2	4.44	.4992
Education	**Primary school**	51	19.8	2.76	.5134	46	10	4.30	.4652
	Secondary school/vocational	19	2.36	2.36	.6840	34	7.4	4.44	.5040
	Bachelor degree	83	32.3	2.91	.7531	173	37.5	4.44	.4984
	Masters-Ph.D. degrees	104	40.5	2.97	.7632	208	45.1	4.51	.5008

4.5.2 Perception on SUP's environmental impact

The survey results of perception on impacts of SUP also indicates similar trend with the perception on SUP. Most respondents know about SUP impacts at perception level of 3-5 or at an average of 3.84 (see also figure 29). It was observed that even most respondents have perception at level 3-5, number of respondents having perception on SUP impacts below average are still as high as 640 persons or 89.13% of total 718 persons. Most of which are primary school students or those younger than 20 years old (see also Table 8). These results imply relation between the perception and any demographic factors; however, it should be confirmed with statistical test.

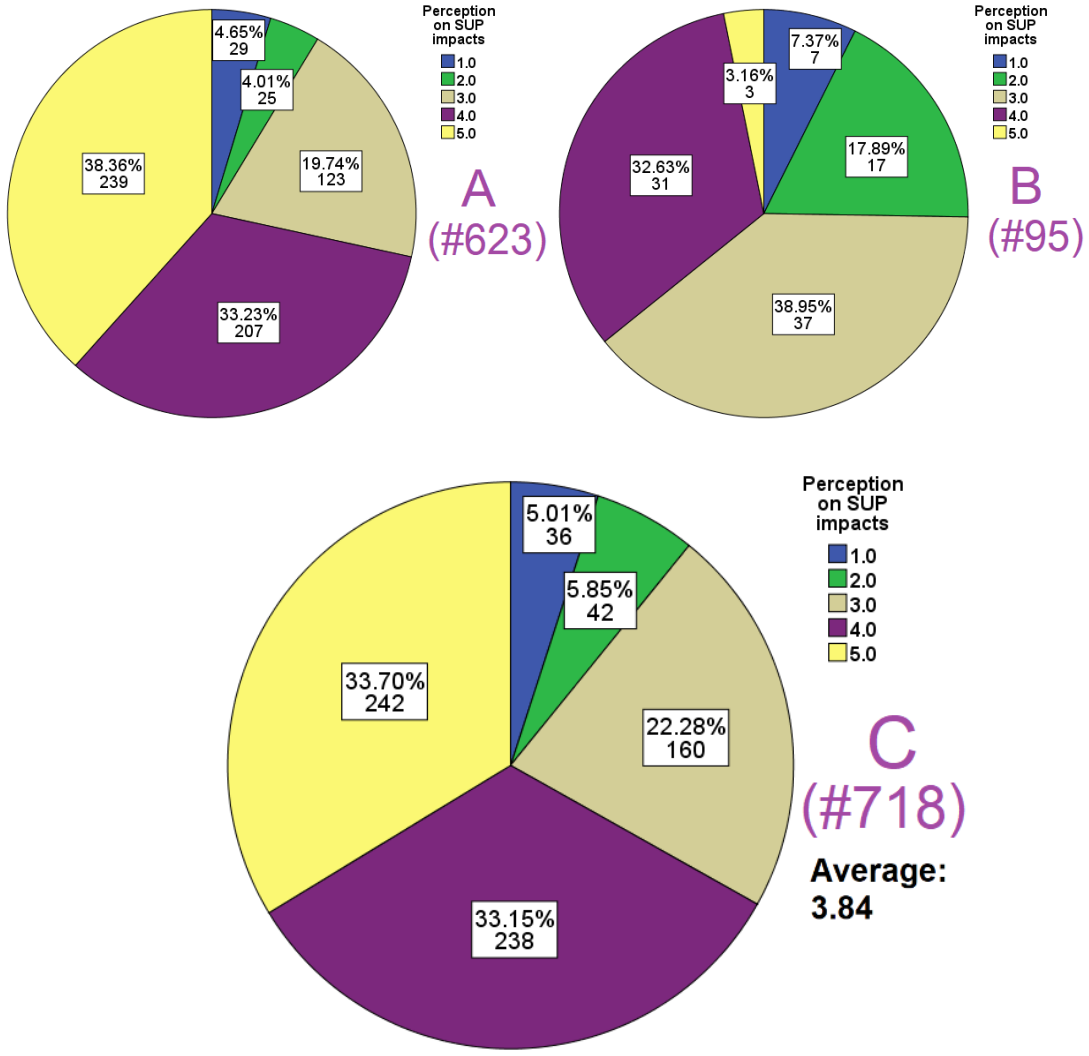


Figure 29 Perception on SUP's environmental impact A: Online survey (623 respondents) B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 8 Perception on SUP's environmental impact

Factors		Below average				Above average			
		N	%	x̄	SD	N	%	x̄	SD
Gender	**Male**	95	39.9	2.34	.8221	146	30.4	4.50	.5017
	Female	143	60.1	2.63	.6666	334	69.6	4.50	.5007
Age	**< 20**	84	35.3	2.46	.7354	68	14.2	4.27	.4520
	20-40	32	13.4	2.59	.7560	127	26.5	4.54	.5001
	41-60	62	26.1	2.62	.6831	186	38.8	4.51	.5012
	> 60	60	25.2	2.45	.8115	99	20.6	4.59	.4520
Monthly Income (THB)	**< 10,000**	97	40.8	2.46	.7509	97	20.2	4.40	.4929
	10,000 – 29,999	44	18.5	2.63	.6851	107	34.2	4.50	.5023
	30,000 – 50,000	38	16	2.71	.5651	112	23.3	4.60	.4906
	> 50,000	59	24.8	2.40	.8534	164	34.2	4.50	.5015
Occupation	**Governmental officials/State enterprise employee**	33	13.9	2.57	.7513	112	23.3	4.48	.5019
	Company/private employee	31	13	2.48	.8112	113	23.5	4.54	.4998
	Freelance/own business	16	6.7	2.81	.4031	50	10.5	4.44	.5014
	Student	90	37.8	2.50	.4885	108	22.5	4.40	.4936
	Unemployed /Retired	68	28.6	2.47	.8006	97	20.2	4.61	.4883
Education	**Primary school**	61	25.6	2.49	.6982	36	7.5	4.11	.3187
	Secondary school/vocational	21	8.8	2.33	.8563	32	6.7	4.34	.4826
	Bachelor degree	70	29.4	2.64	.7027	186	38.8	4.60	.4896
	Masters-Ph.D. degrees	86	36.1	2.48	.7783	226	47.7	4.50	.5011

4.5.3 Perception on BDP

The survey results of perception on BDP (biodegradable plastic) as shown in figure 30 indicate that most respondents know about BDP at perception level of 3-4 or at an average of 3.45, lower than the perception on SUP and its impacts. Those having higher education level and/or higher age (but less than 60 years old) tend to have higher perception level, and students tend to have higher perception (see also Table 9). These results imply relation between the perception and any demographic factors; however, it should be confirmed with statistical test.

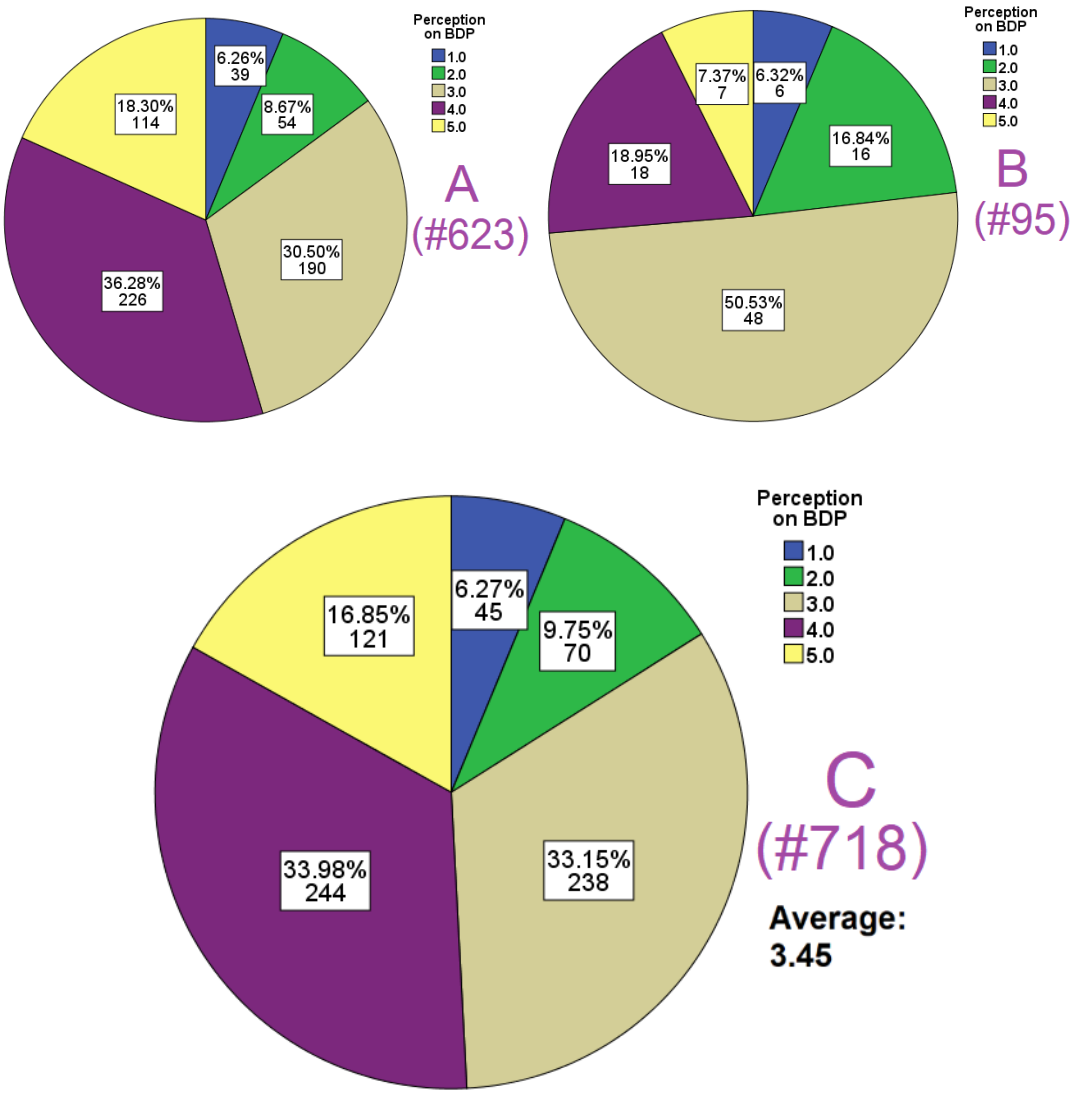


Figure 30 Perception on BDP A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 9 Perception on BDP

Factors		Below average				Above average			
		N	%	x̄	SD	N	%	x̄	SD
Gender	**Male**	131	37.1	2.42	.7741	110	30.1	43.0	.4309
	Female	222	62.9	2.62	.6598	255	69.9	43.4	.4750
Age	**< 20**	102	28.9	2.51	.7277	50	13.7	4.26	.4431
	20-40	59	16.7	2.59	.6726	100	27.4	4.38	.4878
	41-60	116	32.9	2.60	.6709	132	36.2	4.31	.4675
	> 60	76	21.5	2.47	.7741	83	22.7	4.33	.4757
Monthly Income (THB)	**< 10,000**	125	35.4	2.49	.7254	69	18.9	4.34	.4798
	10,000 – 29,999	68	19.3	2.61	.7336	83	22.7	4.27	.4503
	30,000 – 50,000	69	19.5	2.60	.6690	81	22.2	4.32	.4698
	> 50,000	91	25.8	2.51	.7049	132	36.2	4.36	.4829
Occupation	**Governmental officials/State enterprise employee**	58	16.4	2.60	.6994	87	23.8	4.34	.4781
	Company/private employee	55	15.6	2.56	.6314	89	24.4	4.32	.4713
	Freelance/own business	35	9.9	2.65	.6835	31	8.5	4.32	.4752
	Student	123	34.8	2.52	.7169	75	20.5	4.34	.4642
	Unemployed /Retired	82	24.3	2.48	.7737	83	22.7	4.34	.4797
Education	**Primary school**	71	20.1	2.59	.6454	26	7.1	4.30	.4707
	Secondary school/vocational	32	9.1	2.25	.8799	21	5.8	4.19	.4024
	Bachelor degree	116	32.9	2.56	.7137	140	38.4	4.32	.4687
	Masters-Ph.D. degrees	134	38	2.58	.6860	178	48.8	4.36	.4812

4.3.4 Perception on microplastic from degradable or oxo-plastics.

The survey results of perception on microplastic from degradable or oxo-plastics indicate that most respondents know about microplastic from degradable or oxo-plastic at perception level 2-4 or at an average of 3.23 (see also figure 31) seems low relationship with demographic factors. By the way, it should be statistical tested (Also see Table 10). It was also noticed that as much as 419 Persons (58.37%) have perception on microplastic from degradable or oxo-plastics at the level lower than average, and most of which are those 41-60 years old and young students.

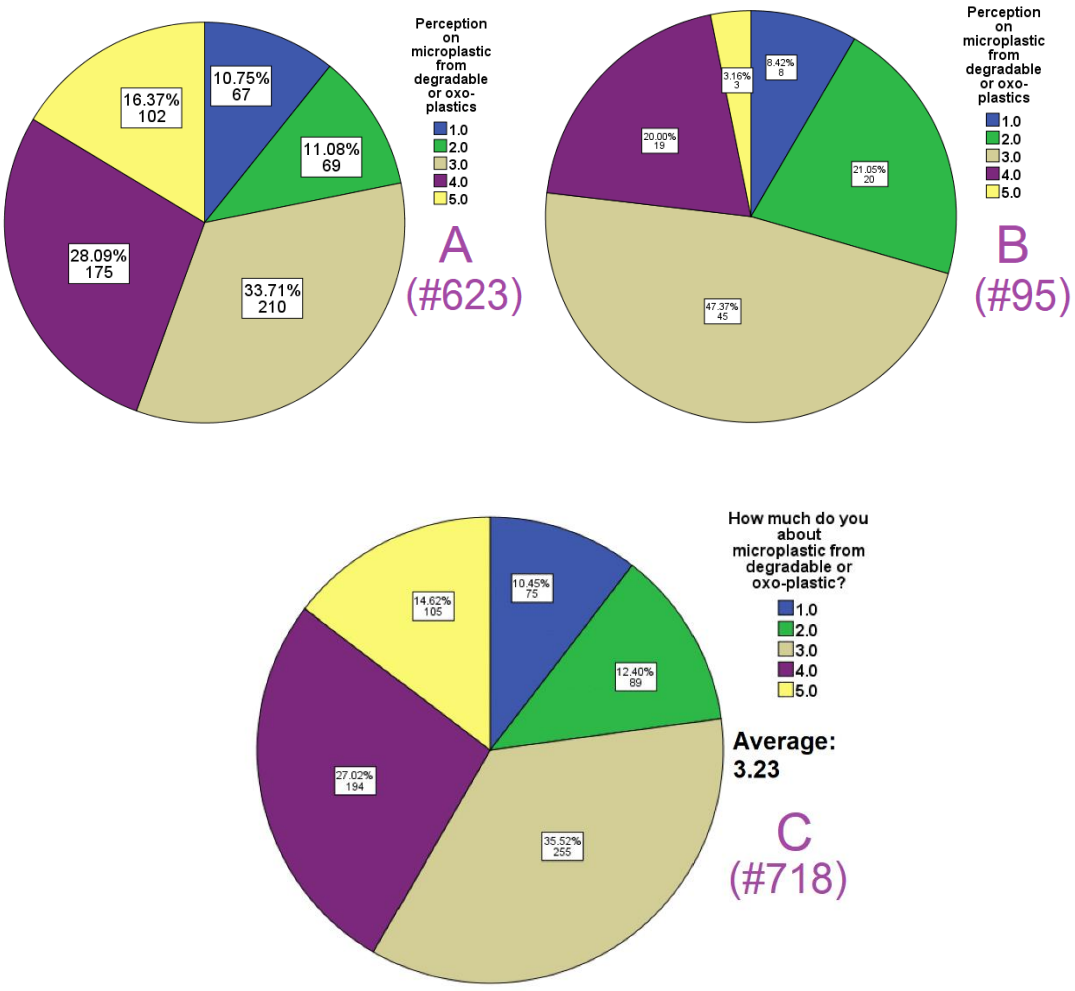


Figure 31 Perception on microplastic from degradable or oxo-plastics A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 10 Perception on microplastic from degradable or oxo-plastics

Factors		Below average				Above average			
		N	%	x̄	SD	N	%	x̄	SD
Gender	**Male**	143	34.1	2.34	.8058	98	32.8	4.36	.4846
	Female	276	65.9	2.47	.7600	201	67.2	4.34	.4760
Age	**< 20**	112	26.7	2.43	.7685	40	13.4	4.42	.4385
	20-40	75	17.9	2.50	.7236	84	28.1	4.42	.4978
	41-60	140	33.4	2.41	.7955	108	36.1	4.30	.4628
	> 60	92	22	2.38	.8099	84	22.4	4.38	.4910
Monthly Income (THB)	**< 10,000**	132	31.5	2.39	.7888	62	20.7	4.38	.4911
	10,000 – 29,999	86	20.5	2.50	.7038	65	21.7	4.36	.4864
	30,000 – 50,000	78	18.6	2.44	.7630	72	24.1	4.33	.4747
	> 50,000	123	29.4	2.38	.8049	100	33.4	4.36	.4726
Occupation	**Governmental officials/State enterprise employee**	68	16.2	2.44	.7800	77	25.8	4.27	.4483
	Company/private employee	72	17.2	2.44	.7485	72	22.1	4.38	.4909
	Freelance/own business	46	11	2.47	.8094	20	6.7	4.25	.4443
	Student	134	32	2.45	.7620	64	21.4	4.37	.4880
	Unemployed /Retired	99	23.6	2.35	.8121	66	22.1	4.40	.4954
Education	**Primary school**	74	17.7	2.51	.6873	23	7.7	4.17	.3876
	Secondary school/vocational	37	8.8	2.24	.9251	16	5.4	4.37	.5000
	Bachelor degree	140	33.4	2.43	.7976	116	38.8	4.40	.4931
	Masters-Ph.D. degrees	168	40.1	2.42	.7627	144	48.2	4.33	.4730

4.3.5 Perception on SUP banning policy implementation in 1st January 2022

The survey results of whether the respondent knows that SUP cups and straws have been banned using since January 1, 2022, as shown in figure 32, indicate that only 35.8% of 718 respondents know that the banning policy started implementing since January 1, 2022. It is also observed that ratios of respondents who know the issue seem to be nearly the same at all age ranges, occupation, and education level. However, student was observed to be the highest ratio of all occupation, and bachelor degree and above were majority (see also Table 11).

Figure 32 Perception on SUP banning policy started implementation A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 11 Perception on SUP banning policy started implementation

Factors		Yes		No	
		N	%	N	%
Gender	**Male**	85	33	156	34
	Female	172	67	305	66
Age	**< 20**	69	27	83	18
	20-40	65	25	94	20
	41-60	70	27	178	39
	> 60	53	21	106	23
Monthly Income (THB)	**< 10,000**	88	34	106	23
	10,000 – 29,999	50	20	101	22
	30,000 – 50,000	50	20	100	22
	> 50,000	69	26	154	33
Occupation	**Governmental officials/State enterprise employee**	51	20	94	20
	Company/private employee	41	16	103	22
	Freelance/own business	19	7	47	10
	Student	91	35	107	23
	Unemployed /Retired	55	21	110	24
Education	**Primary school**	47	18	50	11
	Secondary school/vocational	22	9	31	7
	Bachelor degree	80	31	176	38
	Masters-Ph.D. degrees	108	42	204	44

4.3.6 Perception on SUP banning policy

The survey results of respondent's perception on the SUP cups and straws banning policy, as shown in figure 33, indicate that up to 529 persons (73.7%) know about the banning poly, but only at perception level 1-3 or at average level as low as 2.68. Only 189 respondents have perception level higher than average. Therefore, more PR and campaign has become important. It is observed that ratios of respondents who know the issue seem to be nearly the same at all age ranges, occupation, and education level. By the way, student was observed to be the highest ratio of all occupation, and bachelor degree and above were majority (see also Table 12).

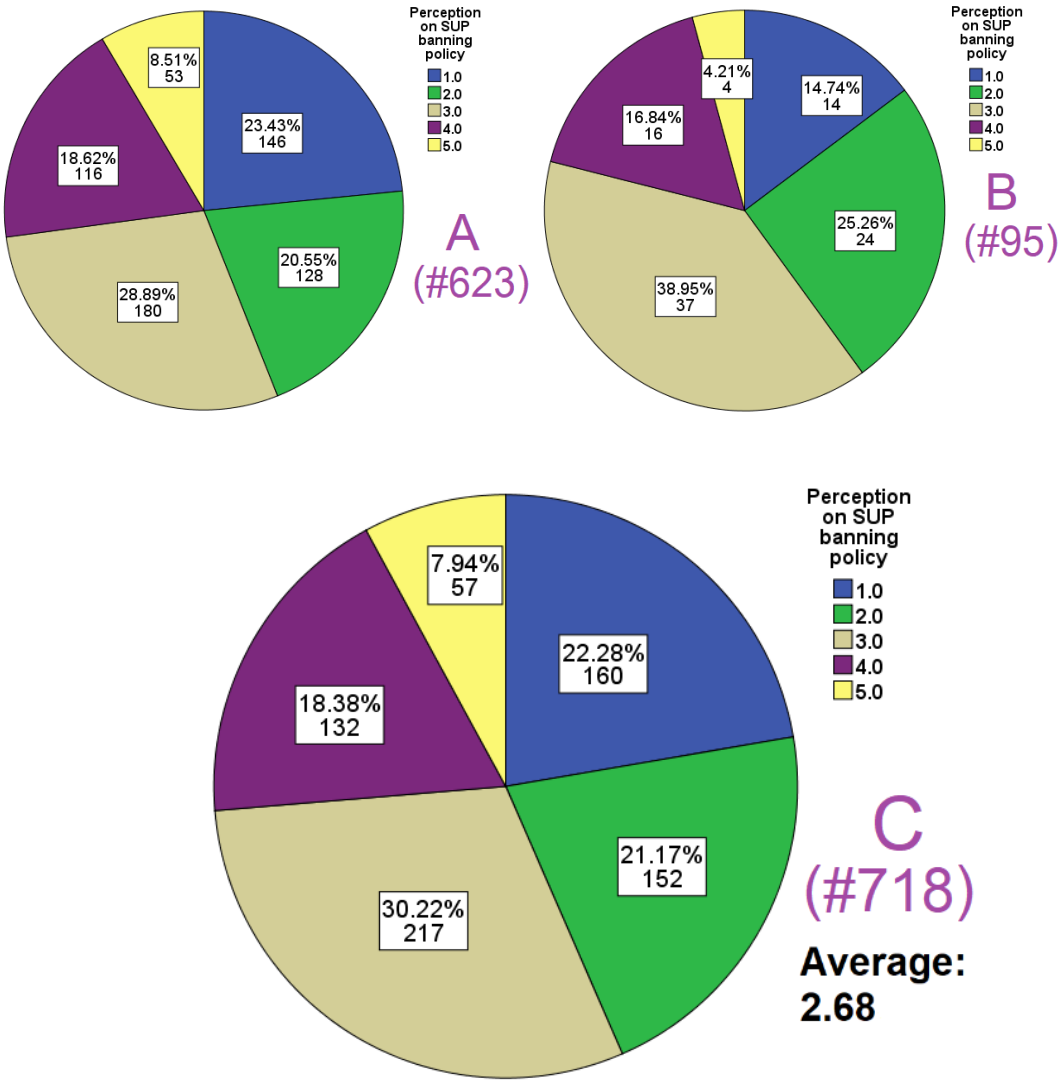


Figure 33 Perception on SUP banning policy A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 12 Perception on SUP banning policy

Factors		Below average		Above average	
		N	%	N	%
Gender	**Male**	189	35.7	52	27.5
	Female	340	64.3	137	72.5
Age	**< 20**	110	20.8	42	22.2
	20-40	104	19.7	55	29.1
	41-60	190	35.9	58	30.7
	> 60	125	23.6	34	18
Monthly Income (THB)	**< 10,000**	142	26.8	52	27.5
	10,000 – 29,999	107	20.2	44	23.3
	30,000 – 50,000	108	20.4	42	22
	> 50,000	172	32.5	51	27
Occupation	**Governmental officials/State enterprise employee**	94	17.8	51	27
	Company/private employee	110	20.8	61	32.3
	Freelance/own business	55	10.4	11	5.8
	Student	137	25.9	61	32.3
	Unemployed /Retired	133	25.1	32	16.9
Education	**Primary school**	76	14.4	21	11.1
	Secondary school/vocational	34	6.4	19	10.1
	Bachelor degree	187	35.3	69	36.5
	Masters-Ph.D. degrees	232	43.9	80	42.3

4.3.7 Agree on SUP banning policy

The survey results of whether respondents agree with the banning policy, as shown in figure 34, indicate that most respondents agree with the banning policy at levels 4-5 or at an average level of 4.24, and up to 585 respondents agree at level higher than average. It is also observed that ratios of respondents who agree with the banning policy seem to be nearly the same at all age ranges, occupation, and education level. By the way, It was noticed that young students tend to agree with the banning policy at slightly lower level than other age ranges (see also Graph B and Table 13).

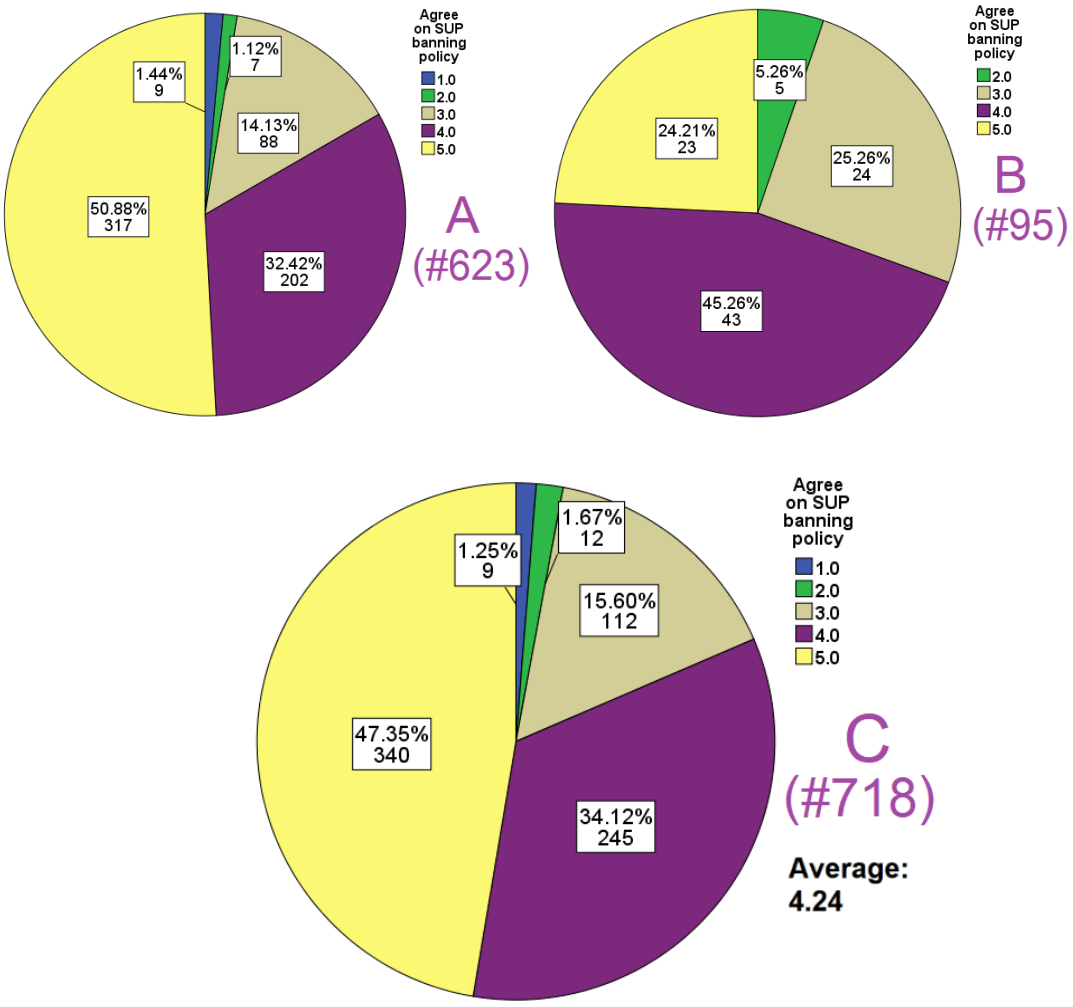


Figure 34 Agree on SUP banning policy A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 13 Agree on SUP banning policy

Factors		Below Average		Above average	
		N	%	N	%
Gender	**Male**	56	42.1	185	31.6
	Female	77	57.9	400	68.4
Age	**< 20**	41	30.8	111	19
	20-40	28	21.1	131	22.4
	41-60	44	33.1	204	39.4
	> 60	20	15	93	27.4
Monthly Income (THB)	**< 10,000**	50	37.6	144	19.7
	10,000 – 29,999	31	23.3	120	20.5
	30,000 – 50,000	19	14.3	131	22.4
	> 50,000	65	26.5	125	32.5
Occupation	**Governmental officials/State enterprise employee**	23	17.3	122	20.9
	Company/private employee	27	20	117	20
	Freelance/own business	14	7.3	52	8.9
	Student	83	33.9	151	25.8
	Unemployed /Retired	22	16.5	143	24.4
Education	**Primary school**	29	21.8	68	11.6
	Secondary school/vocational	15	11.3	38	6.5
	Bachelor degree	45	33.8	211	36.1
	Masters-Ph.D. degrees	45	33.8	268	45.8

4.3.8 Willingness to cooperate with SUP banning policy

The survey results of whether respondents are willing to cooperate with the banning policy, as shown in figure 35, indicate that most respondents are willing to cooperate with the banning policy at levels 4-5 or at an average level of 4.31, and up to 607 respondents are willing to cooperate with the banning policy higher than average. By the way, the younger student seem to have slightly lower willingness to cooperate (see also Graph B and Table 14).

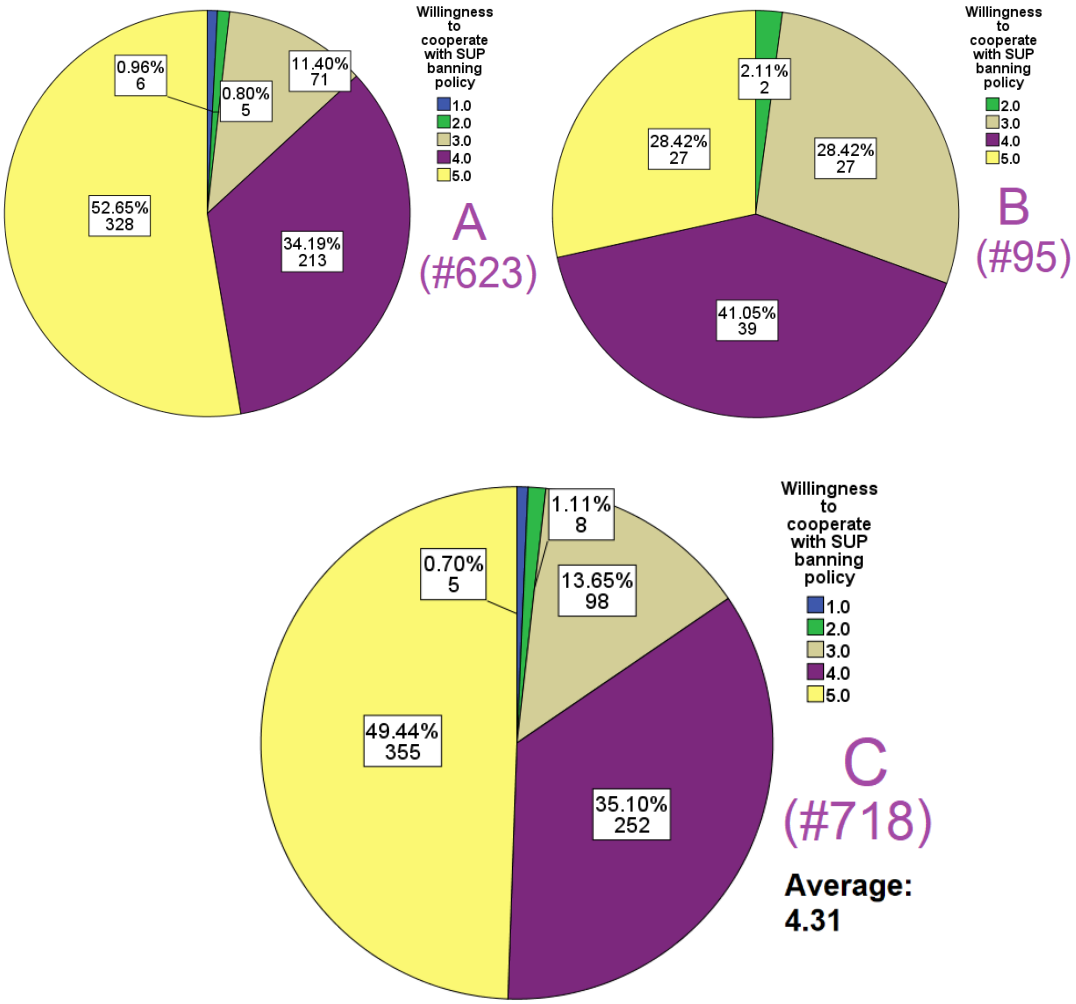


Figure 35 Willingness to cooperate with SUP banning policy A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 14 Willingness to cooperate with SUP banning policy

Factors		Below average		Above average	
		N	%	N	%
Gender	**Male**	43	38.7	198	32.6
	Female	68	61.3	409	67.4
Age	**< 20**	46	41.4	106	17.5
	20-40	27	24.32	132	21.7
	41-60	26	23.4	222	36.6
	> 60	12	10.8	98	27.6
Monthly Income (THB)	**< 10,000**	49	44.1	145	23.9
	10,000 – 29,999	25	22.5	126	20.8
	30,000 – 50,000	15	13.5	135	22.2
	> 50,000	22	19.8	201	33.1
Occupation	**Governmental officials/State enterprise employee**	12	10.8	133	21.9
	Company/private employee	22	19.8	122	20.1
	Freelance/own business	12	10.8	54	8.9
	Student	54	48.6	144	23.7
	Unemployed /Retired	11	9.9	154	20.1
Education	**Primary school**	29	26.1	68	11.2
	Secondary school/vocational	15	13.5	38	6.3
	Bachelor degree	37	33.3	219	36.1
	Masters-Ph.D. degrees	30	27	282	46.5

4.4 Respondent's willingness to pay extra for non-SUP cup.

4.4.1 Willingness to pay for BDP cup

The survey on how much the respondents is willing to pay extra for biodegradable cup (see also figure 36) found that 232 of 718 respondents 32.3%) are not willing to pay extra, followed with willing to pay not higher than 3 THB (31.2%), not higher than 5 THB (28.3%), and not higher than 10 THB (8.2% or 59 persons), respectively. It was observed that those who are not willing to pay extra as well as those who are willing to pay extra not higher than 3 THB and 5 THB are mostly adults with age 41-60 years old. While only 30 persons are willing to pay extra not higher than 10 THB, and 50.8% of which are those younger than 20 years old.

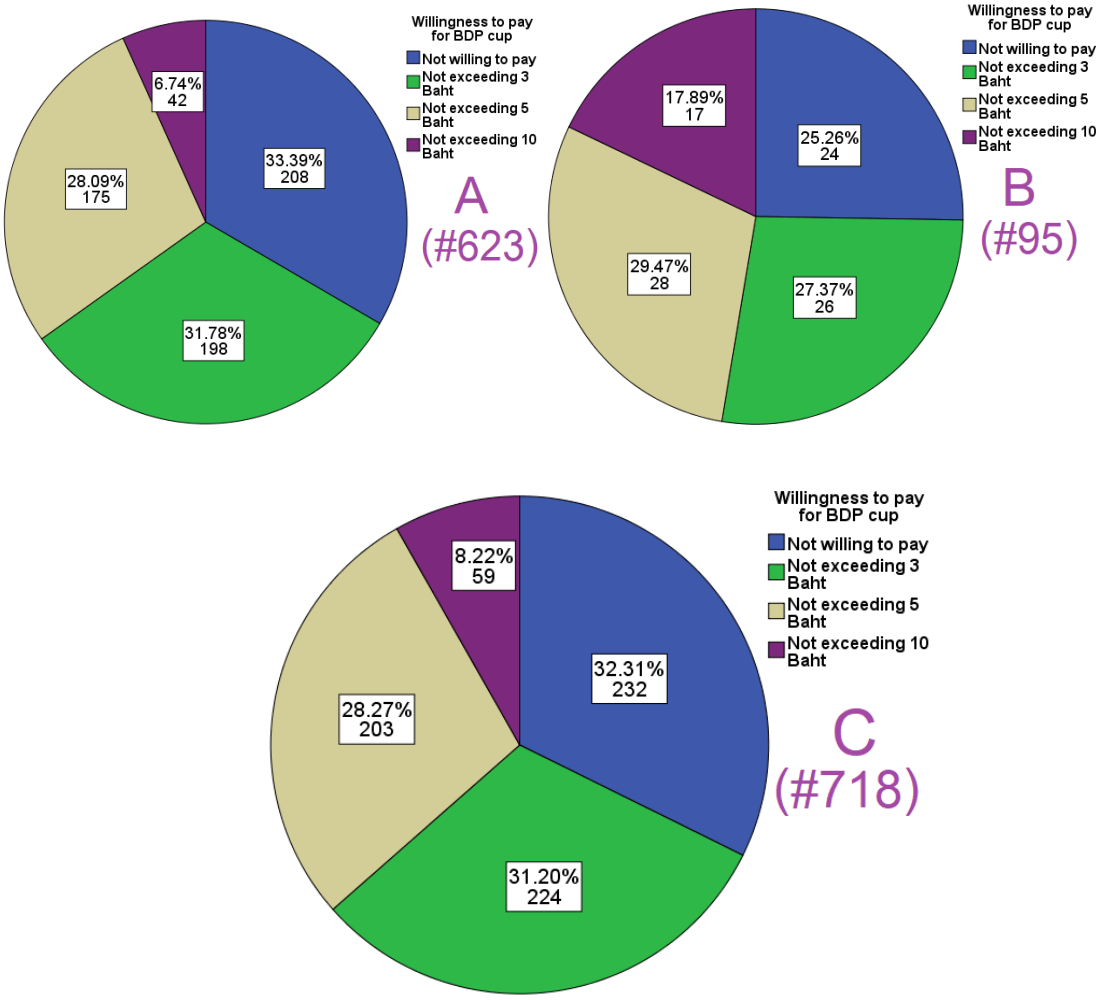


Figure 36 Willingness to pay for BDP cup A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 15 Willingness to pay for BDP cup

Factors		Not willing to pay		Not exceeding 3 Baht		Not exceeding 5 Baht		Not exceeding 10 Baht	
		N	%	N	%	N	%	N	%
Gender	**Male**	81	34.9	64	28.6	72	35.5	24	40.7
	Female	151	65.1	160	71.4	131	64.5	35	59.3
Age	**< 20**	39	16.8	42	18.8	41	20.2	30	50.8
	20-40	51	22	48	21.4	51	25.1	9	15.3
	41-60	97	41.8	69	30.8	69	34	13	22
	> 60	45	19.4	65	29	42	20.7	7	11.9
Monthly Income (THB)	**< 10,000**	54	23.3	52	23.2	64	31.5	24	40.7
	10,000 – 29,999	54	23.3	51	22.8	35	17.2	11	18.6
	30,000 – 50,000	44	19	53	23.7	42	20.7	11	18.6
	> 50,000	80	34.5	68	30.4	62	30.5	13	22
Occupation	**Governmental officials/State enterprise employee**	55	23.7	42	18.8	39	19.2	9	15.3
	Company/private employee	52	22.4	46	20.5	38	18.7	33	13.6
	Freelance/own business	24	10.3	21	9.4	20	9.9	1	1.7
	Student	49	20.7	54	24.1	63	31	33	55.9
	Unemployed /Retired	53	22.8	61	27.2	43	21.2	8	13.6
Education	**Primary school**	25	10.8	26	11.6	29	14.3	17	28.8
	Secondary school/vocational	15	6.5	14	6.3	16	7.9	8	13.6
	Bachelor degree	93	40.1	77	34.4	71	35	15	25.4
	Masters-Ph.D. degrees	99	42.7	107	47.8	87	42.9	19	32.2

4.4.2 Willingness to pay for thick reusable plastic cup

The survey on how much the respondents is willing to pay extra for thick reusable plastic cup (see also figure 37) found that 252 of 718 respondents 35.1%) are not willing to pay extra, followed with willing to pay not higher than 3 THB (19.8%), not higher than 5 THB (28.1%), and not higher than 10 THB (17%), respectively. It was observed that those who are not willing to pay extra as well as those who are willing to pay extra not higher than 3 THB and 5 THB are mostly adults with age 41-60 years old. While only 122 persons are willing to pay extra not higher than 10 THB, and 34.4% of which are those younger than 20 years old, and 31.1% are those higher than 60 years old.

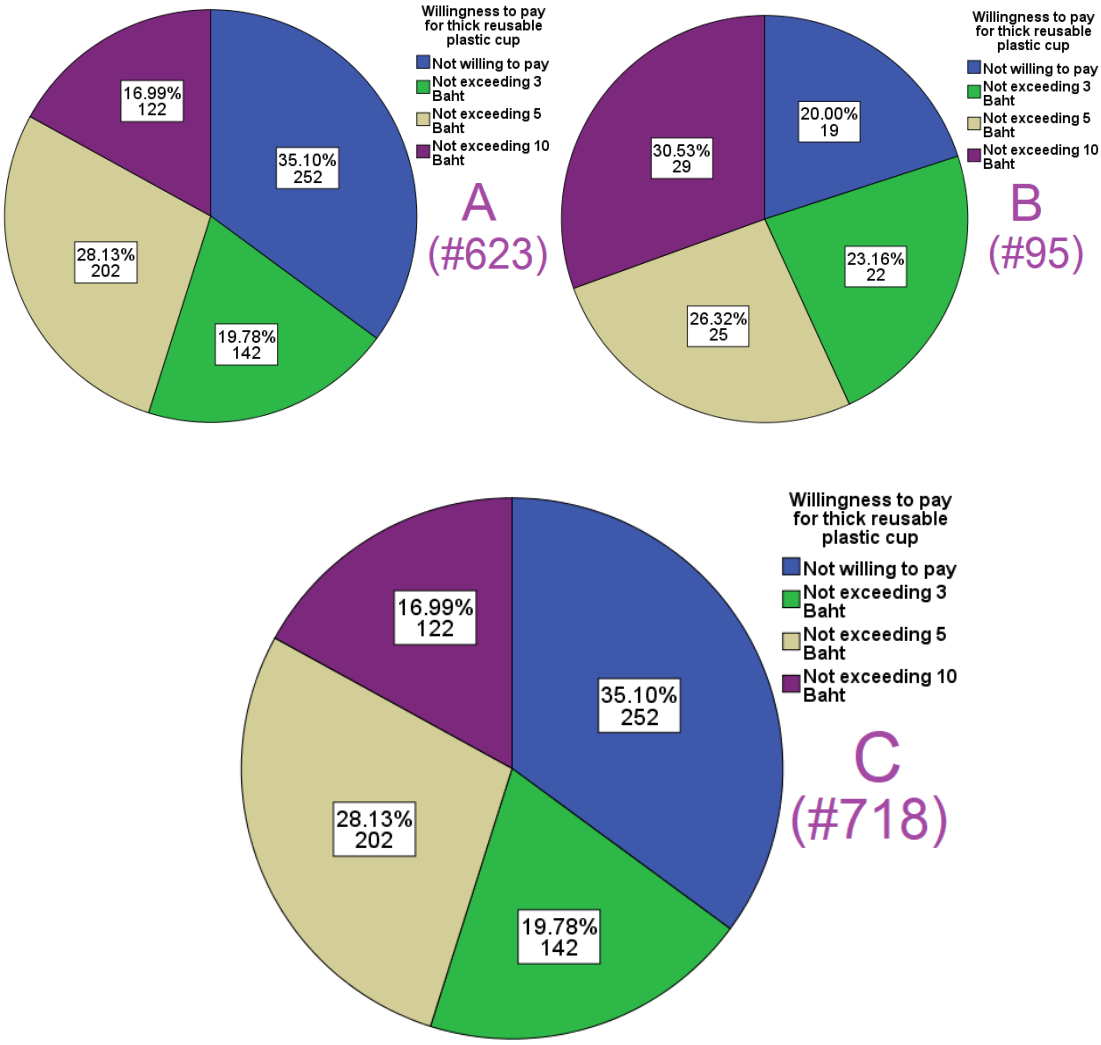


Figure 37 Willingness to pay for thick reusable plastic cup A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 16 Respondent's willingness to pay for thick reusable plastic cup

Factors		Not willing to pay		Not exceeding 3 Baht		Not exceeding 5 Baht		Not exceeding 10 Baht	
		N	%	N	%	N	%	N	%
Gender	**Male**	84	33.3	47	33.1	69	34.2	41	33.6
	Female	168	66.7	95	66.9	133	65.8	81	66.4
Age	**< 20**	33	13.1	37	26.1	40	19.8	42	34.4
	20-40	49	19.4	28	19.7	54	26.7	28	23
	41-60	104	41.3	43	30.3	63	31.2	38	31.1
	> 60	66	26.2	34	23.9	45	22.3	14	11.5
Monthly Income (THB)	**< 10,000**	55	21.8	35	24.6	60	29.7	44	36.1
	10,000 – 29,999	53	21	33	23.2	43	21.3	22	18
	30,000 – 50,000	49	19.4	36	25.4	40	19.8	25	20.5
	> 50,000	95	37.7	38	26.8	59	29.2	31	25.4
Occupation	**Governmental officials/State enterprise employee**	54	21.4	36	25.4	36	17.8	19	15.6
	Company/private employee	54	21.4	22	15.5	45	22.3	23	18.9
	Freelance/own business	28	11.1	11	7.7	16	7.9	11	9
	Student	44	17.5	41	28.9	62	30.7	51	41.8
	Unemployed /Retired	72	28.6	32	22.5	41	21.3	18	14.8
Education	**Primary school**	20	7.9	22	15.5	26	12.9	29	23.8
	Secondary school/vocational	15	6	12	8.5	16	7.9	10	8.2
	Bachelor degree	97	38.5	40	28.2	76	37.6	43	35.2
	Masters-Ph.D. degrees	120	47.6	68	47.9	84	41.6	40	32.8

4.4.3 Interested in using brand-name reusable cup

The survey on how much respondents are interested in brand-name collection reusable cup or not (see also figure 38) found that 29.9% respondents are interested at the level of 3, followed with 24.9% at level, 16.1% at level 1, 15% at level 5, and 13.5% at level 2, or at an average level of 3.08. It was observed that only 287 of 718 respondents are interested in the brand-name reusable cup at above average level, and 32.8% of which are those 41-60 years old, 29.6% of which are 20-40 years old. Most of which are those having monthly income higher than 50,000 THB (see also Table 17).

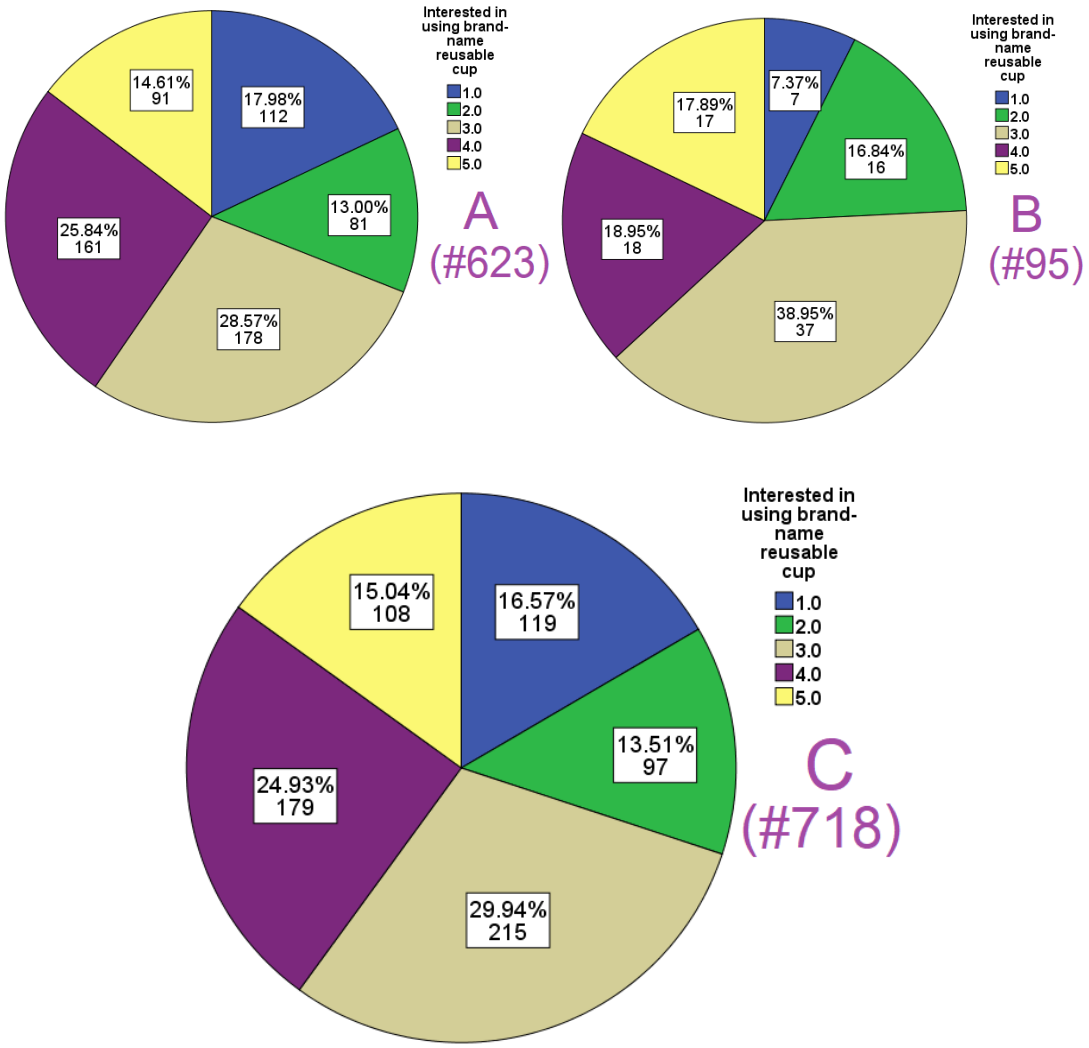


Figure 38 Interested in using brand-name reusable cup A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 17 Interested in using brand-name reusable cup

Factors		Below average		Above average	
		N	%	N	%
Gender	**Male**	149	34.6	92	32.1
	Female	282	65.4	195	67.9
Age	**< 20**	91	21.1	61	21.3
	20-40	74	17.2	85	29.6
	41-60	154	35.7	94	32.8
	> 60	112	26	47	16.4
Monthly Income (THB)	**< 10,000**	116	26.9	78	27.2
	10,000 – 29,999	84	19.5	67	23.3
	30,000 – 50,000	94	21.8	56	19.5
	> 50,000	137	31.8	86	30
Occupation	**Governmental officials/State enterprise employee**	77	17.9	68	23.7
	Company/private employee	84	19.5	60	20.9
	Freelance/own business	39	9	27	9.4
	Student	114	26.5	84	29.3
	Unemployed /Retired	117	27.1	48	16.7
Education	**Primary school**	61	14.2	36	12.5
	Secondary school/vocational	27	6.3	26	9.1
	Bachelor degree	144	33.4	112	39
	Masters-Ph.D. degrees	199	46.2	113	39.4

4.4.4 Willingness to pay for brand name cups

The survey on how much respondents are willing to pay for brand-name collection reusable cup (see also figure 39) found that 38.4% or 276 respondents are not willing to pay for the brand-name cup. While 27.9% (200 persons) are those willing to pay not higher than 20 THB, 16.4% (118 persons) and 11.1% (80 persons) are willing to pay not higher than 50 THB and 100 THB, respectively. Those are not willing to pay for the brand-name cup are mostly senior (39.5% with 41-60 years old and 29.3% with older than 60 years old. While those are willing to pay not higher than 100 THB have 20-60 age ranges. and 27.5% are students (see also Table 18).

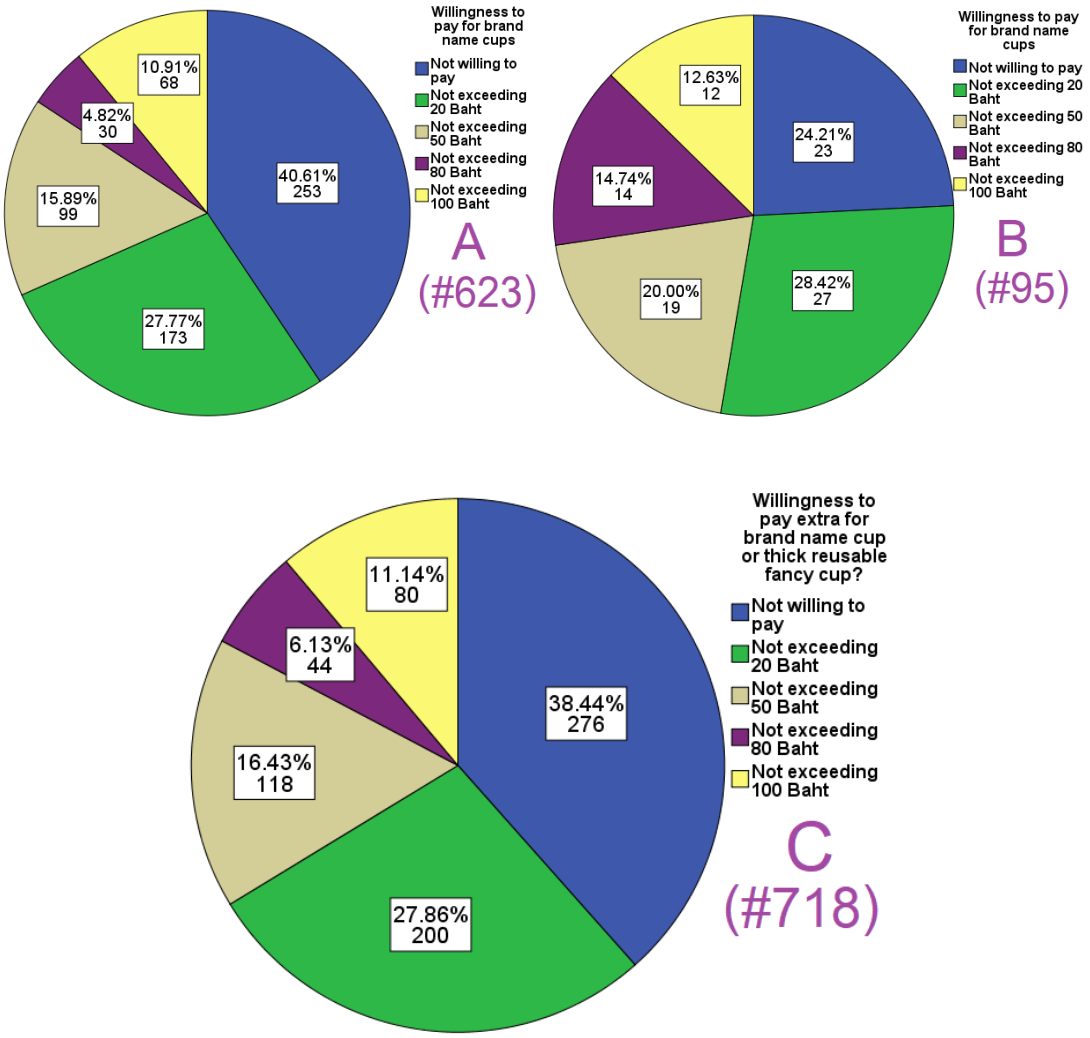


Figure 39 Willingness to pay for brand name cups A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 18 Willingness to pay for brand-name cups

Factors		Not willing to pay		Not exceeding 20 Baht		Not exceeding 50 Baht	
		N	%	N	%	N	%
Gender	**Male**	99	35.9	67	33.5	40	33.9
	Female	177	64.1	133	66.5	78	66.1
Age	**< 20**	40	14.5	45	22.5	33	28
	20-40	46	16.7	50	25	29	24.6
	41-60	109	39.5	56	28	43	36.4
	> 60	81	29.3	49	24.5	13	11
Monthly Income (THB)	**< 10,000**	61	14.5	59	29.5	36	30.5
	10,000 – 29,999	54	19.6	52	26	26	22
	30,000 – 50,000	58	21	41	20.5	26	22
	> 50,000	103	37.3	48	24	30	25.4
Occupation	**Governmental officials/State enterprise employee**	52	18.8	35	17.5	26	22
	Company/private employee	59	21.4	36	18	27	22.9
	Freelance/own business	35	12.7	15	7.5	9	7.6
	Student	48	17.4	64	32	40	33.9
	Unemployed /Retired	82	29.7	50	25	16	13.6
Education	**Primary school**	25	9.1	27	13.5	19	16.1
	Secondary school/vocational	15	5.4	20	10	13	11
	Bachelor degree	102	37	75	37.5	42	35.6
	Masters-Ph.D. degrees	134	48.6	67	33.5	40	33.9

Factors		Not exceeding 80 Baht		Not exceeding 100 Baht	
		N	%	N	%
Gender	**Male**	13	29.5	23	27.5
	Female	31	70.5	58	72.5
Age	**< 20**	18	40.9	16	20
	20-40	11	25	23	28.7
	41-60	11	25	29	36.3
	> 60	4	9.1	81	15
Monthly Income (THB)	**< 10,000**	19	43.2	19	23.8
	10,000-29,999	7	15.9	12	15
	30,000 – 50,000	8	18.2	17	21.3
	> 50,000	10	22.7	32	40
Occupation	**Governmental officials/State enterprise employee**	11	25	21	26.3
	Company/private employee	6	13.6	16	20
	Freelance/own business	1	2.3	6	7.5
	Student	24	54.5	22	27.5
	Unemployed /Retired	2	4.5	15	18.8
Education	**Primary school**	14	31.8	12	15
	Secondary school/vocational	4	9.1	1	1.3
	Bachelor degree	14	31.8	23	28.7
	Master-Ph.D degrees	12	27.3	44	55

4.6 Respondent's opinion on factors and measures to minimize SUP impacts.

4.6.1 Opinion on important factor for reducing microplastic problem

The survey on respondent' s opinion on which factor is the most effective to minimize microplastics from SUP (see also figure 40) found that 353 of 718 respondents (49.2%) suggested stop production of SUP products, another 42.9% suggested consciousness and cooperation from consumers, and only 7.9% suggested law enforcement. Those suggested stopping production are mostly senior with 41-60 years old (39.1%) and older than (32.6%). While those suggested consciousness and cooperation from consumers have all age ranges, but about 31.8% are students. Those suggested law enforcement are students (47.7%) and those younger than 20 years old (33.3%), see also Table 19.

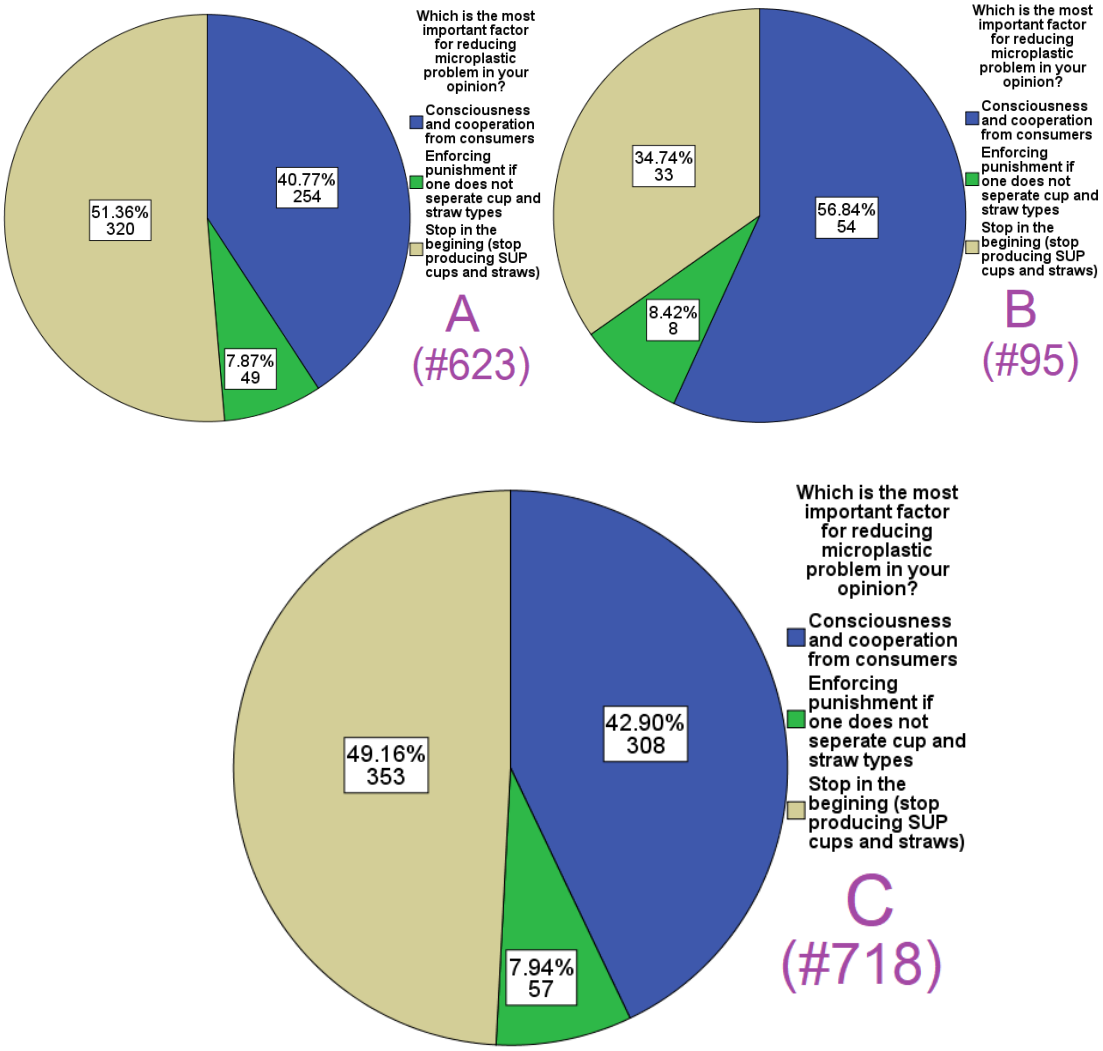


Figure 40 Opinion on important factor for reducing microplastic problem A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 19 Opinion on important factor for reducing microplastic problem

Factors		Consciousness and cooperation		Stop in the beginning		Enforcing punishment	
		N	%	N	%	N	%
Gender	**Male**	106	34.4	111	31.4	24	42.1
	Female	202	65.6	242	68.6	33	57.9
Age	**< 20**	78	25.3	54	15.3	20	35.1
	20-40	73	23.7	69	19.5	17	29.8
	41-60	96	31.2	138	39.1	14	24.6
	> 60	61	19.8	92	26.1	6	10.5
Monthly Income (THB)	**< 10,000**	92	29.9	83	23.5	19	33.3
	10,000 – 29,999	67	21.8	71	20.1	13	22.8
	30,000 – 50,000	56	18.2	84	23.8	10	17.5
	> 50,000	93	30.2	115	32.6	15	26.3
Occupation	**Governmental officials/State enterprise employee**	59	19.2	75	21.2	11	19.3
	Company/private employee	71	23.1	62	17.6	11	19.3
	Freelance/own business	25	8.1	39	11	23	3.5
	Student	98	31.8	73	20.7	27	47.7
	Unemployed /Retired	55	17.9	104	29.4	6	10.5
Education	**Primary school**	54	17.5	34	9.6	9	15.8
	Secondary school/vocational	24	7.8	19	5.4	10	17.5
	Bachelor degree	106	34.4	111	31.4	23	40.4
	Masters-Ph.D. degrees	202	65.6	242	68.6	15	26.3

4.6.2 Opinion on measures for reducing microplastic problem

The survey on respondent' s opinion on measure to minimize microplastics from SUP (see also figure 41) found that 254 of 718 respondents (39.5%) suggested stop or ban using SUP thinner than 100 microns, 38.3% suggested providing separate bin for SUP cups and straws, and another 22.1% suggested deposit or buy back system. Those suggested ban using and buy back system are mostly senior with 41-60 years old (35.2% suggested ban using, and 42.6% suggested buy back system). While those suggested separate bin for SUP are mostly students (36.7%), see also Table 20

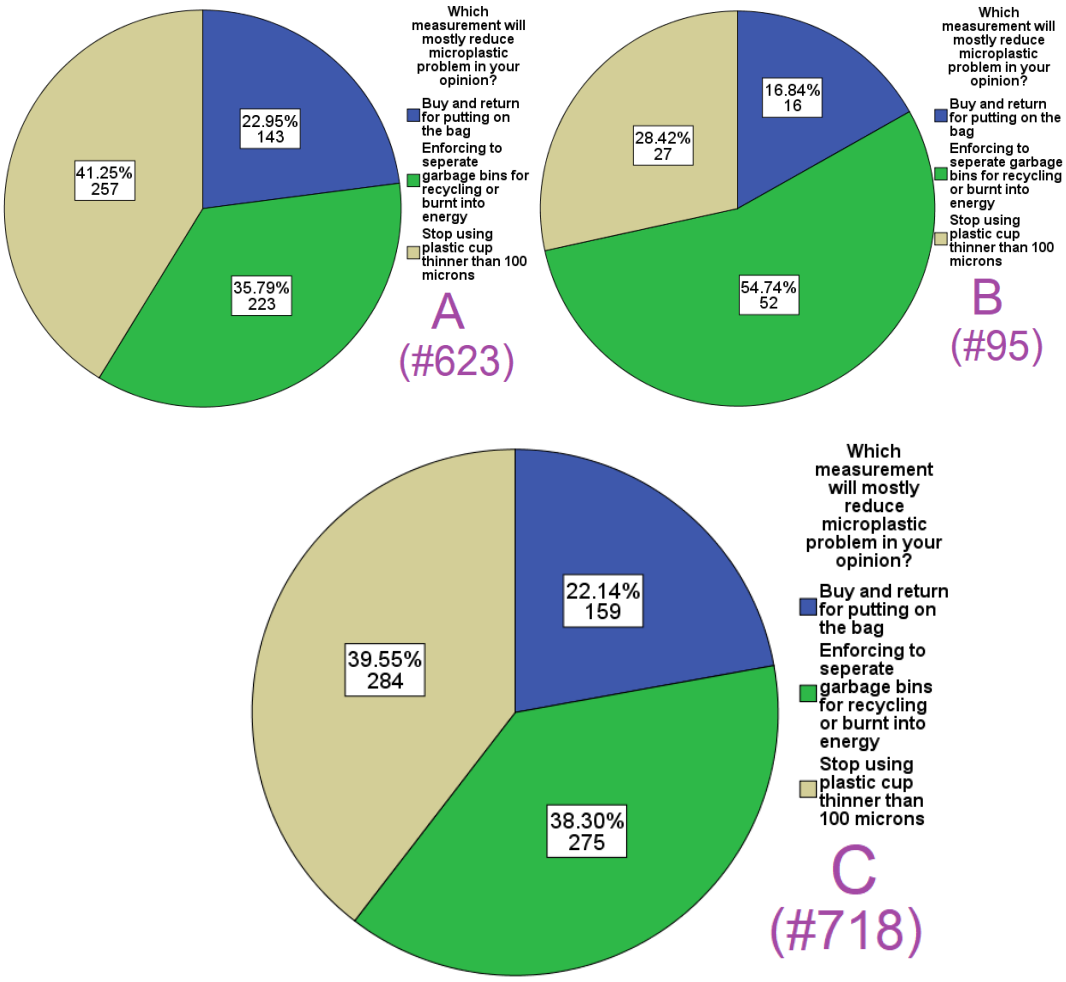


Figure 41 Opinion on measures for reducing microplastic problem A: Online survey (623 respondents), B: Onsite survey (95 respondents), C: Online + Onsite (718 respondents)

Table 20 Opinion on a measure for reducing microplastic problem

Factors		Enforcing for separating garbage bins		Stop using plastic cup thinner than 100 microns		Buy and return	
		N	%	N	%	N	%
Gender	**Male**	106	34.4	111	31.4	24	42.1
	Female	202	65.6	242	68.6	33	57.9
Age	**< 20**	78	25.3	54	15.3	20	35.1
	20-40	73	23.7	69	19.5	17	29.8
	41-60	96	31.2	138	39.1	14	24.6
	> 60	61	19.8	92	26.1	6	10.5
Monthly Income (THB)	**< 10,000**	92	29.9	83	23.5	19	33.3
	10,000 – 29,999	67	21.8	71	20.1	13	22.8
	30,000 – 50,000	56	18.2	84	23.8	10	17.5
	> 50,000	93	30.2	115	32.6	15	26.3
Occupation	**Governmental officials/State enterprise employee**	59	19.2	75	21.2	11	19.3
	Company/private employee	71	23.1	62	17.6	11	19.3
	Freelance/own business	25	8.1	39	11	23	3.5
	Student	98	31.8	73	20.7	27	47.7
	Unemployed /Retired	55	17.9	104	29.4	6	10.5
Education	**Primary school**	54	17.5	34	9.6	9	15.8
	Secondary school/vocational	24	7.8	19	5.4	10	17.5
	Bachelor degree	106	34.4	111	31.4	23	40.4
	Masters-Ph.D. degrees	202	65.6	242	68.6	15	26.3

4.7 Normalization test

The normality test in this study was conducted with both Kolmogorov-Smirnov and Shapiro-Wilk. The results as shown in Table 21 found that sig of both Kolmogorov and Shapiro-Wilk were lower than 0.05, indicating that the data in this study are non-normal distribution. In addition, most questions in the present study are multiple choices. Therefore, non-parametric Chi-square test was selected for relationship of variation and hypotheses test.

Table 21 Test of normality of demographic factors and Perception on SUP, BDP and policies

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Gender	.426	718	.000	.596	718	.000
Age	.216	718	.000	.835	718	.000
Monthly Income	.209	718	.000	.857	718	.000
Current occupation	.208	718	.000	.866	718	.000
Education	.259	718	.000	.859	718	.000

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Perception on SUP	.219	718	.000	.860	718	.000
Perception on SUP impacts	.224	718	.000	.848	718	.000
Perception on BDP	.202	718	.000	.895	718	.000
Perception on microplastic from degradable or oxo-plastics	.193	718	.000	.905	718	.000
Perception on SUP banning policy	.167	718	.000	.903	718	.000
Attitude on SUP banning policy	.281	718	.000	.780	718	.000
Willingness to cooperate with SUP banning policy	.299	718	.000	.768	718	.000
Interested in using brand-name reusable cup	.173	718	.000	.902	718	.000

a. Lilliefors Significance Correction

4.8 Hypothesis test

H1.1: Self-prepare vs. Buy at shop

H1.1 Age – Self-prepare vs Buy	**N**	**Mean Rank**	**Chi square**	**p.**
< 20	152	286.84		
20-40	159	271.28		
41-60	248	378.19	147.786	.000
> 60	159	488.04		

Ranks

	Age	N	Mean Rank
Self/Buy	< 20	152	286.84
	20-40	159	271.28
	41-60	248	378.19
	> 60	159	488.04
	Total	718	

Test Statistics[a,b]

	Self/Buy
Chi-Square	147.786
Df	3
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Age

The hypothesis test shows p-value less than 0.05 which confirms that this consumption behavior (self-prepare vs. buy at shop) significantly relates with consumer's age. The highest mean rank was observed for the group with age >60 indicating the highest relationship of this age range. This can be confirmed by the number of respondents shown in Table 3, where 132 (83%) of total 159 respondents with age >60 are those prefer beverage self-prepare, and only 27 persons buy at shop.

H1.2: Buying frequency

H1.2 Age – Buy Frequency	N	Mean Rank	Chi square	p.
< 20	152	308.39		
20-40	159	305.47		
41-60	248	351.25	84.902	.000
> 60	159	475.26		

Ranks

	Age	N	Mean Rank
Buy Frequency	< 20	152	308.39
	20-40	159	305.47
	41-60	248	351.25
	> 60	159	475.26
	Total	718	

Test Statistics[a,b]

	Buy Frequency
Chi-Square	84.902
df	3
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Age

The hypothesis test shows p-value less than 0.05 which confirms that this consumption behavior (buying frequency) significantly relates with consumer's age. The highest mean rank was observed for the group with age >60 indicating the highest relationship of this age range. This can be confirmed by the number of respondents shown in Table 4, where 123 (77%) of total 159 respondents with age >60 are those buy beverage once in a while, 34 persons buy 1-5 cups per week, and only 2 persons buy at 6-10 cups per week.

H2.1: Consumer's preferred choice for non-SUP cup at age ranges (If not during Covid-19 pandemic)

H 2.1 Consumer's preferred choice for non-SUP cup at age ranges (If not during Covid-19 pandemic)	**N**	**Mean Rank**	**Chi square**	**p.**
< 20	152	353.09	1.917	.590
20-40	159	347.20		
41-60	248	367.81		
> 60	159	364.97		

Ranks

	Age	N	Mean Rank
Preferred choice for non-SUP cup (if during Covid-19 pandemic)	< 20	152	353.09
	20-40	159	347.20
	41-60	248	367.81
	> 60	159	364.97
	Total	718	

Test Statistics[a,b]

	Preferred choice for non-SUP cup (if during Covid-19 pandemic)
Chi-Square	1.917
Df	3
Asymp. Sig.	.590

a. Kruskal Wallis Test

b. Grouping Variable: Age

The hypothesis test shows p-value higher than 0.05 which confirms that consumer's preferred choice for non-SUP cup (if not during Covid-19 pandemic) does not relate with age. The mean rank value of each age range is not so different.

H2.2: Consumer's preferred choice for non-SUP cup at age ranges (If during Covid-19 pandemic where personal cup is not allowed)

H 2.2 Consumer's preferred choice for non-SUP cup at age ranges (If during Covid-19 pandemic where personal cup is not allowed)	**N**	**Mean Rank**	**Chi square**	**p.**
< 20	152	370.74		
20-40	159	342.17		
41-60	248	353.05	3.474	.324
> 60	159	376.14		

Ranks

	Age	N	Mean Rank
Preferred choice for non-SUP cup (if not during Covid-19 pandemic)	< 20	152	370.74
	20-40	159	342.17
	41-60	248	353.05
	> 60	159	376.14
	Total	718	

Test Statistics[a,b]

	Preferred choice for non-SUP cup (if not during Covid-19 pandemic)
Chi-Square	3.474
Df	3
Asymp. Sig.	.324

a. Kruskal Wallis Test

b. Grouping Variable: Age

The hypothesis test shows p-value higher than 0.05 which confirms that consumer's preferred choice for non-SUP cup (if personal cup is not allow during Covid-19 pandemic) does not relate with age. The mean rank value of each age range is not so different.

H3.1 WTP for BDP cup vs. Perception on SUP impact

H3.1 WTP for BDP cup vs. Perception on SUP impact	**N**	**Mean Rank**	**Chi square**	**p.**
1.0	36	398.82		
2.0	42	354.33		
3.0	160	349.37	3.555	.470
4.0	238	348.56		
5.0	242	372.01		

Ranks

	Perception on SUP impacts	N	Mean Rank
Willingness to pay for BDP cup	1.0	36	398.82
	2.0	42	354.33
	3.0	160	349.37
	4.0	238	348.56
	5.0	242	372.01
	Total	718	

Test Statistics[a,b]

	Willingness to pay for bioplastic cup
Chi-Square	3.555
df	4
Asymp. Sig.	.470

a. Kruskal Wallis Test

b. Grouping Variable: Perception on SUP impacts

The hypothesis test shows p-value higher than 0.05 which confirms that consumer's willingness to pay extra for BDP cup does not relate with perception on SUP impacts. The mean rank value of each perception level is not so different.

H3.2 WTP for thick reusable plastic cup vs. Perception on SUP impact

H3.2 WTP for Thick reusable plastic cup vs. Perception on SUP impact	**N**	**Mean Rank**	**Chi square**	**p.**
1.0	36	405.89		
2.0	42	326.45		
3.0	160	356.91	6.704	.152
4.0	238	342.47		
5.0	242	376.80		

Ranks

	Perception on SUP impacts	N	Mean Rank
Willingness to pay for thick reusable plastic cup	1.0	36	405.89
	2.0	42	326.45
	3.0	160	356.91
	4.0	238	342.47
	5.0	242	376.80
	Total	718	

Test Statistics[a,b]

	Willingness to pay for thick reusable plastic cup
Chi-Square	6.704
Df	4
Asymp. Sig.	.152

a. Kruskal Wallis Test

b. Grouping Variable: Perception on SUP impacts

The hypothesis test shows p-value higher than 0.05 which confirms that consumer's willingness to pay extra for reusable plastic cup does not relate with perception on SUP impacts. The mean rank value of each perception level is not so different.

H3.3: WTP vs. Perception on BDP

H3.3 WTP for Thick reusable plastic cup vs. Perception on BDP impact	**N**	**Mean Rank**	**Chi square**	**p.**
1.0	36	432.94	7.305	.121
2.0	42	356.80		
3.0	160	354.72		
4.0	238	347.98		
5.0	242	366.39		

Ranks

	Perception on BDP	N	Mean Rank
Willingness to pay for bioplastic cup	1.0	45	432.94
	2.0	70	356.80
	3.0	238	354.72
	4.0	244	347.98
	5.0	121	366.39
	Total	718	

Test Statistics[a,b]

	Willingness to pay for bioplastic cup
Chi-Square	7.305
Df	4
Asymp. Sig.	.121

a. Kruskal Wallis Test

b. Grouping Variable: Perception on BDP

The hypothesis test shows p-value higher than 0.05 which confirms that consumer's willingness to pay extra for BDP cup does not relate with perception on BDP advantages. The mean rank value of each perception level is not so different.

H4: Willingness to cooperate with banning policy implementation vs SUP impacts

H4 Willingness to cooperate with banning policy implementation vs SUP impacts	**N**	**Mean Rank**	**Chi square**	**p.**
1.0	36	325.51		
2.0	42	280.18		
3.0	160	299.60	69.928	.000
4.0	238	338.31		
5.0	242	438.76		

Ranks

	Perception on SUP impacts	N	Mean Rank
Willingness to cooperate with SUP banning policy	1.0	36	325.51
	2.0	42	280.18
	3.0	160	299.60
	4.0	238	338.31
	5.0	242	438.76
	Total	718	

Test Statistics[a,b]

	Willingness to cooperate with SUP banning policy
Chi-Square	69.928
Df	4
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Perception on SUP impacts

The hypothesis test shows p-value less than 0.05 which confirms that consumer's willingness to cooperate implementation with the banning policy significantly relates with perception on SUP impacts. The highest mean rank value was observed for the group with the highest perception level. In addition, the mean rank value tends to increase with the perception level, except the perception level 1.

Table 22 Hypothesis results

Hypothesis	Acceptable
H1: Beverage buying behavior would relate with consumer's age	
H1.1 Self-prepare vs. Buy at shop	**Yes**
H1.2 Buying frequency	**Yes**
H2: Consumer's preferred choice for non-SUP cup would relate with consumer's age	
H2.1 If not during Covid-19 pandemic	**No**
H2.2 If during Covid-19 pandemic where personal cup is not allowed	**No**
H3: Consumer's WTP for non-SUP cup would relate with perception on SUP impacts and BDP advantages.	
H3.1 WTP for BDP cup vs. Perception on SUP impacts	**No**
H3.2 WTP for Thick reusable cup vs Perception on SUP impacts	**No**
H3.3 WTP for BDP cup vs. Perception on BDP	**No**
H4: Consumer's willingness to cooperate implementation of the banning policy would relate with perception on SUP impacts.	**Yes**

Chapter 5
Conclusion

It is well-known that single-use plastics (SUPs) have been popularly used for packaging and containers for food and beverage. While, the SUPs are not decomposable, but physically degraded to small pieces, which is known as "microplastics", contaminated and very harmful to animals in river and marine. Some plastic industries use oxo-compound additive to accelerate degradation, but still leaving microplastics contaminating in nature. Most countries, including Thailand, have then initiated policy and measures to ban using SUP and oxo-plastic shopping bags, foam food boxes, SUP beverage cups and straws. As the beverage SUP cups and straws banning policy in Thailand has started implementing since January 2022, it is worthy to investigate how perception of Thai consumers, would they agree and willing to cooperate implementation, what kind of their preferred choice for non-SUP or environmentally friendly cup, how much they are willing to pay extra for non-SUP cup, and are there any factors influencing on successfulness implementation of the banning policy. The investigation was conducted with consumers in Bangkok and Vicinity (Nonthaburi, Pathum Thani, Samut Prakan, Samut Sakhon and Nakhon Pathom) using Google form online with additional onsite at Pathumwan Demonstration School to cover all age range representatives. The questionnaire was designed with an aim to investigate consumer's beverage consumption behavior and its relationship with consumer's demographic factors, consumer's perception on related issues and their opinion on effective factors and measures to minimize using SUP cups and straws. Results of the study can be concluded as follow.

5.1 Respondent's profile

Total 623 respondents were achieved from the online survey, and another 95 respondents of the onsite survey. The total 718 respondents are mostly (75%) living in Bangkok. Majority respondents in this study are females (66%), rather high monthly income (except students mostly receive money from parent <10,000 THB per month), and high education levels (up to 80% are bachelor degree and higher).

5.2 Respondent's beverage consumption behavior

Up to 47.21% of total respondents prefer self-preparing at home, most of which are females and those older than 40 years old. While those prefer buying at shop are respondents having age 20-60 years old. Most of which (44.71%) buy beverage at shop 1-5 cups per week, another 44.15% buy beverage once in a while. Only 14 persons (2%) buy beverage more than 10 cups per week, and most of which are working generation. It was assumed that these consumption behaviors would relate with consumer's age as designed in the first hypothesis (H1: Beverage consumption behavior would relate with consumer's age). The hypothesis test also confirms this assumption. The behavior of receiving plastic straw and using personal cup when buying cold beverage at shop indicate that only 58.9% never receive plastic straw, and only 16.6% always using personal cup if not during Covid-19 pandemic, and during the pandemic where personal cup is not allow using, most respondents prefer paper cup without extra payment. The present study did not ask the reason not using personal cup; however, a study by S. Thamma-apipon, J. Thongrod and N. Sarapon (2019) reported that teenagers tend to be majority in

soft drink and beverage consumption so that consumer's age was expected as a key factor influencing on beverage consumption behavior. Another study by P. Areethamsirikul (2018) reported that reasons for not using personal cup were inconvenient to take personal cup to anywhere and lazy to wash the cup after using.

5.3 Respondent's perception on SUP related issues.

The study found that most respondents have rather high perception on SUP (89.7%), SUP impacts (89.1%), and BDP (83.6%), but still low perception on microplastics from degradable or oxo-plastics (58.4%), especially young generation. Therefore, knowledge building either via school or social media are recommended.

5.4 Respondent's WTP for non-SUP cup.

The study found that even high perception on SUP related issues, most respondents still not willing to pay extra for either BDP cup or reusable cup, while preferring paper cup without extra payment. By the way, if necessary or no choice of free paper cup, most of them are willing to pay not higher than 3 THB for non-BDP cup and not higher than 5 THB for reusable cup. It was assumed that the WTP would relate with perception on the SUP impacts and/or BDP (H3). However, the hypothesis test showed the P values higher than 0.05, However, the hypothesis test (H3.1-H3.3) show p-value higher than 0.05, indicating that WTP for non-SUP dies not relate with perception on either SUP impacts or BDP advantages.

5.5 Respondent's perception, attitude, and willingness to cooperate with the banning policy

Most respondents know about the banning policy, but at low perception levels (Average level 2.67) and most do not know that the policy has been implementing since January 2022, especially young generation. Therefore, PR and campaign via social media are recommended. By the way, even low perception on the banning policy, most of them agree and are willing to cooperate implementation with the policy. It was assumed that willingness to cooperate would relate with perception on the SUP impacts (H4), and the hypothesis test also confirmed the relationship with the P value lower than 0.05.

5.6 Respondent's opinion on factors and measures to minimize microplastic impacts

In order to minimize the microplastic impacts, minimize using as well as minimize wastes of SUP cups and straws are necessary. Respondent's opinion on factors and measures to minimize using and also minimize waste of the SUP cups and straws were surveyed. The results show that about half of the total 718 respondents believe reduce at source or stop production of the SUP cups and straws (49.16%) would be the most important measure to minimize the SUP using. While some of them believe consciousness and cooperation from consumers, deposit or buy back system, separate bin for SUP cups and straws, as well as law enforcement for both buyer and seller are also important.

5.7 Factors influencing on WTP for non-SUP up as well as willingness to cooperate with the banning policy

Regarding willingness to cooperate with the banning policy, the survey results of perception and attitude on the policy indicate that all respondents know about the policy, but rather low perception level, and most of them do not know the banning policy has been implementing since January 2022. By the way, most respondent agree (81.47%) and are willing to cooperate with the banning policy (84.54%). It sems they are willing to cooperate, but not willing to pay extra for the non-SUP cup. That's why most of them prefer either using personal cup or paper cup without extra payment.

5.8 Recommendation

As already mentioned, most respondents have low perception on impacts of SUP and oxo-plastics, variety and advantages of BDP, and also detail information or key messages of the banning policy, it is recommended that building or enhancing perception on these issues are the most important. As those having low perception are mostly young generation, PR or campaign via social media is highly recommend.

As most respondents agree and are willing to cooperate with the banning policy, but not willing to pay extra for the non-SUP or environmentally friendly cup, the following measures without extra payment are recommended.

- Environmental or public awareness as well as consciousness raising for both buyers and sellers. Previous study by R. Hohmann, C. Wattana, P. Sracheam, C. Siriapornsakul, V. Ruckthum and R. Clapp (2014) 2014 also reported that the promotion of environmental awareness and education has deeply influences on the people and its family's behavior as the environmental education can create more initiatives for the consumers to pay attention to environmental concern.
- Knowledge building on impacts of single-use plastics and oxo-plastics, advantages of bioplastics as well as biodegradable plastics, and also PR of the banning policy.
- Stop both production and consumption should be parallelly implementing.
- Law enforcement should be strongly implemented with both SUP producers and SUP providers or beverage sellers.
- Measures without extra payment like deposit or buy back system, separate bins for SUP cups and straws and also without law enforcement are recommended as suitable measures for consumers in the Thai context.

5.9 Recommendation for further study

- Questionnaire design as well as data analysis method should be consulted with experts to ensure the result validation as well as the suitable data analysis method.
- Questionnaire regarding consumption behavior and preferred choices should be followed with reasons. For example, why self-preparing, why not using personal cup, why prefer paper cup.
- Questionnaire distribution should be well planned to ensure receiving representatives from all target provinces.
- If possible, specific target group likes primary school students in this study should be conducted at various schools, not only one school in Bangkok.

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Appendix

1: Respondent's demographic profile

1. Gender ☐ Male ☐ Female
2. Age ☐ < 20 ☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ > 50
3. Current residence

   ☐Bangkok ☐ Nonthaburi ☐ Pathum Thani

   ☐ Samut Prakan ☐ Nakhon Pathom ☐ Samut Sakhon ☐ Others
4. Monthly Income

   ☐ < 10,000 Baht ☐ 10,000-29,999 Baht ☐ 30,000-50,000 Baht ☐ > 50,000 Baht
5. Occupation

   ☐ Official/State employee/ State enterprise☐ Company employee/Private employee

   ☐ Freelance ☐ Students ☐ Unemployed/Retired
6. Education

   ☐ Primary school ☐ Secondary school/Vocational ☐ Bachelor degree ☐ Master-Ph.D. degrees

Part 2: Respondent's beverage consumption behavior

7. Where do you prepare beverage (Tea, coffee, cocoa and others)?

   ☐ Self-prepare

   ☐ Buy at coffee shop/convenient store
8. How frequently do you buy beverages at shop?

   ☐ Once in a while ☐ 1-5 cups/week ☐ 6-10 cups/week ☐ > 10 cups/week
9. During buying cold beverage, do you receive straw or not?

   ☐ Always ☐ Sometimes ☐ Never
10. If not during Covid-19 pandemic, will you contain beverage with your personal cup?

    ☐ Always ☐ Sometimes ☐ Never

Part 3: Respondent's perception on SUP and willingness to pay for non-SUP cups

11. How much do you know about single-use plastics (SUP)?

    ☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

12. How much do you know about SUP environmental impact?

    ☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

13. How much do you know about Biodegradable plastic (BDP) or bioplastic?

    ☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

14. How much do you know about "microplastic" impact from BDP but not bioplastic?

    ☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

15. How much do you know that single-use plastic cups and straws has been banned using in Thailand since 2022? ☐ Yes ☐ No

16. How much do you know about SUP cups and straws banning policy?

    ☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

17. How much do you agree with the banning policy?

    ☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

18. How much are you willing to cooperate with SUP banning policy?

    ☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

19. As SUP straw has been banned using, which option do you prefer?

    ☐ Drink beverage directly without straw ☐ Using personal straw

20. Which type of straw do you expect the coffee shops or convenient stores use to replace the SUP straw?

    ☐ Paper straw ☐ Bioplastic straw ☐ Reusable metal straw ☐ Reusable thick straw

21. If not Covid-19 pandemic which type of cups, do you choose to replace SUP cup?

    ☐ Bring your own cup

    ☐ Paper cup without extra payment

☐ BDP cup with extra payment not exceed 5 Baht

☐ Reusable thicker cup with extra payment not exceed 10 Baht

22. During Covid-19 pandemic, personal cup is unavailable which type of cups do you choose to replace SUP cup?

☐ Paper cup without extra payment

☐ BDP cup with extra payment not exceed 5 Baht

☐ Reusable thicker cup with extra payment not exceed 10 Baht

23. How willingness of you to pay extra for bioplastic cup?

☐ Not willing to pay ☐ Not exceeding 3 Baht ☐ Not exceeding 5 Baht ☐ Not exceeding 10 Baht

24. How willingness of you to pay extra for reusable thick (plastic) cup?

☐ Not willing to pay ☐ Not exceeding 3 Baht ☐ Not exceeding 5 Baht ☐ Not exceeding 10 Baht

25. If the store has provided fancy cups for collection how much are you interested?

☐ 5 Most ☐ 4 More ☐ 3 Average ☐ 2 Less ☐ 1 Least

26. How willingness of you to pay extra for fancy cup?

☐ Not willing to pay ☐ Not exceeding 20 Baht ☐ Not exceeding 50 Baht

☐ Not exceeding 80 Baht ☐ Not exceeding 100 Baht

27. In your opinion, which is the most important factor for reducing microplastic problem?

☐ Stop in the beginning (Stop SUP production and providing, and plastic can not be degradable)

☐ (Consciousness and cooperation from consumers)

☐ Enforcing punishment if the consumers do not separate wastes into certain types of garbage bins

28. In your opinion, which measurement will reduce microplastic problem the most?

☐ Stop using plastic items that are thinner than 100 microns

☐ Enforcing to separate garbage bins for recycling or burnt into energy

☐ Buy and return if putting into bag properly

VITA

Name: Natcha Stithyudhakarn
ID number: 6288005920
Birthdate: 17th September 1996
Birthplace: Bangkok, Thailand
Education background:

- Pathumwan Demonstration School (Secondary School)
- Bachelor and Masters of International Relations, Political Science, Thammasat University (Bachelor degree)

Home Address: 59 Soi Yuyen 3 Yuyen Road, Ladprao, Bangkok 10230
Email: ummnatcha@yahoo.com
Rewards: None