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An investigation of the effect of plastic bag ban

Case of Jakarta concerning the regulation of the Governor of Jakarta Province No.142/2019

Image source: https://www.bbc.com/indonesia/majalah-53275980

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Abstract

The versatility, durability, strength, and low-cost characteristics of plastic bags have made plastic bags become consumers' daily companions, making plastic shopping bags one of the primary sources of plastic pollution. As the negative impact of plastics on the environment becomes more and more apparent, many regions around the world have stepped up efforts to restrict the production and use of various types of plastics, including plastic shopping bags. Recently in Jakarta, Indonesia, the ban on the use of plastic bags took effect from July 2020 in accordance with the regulations of the Governor of Jakarta No. 148/2019. This study investigated the extent to which the plastic bag ban has affected consumer demand for plastic bags and the extent to which consumers use their own plastic bags when shopping. The private costs on plastic shopping bags and reusable shopping bags before and after the ban were assessed. The avoidable external costs due to the ban were also calculated. In the process of analyzing consumer use of plastic bags and their own reusable bags, an online survey of the people in Jakarta was conducted. With the implementation of the plastic bag ban, Jakarta has decreased 40% consumption of plastic bags annually. Jakartans' total spending on plastic shopping bags has dropped significantly from 18 billion rupiahs per week to 7 billion rupiahs per week. The calculation also found that the avoided external costs are equivalent to more than 2 trillion rupiahs of the costs of waste management and flood control and prevention, CO2 emission from plastic bag production, and revenue loss in the fisheries sector. Although the study found that the plastic bag ban is not perfect, considering the ban's impact, this research encourages the Jakarta regional government to maintain and improve the ban implementation.

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1 Introduction

1.1 Increased plastic use and waste

Plastic waste is a planetary threat and hence has become a hot global issue (Borelle et al., 2020; Li, Tse, & Fok, 2016; Ostle et al., 2019; Schmidt, Krauth, & Wagner, 2017; Wilcox, Van Sebille, Hardesty, & Estes, 2015). They are unacceptable in any habitat because they have negative impacts on the environment and the organisms living in them (Wilcox et al., 2015). Despite the adverse effects and many efforts that have been made to reduce them, the world's plastic production continues to grow (Borelle et al., 2020; Gall & Thompson, 2015a; Jambeck et al., 2015; Ostle et al., 2019; Wilcox et al., 2015). The commercial production of plastics that began around 1950s has achieved fantastic growth (Jambeck et al., 2015; Li et al., 2016; Wilcox et al., 2015). In 2019, the global annual production of plastics was 359 million tons and reached almost 370 million tons in 2020 (Plastics Europe, 2020). Currently, 79% of the plastic waste is situated in landfills, dumps, or pollute the environment, 12% is incinerated, and only 9% of plastic is recycled (Geyer, Jambeck, & Law, 2017). If the world's plastic production continues to grow at the current rate, it will grow to a double-figure in the next 20 years (Borelle et al., 2020). Unfortunately, this rapid increase in plastic production is in line with the corresponding increase in the amount of plastic waste in the marine environment (Jambeck et al., 2015; Villarrubia-Gómez, Cornell, & Fabres, 2018; Wilcox et al., 2015). With business as usual scenario, with no arrangement taken in place for future improvements, or with inadequate management to reducing plastic pollution, it is foreseeable that the amount of plastic waste entering the marine environment will increase. (Jambeck et al., 2015; L. Lebreton & Andrady, 2019; Villarrubia-Gómez et al., 2018).

Plastics have been very useful materials in our lives since the 1950s, or since the first years these slow-degrading materials were made readily available and inexpensive (Dauvergne, 2018; Ostle et al., 2019). For example, plastic bags were provided to consumers for free at that time. From the perspective of the producers, plastics are regarded as materials that are inexpensive, light in weight, high in strength, durable and corrosion-resistant (Derraik, 2002; Li et al., 2016; Thompson, Moore, vom Saal, & Swan, 2009). In many cases, the use of plastic is undeniable because there have been no alternative materials that can replace the characteristics and functions of plastic (Hidayat, Kiranamahsa, & Zamal, 2019). This can be seen in supermarkets where meat is covered in transparent packaging films that are strong, impermeable to air and moisture, thus facilitating conformal packaging (vacuum packaging) or controlled environment packaging. In this case, plastic packaging has been proven to lead to higher food preservation, reduced food waste, and increased shelf life and transportation possibilities (van Emmerik & Schwarz, 2020). Furthermore, lighter, more durable, and cheaper plastics have replaced metal and even wood in construction applications, which account for around 20% of global production (L. Lebreton & Andrady, 2019). It is estimated that 50% of plastic products, including utensils, plastic bags, and packaging, are intended to be single-use products (Hopewell, Dvorak, & Kosior, 2009; Li et al., 2016). In Indonesia, economic growth is depicted in the increasing number of industrial establishments over

the years (Hidayat et al., 2019). Production activities in these industries subsequently led to an increase in plastics – therefore plastic waste as well –, because plastics are usually the indispensable first choice in consumer packaging (Hidayat et al., 2019; L. Lebreton & Andrady, 2019). Figure 1 shows the plastic industry development in Indonesia estimated by the Ministry of Industry (MoI). The graph shows that in the next 15 years, plastic consumption is expected to increase significantly, which means that plastic production is expected to grow to meet plastic demand.

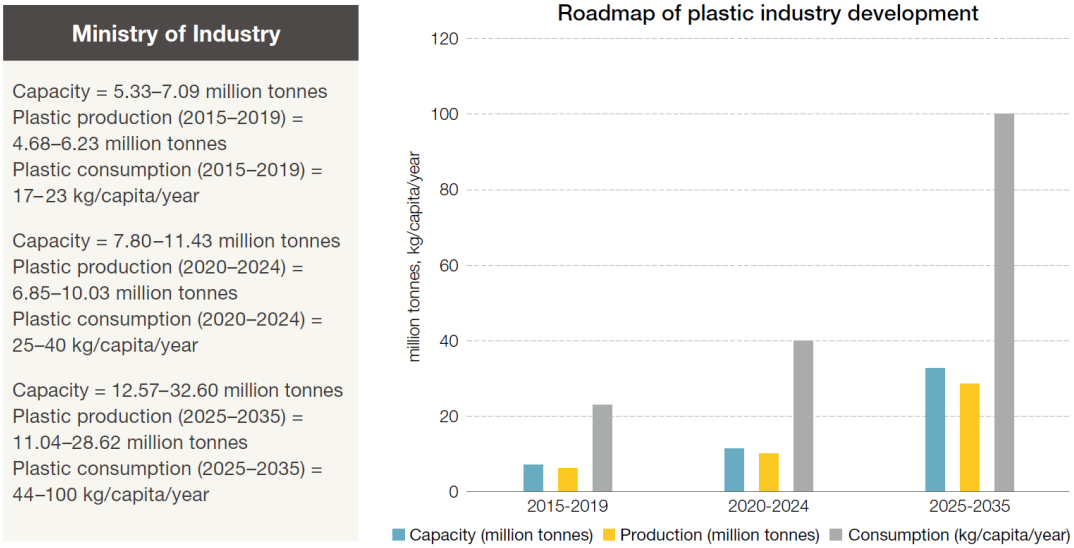

Figure 1. Roadmap of plastic industry development
Source: National Plastic Waste Reduction Strategic Actions for Indonesia (MoEF, 2020)

1.2 The harms of plastic waste

Many types of plastic waste occur in the natural environment. The main source of plastic pollution is waste from consumer packaging and products, which include soda bottles, shopping bags, bottle caps, food containers, straws, cigarette butts, and food wrappers, followed by lost and discarded fishing nets (Li et al., 2016; UNEP, 2018). A considerable amount of plastic waste will pose a plethora of direct and indirect harms to the ecology and human livelihoods (van Emmerik & Schwarz, 2020). Direct adverse effects of plastic waste are those that can be easily seen thus attract considerable media and public attention, which includes ingestion of plastics and entanglement in plastics that happen to animals (Gregory, 2009; Honingh et al., 2020; van Emmerik & Schwarz, 2020; Wilcox et al., 2015). Indirect adverse effects of plastics are defined as longer-term effects, which include decomposition into microplastics (van Emmerik & Schwarz, 2020). The most critical marine plastic waste problem is the visual offense and overall aesthetic value of unprepossessing discarded plastics (Gregory, 2009). In addition, the accumulation of plastic waste at trash racks will cause the upstream water level to rise (Honingh et al., 2020). The clogging of sewers caused by plastic bags increases the risk of flooding in the city (Honingh et al., 2020). Besides, plastic plugging of sewers is a breeding ground for mosquitoes and pests which exacerbates the transmission of vector-borne diseases such as malaria (UNEP, 2018). The

characteristic of plastic that is durable in the environment also can lead to a mismanaged open landfills and cause deterioration of air quality (L. Lebreton & Andrady, 2019).

In addition to those land-based problems, a severe problem is a situation where poorly managed waste close to inland waterways or coastal regions serves as a contribution of plastics to enter the rivers and oceans (L. Lebreton & Andrady, 2019). Plastic is identified as the most common type of litter found in the sea (D. Hardesty, Wilcox, Lawson, Van Der Velde, & Lansdell, 2014; UNEP, 2014), with more than 80% coming from land-based sources and the rest being generated by fishing, shipping, leisure industry, and offshore oil and gas platform exploration (Mouat, Lozano, & Bateson, 2010). Surprisingly, several studies have shown that despite every effort to promote the reduction of plastic use and trash, the amount of plastic trash found in the ocean is still increasing (UNEP, 2014).

Marine plastic litter endangers all the wildlife in the ocean (D. Hardesty et al., 2014). An extensive review from Gall & Thompson (2015) revealed that 233 species of marine vertebrates mistook plastic waste for food, thus were affected by plastic ingestions. When animals ingest plastics, it has multiple effects. These effects include hunger (due to intestinal obstruction), false feelings of fullness, decreased physical fitness, behavior changes, and affected reproduction and growth (Gall & Thompson, 2015a). Entanglement in plastic material has also been frequently reported in marine environments, often because entanglement effects are more pronounced compared to ingestion. Discovering cases of direct and visible injury or death is a more common aftermath of entanglement than ingestion (Gall & Thompson, 2015a; Li et al., 2016). Plastic bags, balloons, bottle caps, fishing nets, and fishing gear are the 20 most common marine debris items that are considered hazardous to wildlife because of the risk of entanglement (B. D. Hardesty, Good, & Wilcox, 2015). The effects of entanglement can be summed up as drowning, suffocation, laceration, reduced fitness, a reduced ability to catch foods, or an increased likelihood of being caught by predators (Derraik, 2002; Gall & Thompson, 2015a). According to observations, sea turtles, fish, sharks, and more vertebrates are often found fatally stuck in plastic waste (Gall & Thompson, 2015b; van Emmerik & Schwarz, 2020). The ecological impacts of plastic on ocean life are depicted by the effects endured by marine biodiversity, in addition to long-term marine ecosystem deterioration, both leading to the loss of biodiversity (Eriksen et al., 2014; Gall & Thompson, 2015b; Thompson, 2017).

Plastics can last for centuries (Cole, Lindeque, Halsband, & Galloway, 2011; Li et al., 2016). They are not biodegradable, but are broken down into smaller fragments through different pathways, namely photodegradation and other weathering processes, which may take up to thousands of years (Chasse, 2018; Gallo et al., 2018; Ritch, Brennan, & MacLeod, 2009; UNEP, 2018). As time goes by, plastics can break down into pieces smaller than 5 mm in size, forming the so-called ‘secondary microplastics’ (Ryan, Moore, van Franeker, & Moloney, 2009). Secondary microplastics are microplastics produced by the degradation of the plastic itself, for instance, due to the abrasion of plastic waste on the soil surface or inside the soil profile (Rillig, 2012). ‘Primary microplastics’ refer to fragments that are already less than 5 mm in diameter when they enter the

ocean. They are produced for purposes, mainly for industrial abrasives and cosmetic products (Cole et al., 2011). Primary microplastics account for a quarter of ocean plastic pollution every year and therefore are also the source of increasing ocean pollution (Dauvergne, 2018). Microplastics that are further broken down into pieces less than 100 nm are called 'nano plastics' (Gallo et al., 2018).

More and more evidence shows that plastics are the major source of litter, and plastic pollution affects the continuous biological tissue level through various mechanisms, and therefore hazardous to the entire ecosystem (Macintosh, Simpson, Neeman, & Dickson, 2020; Stefatos, Charalampakis, Papatheodorou, & Ferentinos, 1999; Thompson, 2017; Villarrubia-Gómez et al., 2018). Like all plastics, microplastic can both absorb and leach chemicals, including persistent organic pollutants (POPs) and endocrine disruptor chemicals (EDCs), some of which are known as reprotoxic and carcinogenic substances (Dauvergne, 2018; Gallo et al., 2018; Rochman & Browne, 2013; Teuten et al., 2009; van Emmerik & Schwarz, 2020). Microplastics can absorb toxic chemicals related to cancer and other diseases and then release them when they are eaten by fish and mammals and to people who eat them (Sinha & Wilson, 2021). An investigative report by Tyree & Morrison (2017) reveals that microplastics have infected 83% of the world's drinking water in sampled populations. This finding is in line with another investigation which indicates the existence of microplastic in 81% of the tap water sampled population, as well as in beers and sea salt (Kosuth, Mason, & Wattenberg, 2018).

1.3 Plastic shopping bags and efforts to reduce plastic shopping bags

Figure 2. Illustration of single-use plastic bags

Single-use plastic bags are used to transport goods and are usually provided to the customers in the market or at the point of purchase. The characteristics of versatility, durability, strength and low cost of plastics have made the plastic carrier bag or plastic bags an increasingly visible everyday companion for consumers (Nielsen, Holmberg, & Stripple, 2019), making plastic shopping bags one of the significant source of plastic pollution (Dauvergne, 2018; Macintosh et al., 2020; Xanthos & Walker, 2017). The most popular shopping bags are made of plastics called polyethene, a tough, lightweight, and soft synthetic resin, generated by polymerizing ethylene

(Chasse, 2018; UNEP, 2018). To manufacture plastic bags, large amounts of energy are needed, and they are composed of substances derived from petroleum, which can take between 200 and 1000 years to break down (Ritch et al., 2009; Zambrano-Monserrate & Alejandra Ruano, 2020). Plastic bag waste (PBW) has become more problematic because PBW is relatively unsuitable for efficient recycling and leads to littering and expansion of mismanaged dumps or landfills (Alam, Billah, & Yajie, 2018).

As the amount of domestic waste increases, the share of plastic bags being produced and disposed of also increases (Lukyanova, Berezina, Golovlev, Koltsov, & Doronkina, 2020). It is estimated that one to five trillion plastic bags are used every year worldwide (Chasse, 2018; UNEP, 2018). Among the countries with the highest GDP growth, individual consumption of plastic bag is relatively high, and so are their per capita generation of plastic bag waste (Bahri, 2005). However, due to the lack of awareness and illegal disposal, developing countries are more affected by PB pollution (Alam et al., 2018; Bahri, 2005). Studies have proved that urban land use and population density are positively correlated with plastic concentration (Baldwin, Corsi, & Mason, 2016; Schmidt et al., 2017).

The increasing amount of plastic waste over time manifests that reducing plastic pollution is not an easy task. Some studies pointed out that the monitoring of measures taken to reduce plastic waste is complicated due to the considerable heterogeneity of the amount of plastic waste in space and time, making the problems arising from plastic waste challenging to address (Gregory, 2009; Ryan et al., 2009). Andrady & Neal (2009) even claimed in their research that any future situation where plastics will no longer play an increasingly important role in human life seems unrealistic. However, since the negative impacts of plastic on the environment have been increasingly visible, more efforts by people have been increasingly visible as well (Nielsen et al., 2019). Concerns about plastic pollution also have led to the requirement for restriction on the production and use of various types of plastics, including plastic shopping bags (Macintosh et al., 2020; UNEP, 2014; van Emmerik & Schwarz, 2020).

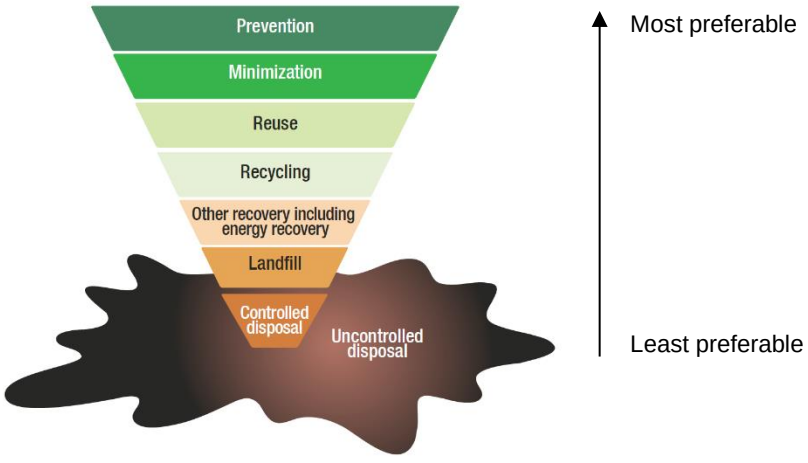

Figure 3. The waste management hierarchy (the inverted pyramid model)
Source: Global Waste Management Outlook, UNEP, 2015

When plastic bags leak into the environment, their light weight and parachute-shaped design make them easy to travel through the air and waterways (Clapp & Swanston, 2009), making them particularly difficult to handle. Moreover, plastic bags that are already broken down into micro/nano plastics are more arduous to observe and remove from the environment. Reducing the amount of plastics used is considered the most effective mitigation strategy as also recommended in the waste management hierarchy (Figure 3) (UNEP, 2015a, 2018). Policies' goal, therefore, is to reduce the amount of plastic produced and used before it can enter the environment. In recent years, policies related to plastics particularly plastic bags have undergone significant changes worldwide (Jakovcevic et al., 2014; Ritch et al., 2009). Since 2010, the number of public policies for plastic bags has tripled and can now be found on every continent, from municipal to government (Nielsen et al., 2019). The government's recent actions in reducing plastics are mainly focused on plastic bags since plastic bags are easy to observe in the environment creating causing visual pollution (UNEP, 2018).

Many countries have started banning or imposing restrictions on plastic bags usage, charging consumers for the plastic bags and/or collecting taxes from stores who sell plastic bags, and conducting voluntary agreement concerning the amount of money charged to plastic bags (Figure 4)(EEA, 2019; UNEP, 2018; Xanthos & Walker, 2017). In 2002, for instance, the Bangladesh government banned plastic bags, becoming the first country to do so as they found evidence that plastic bags hinder drainage during the rainy season and cause flooding during the monsoon season (Dauvergne, 2018). Since 2010, some Nepalese municipalities have banned plastic bags, although the effect of this ban has not been achieved (Bharadwaj, 2016). Other plastic bag-related policies include charges or levies for single-use plastic in Buenos Aires and Malaysia, and plastic bag ban in Germany, Denmark, Kenya, India, and Australia (Jakovcevic et al., 2014; Macintosh et al., 2020; NEMA, 2017; Xanthos & Walker, 2017).

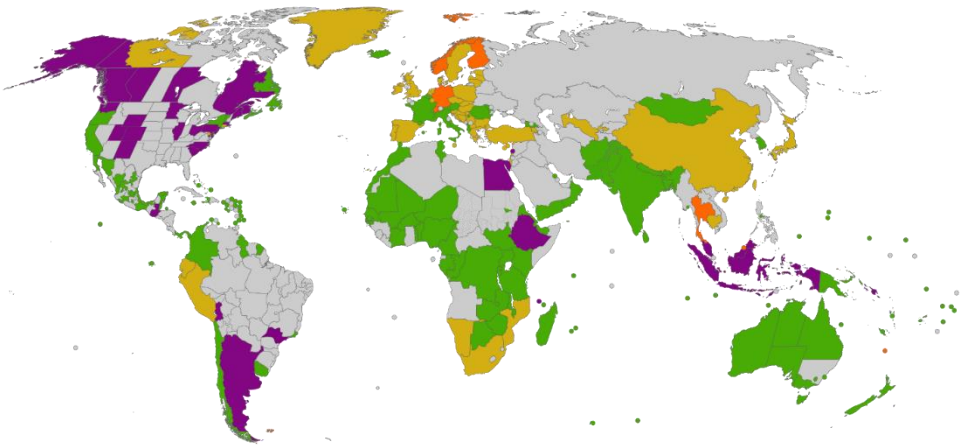

Figure 4. Regulation concerning phasing out single-use plastic bags worldwide.
Plastic bags banned; Charges on some plastic bags;
Voluntary charge agreement; Partial tax or ban (municipal or regional levels)
(adapted from: Elekhh - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=32400659).

In addition to the plastic bag ban and charges on plastic bag, another major policy tool to curb the consumption of plastic bags includes voluntary agreement mechanisms. Voluntary agreements usually refer to agreements that are not produced entirely out of the political decision-making process but are the result of negotiations between social partner organizations and other relevant stakeholders (EEA, 2019). Voluntary agreements have been enacted in Thailand and most countries in the EU, such as Sweden, Switzerland, Netherlands, Luxembourg (EEA, 2019; Vassanadumrongdee & Marks, 2020). For example, in the Netherlands, a type of voluntary agreement involves a voluntary charge system for most kinds of plastic bags in which customers have to pay about EUR 0.20 per bag (EEA, 2019). In Thailand, another type of voluntary agreement occurs. There, many retail stores began to ban the use of plastic bags nationwide. The plan is based on a voluntary agreement between the government and large retailers without any official regulations (Vassanadumrongdee & Marks, 2020).

It is evident from the texts above that the number of public policies on plastic bags has increased rapidly. However, it is difficult to understand the effects of these policies clearly. This is partly due to the uncertainty in the number of plastic bags used and the relatively low evaluation of the impact of these policies (Nielsen et al., 2019; Wagner, 2017). Studies that have documented or measured the effectiveness of policy and legislative tools related to mitigating plastic bags are few (Clapp & Swanston, 2009; Poortinga, Whitmarsh, & Suffolk, 2013; Willis, Maureaud, Wilcox, & Hardesty, 2018; Xanthos & Walker, 2017). Little is known about the underlying processes, which is critical to understanding why and under what circumstances these types of regulations can be effective and how to improve them. For example, more than 140 regulations of the bans and levies have been established at the national and local levels. Although the ban is considered very effective because it distorts consumers' choice and freedom and thus intervenes their behavior (Ogunola, Onada, & Falaye, 2018), there is not enough information to draw any reliable conclusions about the environmental impact of bans and charges (UNEP, 2018). In 50% of cases, information on their effect is missing, partly because some countries have only recently adopted them and partly because of insufficient monitoring (UNEP, 2018).

The problem of plastic waste pollution is a global problem that Indonesia has also experienced as Indonesia is hailed as the second largest marine plastic polluter (Jambeck et al., 2015). The plastic industry is growing significantly in Indonesia, though the current per capita plastic consumption of 22.54kg is still lower than consumption in other Southeast Asian countries (Malaysia, Singapore, and Thailand each have a per capita plastic consumption of more than 60 kg) (MoEF, 2020). Nevertheless, Indonesia is also one of the countries that have taken preventive measures to reduce the use of plastic bags. This research aims to fill the knowledge gap about the evaluation of plastic waste reduction-related policies by investigating the impact of the plastic ban (which was recently introduced in Jakarta) on consumer behavior. Recently in Jakarta, with the regulation of the Governor of Jakarta Province No.148/2019, the practice of banning plastic bags has been in effect since July 2020. This research investigates the extent to which the plastic bag ban has affected consumer demand for plastic bags and the extent to which consumers use their own bags during shopping. The study also investigates factors that influence consumer

behavior. In the process of analyzing consumer use of plastic bags and their own reusable bags, surveys were conducted.

2 Problem Statement

2.1 The externalities from the usage of the plastic shopping bag

Plastic shopping bags are popular among retailers and consumers because of their functionality and low cost (UNEP, 2005). They are readily available and easy to store and move due to their thinness and lightweights. In the past times where environmental degradation because of plastics was not thought of as of now, they were generally even provided at no significant cost to the consumers. These attractive advantages of plastic bag emerge the very problem of the plastic shopping bag. Firstly, because plastic bags are provided cheap, excessive consumption of plastic bags emanates. Supported by low environmental awareness, it makes people continue to take plastics offered free in the market without paying attention to its future ecological impacts. Second, plastic bags being lightweight makes the plastic bags themself fragile and prone to breakage, making them hard to be reused for the next consumption. This leads to littering, which is associated with significant numbers of environmental problem. Unfortunately, its consequent effects on the environment are ignored while they should have been taken into account to fully compensate for the degradation it causes to the environment.

In economic theory, the effect directly affecting another person's wellbeing or a firm's production capability generated by actions of a firm is called an externality. Externalities may either benefit or harm others. An externality that harms others is called a negative externality. An externality that benefits others is called a positive externality. In the plastic shopping bag context, the use of plastic bag by retailers or other parties in the market contribute to the environmental problems from littering activities such as flooding events, increased CO2 emission from an escalated number of incinerated plastic waste, and marine biodiversity losses generated by the plastic waste washed into the sea (Gallego, 1995; Rivers, Shenstone-Harris, & Young, 2017; Thompson, 2017). Subsequently, the agents (producers and consumers) and their economic activities in this case are considered to create externalities that are not compensated. Externalities generated by economic activities and damaging neighbors, including the environment are called negative externalities (Perloff, 2018). In the competitive market, companies and consumers do not have to pay for the damage resulting from negative externalities, so they create inordinate amounts. Likewise, since they are not compensated for the benefits of a positive externality, too few of these externalities are generated.

Externalities lead to non-optimal production. In the normal competitive equilibrium (Figure 5), the sum of consumer surplus and private producer surplus would equal welfare. However, it does not work that way when damage is generated from the production decision. The full competitive equilibrium, instead, does not maximize welfare as it neglects the damage induced by production decisions which further creates market failure. In Figure 5, the private cost of each company (only production cost, excluding external costs) does not include the indirect costs of damage caused by plastic bags. Consequently, pollution occurs, leading to environmental and health damage as well as social welfare loss. What happens in Figure 5 wherein competitive market forces equalize

the price and private marginal cost rather than social marginal cost which includes both the private costs of production and the externality damage is called *market failure* (Perloff, 2018)

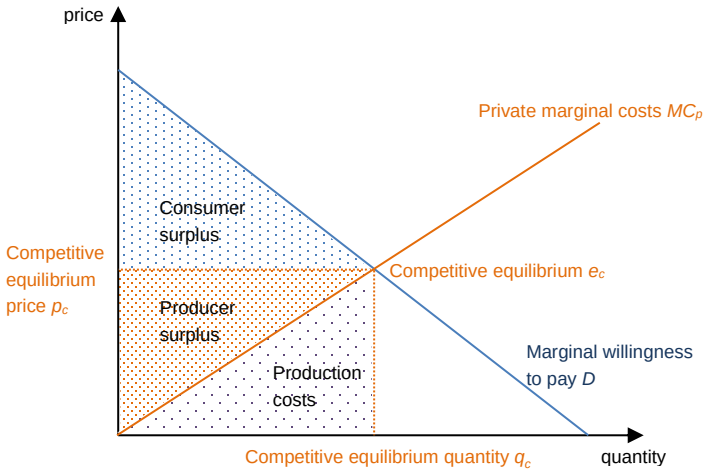

Figure 5. Market equilibrium if external effects are ignored

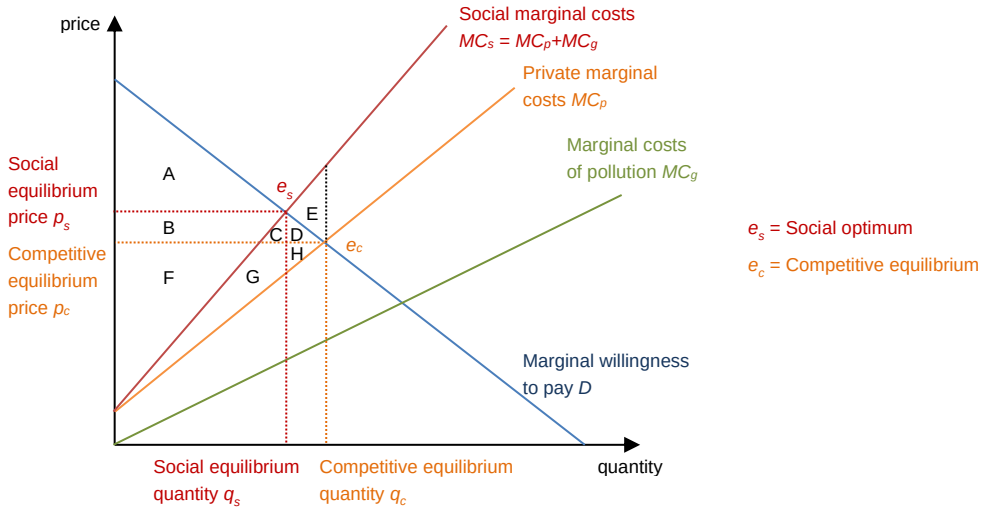

Figure 6. Market equilibrium if external effects are counted

It is obvious from the above explanation that due to pollution, the competitive equilibrium cannot maximize welfare. In social equilibrium (Figure 6), producers incorporate externality damage into their costs, and therefore take social marginal costs (MC_s) into account. MC_s is the production cost plus other externality damage costs. The welfare here is the sum of consumer surplus (*A*) and social producer surplus (*B+F*). It is based on the social marginal cost curve rather than the private marginal cost curve. Therefore, at the social optimum e_s, welfare equals *A+B+F*; while welfare at the competitive equilibrium e_c is *A+B+F-E. -E* is a deadweight loss because the social cost exceeds the value that consumers place between q_s and q_c. The reason for the deadweight

loss is that the competitive market equates the price with the private marginal cost, not the social marginal cost (Perloff, 2018). In the presence of externalities, welfare is maximized when the price is equal to the social marginal cost. The social optimum welfare is higher than the competitive equilibrium welfare because the benefits of reducing pollution from competitors to the social optimal level are greater than offsetting the losses to consumers and producers.

The fundamental problem with negative externalities generated from plastic consumption, apart from the benefits of plastic itself and easy access towards plastic, is the lack of a compensation system. External effects arise where people's actions affecting other agents do not involve any feedback; that is, harm is done and is not compensated. When they reduce the use of plastic bags, incentives are not given either for their goodwill. Given the lack of compensation, it is normal for people to not take any account of the effect concerned. In the case of the harmful effect of plastics, the harm will not be discouraged sufficiently, and there will be too much of it. The key to dealing with the market failure that external effects give rise to is to put in place the missing feedbacks, that is, to create a system that establishes a compensation system for the generation of harmful effects. Through such system, it is expected that external cost or pollution cost is taken into account indirectly, in such a way that eventually, market equilibrium reaches social costs, not only private cost anymore.

2.2 Instruments to reduce plastic waste

To control the plastic waste, that is, to achieve pollution abatement targets, options of instruments are available. There are three kinds of instruments to do this; they are institutional approaches, command and control instruments, and economic incentive instruments (Perman, 2003). Institutional approaches achieve emissions targets by improving existing social or institutional arrangements that facilitate environmental damage-reducing voluntary decentralized behavior. An example could be placing information on plastic polluter in the public domain or providing more media campaigns about the dangers of plastic waste to develop more social responsibility associated with environmental awareness in society. While this approach may be influential in promoting social responsibility in achieving general environmental goals, encouraging people is not an easy task since people have limited influence over the cultural context of human behavior.

Admittedly, utilizing direct controls over polluters has been the dominant method of reducing pollution in most countries (Perman, 2003). This set of controls is also known as command and control (CAC) instruments. Command and control strategy involves direct regulation along with monitoring and enforcement systems. It generally requires the government to formulate the waste standards, specify schedules for meeting the standards, permitting and enforcement procedures for facilities, liability assignment, and penalties for non-compliance. The major advantage of the command-and-control approach is that the regulator has a reasonable degree of predictability about how much pollution levels will be reduced. While there is a certainty of outcome and the ability to get desired results very quickly, CAC is likely to be cost-inefficient as it does not contain a mechanism to achieve two desired results, namely; the equalization of marginal abatement costs over the controlled firms in that program; and, the equalization of marginal abatement costs

across different programs (Perman, 2003). An example of CAC instruments associated with plastic waste is the bans on the use of plastic bags.

The last type of instrument to achieve pollutions targets is by creating incentives for individuals or firms to change their behavior voluntarily. This action is commonly known as an economic incentive (market-based) instrument. Here, the pay-off structures are modified by changing the relative prices. An example of this instrument associated with reducing plastic bags is imposing taxes on plastic shopping bag usage. In the language of externalities theory, the tax eliminates the wedge (created by pollution damage) between private and socially efficient prices; the tax brings private prices of emissions (zero, before the introduction of the tax) into line with social prices. The tax internalizes the externality by inducing the pollution generator to behave as if pollution costs entered its private cost functions. Decisions will then reflect all relevant costs, rather than just the producer's private costs, and so the profit-maximizing pollution level will coincide with the socially efficient level. In addition, unlike the CAC instrument, the tax instrument will achieve the aggregate target in a cost-efficient way as the tax rate is identical for all firms, and so are their marginal costs.

2.3 State of plastic waste in Jakarta

Jakarta, with its population of 10,557,810 people (BPS DKI, 2020a) coupled with ± two million commuters during the day from Bodetabek (Bogor, Depok, Tangerang, and Bekasi district), generates a lot of waste. Hence, it is not surprising that the amount of waste from Jakarta city, with the absence of significant effort to reduce waste, has been increasing over the years as Jakarta's population has also increased along with its consumption. In 2014, Jakarta Environment Agency reported that an average of 5,665 tons of waste was disposed of at the Bantar Gebang landfill each day. While in 2015, an average of 6,419 tons of waste per day was disposed of. The city's waste continued to rise 16,10 percent in 2018 and reach 7,453 tons of waste per day. In 2019, based on the Jakarta Environment Agency's latest data, an average of 7,702 tons of the city's waste was reported to be disposed of at the Bantar Gebang landfill each day (DLHDKI, 2020). Of 7,702 tons of waste, 45 percent is organic waste, 53 percent is inorganic waste, and the rest is toxic and hazardous waste. The plastic waste itself contributes to 34 percent of the total waste in the Bantar Gebang landfill, which equals around 150 tons of plastic waste per day disposed of in the Bantar Gebang landfill.

In Jakarta, plastic waste is disposed of in three ways. Firstly, most of the plastic waste is collected mixed with other waste by municipalities. The waste is then transported to final disposal sites at Bantar Gebang landfill through municipality waste collection services. Bantar Gebang landfill is a landfill on the southeast side of Jakarta, which is geographically located in Bekasi, a district that lies in West Java province. Furthermore, some other plastic wastes are picked by scavengers. Some other waste is separated by some citizens to be recovered at community-based waste management centers called waste banks. Once again, most of the plastic waste in Jakarta is not recycled. Through a material flow analysis, it is found that only 24 percent of plastic waste is

recycled, leaving 76 percent of the rest of plastic waste in the landfills or the environment (Putri, Fujimori, & Takaoka, 2018).

Plastic is just one of many types of waste that is dangerous for the environment due to its substance and its indestructible characteristics. The amount of plastic waste in the Jakarta environment generated by littering behavior has made Jakarta regularly suffer from floods. Furthermore, land-based plastics transported to the ocean through the rivers are the primary sources of marine plastic pollution (Jambeck et al., 2015). Unfortunately, the Jakarta people have not entirely been aware of this severe future environmental risk. Instead of carrying out the plastic recycling practice, people still view waste as waste that is no longer useful; hence, they prefer to rely on waste collection services to dispose of plastic waste. Based on the National Socio-Economic Household Survey (Susenas) 2017, more than three-quarters of Jakarta households have not carried out waste sorting. Only 22,16 percent of households in Jakarta practice waste sorting (BPS DKI, 2017). The feeling of laziness, tiredness, and lack of time to practice is the main reason behind this phenomenon (BPS DKI, 2017).

2.4 Plastic shopping bag consumption in Jakarta

Most retail stores in Jakarta provide free plastic bags and overuse these plastic bags (Firdaus, 2020). Plastic bags are usually offered to the customers before the shopping items are counted. The research conducted by DLHDKI in collaboration with NGO The Indonesian Plastic Bag Diet Movement in 2018 found that plastic bag consumption in Jakarta reaches up to 240-300 million plastic bags, equal to 1,900-2,400 tons of plastic bags per year (LITBANG Kemendagri, 2018).

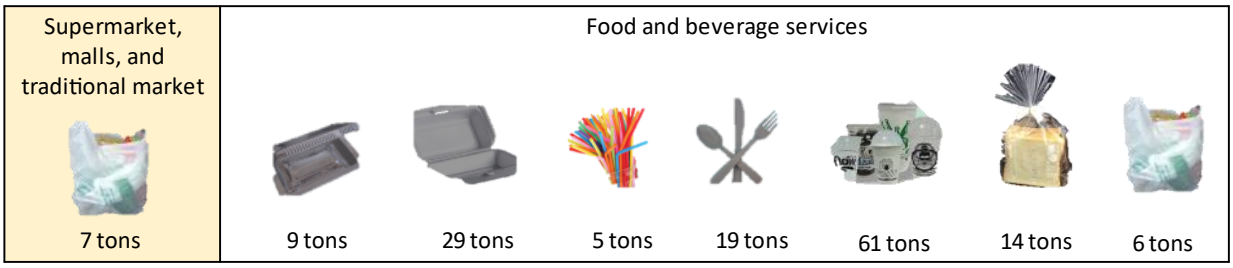

Figure 7. Daily consumption of plastic shopping bags in Jakarta. Source: DLHDKI Survey, (2020)

Surveys conducted by DLHDKI in 2018 and 2019 also show that a minimum of 150 tons of single-use plastic is consumed in Jakarta each day (DLHDKI, 2020b). This number is equivalent to 5%[1] of the total unmanaged plastic waste a year that ends up in the sea in Indonesia, which amounts to approximately 1.29 million tons (MoEF, 2020). The DLHKI survey differs the source of single-plastic use into two primary sources; 1. Supermarket, malls, and traditional market; and 2. Food and beverage services (Figure 2). It is found that around 7 ton of plastic shopping bag is consumed each day by the first source. Food and beverages services engaged in the

[1] This is derived from own calculation $\frac{150\ tons \times 365\ days}{1{,}290{,}000\ tons} \times 100\% = 5\%$

consumption of 134 tons per day of various single-use plastic products such as plastic cups, plastic straw, plastic cutlery, including plastic wrap for food wrapping.

2.5 National overview of regulation concerning reducing plastic waste in Indonesia

The Solid Waste Management Law (No. 18/2008) was promulgated as an umbrella for national waste management policy and practice to improve solid waste management in Indonesia, including the suspension of all open waste disposal by 2013. However, the ambitious goals were not achieved since the Ministry of Environment and Forestry (MoEF) found out that 167 open waste treatment facilities are still operating and the waste collection rate in Indonesia was also still meager (World Bank, 2018). With the increasing global concern of plastic pollution, the Indonesian government launched the plastic reduction program in 2015 through form letter No. S.71/Men/LHKII/2015 (21 February 2015) issued by MoEF. This letter was then followed by another form letter from the directorate general of waste management of the MoEF, namely form letter No. SE-06/PSLB3-PS/2015 on 17 December 2015. These form letters were distributed to governors, mayors, and regents as regional heads aiming to establish the implementation of a paid plastic bag policy in modern retail businesses in each region throughout the country (Firdaus, 2020).

Indonesia has a population of 270 million (BPS, 2020), making it the world's fourth most populous country and the second-largest plastic polluter in the world after China (Jambeck et al., 2015). The country generates 3.22 million tons of unmanaged plastic waste each year, of which about 1.29 million tons ultimately end up in the ocean (Jambeck et al., 2015). In addition, the problematic plastic waste is not limited to the sea but also affects rivers in Indonesia. According to data from Nature Communications, Indonesia's four major rivers – the Brantas, Solo, Serayu, and Progo – are among the 20 most polluted rivers in the world (L. C. M. Lebreton et al., 2017; MoEF, 2020). In view of the foregoing, the government of Indonesia then enacted Presidential Decree No.97/2017 on national policy and strategy on management of household waste and household-like waste (JAKSTRANAS). Through Jakstranas, Indonesia has pledged to reduce waste by 30% and appropriately manage 70% of the total waste generation by 2025. In addition, efforts to curb the use of plastics are also included in the Presidential Decree No. 83/2018 (Marine Plastic Garbage Action Plan 2017-2025) on marine debris management. The government has also begun to pass ministerial laws to deal with the plastic waste trade. At the local level, the government has begun to issue requirements restricting the use of single-use plastics. In 2020, Indonesia through MoEF issued the National Plastic Waste Reduction Strategic Actions for Indonesia to achieve the national goal of reducing plastic by 70 percent by 2025, reflecting its ambition to solve the plastic problem through a circular economy approach.

Utilizing Waste Management Law No.08/2008, one of the efforts by Indonesia is to regulate plastic waste under various government regulations, presidential-level regulations, presidential decree, ministerial regulation, and regional/local regulation. Concerning regional/local laws, many regions in Indonesia have started to issue regulations on banning plastics, such as Banjarmasin (Banjarmasin Mayor Regulation No. 18/2016), Balikpapan (Balikpapan Mayor Regulation

No.8/2018), Bogor (Bogor Mayor Regulation No. 61/2018), and Bali (Bali Governor Regulation No. 97/2018). Since March 2019, regulations banning the use of plastic bags in supermarkets in Tangerang, Jakarta, and Bekasi have been enacted (Cordova & Nurhati, 2019). Jakarta finally followed in the footsteps of cities that have already issued the plastic bag ban regulation. On 27 December 2019, the regulation of the Governor of Jakarta Province No.142/2019 was signed. After the pilot implementation series conducted in several markets in Jakarta, on 1 July 2020, the single-use plastic bag is officially banned in the city.

2.6 Plastic shopping bag ban in the Jakarta Governor Regulation No.142/2019

From the previous section, it is evident that in Indonesia, concerns over the environmental impact of plastic bags have been widespread since early 2015. Hence at that time many regions in Indonesia have started to implement a paid plastic bag, as with the expectation that the plastic bag usage will reduce by the time goes by. However, this kind of approach has not shown significant improvement concerning waste from plastic. Therefore, the regulation shifts from providing paid plastic bags to fully banning plastic bags by the time. Based on the interview with staff from DLHDKI, Jakarta Governor Regulation No.142/2019 is primarily aimed at reducing 7 tons of plastic shopping bags are consumed each day in supermarkets, malls, and traditional markets (see Section 2.4). The regulation was born on the realization that implementing regulations related to the mandatory use of environmentally friendly shopping bags is not only the government's task. To reduce plastic waste in Jakarta also demands awareness from Jakarta people to get used to carrying their own shopping bags and refusing to use plastic bags in the market when shopping. The most expected outcome of the regulation at the moment is the behavior changes within the Jakarta community, that is, a shift from plastic bag consumption to reusable or environmentally friendly shopping bag consumption.

The scope of the regulation of the Governor of Jakarta Province No.142/2019 is the obligation for people to use environmentally friendly shopping bags at markets and the prohibition of single-use plastic bags uses. Single-use shopping plastic bag is defined as a shopping bag with handrails used as a container for lifting or transporting goods and is made from or contains plastic base materials. However, single-use plastic wrap for wrapping food is still allowed to be used until a more environmentally friendly alternative is available. This regulation prohibits retailers from providing customers single-use plastic shopping bags, and instead, they must provide environmentally friendly shopping bags for not free and at a reasonable price. This regulation applies to shopping centers, convenience stores (such as minimarkets, supermarkets, department stores, and hypermarkets), and traditional markets. Economic incentives are also offered to shopping centers, convenience stores, and traditional markets that have carried out the obligations and socialization procedures for the use of environmentally friendly shopping bags. They are provided in the form of local tax reduction or remission, which can be done by filing an application letter to the governor. As for further provisions regarding the procedures for granting the amount of regional fiscal incentives, they are regulated by a (separated) governor regulation. Unfortunately, to date, as of this writing, such regulation concerning financial incentives for those

who comply with the ban, has not been implemented yet. Furthermore, administrative sanctions have also been arranged and prepared for shopping centers, convenience stores, and traditional markets that do not comply with the regulations. The imposition of the administrative sanctions includes a written warning, forced money (dwangsom/non-compliance penalty), suspension of business license, and revocation of business license. The first two sanctions are imposed by the DKI Jakarta Environmental Services, whereas the last two sanctions are imposed by the DKI Jakarta One-stop integrated investment services. The amount of forced money is Rp 5,000,000 (five million rupiahs) at the minimum and Rp 25,000,000 (twenty-five million rupiahs) at the maximum. Apart from the imposition of administrative sanctions, the perpetrators of violations might also be announced in publicly accessible media.

Concerning the implementation of the governor regulation No.142/2019 in Jakarta, scientists from the Research Center for Oceanography of LIPI and Center for Environmental Law (ICEL), as well as activists from The Indonesian Forum for Environment (WALHI) are still not entirely sure of the ability of the regulation of tackling the overall plastic waste in Jakarta (BBC, 2020; Rahmawaty & Dirgantara, 2020; Yogi, 2020). The main reason is that the share of consumption of plastic shopping bags in Jakarta is very small compared to the total plastic waste which includes styrofoam, plastic bottles, glass, and other plastic packaging. According to their recent research, most of the 59% of plastic waste flowing into Jakarta Bay is styrofoam in the form of internal protection devices for food containers and electronic equipment boxes and plastic bag only contributes to 1.26 percent of the total plastic waste (Cordova & Nurhati, 2019), emerging doubt about to what extent this new regulation can tackle the plastic waste problem in Jakarta (Wijaya & Franciska, 2019). Moreover, data on plastic material flows in Indonesia shows that the consumption of plastic shopping bags amounts to about 0.366 million metric tons (MMT) or 6% of the total consumption of plastic-based goods (MoEF, 2020).

Nonetheless, the little doubt on the efficacy of the governor regulation No.142/2019 is understandable since recent research also states that there has been less information available about the effects of various plastic bag bans in many countries, leading to uncertainty about the exact impact of such policies in reducing global plastic pollution (Nielsen et al., 2019). It is difficult to clearly understand the effects of these policies. Little is known about the underlying processes, which is critical to understanding why and under what circumstances such regulation can be effective and how to improve it. Part of the reason is the uncertainty in the number of plastic bags used and the relatively low assessment of the impact of these policies (Nielsen et al., 2019; Wagner, 2017). For example, more than 140 regulations of the bans and levies have been established at the national and local levels. Although the ban is considered very effective because it distorts consumers' choice and freedom and thus intervenes in their behavior (Ogunola et al., 2018), there is not enough information to draw any reliable conclusions about the environmental impact of bans and charges (UNEP, 2018). In 50% of cases, information on their effect is missing, partly because some countries have only recently adopted them and partly because of insufficient monitoring (UNEP, 2018).

Studies that have documented or measured the effectiveness of policy and legislative tools related to mitigating plastic bags are few (Willis et al., 2018; Xanthos & Walker, 2017). Moreover, only a few published studies on the effectiveness of the plastic bag ban are available (Macintosh et al., 2020). While data shows that around 65 countries now have implemented plastic bag bans at national and sub-national levels, the existing academic literature on the efficacy of the plastic bag ban is still found limited (Macintosh et al., 2020). For example, there has been a question on to what extent the plastic shopping bag ban could result in an increase in other types of plastic bags, without any associated behavioral change with respect to reuse behavior. Also, there has been a question about whether society supports the plastic bag ban as the measure to reduce plastic consumption is sustainable.

2.7 Objective

Given the knowledge gap of the impacts of strategies and policies in general about reducing plastic bags, and the effects of the Jakarta plastic bag ban in particular, this research aims to investigate certain aspects, namely the impact of the regulation of the Governor of Jakarta Province No.142/2019 with respect to behavioral changes on the consumption of plastic bags in Jakarta. Concerning the fact that regulation has only been implemented since 1 July 2020, this research aims to seek to what extent the regulation has changed people's behavior in Jakarta with respect to plastic shopping bag consumption.

2.8 Research questions

The main research question is "What are the effects of the implementation of plastic shopping bag ban in Jakarta following the regulation of the Governor of Jakarta Province No.142/2019 with respect to behavioral changes on the consumption of plastic bags in Jakarta?"

Specific research questions (SRQs) are:

1. How does plastic bag use change after the regulation of the Governor of Jakarta Province No.142/2019 is implemented?
2. How much are the private costs on plastic shopping bags and alternative shopping bags (i.e. reusable bags) before and after the regulation of the Governor of Jakarta Province No.142/2019 is implemented?
3. How much are the avoidable external costs of reducing the number of plastic bags due to the plastic ban?

3 Scope and Methodology

3.1 Study area

The study area in this research is where Regulation No. 142/2019 takes place, namely in Jakarta. To date, Jakarta remains the capital city of Indonesia. Although in 2019 Indonesia announced to relocate the country's capital to East Borneo (Van de Vuurst & Escobar, 2020) the plans seem to be postponed for a little longer because the country currently is grappling with reining in the COVID-19 pandemic.

Figure 8. Study area

Jakarta is a lowland area with an average altitude of +7 meters above sea level. It has a land area of 662.33 km2 and a sea area of 6,977.5 km2. It is a region with quite a number of dams and canals. Around 17 rivers are passing through the city. Based on the projections of the 2010 population census, the population of Jakarta is 10,557,810 people (BPS DKI, 2020a).

3.2 Data sources

3.2.1 Survey

The aims of this thesis were to investigate the effects of Jakarta's plastic bag ban on behavioral changes of Jakartans on their consumption of plastic bags as well as its possible savings on the regional budget in terms of clean-up costs and potential additional revenues from marine tourism. To collect the information, surveys were conducted. Similar studies with the same aim also utilized the survey to collect the data. In Nepal, consumer surveys were conducted to investigate the plastic bag ban's impact on people's behavior in 14 Nepal's municipalities (Bharadwaj, 2016). To collect information on people's consumption and the use of reusable bags in accordance with the implementation of plastic bag bans in the Australian Capital Territory, a supermarket consumer survey was also conducted (Macintosh et al., 2020).

The population sample in this research consists of the labor force of the Jakarta population and the commuters from outside Jakarta who carry out activities regularly in Jakarta. Given the population size from BPS, the number of samples is determined with a cross-sectional approach with the equation below.

$$n = \frac{Z^2_{1-\alpha/2} p(1-p)N}{d^2(N-1)+Z^2_{1-\alpha/2} p(1-p)} \quad (1)$$

- *n* denotes sample size
- *N* denotes population
- *p* denotes prevalence of the condition. Using the standard *p*-value for sampling, in this case the proportion of the population who knows about the regulation is assumed 80%.
- *d* denotes precision of the estimate equals 5%
- *Z alpha* denotes the value of *z* from probability tables. With *d* equals 5%, the correspondent Z is 1.96

Table 1. Jabodetabek commuter flow between districts/cities

	Location where the commuters do the activities					
Commuters' home address	**South Jakarta**	**East Jakarta**	**Central Jakarta**	**West Jakarta**	**North Jakarta**	**Total**
Bogor district	70,674	16,267	43,478	10,522	8,077	149,018
Bogor city	6,812	1,933	6,104	2,484	770	18,103
Depok	158,991	57,668	56,738	13,349	9,742	296,488
Tangerang district	16,559	597	16,987	27,321	8,329	69,793
Tangerang city	52,041	7,279	28,999	72,950	11,141	172,410
South Tangerang city	92,429	9,161	30,536	21,004	5,894	159,024
Bekasi district	25,841	38,628	27,033	4,296	17,903	113,701
Bekasi city	51,290	110,532	59,522	15,056	40,834	277,234
Bodetabek	474,637	242,065	269,397	166,982	102,690	1,255,771

Source: Statistics of Jabodetabek Commuter 2019 (BPS, 2019)

Labor force is defined as people who are capable of doing work to produce goods and services either to fulfil their own or other people's needs. Labor force is characterized as persons of 15 years old and older who are working, have a job but temporarily not work, and unemployment. Based on Statistics of DKI Jakarta (Table 1), labor force of Jakarta population in 2019 is 5,157,878 people (BPS DKI, 2019b). Considering the existence of intense commuter flow to Jakarta for activities such as work and study, that is, the fact that there is 15 million people in Jakarta regularly during the day, this research includes the commuters from outside Jakarta whose activity's

location in Jakarta as another composition of research population which adds 1,225,771 to the research population (Table 2).

Table 2. Study population

	2019
Labor force of DKI Jakarta	5,157,878
Commuters from outside DKI Jakarta	1,225,771
Total	6,383,649

Source: Statistics of Jabodetabek Commuter 2019 (BPS, 2019) and Labor Force Circumstance of DKI Jakarta (BPS DKI, 2019b)

Using the equation (1) above, the sample size generated equals 245.85 rounded to be 246 target samples.

$$n = \frac{1.96^2 * 0.8 * (1-0.8) * (5{,}157{,}878 + 1{,}225{,}771)}{0.05^2 (5{,}157{,}878 + 1{,}225{,}771 - 1) + 1.96^2 * 0.8 * (1-0.8)} = 245.85$$

- *n* denotes targeted sample size
- *N* is represented by the number of Jakarta's labor force in 2019 and the number of commuters from outside Jakarta (Bodetabek (see Table 2)), which are 5,157,878 and 1,225,771 respectively
- *p* denotes prevalence of the condition. Using the common p-value for sampling, in this case the proportion of the population who knows about the regulation is assumed 80% or 0.08, hence 2-p equals 0.02
- *d* denotes precision of the estimate equals 5% or 0.05
- *Z* alpha denotes the value of *z* from probability tables. With d equals 5%, the correspondent Z is 1.96

In this thesis, the questionnaire comprised of both qualitative and quantitative questions. Qualitative items were presented through Likert-scale questions. Likert scale was utilized since it has been applied as one of the most fundamental tools in social sciences research to measure attitude in a scientifically accepted and validated manner (Edmondson, 2005; Joshi, Kale, Chandel, & Pal, 2015). This way, information on how often Jakartans use plastic bags and environmentally bags daily before and after the ban and how strongly they support the plastic bag ban can be seen. To numerically measure the changes in behavior, quantitative items were also used. This way, the trends in plastic bag use can be quantified and compared.

Due to extraordinary circumstances related to the COVID-19 pandemic, the survey was conducted online utilizing the Qualtrics survey platform. The questionnaire consists of 18 questions (see Appendix 1) and was distributed through emails and social media to the targeted samples. The survey was distributed from 15 December 2020 and ended on 20 December 2020 when the survey finally reached the target number of samples. After all of the responses were downloaded, IBM statistics version 26 is used to conduct data analysis. In order to find connections between answers and to make a better understanding of how these are correlated

and influenced by each other, correlation tests are performed. The correlations are considered relevant only when they are statistically significant (P-value is <0.05).

3.2.2 Interview with experts

This research focuses on the impact of Jakarta Governor Regulation No.142/2019. To enrich the existing information, an in-depth interview with the issuer agency, that is, DLHDKI (Environmental Services of Jakarta Province) is conducted. Due to extraordinary circumstances related to the COVID-19 pandemic, the interview, similar to the survey, was completed in an online setting. Zoom video conference application was used with video recording mode to make sure the interview is documented and help the researcher transform it into written form. Around ten questions about the content of the regulation were asked in the first session of the interview (see Appendix 3). These questions aim to dig deep information that cannot be answered by reading the regulation document and related online news or articles.

Interview with DLHDKI started with the background concerns about reducing plastic waste in Indonesia through regulation instrument started in 2016. In the beginning, the effort to reducing plastic bag started by implementing paid plastic shopping bag in several cities in the country, wherein plastic bags were provided not free by charging around Rp 200 (equal to €0.012) per piece. The program was tested on February 21, 2016, along with the commemoration of National Waste Care Day. The paid plastic bag policy in the markets was based on the two circular letters issued by MoEF namely circular letter No. S.71/Men/LHKII/2015 on 21 February 2015 and circular letter No. SE-06/PSLB3-PS/2015 on 17 December 2015 which contain about the implementation of paid plastic bag policy in the modern retail businesses. In particular, MoEF subsequently released another circular letter, namely circular letter No. S.1230/PSLB3-PS/2016 about the price and mechanism of the paid plastic bag policy. The circulars were distributed to governors, mayors and regents, aiming to establish the implementation of the paid plastic bag national policy in modern retail enterprises in various regions of the country. Since the issuance of the circular, modern retailers no longer provide consumers with free plastic bags. If consumers need plastic bags, they are obliged to buy plastic bags at a predetermined price. Through the paid plastic bag policy, it is expected that consumers will reduce the use of plastic bags, and the retailer can help educate consumers to reduce the use of plastic bags.

The funds collected from the paid plastic bags are public funds (Astuti, 2016). Retailers are expected to cooperate with non-governmental organizations in environmental waste management activities. The amount of money generated from charging the plastic bag fee to the end consumers was then used by the environmentalist association to conduct a plastic-free campaign in society. The regulation of paid plastic bag, however, was not an official regulation, but more like a circular letter from the related regional government, hence less powerful and unbinding. According to Article 7 paragraph (1) of Law Number 12 Year 2011 (or UU 12/2011) regarding the formation of legislative regulations, the types and hierarchies of statutory regulations consist of: The 1945 Constitution of the Republic of Indonesia; Decree of the People's Consultative Assembly; Laws / Government Regulations in Lieu of Laws; Government regulations; Presidential decree;

Provincial Regulation; and Regency / City Regional Regulations. According to this law, the types of Indonesian laws and regulations basically do not include circulars. According to Anggono (2015), a circular is not a statutory regulation (*regeling*), nor is it a national administrative decision (*beschikking*), but a policy or regulation (*beleidsregel*) or *pseudo wetgeving*. The fact that there was not any official arrangement on how those amount of money from selling the paid plastic bag additionally made the paid plastic bag policy at that time did not last long. Besides, even though there had been a circular regulating the paid plastic bag policy, there was no specific regulation that explained the sanctions imposed on those who do not implement the policy (Astuti, 2016). Aware of these problems, several regions in Indonesia, including Jakarta, then started to make a more powerful regulation to regulate plastic bag consumption by creating legislation on banning the plastic shopping bag through regulation of Governor or Mayor in certain regions.

In 2017, the local government of Jakarta through DLHDKI as the leading institution, started to formulate the draft of governor regulation No.142/2019. The regulation was finally enacted in the late 2019 and the transition period before field implementation took six months. Since 1 July 2020, Jakarta governor regulation No.142/2019 has started to come into effect. The regulation aims to reduce plastic shopping bag waste in supermarkets, malls, and traditional markets which only accounts for 7 tons or 1,750,000 sheets of plastic bag. Seven tons of which, only accounts for less than five percent of the total plastic waste in Jakarta. Although it feels that the regulation has not completely wanted to eradicate the plastic, Jakarta was the first region that implements the plastic shopping bag ban in traditional market. Other regions in Indonesia have known to implement the regulation in malls and supermarkets only.

DLHDKI as the government institution responsible to arrange the environmental policy in Jakarta hopes that through this regulation, Jakarta people will change their behavior gradually to reduce plastic shopping bag uses. The regulation aims to grow awareness and good habits among Jakartans to bring their own reusable shopping bag, considering some alternatives to plastic shopping bag are widely available. In the future, plastic ban regulation in Jakarta will limit the use of other type of plastic, such as straws, styrofoam, single use drinking bottle, etc.

DLHDKI realized that the regulation is still far from perfect. For example, the regulation has not set the detailed specifications of the plastic shopping bag that is prohibited to use (for example, there has not been any concern about the certain thickness of the plastic bag). In addition, the supporting regulation on compensation or incentives for parties who successfully follow the regulation No.142/2019 has not been made even though it has mentioned clearly about the incentive for the obedient parties in it. Furthermore, for the current implementation, the regulation only applies for retailers that operate in supermarkets, malls, and traditional markets only, and does not apply for others, such as cadgers and restaurants that do not operate in the aforementioned markets. It is important to know that, there has not been specific regional budget for the publishing, socializing, or supervising the regulation. There was only a special budget for drafting which account for less than 100 million rupiahs or around five thousand euros.

3.3 Questionnaire design

Within the scope of this research, a survey was designed to investigate consumers response to the policy of banning the use of plastic bags as of July 1, 2020, and the extent to which this policy has affected consumers' use of plastic bags. The questionnaire contains 25 questions covering the following topics: plastic and self-use plastic bags, support and attitudes towards the plastic bag ban, self-reported environmental characteristics and concerns, and sociodemographic background information of the respondents. The questions contained in the questionnaire were adopted from the study of Macintosh et al., (2020) and other similar studies. The questionnaire consists of several parts. Table 3 lists the categories and the question types in the questionnaire.

Table 3. Content and question types in the questionnaire

	The content of the question	**Question type**
The first part (6 questions)	Socio-demographic characteristics (Q1) city of home or work address (Q2) gender (Q3) age (Q4) educational background (Q5) occupation (Q6) monthly expenses	Multiple choice
The second part (9 questions)	This part aims to measure the support and attitude towards the plastic bag ban and to investigate the reasons behind the consumer habit of plastic and own bag use; (Q7_1) I agree and support the implementation of the regulation of the governor of Jakarta province No.142/2019 concerning the ban of the plastic shopping bag (Q7_2) I believe the plastic shopping bag ban has a positive impact on the environment (Q7_3) I always bring my own shopping bag every time I go shopping even before the regulation comes into effect (Q7_4) Since the regulation is implemented, I now use fewer plastic shopping bags (Q7_5) I chose to bring my own shopping bag for economic reasons (Q7_6) I choose to bring my own shopping bag for lifestyle reasons (Q7_7) I carry my own shopping bag for environmental reasons (Q7_8) I often buy new reusable shopping bags because I forget to bring my own shopping bag (Q7_9) In my opinion, currently the reusable shopping bags sold in the market is quite expensive	These questions are expressed in 5-point Likert scale style (as in strongly agree, agree, neutral, disagree, strongly disagree)
The third part (9 questions)	This section aims to measure how often consumers buy plastic shopping bags before and after the ban (Q10 & Q13), where they buy plastic shopping bags (Q11 &	These questions are expressed in the form of multiple-

	The content of the question	Question type
	Q14), and the average price per piece of plastic bag (Q12 & Q15(. In addition, this part also asks how many own or reusable shopping bags were before and after the ban (Q16 & Q17) and how much they cost (Q18).	choice questions and open-ended questions
The fourth part (2 questions)	This part aims to obtain additional information (if any) about the plastic bag ban (Q19) and email address (if desired) to be used for survey incentives for ten randomly selected respondents (Q20)	Open-ended questions

3.4 Statistical analysis

In order to find the link between answers and to better understand how these are correlated and influenced by each other, correlational analysis is conducted. Statistical analysis will be carried out through SPSS software. Several types of correlation tests are done. Deciding which type of statistical test to perform depends on the type of data.

Correlation or the relationship between two quantitative variables with interval and ratio measurement scales can be measured by the most commonly used correlation measure, namely the Pearson correlation coefficient (Asra & Rudiansyah, 2017). The value of Pearson r is between -1.00 and +1.00. A correlation coefficient of zero indicates that there is no linear relationship between the variables; the correlation coefficient is zero. −1.00 represents an ideal negative linear relationship, and +1.00 represents an ideal positive linear relationship. In fact, it is impossible to observe a perfect relationship between variables. A negative coefficient indicates a negative linear relationship, while positive coefficients indicate a positive linear relationship.

For qualitative variables, the relationship is called association (actually the same as correlation), which can be measured by Spearman's rank-order correlation and Kendall rank correlation (Asra & Rudiansyah, 2017). In this study, only Spearman's test is used. Spearman's correlation coefficient is a correlation measure that uses rank order to determine the size and direction of the association between two sets of rank data. Similar to Pearson's r, Spearman's correlation coefficient value varies from -1.00 to +1.00, and can be explained in a similar way. In order to show more correlation tests, in some cases in this study, Pearson's chi-square test will be performed. Like Spearman's rank correlation test and Kendall's correlation test, Pearson's chi-square test (or simply Chi-square) is a part of non-parametric statistics. Chi-square is used to assess the association between two categorical (non-numeric) variables (Simon & Moore, 1996).

Statistical tests are performed to assess the strength of the relationship between two variables. The null hypothesis is that there is no linear relationship between the two variables. P-value is used to determine statistical significance. When the correlation is statistically significant (P-value <0.05), they are considered correlated.

Furthermore, to determine how much independent variables affect the dependent variable, multiple linear regression is performed. Regression analysis is a statistical method used to investigate the relationship between two or more variables. In simple regression, the relationship

function (relationship between variables) studied is the form of the relationship function between two variables (one is the independent variable, and the other is the dependent variable). In multiple regression, the relationship between the dependent variable and multiple independent variables is studied. Multiple linear regression analysis assesses the linear relationship between two or more independent variables and the dependent variable. This analysis determines whether the relationship between the independent and dependent variables is positive or negative and predicts the value of the dependent variable when the independent variable increases or decreases. In regression analysis, several assumptions must be satisfied so that the regression equation obtained can be effective when used for prediction (Asra & Rudiansyah, 2017; Kutner, Nachtsheim, & Neter, 2004). These assumptions are:

- The normality assumption is designed to ensure that the data to be analyzed is normally distributed. The normal P-P plot represents the normality test in the SPSS program. The resulting plot will show the distribution of points. If the distribution of these points is close to or close to a straight line (diagonal), then the residual (data) is normally distributed, but if the distribution of these points is far from this line, then it is not a normal distribution. If the latter is the case, the non-straight-line model can still be converted (for example, by logarithmic or by applying a square root transformation to the outcome variable (dependent variable) to a straight-line model to allow an approximate description of the parameters of the equation in relational form (Asra & Rudiansyah, 2017).
- The assumption of multicollinearity states that the independent variables must have no symptoms of multicollinearity. One way to measure multicollinearity is through the variance inflation factor (VIF), which assesses how much the variance of the estimated regression coefficient increases if your predictors are correlated. If VIF is equal to 1, there is no multicollinearity between the factors, but if VIF is greater than 1, the predictors may be moderately correlated. A VIF between 5 and 10 indicates a high correlation. If the VIF exceeds 10, it means that regression coefficients are poorly estimated due to multicollinearity.
- The homoscedasticity assumption is an assumption in regression where the variance of the residual is different from another observation. The symptom of the same residual variance from one observation to another is called homoscedasticity. The purpose of the homoscedasticity test is to test whether there are variance and residual inequalities from one observation to another in the regression model. Homoscedasticity assumption can be checked by evaluating the residual scatter plot. If the data looks a bit like a shotgun of randomly distributed data, then it is homoscedastic. The opposite of homoscedasticity is heteroscedasticity, where cones or sectors are found in the data.

From the linear regression analysis, a linear regression equation is derived. In general, a multiple regression model can be formulated as below. If *Y* is a dependent variable and $X_1,X_2,X_3,\ldots,X_k$ are independent variables that influence variable *Y*, the multiple regression model is

$$Y_i = \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + c$$

Here, c is the constant, and β_i (i=1,2…n) are the regression coefficients, or known as the unstandardized coefficients in the regression output. The unstandardized coefficients are the most important parameters derived from multiple regression. They are given in the original units of the dependent variables. In simple linear regression, unstandardized coefficients indicate the slope of the relationship. The same thing applies to multiple regression, even though the slope is in n-dimensional space. The value of β indicates how many units change (up or down) in the dependent variable for each additional unit of the independent variable (Stellefson, Hanik, & Chaney, 2008).

Other important parameters from linear regression are R square and beta coefficients. The former indicates the degree of influence of different predictors in the model on the variance of the dependent variable. The adjusted R-squared represents the degree of generalization of the model in the population (Field, 2009). The latter is derived from standardized coefficients in the regression output. Beta coefficients or standardized coefficients are used to know which independent variable has more influence on the dependent variable.

4 Results

This chapter elaborates on the current behavior of the people of Jakarta after the official implementation of Jakarta Governor Regulation No.142/2019 on 1 July 2020. The subchapters below depict the main results of the data collection for the thesis. They are presented through frequencies and significant correlations that were identified. This chapter only presents the result of the data analysis as is. Further discussion on the results will be introduced in Chapter 0.

4.1 Demographics of the respondents

Out of the 272 respondents, 33% live or work in East Jakarta, 27% live or work in South Jakarta, 26% live or work in Central Jakarta, 9% live or work in West Jakarta, and 5% live or work in North Jakarta. The distribution of male and female is 40% and 60%, respectively. 85% of the respondents are in prime working-age (25-54 years), while the rest is in early working age (15-24 years) (11%) and mature working age (55-64 years) (4%). From educational background, around 85% of the respondents have a bachelor's degree or higher, while the rests have a diploma background (5%) and high school or lower background (10%). Looking at respondents' occupation, 39% of the respondents are employees in private companies, followed by civil servants which account for 34% of the total respondents. The rest (27%) consists of entrepreneurs, homemakers, students, and other occupations. Furthermore, the questionnaire also asks the respondents about their monthly expenses. From the responses, about 53% of respondents have expenses above 5 million rupiahs. 29% of the respondents have expenses of three to five million rupiahs, and the remaining 18% of the respondents have expenses of below three million rupiahs. With the numeric information above, it can be concluded that most of the respondents are formally educated workers and have an income of three million rupiahs and above.

Table 4. Socio-demographic data of the respondents (Total number of participants: 272)

	The number of participants	
	N	%
Gender		
Female	162	59.6
Male	110	40.4
City of home or work address		
Central Jakarta	70	25.7
East Jakarta	90	33.1
North Jakarta	14	5.2
South Jakarta	73	26.8
West Jakarta	25	9.2
Age		
15-24	31	11.4
25-54	231	84.9
55-64	10	3.7
Education		

	The number of participants	
	N	%
SD/SMP/SMA	28	10.3
DI/DII/DIII	13	4.8
DIV/S1 (Bachelor's degree)	157	57.7
S2/S3 (Post-graduate degree)	74	27.2
Occupation		
Student	20	7.4
PNS (Civil servant)	93	34.1
General employee	106	39.0
Entrepreneur	16	5.9
Homemaker	11	4.0
Others	26	9.6
Monthly expenses		
Rp 1,000,000-2,999,999	48	17.7
Rp 3,000,000-4,999,999	79	29.0
Rp 5,000,000 and above	145	53.

4.2. Attitudes towards plastic shopping bag ban

In this study, supports towards plastic bag ban are represented through two Likert-scale types of questions (Table 5). Almost all respondents have positive attitudes towards Jakarta's plastic shopping bag ban. Around 93% of respondents agree[2] and support implementing the regulation of the governor of Jakarta province No.142/2019 concerning the prohibition of plastic shopping bags. 95%[2] respondents also believe that the plastic shopping bag ban has a positive impact on the environments. When asked if they believe that the plastic shopping bag ban has a positive effect on the environment, given the Likert scale of 1 to 5, with the higher score meaning more positive attitude, the average score from respondents' answers is 4.54.

Table 5. Averages of the responses regarding supports towards plastic bag ban

Question	Mean
(Q7_1) I agree and support the implementation of the regulation of the governor of Jakarta province No.142/2019 concerning the ban of the plastic shopping bag	4.49
(Q7_2) I believe the plastic shopping bag ban has a positive impact on the environment	4.54

4.3. Plastic and own shopping bag consumption

The support for the plastic bag ban has been seen in the previous section. However, when it comes to plastic shopping bag consumption, on average, 48%[2] of the respondents agree that they still often forget to bring their own shopping bag, causing them to buy new reusable shopping bags often when they go shopping, disregarding the finding that around 50%[2] of the respondents agree that currently, the reusable shopping bags sold in the market are pretty expensive.

[2] This figure is obtained by summing up the scores of strongly agree and agree and excluding the neutral's

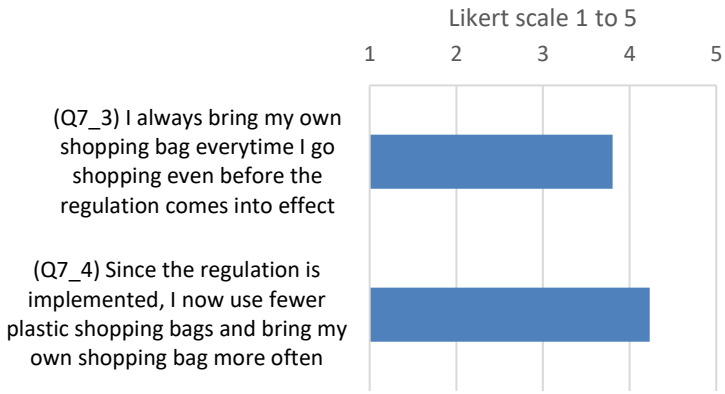

Figure 9. Averages of the responses regarding practices of bringing own shopping bags before and after the ban

The good news is, from Figure 9 it is found that before the regulation came into effect, the average score of the question asking if respondents always bring their own shopping bag is 3.80 with a standard deviation of 1.03. 14%[3] of respondents did not bring their own shopping bags before the regulation was implemented. After the regulation is implemented, the score increases to 4.23 with a slightly decreased standard deviation of 0.78. After the ban started, only 3%[3] of the respondents do not agree that they use fewer plastic bags after the regulation comes into effect. These responses show an increasing trend of own bag use after the plastic bag ban occurs. Using Spearman's correlation test as shown in Table 6, there is a sufficient positive association between Q7_3 and Q7_4, represented by Spearman's rho of 0.33. This result means that the more people agree that they have used their own bags before the ban, the more they agree that they also use less plastics after the ban.

Table 6. Spearman's correlation test for Q7_3 and Q7_4[4]

			Q7_4
Spearman's rho	Q7_3	Correlation Coefficient	.331**
		Sig. (2-tailed)	.000

**. Correlation is significant at the 0.01 level (2-tailed).

With the coming of governor regulation No.142/2019, there is a trend of using fewer plastic bag among Jakartans (Table 7). The results show that after implementing the ban, the use of plastic bags has dropped sharply, while the number of reusable plastic bags has increased. This is demonstrated by the decreasing average number of plastic bags used by Jakartans, from eight plastic bags to two plastic bags per week per person. The decreasing use of plastic bags is offset by the increase in the average number of environmentally shopping bags used, namely from three

[3] This number refers to the percentage sum of the "strongly disagree" and "disagree" responses, excluding the response of "neutral"

[4] Q7_3 refers to Likert-scale question "I always bring my own shopping bag everytime I go shopping even before the regulation comes into effect". Q7_4 refers to Likert-scale question "Since the regulation is implemented, I now use fewer plastic shopping bags and bring my own shopping bag more often"

to eight bags per week per person. This number is obtained by utilizing Q10, Q13, Q16, and Q17[5] and calculating the average number of plastic and own reusable bag per person.

Table 7. Change of number of plastic and own bags used before and after the ban

	Before plastic ban	After plastic ban
Individual average number of plastic bags used per week	8 pcs	2 pcs
Individual average number of reusable bags owned	3 pcs	8 pcs

To see how much Q7_3 and Q7_4 contributed to plastic changes after the ban, a standard multiple linear regression analysis was performed. In this analysis, the regression uses the difference in the number of plastic bags used per week before and after the ban (Q13-Q10) as one dependent variable (*y*). The predictors are questions Q7_3 and Q7_4, namely the behavior of respondents asking whether they always carry their own shopping bags before and after the ban, respectively.

Linear regression output

Under this section, a multiple linear regression was calculated to predict the changes in the number of plastic bags per week (y, which is derived from Q13-Q10) based upon Q7_3 (the behavior of respondents asking whether they always carry their own shopping bags before the ban) and Q7_4 (the behavior of respondents asking whether they always carry their own shopping bags after the ban). Preliminary analyses were performed to ensure there was no violation of the assumption of normality, heteroscedasticity, and multicollinearity. However, it was found that the assumptions of normality and heteroscedasticity were not satisfied.

From Table 8, a non-significant regression equation was found with an R^2 of .014. R-squared is an important measure that indicates how much the different predictor variables in the model affect the variance of the dependent variable. The adjusted R-squared represents the degree of generalization of the model in the population (Field, 2009). This means that Q7_3 and Q7_4 contribute 1% only to the value of dependent variable.

The predicted changes in the number of plastic bags used is equal to $-4.407 + .975\ (Q7\_3) - 1.101\ (Q7\_4)$. Each Q7_3 and Q7_4 is coded as 1 to 5 (five-point scale of Likert scale). The equation means that the changes in the number of plastics used will increase by .975 (1 plastic) for each additional scale of Q7_3 answer and will decrease by -1.101 (-1 plastic) for each additional scale of Q7_4 answer. Both Q7_3 and Q7_4 were non-significant predictors (p=.093 and p=.148 for Q7_3 and Q7_4 respectively).

We can also see the magnitude of each independent variable towards the dependent variable through the standardized coefficient. The larger the absolute value of the beta coefficient, the

[5] Q10: The number of plastic bags used per person per week before the ban. Q13: The number of plastic bags used per person per week after the ban. Q16: The number of reusable bags owned per person before the ban. Q17: The number of reusable bags owned per person after the ban.

stronger the magnitude. It can be seen from Table 8 that Q7_3 (Beta=.106) has a stronger influence on the dependent variable than Q7_3 (Beta=.092).

Table 8. Linear regression result

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.119[a]	.014	.007	9.39103
F(2,269)=1.944, p=.145[a]				

a. Predictors: (Constant), Q7_3, Q7_4

b. Dependent Variable: Changes in the number of plastic bags used

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-4.407	3.391		-1.299	.195
	Q7_3	.975	.578	.106	1.688	.093
	Q7_4	-1.101	.758	-.092	-1.452	.148

a. Dependent Variable: Changes in the number of plastic bags used

This study also asked about the motives behind Jakartans' practices of bringing their own shopping bag. Environmental reasons are found out to be the dominant motive as the average score for the answer is 4.32, followed by economic reasons and lifestyle reasons with an average score of 3.99 and 3.39, respectively (Figure 10).

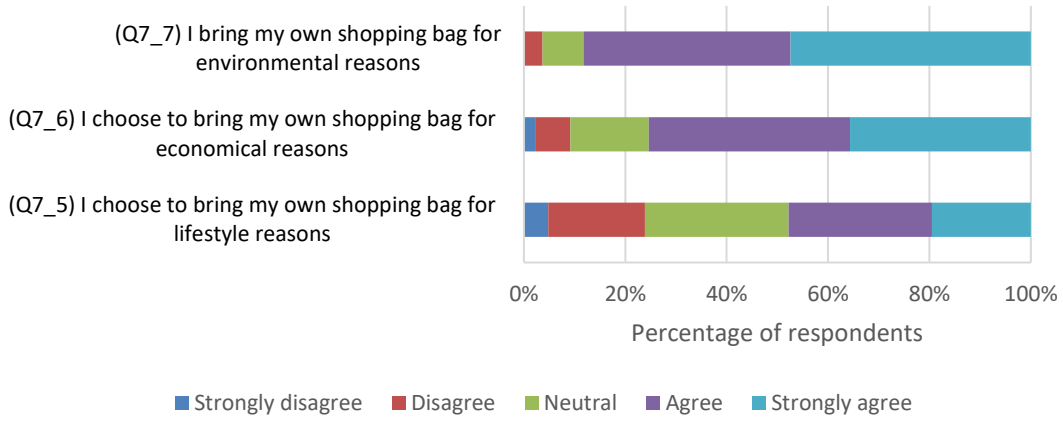

Figure 10. Reasons behind the practice of bringing own shopping bags

4.4. Correlation between the trend number of plastic bags and reusable bags with the degree to which the Jakartans support the regulation

This section investigates whether the consumption pattern of Jakarta plastic and reusable shopping bags before and after the ban is related to the extent to which Jakarta supports the

regulation. The first variable, in this case, is derived from Q7_1, which represents the community support for the ban. The second variable is derived from Q7_2, which represents the belief that the ban is good for the environment. The third and fourth categoric variable is the change of plastic and own shopping bag consumption. Because the analysis involves Likert scales as ordinal variables, a non-parametric correlation test is performed. Table 9 shows that changes in consumption of plastics and reusable shopping bags have nothing to do with the extent to which someone supports the regulations or the extent to which one believes the plastic ban is good for the environment.

Table 9. Spearman's correlation test for Q7_1 (community support for the ban), Q7_2 (belief that the ban is good for the environment), and changes in the number of uses of plastic and own shopping bags

			Changes in the number of uses of plastic bags[6]	Changes in the number of uses of own bags[7]
Spearman's rho	Q7_1	Correlation Coefficient	-.032	-.080
		Sig. (2-tailed)	.605	.186
	Q7_2	Correlation Coefficient	-.072	-.002
		Sig. (2-tailed)	.236	.968

To provide more argument about the non-significant correlation found above, another non-parametric correlation test is conducted. This time, the chi-square is used. Table 10 shows the non-significance Pearson Chi-Square for all tests. Here, variables of changes in the consumption of plastic and own plastic bags are categorized into three categories: 'more', 'same', 'fewer'. This variable transformation was done because the Chi-square test is used for categoric variables. This table further confirms that it is true that there is no relationship between changes in consumption of plastics and reusable shopping bags have nothing to do with the extent to which someone supports the regulations, nor to the extent to which one believes the plastic ban is good for the environment.

Table 10. Chi-Square test significance result

	Asymptotic Significance (2-sided)
Pearson Chi-Square for Q7_1 and categorical changes in the number of used plastic bags	.745
Pearson Chi-Square for Q7_2 and categorical changes in the number of used plastic bags	.183
Pearson Chi-Square for Q7_1 and categorical changes in the number of owned reusable shopping bags	.209
Pearson Chi-Square for Q7_2 and categorical changes in the number of owned reusable shopping bags	.104

[6] The result from the difference between Q13-Q10
[7] The result from the difference between Q17-Q16

To complement the analysis, a standard multiple linear regression analysis was performed. Similar to the previous section, here, the dependent variable (*y*) is the changes in the number of plastic bags used (Q13-Q10). Independent variables are Q7_1 and Q7_2, namely the community support for the ban, and the belief that the ban is good for the environment, respectively.

Linear regression output

Under this section, a multiple linear regression was calculated to predict the changes in the number of plastic bags per week (y, which is derived from Q13-Q10) based upon Q7_1 (the community support for the ban) and Q7_2 (the belief that the ban is good for the environment). Preliminary analyses were performed to ensure there was no violation of the assumption of normality, heteroscedasticity, and multicollinearity. However, it was found that the assumptions of normality and heteroscedasticity were not satisfied.

Table 11. Linear regression result

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.014[a]	.000	-.007	9.45775
F(2,269)=.026, p=.974[a]				

a. Predictors: (Constant), Q7_1, Q7_2

b. Dependent Variable: Changes in the number of plastic bags used

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-5.058	4.143		-1.221	.223
	Q7_1	.203	1.115	.015	.182	.856
	Q7_2	-.267	1.188	-.019	-.225	.822

a. Dependent Variable: Changes in the number of plastic bags used

From Table 8, a non-significant regression equation was found with an R^2 of .000. This means that Q7_1 and Q7_2 do not contribute to the changes in the number of plastic bags used. The predicted changes in the number of plastic bags used is equal to $-5.058 + .203\ (Q7\_1) - .267\ (Q7\_2)$. Each Q7_1 and Q7_2 is coded as 1 to 5 (five-point scale of Likert scale). The equation means that for each additional scale in the answer to Q7_1, the change in the amount of plastic used will increase by 0.203 (0 plastic), and for each additional scale in the answer to Q7_2, the change in the amount of plastic used will decrease by -.267 (0 plastic). From these non-standardized coefficients, we further prove that both Q7_1 and Q7_2 have no contribution to the value of the dependent variable. Q7_1 and Q7_2 are both insignificant predictors (Q7_1 and Q7_2 are p=.856 and p=.822, respectively).

4.5. Correlation between the trend number of plastic bags and reusable bags with respondent's profile

A statistical correlation test is also conducted to see if a characteristic of the respondent correlates with the changing behavior of Jakartans in using plastic bags. Characteristics of respondents are represented through demographic items in the questionnaire. These items include the city of home or work address, gender, age, education, occupation, and monthly expenses. First, Pearson's correlation test is conducted to investigate the relationship between plastic and own shopping bag consumption with age and monthly expenses variables. Pearson's is used because these variables (age and monthly expenses) are continuous. Table 12 shows a strong, negative correlation between monthly expenses and changes in plastic bag consumption. In other words, the higher the monthly expenses, the smaller the difference in plastic bag consumption after the ban (Q13-Q10). Meaning that the higher the monthly expenses, the less plastic bags used by a Jakartan after the ban.

Table 12. Pearson's correlation test of changes in the number of uses of plastic and own shopping bags with Q3 (age) and Q6 (monthly expenses)

		Changes in the number of uses of plastic bags[8]	Changes in the number of uses of own bags[9]
(Q3) Age	Pearson Correlation	-.040	.050
	Sig. (2-tailed)	.509	.408
(Q6) Monthly expense	Pearson Correlation	-.169**	.081
	Sig. (2-tailed)	.005	.184

**. Correlation is significant at the 0.01 level (2-tailed).

Furthermore, since the rest of the demographic variables are in nominal scales, the chi-square correlation test is used. Table 13 shows that the changes in the plastic and reusable bags used do not correlate with the rest socio-demographic variables (city of home or work address, gender, education, and occupation).

[8] Obtained from the difference between Q10-Q13
[9] Obtained from the difference between Q16-Q17

Table 13. Chi-Square for Q1, Q2, Q4 and Q5 and categorical changes in the number of uses of plastic and own shopping bags

	Asymptotic Significance (2-sided)
Pearson Chi-Square for Q1 and categorical changes in the number of used plastic bags	.795
Pearson Chi-Square for Q2 and categorical changes in the number of used plastic bags	.957
Pearson Chi-Square for Q4 and categorical changes in the number of used plastic bags	.014
Pearson Chi-Square for Q5 and categorical changes in the number of used plastic bags	.247
Pearson Chi-Square for Q1 and categorical changes in the number of owned reusable shopping bags	.616
Pearson Chi-Square for Q2 and categorical changes in the number of owned reusable shopping bags	.246
Pearson Chi-Square for Q4 and categorical changes in the number of owned reusable shopping bags	.165
Pearson Chi-Square for Q5 and categorical changes in the number of owned reusable shopping bags	.585

To complement the analysis, this section also performed linear regression. In this analysis, the regression uses the difference in the number of plastic bags used per week before and after the ban (Q13-Q10) as one dependent variable (*y*). The predictors are demographic questions, namely Q1 (city of respondents' address), Q2 (gender), Q3 (age), Q4 (education background), Q5 (occupation), and Q6 (monthly expenses).

Linear regression output

Under this section, a multiple linear regression was calculated to predict the changes in the number of plastic bags per week (y, which is derived from Q13-Q10) based upon Q1 (city of respondents' address), Q2 (gender), Q3 (age), Q4 (education background), Q5 (occupation), and Q6 (monthly expenses). Preliminary analyses were performed to ensure there was no violation of the assumption of normality, heteroscedasticity, and multicollinearity. However, it was found that the assumptions of normality and heteroscedasticity were not satisfied.

Table 14. Linear regression result

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.200[a]	.040	0.18	9.33627
F(6,265)=.1.850, p=.090[a]				

a. Predictors: (Constant), Q1, Q2, Q3, Q4, Q5, Q6

b. Dependent Variable: Changes in the number of plastic bags used

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.672	3.706		.181	.856
	Q1 (city)	-.128	.372	-.021	-.343	.732
	Q2 (gender)	-1.725	1.161	-.090	-1.485	.139
	Q3 (age)	-.003	.073	-.003	-.042	.967
	Q4 (education)	.561	.704	.051	.797	.426
	Q5 (occupation)	.267	.439	.037	.608	.544
	Q6 (monthly expenses)	-2.251	.811	-.183	-2.777	.006

a. Dependent Variable: Changes in the number of plastic bags used

From Table 8, a non-significant regression equation was found with an R^2 of .040. This means that Q1, Q2, Q3, Q4, Q5, and Q6 contribute only 4% to the value of dependent variable. The predicted changes in the number of plastic bags used is equal to $.672 - .128\,(Q1) - 1.725(Q2) - .003(age) + .561(education) + .267(occupation) - 2.251(monthly\ expenses)$. From this equation, it can be seen that additional scale of answer for variable Q4 (education) and Q5 (occupation) will lead to an increase to the changes of number of plastic bags used, meaning the number of plastic bags used after the ban will tend to increase. On the other hand, with every increase in age (Q3) and monthly expenses (Q6), as well as additional scale of answer for variable Q1 (city), the number of plastic bags used after the ban will tend to decrease. Female respondent uses -1.725 plastic bags less than males after the ban. Only Q6 was significant predictor (p=.006). Finally, from the standardized coefficients in Table 15, it can be seen that monthly expenditure (Beta=.183) has the greatest impact on the dependent variable.

4.6. Expenditure on the plastic shopping bag

Through the answers from question Q12 and Q15 in the questionnaire, the average price of plastic and reusable shopping bag can be obtained. Q12 asked respondents about the cost of a plastic bag they used to buy before the ban came into effect. Q15 asked respondents about the price of

a plastic bag after the ban was implemented. Through simple average calculations, Table 15 shows that, on average, the cost of a plastic bag increased 39%, from Rp 375 (€0.02) before the ban to Rp 519 (€0.03) after the ban. To see if the price increase is correlated with the attribute of the presence of plastic ban, which inserted in each question Q12 and Q15, Pearson's correlation test is conducted. Table 16 shows that there is a strong correlation between Q12 and Q15. It is noteworthy that the price of plastic bags asked through question Q12 and Q15 is measured from the consumer's perspective.

Table 15. Expenditure on plastic shopping bag before and after the ban

		Before plastic ban	After plastic ban
a.	Individual average number of plastic bags used per week[10]	8	2
b.	Price of one piece of plastic bag	Rp 357	Rp 519
c.	Study population	6,383,649	6,475,424
	Labor force of DKI Jakarta[11]	5,157,878	5,232,031
	Commuters from outside DKI Jakarta[12]	1,225,771	1,225,771
Expenditure of the total study population on plastic bag consumption per week (a x b x c)		Rp 18,231,701,544	Rp 6,721,490,609

Source: Own calculation, Statistics of Jabodetabek Commuter 2019 (BPS, 2019), and Labor Force Circumstance of DKI Jakarta (BPS DKI, 2019b, 2020b)

Table 16. Pearson's correlation test for Q12 (the average price per piece of the plastic bag before the ban) and Q15 (the average price per piece of the plastic bag after the ban)

		Q_15
Q_12	Pearson Correlation	.783**
	Sig. (2-tailed)	.000

**. Correlation is significant at the 0.01 level (2-tailed).

Calculating the price of plastic bags before and after the ban allows us to calculate the total expenditure of the study population for plastic bag consumption. Since this study involves only one population at a time, one assumption may be that the population size before and after the ban is unchanged. However, here it is assumed that there is a growth in the population. Therefore, we assume that the population in the state before the plastic ban is the condition of 2019 (the original number of the research population). For the population in the state after the plastic ban, statistics of labor force and commuters of 2020 from BPS are used. Jakartans used to spend 18

[10] Calculated in section 4.3

[11] The labor force before the plastic ban refers to the state of the labor force in DKI Jakarta in 2019. The labor force after the plastic ban refers to the state of the labor force in DKI Jakarta in 2020.

[12] The latest statistics on DKI Jakarta commuters available are still in the state of 2019, hence the same number.

billion rupiahs (1 million euros) per week consuming plastic shopping bags. Since the plastic shopping bag regulation came into effect, however, the total expenses of Jakarta people for plastic shopping bag consumption have dropped dramatically to almost 7 billion rupiahs (397 thousand euros) per week, savings a rough amount of 12 billion rupiahs (679 thousand euros) (See Table 15).

Indonesian consumers are not used to bringing their own bags when shopping (Zulganef, Wijaya, & Pratminingsing, 2019). Research from Suharmiati & Harni (2017) shows 72% of their sampled respondents stated that they did not or had not taken the initiative to bring their own shopping bags when shopping in retail stores. The National Socioeconomic Survey (SUSENAS) shows that only 8.7% of households always carry their own shopping bags when shopping (Idris;, Adry, Putri, Israyeni;, & Sari, 2019; Rarasati, 2019). Therefore, with regard to reusable bag, the price being asked in the questionnaire did not differ the condition before and after the ban because it is assumed that reusable bags are not popular, nor the respondents were familiar with buying reusable bags before the ban took place. The price of reusable bags bought by consumers was asked through question Q18. Using a simple mean calculation, it is found that the average price of a reusable bag from consumers' experience is Rp 10,176 (€0.60).

4.7. The avoidable external costs from plastic shopping bag ban implementation

As discussed in the previous sections, with the implementation of the plastic bag ban, Jakarta has shown to decrease 75% consumption of plastic bags annually significantly. Using this as a fraction of Jakarta's total annual plastic bag waste, the reduction in the number of plastic bags will help Jakarta reduce 1,800 tons of plastic bag waste each year[13]. As shown in Table 17, it is estimated from this research that the Jakarta plastic ban will generate 600 tons of plastic bags per year, which is 1,800 tons less than without the plastic ban. It is worth noting that this calculation is done by keeping the growth of the components such as population and the plastic waste generated constant; hence it will be further written in the discussion section as the limitation of the research.

Table 17. Amount of plastic bag waste before and after the ban

	Amount of plastic bag waste
Without plastic ban	2,400 tons[14]
With plastic ban	600 tons[15]

This section aims to answer the third research question, which is to estimate the external cost that can be avoided by reducing the number of plastic bags due to the plastic ban. In other words, the aim is to calculate the monetary values of the 75% decrease in plastic bags consumption. The monetary value here is related to the externalities or the damage costs generated by plastic bags.

[13] This is derived from own calculation of (100%-75%) x 2,400 tons[14] = 1800 tons

[14] NGO The Indonesian Plastic Bag Diet Movement in 2018 found that plastic bag consumption in Jakarta reaches up to 240-300 million plastic bags, equal to 1,900-2,400 tons of plastic bags per year (LITBANG Kemendagri, 2018)

[15] 2,400 tons[14] – 1800 tons[13] = 600 tons

From the explanation in the introduction section, we have acknowledged that plastic waste harms are various. However, this section will be limited to damages related to Jakarta's environmental cleanliness and fisheries sector (Table 18). For the former, this study will mainly focus on the environmental cleaning costs in Jakarta, which is organized by DLHDKI. Therefore, the data used comes from DLHDKI reports. In this context, the approach to calculate the external cost related to cleanliness is obtained by using the cost of waste management prevention and flood control and prevention. These costs are provided explicitly in DKI Jakarta's 2020 Environmental Management Budget. In addition, the former will also include the cost of CO2 emission from producing the plastic bags by utilizing the data from the research conducted by Akullian et al. in 2006. As for the latter, namely the harm of plastic waste in the Jakarta fishery sector, the external cost will include the annual revenue loss of the fishery sector in Jakarta. The approach to estimating this indicator is by utilizing the proxy number from the research conducted by Mouat et al. (2010).

Table 18. External costs to be estimated in this research

	Indicators
Jakarta environmental cleanliness	Waste management cost
	Flood control and prevention cost
	Monetary value of CO2 emission
Jakarta fishery sector	Fishery revenue loss

4.7.1. External costs related to Jakarta environmental cleanliness

From the data provided by DLHKI annual report, in 2020, Jakarta has a special budget of nearly 5 trillion rupiahs (280 million euros) for waste management and flood control (Table 19).

Table 19. Regional budget for DLHDKI programs in 2020

Program	Amount (million rupiahs)	Amount (million euros) *
Waste management	2,026,124	119
Flood control and prevention	2,746,792	162

**Assuming €1 equals Rp 16,952 (condition of 1 February 2021)*
Source: DLHDKI (2020a)

The assumption used to derive the reduced or avoidable external costs is by using a proportion of reduced plastic bags derived in the earlier section, that is, a 75% reduction in plastic bag consumption. So, by assuming expenses in Table 19 are the expenses in the condition before the plastic bag ban took place, it is implied that these expenses are for managing the full amount (100%) of plastic bags consumed before the ban. Hence, the 75% decrease in plastic bag consumption is assumed to equal 75% of the total expenses, which account for 3.5 trillion rupiahs[16] (211 million euros).

The next indicator is the CO_2 emission from plastic bag production. Similarly, it is assumed here that by reducing plastic bag consumption by 75% due to the plastic bag ban, this study aims to

[16] 75% x (2,026,124 + 2,746,792) million rupiah = 3,579,688 million rupiah

estimate the cost of avoidable carbon dioxide emissions from this reduction. The method is slightly different because the data available from Akullian et al. (2006) is based on the cost of each plastic bag per se. According to their research, by including the CO_2 emissions from the production of plastic bags, the additional external cost of plastic bags is equal to 28 Rupiah/bag or 0.002 Euro/bag. The reduction in plastic bags is 1,800 tons of plastic bag waste each year, estimated to be equal to 257 million plastic bags[17][18]. Therefore, the CO2 emission cost equals seven billion rupiahs[19] (0.42 million euros). See Table 20 for the complete numbers from this descriptive explanation.

Table 20. External costs of plastic bags consumption related to Jakarta environmental cleanliness

Description	Amount per year (million rupiahs)	Amount per year (million euros) *	Source
The external costs of 960 tons of plastic bags			
Waste management costs	1,519,594	89.64	Own calculation with additional data from DLHDKI (2020)
Flood control and prevention costs	2,060,094	121.53	Own calculation with additional data from DLHDKI (2020)
Costs of CO2 emission from plastic bag production	7,200	0.42	Own calculation with additional data from Akullian et al., (2006)

**Assuming €1 equals Rp 16,952 (condition of 1 February 2021)*

4.7.2. External costs related to the Jakarta fishery sector

With the aforementioned information on the harm of plastics to marine life, it is important to assess the external costs associated with the Jakarta fisheries sector. Mouat et al., 2010 in their study estimate that 2% of the total revenue from fisheries activities will be lost because of plastic waste in the ocean. Revenue from fisheries activities can be depicted by the Gross Regional Domestic Product (GRDP) of the fishery sector of Jakarta province, which accounts for 946,347 million rupiahs, contributing 0.03% to the total Jakarta's GRDP (BPS DKI, 2019a). A similar assumption is used here, that is, by reducing plastic bag consumption by 75% due to the plastic bag ban, this study aims to estimate the cost of avoidable revenue loss in fisheries from this reduction. With plastic bag only contributes to 1.26% of the total plastic waste in Jakarta bay (Cordova & Nurhati,

[17] Average weight per plastic bag is 7 grams (Roger Spranz, 2017)
[18] 1,800,000,000 gram / 7gram = 257,142,857
[19] 257,142,857 x Rp28 = Rp 7,200,000,000

2019), the annual revenue loss from fisheries activities is 95 million rupiahs[20] (0.01 million euros). See Table 21 for the complete numbers from this descriptive explanation.

Table 21. External costs of plastic bags consumption related to revenue loss in the fisheries sector

Description	Amount per year (million rupiahs)	Amount per year (million euros) *	Source
The external costs of 960 tons of plastic bags			
Revenue loss in the fisheries sector	178.86	0.01	Own calculation with additional data from BPS DKI (2019), Cordova & Nurhati (2019), and Mouat et al., (2010)

**Assuming €1 equals Rp 16,952 (condition of 1 February 2021)*

[20] Annual revenue loss in fisheries activities = 75% × 1.26% (share of plastic bag waste) × 2% (annual revenue loss in fisheries sector due to plastic pollution) × GRDP of fisheries sector
= 75% × 1.26% × 2% × 946,346 million rupiah
= 178.86 million rupiah

5 Discussion

This chapter will discuss the major finding in this thesis, its limitation and suggestions for future research. Similar studies will be included for results comparison. Since there have not been many similar studies in South East Asia aiming at similar research objectives, in addition to studies from Indonesia, some studies from Australia (Macintosh et al., 2020), Rhode Island (Akullian et al., 2006), and Nepal are also used (Bharadwaj, 2016; Bharadwaj, Baland, & Nepal, 2020; Bharadwaj, Subedi, & Chalise, 2021).

5.1 Major findings

The plastic bag ban in Jakarta through Regulation No.142/2019 was initiated in 2017. The ban made its official implementation in July 2020. From the interview with Jakarta Environmental Services (DLHDKI), it was clear that the ban acts as a starting point to encourage the people of Jakarta to use fewer plastic bags and use an environmentally friendly bag as a replacement. Considering the massive amount of plastic waste in Jakarta which accounts for 35% of the total waste, the ban is deemed substantial to reduce Jakarta's plastic waste. This is in line with a recent study that found the ban is an effective government approach to tackle the issue of plastic waste (Pramudianto, 2020). Furthermore, as a small step, DLHDKI, as the responsible institution, has been aware of this decision that the regulation was only instilled to eliminate the small proportion of the total plastic waste in Jakarta. Targeting less than 5% of the total plastic waste in Jakarta, which accounts for 70 tons of plastic bag waste, the ban is implemented only in targeted markets. The regulation has not mentioned anything about the specifications of the plastic banned. Besides, the regulation has not either provided a clear regulation about the fines for someone who violates and what they might get if they comply with the regulation. Therefore, although the ban is undoubtedly very relevant to reducing the use of plastic bags (Pramudianto, 2020), it is safe to say that the implementation has not yet taken effect because there are still many aspects of the regulations that need to be elaborated.

Online survey results suggest that the regulation has enjoyed a high level of support from more than 93% of the respondents. 14% of the respondents said they did not bring their own shopping bags into the market before the ban was implemented. After the implementation of the ban, only 3% of respondents said that they did not bring their own shopping bags. Using Spearman's correlation test, it is found that there is a sufficient positive correlation between the existence of the plastic ban and the practice of carrying plastic bags and bringing their own bags when shopping in Jakarta. Based on the previous studies aiming at investigating the perspective of Jakartans on how important the environment is, how bad the plastic for the environment is, and how often the use of plastic bags recently by Jakartans is, these findings are very relevant. A study by Suryani (2016) informs that most Jakartans have acknowledged the adverse effects of plastic waste on the environment and health. Based on the Jakarta Community Behavior Survey arranged by DLHDKI in 2018, 81.5% of Jakartans supported the regulation to reduce plastic shopping bag (DLHDKI, 2019). Furthermore, an opinion poll in late November 2018 organized by

Kompas, an Indonesian national newspaper, stated that 91.5% of Jakartans had fully supported the government program in reducing disposable plastic bag (Krisna, 2019). This number then increased to become 97.9% in August 2019 (Krisna, 2019). Seeing the community's active support for plastic reduction work, it can be concluded that the Jakarta local government has successfully granted the wishes of its citizens by issuing a plastic bag ban as one of Jakarta's efforts to reduce plastic waste. Previously in 2019, the DKI Jakarta Government was asked to consider formulating a policy to ban plastic bags (DLHDKI, 2019).

The survey results also indicate that the ban has effectively reduced plastic bag consumption amongst the Jakartans. This is depicted through the decreased average number of plastic bags usage per week, which falls from eight plastic bags per capita per week before the ban to two plastic bags per capita per week after the ban is implemented. Considering that previous research has shown that most people in Jakarta claim to have been on a plastic bag diet, this finding is reasonable (Krisna, 2019). In addition, regarding the use of environmentally friendly shopping bags, more than 60% of the survey respondents said that they had already brought their own shopping bag even before the ban took place. This is consistent with the prior data provided by DLHDKI, stating that 58% of people in Jakarta people brought their own shopping bag when they go shopping (DLHDKI, 2020b). Additionally, recent reports also have shown a declining use of plastic bags at stores (Sutrisno, 2021).

Although it has been shown that the community has been highly supportive of government regulation to reduce plastic waste, from the statistical correlation test, the high support has nothing to do with the reduction of plastic bags and the use of more reusable bags after the ban. This finding reinforces the evidence that the willingness and desire of Jakartans to reduce plastic waste has indeed always existed. Regardless of whether there is a ban, they will still further reduce the consumption of plastic bags. This is in line with the study that shows that the regulations issued by the government are not the primary driver in changing the consumers' behavior, thus do not directly drive consumers to prevent them from using plastic bags (Zulganef et al., 2019). In fact, it is not enough for the government to regulate consumers' use of plastic bags by regulating plastic bags (Zulganef et al., 2019). Laws and regulations should first be able to cultivate environmental awareness, and only then its content will be internalized into social norms (Enge, 2018; Zulganef et al., 2019).

Furthermore, the survey results show that the price of plastic shopping bags is on the rise. However, with the declining trend of plastic bag consumption, per capita expenditure remains lower after implementing the ban. Regarding the consumption of own reusable bags, according to consumer experience in the survey, the average price of a reusable bag is Rp 10,176. About 50% of the respondents agree that the reusable bags currently on the market are pretty expensive. This finding should be considered because the apparent change in behavior requires an incentive to stop using the bag and a cheaper alternative (Enge, 2018).

Plastic waste gives rise to a wide range of economic, social, and ecological impacts (Beaumont et al., 2019). The adverse effects of plastic waste are called externalities, which, if calculated, are

called external costs. This research estimated the avoided external costs from implementing the plastic bag ban. Although there are so many known externalities of plastic bags, not all of them are easy to quantify in physical and monetary units. In this research, not to mention due to time and place constraint, only four components are included in the calculation of externalities; Waste management cost; Flood control and prevention cost; Monetary value of CO2 emission; and Fishery revenue loss. This problem also happened in the existing studies for example in the research by Akullian et al., (2006). Having managed to list at least 10 environmental externalities of plastic bags in physical units, their study only managed to monetize four of them, which included CO_2 emissions from plastic bag production, litter costs, landfill costs, and improper recycling cost. The social costs that have not entirely covered all the externalities of plastic bags are reasonable since in practice, measuring the full economic costs resulting from plastic waste is extremely complicated (Mouat et al., 2010; UNEP, 2015b). However, an appropriate cost analysis of reducing plastic bag consumption can strengthen the survey findings on changes in the use of plastic bags. This requires estimating the social cost of plastic bag consumption. This is undoubtedly fertile ground for future research.

5.2 Limitations

Jakarta has made strategy and actions to reduce solid waste including plastic waste at the source by 30%. To achieve this goal, collaborative efforts are required. The plastic ban will be substantive with strong engagement and participation from society and government (Diana, 2020). Therefore, it will be useful to see the society will remain supportive of government programs in the upcoming years in reducing plastic waste in Jakarta. For that, a time series of data collection to assess community support may be beneficial for future research.

There was a negative correlation between the degree of people agreement towards the ban with the number of plastic usages through Spearman correlation, which means the more a person supports the ban, the smaller number of plastic bags he will use. While this is the case, however, this correlation is not proven to be statistically significant. This means that it is not statistically significant whether the degree of support of Jakartans for the ban implementation associates with their behavior in using fewer plastic bags. The non-significant result in statistics is called Type II error, which means there is a chance that the effect is present in the population, but the data used in the thesis does not support it statistically. While the sampling method was appropriately conducted, fewer samples, which in this thesis account for 272 responses, may still be the possible reason behind the non-significant statistics. Hence, increasing the sample size is recommended to eliminate the Type II error in future research. In order to enrich the statistical analysis, other types of statistical analysis can be followed, such as the paired T-test. The results will more clearly describe the behavioral changes of Jakartans before and after the intervention. The sampling method is a group design, but it is carried out at two-time points before and after the intervention.

Some reports have shown a declining use of plastic bags at stores due to the ban implementation (Sutrisno, 2021). However, because the ban was implemented during the COVID 19 pandemic,

it is not clear to what extent the ban is enforced on online retailers since most shopping has been taking place online. Retailers are not included within the scope of the population in this thesis. With goods and food being delivered to consumers, extra plastics provided by the retailers to cover them are undeniable. A recent study by LIPI shows an increasing amount of plastic used due to online shopping during the pandemic (LIPI, 2020). Hence, the effect of the ban on the behavioral changes of people of Jakarta concerning plastic bag consumption seem biased because it only provides perspective from consumers. Retailer's survey therefore might be beneficial for future research.

Another important thing to keep in mind is that with the ongoing regulation, it is impossible to know the type of plastic bags that have been significantly reduced due to the ban. It is also unknown to what extent the ban to what extent the ban leads to an increase in the consumption of other reusable plastic bags as a substitution because the item in the questionnaire did not specify the material of the reusable shopping bags. Recognizing the type of plastic bag can help related stakeholders, including policymakers, implement proper regulations specific to the type of plastic. For example, when policy focuses on restricting thin plastic bag—those less than 20mm, which is often the case in Nepal—it forces retailers to provide thicker bags. This increased use of thicker bags raises the bag's total weight, if not the number of bags (Bharadwaj et al., 2020, 2021). A study found that the plastic bag ban in the Australian Capital Territory did not reduce the tangible material outcome, as plastic reduced by the ban was offset by the increased use of reusable bags (Macintosh et al., 2020).

Furthermore, beyond the reduced plastic bag consumption, it is unclear to what extent the ban has produced other positive environmental impacts related to plastic waste. It could have been more informative if surveys used for this thesis included more detailed questions about how the ban influences the behavior of individuals in consuming other plastic products, for instance. This way, it will be clearer whether the government’s mission through the ban in shaping people's behavior to use as little plastic as possible apart from reducing their use of plastic bags is possible.

In Chapter 2, it has been mentioned that the externalities brought about by the consumption of plastic bags lead to the generalization of welfare loss. Generally speaking, market mechanisms do not reflect environmental damage. Therefore, it is an external effect, and the market's neglect of it will lead to welfare losses. The degree of ecological damage activity may be related to production or consumption. This research is from the consumer's point of view, so it is related to the latter. While the harmfulness of using plastic bags has always been mentioned throughout the chapter, the study does not measure the motivation of Jakartans to continue using plastic bags. Several studies, however, have asked consumers to explain their reasons for purchasing plastic bags. In a study in South Africa, the clearest response is ‘convenient’, ‘reusable’, ‘easy to obtain’, ‘cheap’, and ‘light’ (O’Brien & Thondhlana, 2019). Similar results were found in Ethiopia. The wide use, low price, light weight, and easy availability of plastic bags are the three primary reasons people use plastic bags (Adane & Muleta, 2011). Verghese et al. (2009) reported similar reasons

for the massive use of plastic bags but added that the lack of alternative bags is another factor that led to the use of plastic bags.

Although the benefits of plastic bag might not be able to be monetized yet, they are still important to be measured. By acknowledging them, it is possible to propose correct interventions around the promotion of pro-environmental behaviors For example, Enge (2018) mentioned in their research that for some people in Kenya, the abandonment of the advantage of plastic bags being ‘cheap’ was not an option because of the lack of cheaper-cost alternatives. From the studies mentioned above, the most common answer, ‘convenience’ also suggests that people can buy plastic bags simply because they are there and readily available. In terms of interventions to reduce the use of plastic bags, this may be a focus area-making it less convenient for people to buy plastic bags may lead to a reduction in the use of plastic bags. O’Brien et al. (2019) also mentioned that 13% respondents in their research tend to forget to bring their own shopping bag when shopping. This suggests that consumers may already intend to use more environmentally friendly alternatives, but they just need motivation and reminders to do so.

Lastly, due to COVID-19 measures being implemented in Jakarta, it was not possible to conduct field data collection. Hence, survey and interview were conducted over online platforms. In addition to surveys and interviews, direct observation data collection in Jakarta markets would have added more insights to the detailed findings.

6 Conclusion and recommendations

This thesis aims to investigate the effects of the implementation of the plastic shopping bag ban in Jakarta (Governor of Jakarta Province No.142/2019) on behavioral changes in the consumption of plastic bags in Jakarta. Based on the online survey conducted to collect the data, it is shown that there is a decreasing trend in the use of plastic bags by Jakartans. Before the ban, only 65% respondents would bring their own shopping bags when shopping, leading to an average of eight plastic bags usage per person per week. After the ban, 88% of the respondents agreed that they use fewer less plastic bags, generating an average of two plastic bags per week used by a person in Jakarta.

Reusable bags replace the reduction in the use of plastic bags. Before the ban, on average, a Jakartan would own three reusable bags. After the ban, a Jakartan own five additional reusable bags or eight reusable bags in total on average per person. More than 70% of the respondents stated that environmental and economic reasons were their primary motives to bring their own shopping bag to the market. While the Spearman test showed a correlation between the degree of support of the Jakartans for the ban implementation with the decreased amount of plastic bags and the increased amount of reusable bags used by the Jakartans after the ban, the P-value is not statistically significant.

Before the ban, Jakartans spent almost 18 billion rupiahs per week to consume plastic shopping bags. Since the plastic shopping bag regulation came into effect, the total expenses of Jakartans in consuming plastic shopping bag have dropped dramatically to 7 billion rupiahs per week, savings a rough amount of 11 billion rupiahs. Furthermore, on the expenditure side, reusable bags are sold at Rp 10,176 per piece in public. 50% of respondents admitted that the reusable shopping bags sold in the market are pretty expensive.

With the implementation of the plastic bag ban, Jakarta has shown to decrease 75% consumption of plastic bags annually, or about 1800 tons of plastic bags. This physical unit can be monetized into the external costs of plastic bags. Focusing on two aspects, namely environmental cleanliness and the fishery sector, four indicators are used to estimate the avoided external costs due to the plastic bag ban. The calculation found that the avoided external costs equal 3.5 trillion rupiahs of cost of waste management and flood control and prevention, 7 billion rupiahs of CO_2 emission from plastic bag production, and 179 million rupiahs of revenue loss in the fisheries sector.

There are many things in the regulations that need to be refined. Taking into account the benefits of the research results, it is strongly recommended to expand the scope of target plastic products within the scope of supervision in the future, that is, not only the current plastic shopping bags. Not only to stringent monitoring and enforcement of the ban is essential, to fulfil DLHDKI's promise to give awards to parties which carry out the regulation is still seen as an excellent approach to encourage environmental behavior of the society in avoiding plastic bag usage. The publicity

regarding the ban on plastic bags also needs to be further strengthened. National and governmental administration departments, environmental NGOs, supermarkets, merchants and student environmental volunteers should be the main and persistent force in spreading the relevant knowledge on the plastic bag ban. Consumers should be educated and guided to improve their environmental awareness and implement the plastic bag ban on their own initiative. In addition, the plastic ban has been acknowledged as one of the robust policies for plastic usage prevention in the world. From existing studies, plastic prevention is recognized as the only successful approach to deal with the plastic waste problem. Hence, this thesis does encourage DLHDKI and related stakeholders to keep and improve the ban implementation in the near future.

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Appendix 1. Questionnaire

Survey on the plastic shopping bags ban in Jakarta

Start of Block: Introduction

QX Thank you for devoting the time to complete this survey for my thesis project at Wageningen University, The Netherlands. By taking this survey you have the opportunity to win one in ten Tokopedia Giftcards each worth IDR 100,000.

This survey will take approximately 5 minutes to complete.

The purpose of this questionnaire is to collect information from the people of Jakarta regarding Governor Regulation No. 142/2019 regarding the ban on plastic shopping bags in Jakarta.

Participation in this study is completely voluntary. If you decide not to participate, there will be no consequences. Please note that if you decide to participate, you can stop participating at any time and you can decide not to answer certain questions. I as a researcher will guarantee the confidentiality of your answers. The results of this survey will only be used for scholarly purposes.

If you have any questions please contact me via whatsapp +31626225944 or email me at ria.arinda@wur.nl

Regards,
Ria Arinda

QX I have read the above information and can continue to the questionnaire.

- ○ Yes, I have read the information and consent in participating in the survey (1)

End of Block: Introduction

Start of Block: Description of respondents

QX City of home or work address

- ○ Central Jakarta (1)
- ○ East Jakarta (2)
- ○ west Jakarta (3)
- ○ North Jakarta (4)
- ○ South Jakarta (5)

Q1 Sex

- ○ Male (1)
- ○ Women (2)

Q2 Age (... years old)

_____

Q3 Educational level

- ○ SD / SMP / SMA (1)
- ○ DI / DII / DIII (2)
- ○ DIV / S1 (Bachelor) (3)
- ○ S2 / S3 (Postgraduate) (4)

Q5 Occupation

- ○ Student (1)
- ○ PNS (Civil Servants) (2)
- ○ Private employees (3)
- ○ Entrepreneur (4)
- ○ Housewife (5)
- ○ Others (6) _____

Q6 Monthly expenses

- ○ IDR 1,000,000 – 2,999,999 (1)
- ○ IDR 3,000,000 – 4,999,999 (2)
- ○ > IDR 5,000,000 (3)

End of Block: Description of respondents

Start of Block: Attitudes towards the plastic shopping bag ban (Qualitative)

Q7 Since 1 July 2020, The DKI Jakarta Province has implemented a plastic bag ban based on the regulation of the Governor of DKI Jakarta Province No. 142 of 2019, where people are prohibited from using plastic shopping bags in supermarkets, traditional markets, and malls. Please read the following statements and choose to what extent you disagree or agree with the following statements:

	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)
I agree and support the implementation of the regulation of the governor of Jakarta province No.142/2019 concerning the ban of plastic shopping bag (1)	○	○	○	○	○
I believe the plastic shopping bag ban has a positive impact on the environment (2)	○	○	○	○	○
I always bring my own shopping bag everytime I go shopping even before the regulation comes into effect (3)	○	○	○	○	○
Since the regulation is implemented, I now use fewer plastic shopping bags and bring my own shopping bag more often (4)	○	○	○	○	○
I chose to bring my own shopping bag for economic reasons (5)	○	○	○	○	○
I choose to bring my own shopping bag for lifestyle reasons (6)	○	○	○	○	○
I carry my own shopping bag for environmental reasons (7)	○	○	○	○	○
I often buy new reusable shopping bags because I forget to bring my own shopping bag (8)	○	○	○	○	○

In my opinion, currently the reusable shopping bags sold in the market is quite expensive (9)	○	○	○	○	○

End of Block: Attitudes towards the plastic shopping bag ban (Qualitative)

Start of Block: Attitudes towards the plastic shopping bag ban (Quantitative) (part 1)

*

Q10 How many plastic shopping bags do you usually buy or collect from the store per week, **before Pergub 142/2019 goes into effect**? (fill in 0 if none)

_____

Skip To: End of Block If Condition: Menurut Anda, berapa banyak... Is Equal to 0. Skip To: End of Block.

Q11 Where did you get them?

- ☐ Traditional market (1)
- ☐ Minimarket / supermarket (2)
- ☐ Mall (3)
- ☐ Others (4) _____

*

Q12 How much did most of the plastic bags cost per piece? (in Rupiah) (Fill it with 0 if it's free)

_____

End of Block: Attitudes towards the plastic shopping bag ban (Quantitative) (part 1)

Start of Block: Attitudes towards the plastic shopping bag ban (Quantitative) (part 2)

Q13 How many plastic shopping bags do you usually buy or collect from the store per week, after Pergub 142/2019 is implemented? (fill in 0 if none)

_____

Skip To: End of Block If Condition: Menurut Anda, berapa banyak... Is Equal to 0. Skip To: End of Block.

Q14 Where did you get them?

- ☐ Traditional market (1)
- ☐ Minimarket / supermarket (2)
- ☐ Mall (3)
- ☐ Others (4) _____

Q15 How much did most of the plastic bags cost per piece? (in Rupiah) (Fill it with 0 if it's free)

_____

End of Block: Attitudes towards the plastic shopping bag ban (Quantitative) (part 2)

Start of Block: Attitudes towards the plastic shopping bag ban (Quantitative) (part 3)

Q16 How many alternative shopping bags (i.e. reusable shopping bags) did you hav**e before the plastic ban is implemented**? (If none, type 0)

_____

Q17 How many alternative shopping bags (i.e. reusable shopping bags) do you have **now after the plastic ban is implemented**? (If none, type 0)

_____

Q18 How much did most of reusable shopping bag cost per piece? (in Rupiah)

_____

End of Block: Attitudes towards the plastic shopping bag ban (Quantitative) (part 3)

Start of Block: Closure

Q19 Additional information to be conveyed. (If any)

_____

Q20 Thank you very much for participating in this research.

If you'd like a chance to win one of tokopedia gift cards of Rp150,000, please leave your email address below.

_____

Appendix 2. Governor Regulation No. 142/2019

GOVERNOR OF THE SPECIAL CAPITAL REGION OF JAKARTA

GOVERNOR REGULATION OF
THE SPECIAL CAPITAL REGION OF JAKARTA
NUMBER 142 OF 2019
ON
ENFORCEMENT OF THE USE OF ENVIRONMENTALLY FRIENDLY SHOPPING BAGS IN SHOPPING CENTERS, MODERN MARKET (SELF-SERVICE), AND TRADITIONAL MARKETS
BY THE GRACE OF GOD ALMIGHTY
THE GOVERNOR OF SPECIAL CAPITAL REGION OF JAKARTA

Considering:

a. that in order to reduce piles of waste from plastic bag waste and to increase public awareness of clean and healthy environment, it is essential to implement comprehensive and integrated strategic steps, as prevention and handling of the negative impacts of shopping bags, by limiting the use of plastic shopping bags and the use of Environmentally Friendly Shopping Bags;
b. that based on the considerations as referred to in letter a, as well as the implementation of the provisions of Article 21 of Regional Regulation Number 3 of 2013 concerning Waste Management, it is deemed necessary to stipulate a Governor Regulation concerning the Enforcement of the Use of Environmentally Friendly Shopping Bags at Shopping Centers, Modern Market (Self-Service), and Traditional Markets;

In view of:

1. Law No.18 of 2008 concerning Waste Management;
2. Law No.23 of 2014 concerning Regional Government as amended several times, most recently by Law Number 9 of 2015;
3. Regional Regulation No.3 of 2013 concerning Waste Management;
4. Regional Regulation No.5 of 2016 concerning the Formation and Composition of Regional Apparatus of Special Capital Region of Jakarta;
5. Regional Regulation No.2 of 2018 concerning Marketing;
6. Regional Regulation No.7 of 2018 concerning Management and Business Development of Regional Public Companies in Pasar Jaya;

HAS DECIDED:

To Enact: GOVERNOR REGULATION OF THE SPECIAL CAPITAL REGION OF JAKARTA ON ENFORCEMENT OF THE USE OF ENVIRONMENTALLY FRIENDLY SHOPPING BAGS IN SHOPPING CENTERS, MODERN MARKET (SELF-SERVICE), AND TRADITIONAL MARKETS.

CHAPTER 1
GENERAL

Article 1

Referred to in this regional regulation as:

1. Region shall be the Capital Special Region of Jakarta.
2. Regional Government shall be Governor and Regional Apparatus as the elements of regional administrator.
3. Governor shall be the Head of the Provincial Region of the Special Capital Region of Jakarta.
4. Regional Secretary shall be the Secretary of the Special Capital Region of Jakarta.
5. Regional Apparatus shall be the Regional Apparatus of the Special Capital Region of Jakarta.
6. Department of Environment shall be the Department of Environment of the Special Capital Region of Jakarta.
7. Department of Communication, Information, and Statistics Agency shall be the Department of Communication, Information, and Statistics of the Special Capital Region of Jakarta.
8. Department of Cooperative, Small-Medium Enterprises, and Trade, hereinafter referred to as Department of Cooperative, Small-Medium Enterprises, (KUKM) and Trade shall be the Department of Cooperative, Small-Medium Enterprises, and Trade of the Special Capital Region of Jakarta.
9. Department of Investment and One-Gate Integrated Service shall be the Department of Investment and One-Gate Integrated Service of the Special Capital Region of Jakarta.
10. Mayor shall be the Mayor of Administrative City of the Special Capital Region of Jakarta.
11. Regent shall be the Regent of Administrative Regency of Kepulauan Seribu.
12. Civil Service Police Unit hereinafter referred to as *Satpol PP* shall be the Civil Service Police Unit of the Special Capital Region of Jakarta.
13. Business Practitioner shall be individual and/or legal entity who sells goods at Shopping Centers, Modern Market (Self-Service), and Traditional Markets.
14. Administrator shall be individual and/or legal entity, in the form of either a legal entity or non-legal entity, established and domiciled or conducting activities within the jurisdiction of the Republic of Indonesia, either individually or collectively, through an agreement that has obtained a business license to carry out business management of Shopping Centers, Modern Market (Self-Service), and Traditional Markets.
15. Shopping Center shall be a certain area consisting of one building, or several buildings, built vertically or horizontally, which are sold or leased to Business Practitioner or managed by themselves for trading goods.
16. Modern Market (Self-Service) shall be a shop with an independent service system that sells various types of goods at retail in the form of minimarket, supermarket, department store, hypermarket, or wholesaler.
17. Traditional Market shall be a market built and managed by the Government, Regional Government, Private-Owned Enterprise, State-Owned Enterprise, and Regional-Owned Enterprises, including cooperation with the private sector and place of business in the

form of shop, stall, stand, and stall tent that are owned or managed by small-medium sellers, independent traders, or cooperatives with small-scale businesses and small capital, where the process of buying and selling merchandise is done through bargaining.

18. Minimarket shall be a shop with a self-service system that sells various types of consumer goods, especially food products and/or other household products, with a maximum shop floor area of 400 m^2 (four hundred square meters).
19. Supermarket shall be a self-service shop with a self-service system that sells various types of consumer goods, especially food products and/or other household products, such as building materials, furniture, and electronics with shop floor area of more than 400 m^2 (four hundred square meters) and a maximum of 5000 m^2 (five thousand square meters).
20. Department Store shall be self-service store with self-service system that shells various types of consumer goods in retail, especially clothing products and accessories with an arrangement based on sex and/or age of the consumers with a shop floor area of more than 400 m^2 (four hundred square meters) and a maximum of 5000 m^2 (five thousand square meters).
21. Hypermarket shall be a self-service shop that sells various types of consumer goods in retail, especially food products and/or other household products such as building materials, furniture, and electronics with a shop floor area of more than 5000 m^2 (five thousand square meters).
22. Wholesaler shall be a self-service shop that sells various types of consumer goods in retail, especially food products and/or other household products such as building materials, furniture, and electronics with a shop floor area of more than 5000 m^2 (five thousand square meters).
23. Goods shall be any objects, whether tangible or intangible, movable or immovable, consumable or non-consumable, that can be traded, used, or utilized by consumers or Business Practitioner.
24. Consumer shall be everyone who purchases goods at Shopping Centers, Modern Market (Self-Service), and Traditional Markets.
25. Environmental Friendly Shopping Bag shall be reusable shopping bag made of any material, such as dry leaves, paper, cloth, polyester, and its derivatives or recycled materials, with sufficient thickness, which can be recycled and are designed for repeated use.
26. Disposable Plastic Shopping Bag shall be shopping bag with handles used as a container for lifting or carrying goods and is made of or contains plastic base materials, thermoplastic polymers, latex, polyethylene, thermoplastic synthetic polymeric, or other similar materials, which are hydrocarbon derived polymers, including those containing prodegradant material.
27. Disposable Plastic Packaging Bag shall be transparent bag used as packaging to wrap and to maintain sanitation of foodstuffs that have not been covered by any packaging and are made of or contain plastic base materials, thermoplastic polymers, latex, polyethylene, thermoplastic synthetic polymeric, or other similar materials, which are polymer of hydrocarbon derivatives.

28. Use shall be the provision of Environmentally Friendly Shopping Bag by the Manager in every shopping transaction.
29. Food shall be anything that comes from biological sources of agricultural, plantation, forestry, fishery, animal husbandry, water and water products, whether processed or not, which are designated as food or beverage for human consumption, including food additives, food raw materials and other materials used in the process of preparing, processing, and/or making food or beverages.
30. Community shall be an individual or a group of people, including non-profit organizations and/or other non-government stakeholders.

CHAPTER 2
PURPOSE, OBJECTIVES, AND SCOPE

Article 2

This Governor Regulation is intended as a legal basis regulating obligations of the use of Environmentally Friendly Shopping Bags in Shopping Centers, Modern Markets (Self-Service), and Traditional Markets.

Article 3

This Governor Regulation aims to provide legal certainty in the enforcement of Administrator of Shopping Centers, Modern Markets, (Self-Service), and Traditional Markets of the Use of Environmentally Friendly Shopping Bags.

Article 4

The scope of the implementation of this Governor Regulation includes:

a. the enforcement of the use of Environmentally Friendly Shopping Bags; and
b. guidance and supervision of the provision of Environmentally Friendly Shopping Bags

CHAPTER 3
THE ENFORCEMENT OF THE USE OF
ENVIRONMENTALLY FRIENDLY SHOPPING BAGS

Part 1
The Use of Environmentally Friendly Shopping Bags

Article 5

1) Administrators of Shopping Centers, Modern Markets (Self-Service), and Traditional Markets are obliged to use Environmentally Friendly Shopping Bags.
2) Regarding the obligation as referred to in Section 1), the Administrators of Shopping Centers, Modern Markets, (Self-Service), and Traditional Markets are prohibited from using Disposable Plastic Shopping Bags.

Part 2

Obligations of the Administrator of Shopping Centers

Article 6

1) The Enforcement of the Use of Environmentally Friendly Shopping Bags, as referred to in Article 5 Section 1), is carried out by the Administrators of Shopping Center by:
   a. requiring all Business Practitioners conducting business activities in the Shopping Centers under their management to use Environmentally Friendly Shopping Bags;
   b. prohibiting the use of Disposable Shopping Bags in the Shopping Centers under their management;
   c. providing information and official notification to Business Practitioners conducting business activities in the Shopping Centers under their management regarding the enforcement and/or prohibition as referred to in letters a and b;
   d. providing information and education about the Use of Environmentally Friendly Shopping Bags to consumers in the Shopping Centers under their management through audio, visual, and/or audio-visual communication media;
   e. monitoring the implementation of the prohibition on the use of Disposable Plastic Shopping Bags and the enforcement of the Use of Environmentally Friendly Shopping Bags in the Shopping Centers under their management;
   f. by giving a warning to Business Practitioners and/or Consumers who do not comply with the enforcement of obligations and/or prohibition as referred to in letters a and b;
2) In the enforcement of the obligation and/or prohibitions as referred to in Section (1) letter a and letter b, every Business Practitioner in the Shopping Center is obliged:
   a. not to provide Disposable Plastic Shopping Bags at the place of business that they manages;
   b. to provide non-free Environmentally Friendly Shopping Bags near the cashier of the payment transaction;
   c. to provide information about the use of Environmentally Friendly Shopping Bags to the Consumers; and
   d. to provide information about the negative impacts of the use of Disposable Plastic Shopping Bags

Article 7

1) Business Practitioners in the Shopping Center may provide Disposable Plastic Shopping Bags;
2) The Provision of Disposable Plastic Shopping Bags as referred to in Section 1) is only to wrap food without any packaging;
3) In the event that more environmentally friendly packaging bag alternatives are available, the provision of Disposable Plastic Packaging Bags as referred to in Section 1) is stopped

Article 8

1) In the implementation of providing information about the use of Environmentally Friendly Shopping Bags and/or the negative impacts of the use of Disposable Plastic Shopping Bags as referred to in Article 6 Section 2) letter c and letter d, Business Practitioners are required

to have and to implement the procedure of the providing information about the use of Environmentally Friendly Shopping Bags

2) The procedure of providing information as referred to in Section 1) shall at least include the following elements:
   a. providing information in the form of audio, visual, and audio-visual media to consumers related to the program of the provision of Environmentally Friendly Shopping Bags;
   b. providing information in the form of audio, visual, and audio-visual media to consumers related to the negative impacts of Disposable Plastic Shopping Bags to the environment;
   c. asking the consumers whether they bring Environmentally Friendly Shopping Bags;
   d. offering incentive for those who bring Environmentally Friendly Shopping Bags; and
   e. giving reasonable price for the Environmentally Friendly Shopping Bags
3) During the implementation of procedures for providing information as referred to in Section 1), Business Practitioners may determine the method for providing information based on their creativity and market share without diminishing elements as referred to in Section 2)

Part 3

Obligations of the Administrator of Modern Market (Self-Service)

Article 9

1) The enforcement of the use of Environmentally Friendly Shopping Bags as referred to in Article 5 Section 1) is carried out by the Administrator of Modern Market (Self-Service) by:
   a. Implementing the use of Environmentally Friendly Shopping Bags in the Shopping Centers under their management;
   b. Providing non-free Environmentally Friendly Shopping Bags near the cashier of the payment transaction;
   c. Providing information about the use of Environmentally Friendly Shopping Bags to the Consumers; and
   d. Providing information about the negative impacts of the use of Disposable Plastic Shopping Bags
   e. Giving incentive for Consumers, based on the policy of each Self-Service, in order to encourage and to appreciate the Consumers who bring Environmentally Friendly Shopping Bags
2) The Administrator of Modern Markets (Self-Service) as referred to in Section 1), including independent Modern Markets (Self-Service) and/or those integrated with Traditional Markets, Shopping Centers, or other building/area.

Article 10

1) Modern Markets (Self-Service) may provide Disposable Plastic Shopping Bags
2) The Provision of Disposable Plastic Shopping Bags as referred to in Section 1) is only to wrap food without any packaging
3) In the event that more environmentally friendly packaging bag alternatives are available, the provision of Disposable Plastic Packaging Bags as referred to in Section 1) is stopped

Article 11

1) Modern Markets (Self-Service) are required to have and to implement the procedure of the providing information about the use of Environmentally Friendly Shopping Bags as referred to in Article 9 Section 1) letter c and letter d.
2) The procedure of providing information as referred to in Section 1) shall at least include the following elements:
   a. providing information in the form of audio, visual, and audio-visual media to consumers related to the program of the provision of Environmentally Friendly Shopping Bags;
   b. providing information in the form of audio, visual, and audio-visual media to consumers related to the negative impacts of Disposable Plastic Shopping Bags to the environment;
   c. asking the consumers whether they bring Environmentally Friendly Shopping Bags;
   d. offering incentive for those who bring Environmentally Friendly Shopping Bags; and
   e. giving reasonable price for the Environmentally Friendly Shopping Bags
3) Modern Markets (Self-Service) may determine the method for providing information based on their creativity and market share without diminishing elements as referred to in Section 2).

Part 4

Obligations of the Administrator of Traditional Markets

Article 12

1) The Enforcement of the Use of Environmentally Friendly Shopping Bags, as referred to in Article 5 Section 1), is carried out by the Administrators of Traditional Markets by:
   a. requiring all Business Practitioners conducting business activities in the Traditional Markets under their management to use Environmentally Friendly Shopping Bags;
   b. prohibiting the use of Disposable Shopping Bags in the Traditional Markets under their management;
   c. providing information and official notification to Business Practitioners conducting business activities in the Traditional Markets under their management regarding the enforcement and/or prohibition as referred to in letters a and b;
   d. providing information and education about the Use of Environmentally Friendly Shopping Bags to consumers in the Traditional Markets under their management;
   e. monitoring the implementation of the prohibition on the use of Disposable Plastic Shopping Bags and the enforcement of the Use of Environmentally Friendly Shopping Bags in the Traditional Markets under their management;
   f. by giving a warning to Business Practitioners and/or Consumers who do not comply with the enforcement of obligations and/or prohibition as referred to in letters a and b;
2) In the enforcement of the obligation and/or prohibitions as referred to in Section (1) letter a and letter b, every Business Practitioner in the Traditional Markets is obliged:
   e. not to provide Disposable Plastic Shopping Bags at the place of business that they manages;
   f. to provide non-free Environmentally Friendly Shopping Bags near the cashier of the payment transaction;
   g. to provide information about the use of Environmentally Friendly Shopping Bags to the Consumers; and

h. to provide information about the negative impacts of the use of Disposable Plastic Shopping Bags

Article 13

1) Business Practitioners may provide Disposable Plastic Shopping Bags
2) The Provision of Disposable Plastic Shopping Bags as referred to in Section 1) is only to wrap food without any packaging
3) In the event that more environmentally friendly packaging bag alternatives are available, the provision of Disposable Plastic Packaging Bags as referred to in Section 1) is stopped

Article 14

1) During the implementation of procedures for providing information about the use of Environmentally Friendly Shopping Bags and the negative impacts of using Disposable Plastic Shopping Bags as referred to in Article 12 Section 2) letter c and letter d, Business Practitioners are obliged to have and to implement the procedures for providing information about the use of Environmentally Friendly Shopping Bags
2) The procedures for providing information as referred to in Section 1) shall at least include the following elements:
   a. Providing information verbally to consumers related to the program of the provision of Environmentally Friendly Shopping Bags;
   b. Providing information verbally to consumers related to the negative impacts of using Disposable Plastic Shopping Bags;
   c. Asking the consumers whether they bring Environmentally Friendly Shopping Bags;
3) Business Practitioner may determine the method for providing information based on their creativity and market share without diminishing elements as referred to in Section 2).

Part 5

The Community Rights

Article 15

1) The Community has the rights to get shopping bags easily in the form of Environmentally Friendly Shopping Bags from the Administrators;
2) The Community has the rights to bring their own Environmentally Friendly Shopping Bags and to refuse to be given Disposable Plastic Shopping Bags from the Administrators;
3) The Community has the rights to get information from the Business Practitioner about the kinds and material of the Environmentally Friendly Shopping Bags as well as the cost they shall pay if to get the Environmentally Friendly Shopping Bags.

CHAPTER 4
GUIDANCE AND SUPERVISION

Article 16

1) Regional Government shall guide the Administrators, Business Practitioners, and Consumers to fulfill their obligation as regulated in this Governor Regulation.
2) The guidance as referred to in Section 1) shall be done continuously to make it a habit for the community to bring their own Environmentally Friendly Shopping Bags for shopping.
3) The guidance as referred to in Section 1) shall be done through:
   a. Coordination;
   b. Providing information and campaign;
   c. Extension and technical supervision;
   d. Supervision and consultation;
   e. Giving reward to Administrator and/or Business Practitioner; and/or
   f. Conducting other development program to reduce plastic waste
4) The guidance as referred to in Section 1) shall be coordinated by Department of Environment executed by the Regional Apparatus, namely:
   a. Department of Communication, Information, and Statistics;
   b. Department of Small-Medium Enterprise
   c. Department of Tourism
   d. Mayor; and
   e. Regent

Article 17

1) The supervision of the implementation of the provision of Environmentally Friendly Shopping Bags shall be carried out by the Regional Government.
2) The supervision as referred to in Section 1) shall be done to ensure that the Business Practitioners provide Environmentally Friendly Shopping Bags properly.
3) During the supervision, Department of Cooperative and Small-Medium enterprise (KUKM) and Trade and Civil Service Police Unit *(Satpol PP)* coordinated by Department of Environment do the field supervision and regular monitoring to the Business Practitioners.
4) During the supervision, as referred to in Section 3), Department of Environment may involve the elements of consumer and the community.

Article 18

1) The supervision by the Department of Environment shall be carried out with considerations that:
   a. The results of field supervision and regular monitoring; and
   b. Suggestion/complaints from consumers and the community
2) The results of supervision in question shall be reported by the Department of Environment to the Governor once every 6 (six) month.

Article 19

1) Regional Government has the authority to carry out an inventory of the use of Environmentally Friendly Shopping Bags by Business Practitioners.
2) Inventory as referred to in Section 1) shall be carried out to obtain data and information about the use of Environmentally Friendly Shopping Bags, which includes:
   a. kinds of shopping bags provided;
   b. size and material of the shopping bags;
   c. price and sales of the shopping bags; and
   d. changes in the level of consumer demand for shopping bags from time to time
3) In In the event that the Regional Government carries out an inventory as referred to in Section 1) and Section 2), the Business Practitioners are obliged to facilitate the provision of data and information.

CHAPTER 5
PROVISION OF REGIONAL FISCAL INCENTIVES

Article 20

1) The Administrators of Shopping Centers, Modern Markets (Self-Service), and Traditional Markets that have carried their obligation and procedure for giving information about the use of Environmentally Friendly Shopping Bags as regulated in this Governor Regulation shall have the rights to get regional fiscal incentives.
2) The regional fiscal incentives as referred to in Section 1) shall be given in the form of tax reduction and/or relief for the business activities carried out by Shopping Centers, Modern Markets (Self-Service), and Traditional Markets.
3) The Administrators of Shopping Centers, Modern Markets (Self-Service), and Traditional Markets, as referred to in Section 1), shall submit application letter to the Governor to get the regional fiscal incentives.
4) Further provisions regarding the procedures for granting and the amount of regional fiscal incentives as referred to in section 1) are regulated in the Governor Regulation.

CHAPTER 6
COST

Article 21

The cost of guidance and supervision as referred to from Article 16 to Article 19 shall be included in the Regional Budget through the Budget Implementation Document of each Regional Apparatus.

CHAPTER 7
ADMINISTRATIVE SANCTIONS

Part 1
Administrative Sanctions for the Administrators of Shopping Centers, Modern Markets (Self-Service), and Traditional Markets

Article 22

1) The Administrators of Shopping Centers, Modern Markets (Self-Service), and Traditional Markets who do not carried out the obligations as referred to in Article 5 of this Governor Regulation shall get administrative sanctions.
2) The administrative sanctions as referred to in Section 1) shall be in the form of:
   a. Written warning;
   b. Forced money;
   c. License suspension;
   d. License revocation
3) The administrative sanctions as referred to in Section 2) shall be given based on the results of supervision by the Department of Environment.
4) The administrative sanctions as referred to in Section 2) letter a and letter b shall be given by the Department of Environment.
5) The administrative sanctions as referred to in Section 2) letter c and letter d shall be given by the Department of Investment and One-Gate Integrated Service to the holder of operational business license of Business Practitioner.
6) In addition to administrative sanctions as referred to in Section 2), the offender may be announced in publicly accessible media.

Article 23

1) Written warning as referred to in Article 22 Section 2) letter a shall be given gradually, namely the first written warning shall be given in 14x24 (fourteen times twenty four) hours, and if it is not heeded, then a second written warning shall be given in 7x24 (seven times twenty four) hours, and if it is not heeded, then a third written warning shall be given in 3x24 (three times twenty-four) hours
2) If the Administrator has fulfilled the written warning as referred to in Section 2), then the Administrator shall be freed from the obligation to pay forced money.
3) The Administrator who does not heed the third written warning in 3x24 (three times twenty-four) hours after the third written warning is issued shall be responsible of paying forced money.

Article 24

1) The Administrator as referred to in Article 23 Section 3) is subject to administrative sanctions in the form of forced money of at least Rp 5,000,000 (five million rupiah) and a maximum of Rp 25,000,000 (twenty-five million rupiah).

2) Forced money amounting Rp 5,000,000 (five million rupiah) shall be paid in 1 (one) week as from the Administrator received the letter of notification of imposition of administrative sanctions in the form of forced money.
3) Any delay in payment of administrative sanctions for forced money for more than 7 (seven) days will be subject to forced money of Rp 10,000,000 (ten million rupiah).
4) Any delay in payment of administrative sanctions for forced money for more than 14 (fourteen) days will be subject to forced money of Rp 15,000,000 (fifteen million rupiah).
5) Any delay in payment of administrative sanctions for forced money for more than 21 (twenty-one) days will be subject to forced money of Rp 20,000,000 (twenty million rupiah).
6) Any delay in payment of administrative sanctions for forced money for more than 30 (thirty days will be subject to forced money of Rp 25,000,000 (twenty-five million rupiah).

Article 25

1) The administrative sanction in the form of forced money as referred to in Article 23 shall be imposed by the Department of Environment.
2) The payment of forced money by the Administrator shall be transferred via Bank DKI.
3) Proof of deposit or receipt by Bank DKI Jakarta as referred to in Section 2) shall be submitted to the Department of Environment.

Article 26

1) If the Administrator has fulfilled the payment of forced money as referred to in Article 24, the Administrator is freed from administrative sanctions in the form of license suspension.
2) The payment of forced money shall not free the Administrator from providing Environmentally Friendly Shopping Bags.

Article 27

1) In the event that the Administrator has been given an administrative sanction in the form of forced money but does not implement it within 5 (five) weeks, then the Administrator will be subject to administrative sanctions in the form of license suspension as referred to in Article 22 Section 2) letter c.
2) The administrative sanction in the form of license suspension as referred to in Section 1) shall be given by the Department of Investment and One-Gate Integrated Service based on a recommendation from the Department of Environment regarding sanction in the form of forced money that is not fulfilled.
3) The administrative sanction in the form of license suspension shall be reported to the Governor, along with copy submitted to the Department of Environment.
4) In the event that the Administrator has paid the forced money as referred to in Article 26, the Administrator shall get the administrative sanction exemption letter for the license suspension.

Article 28

1) In the event that the Administrator has been given an administrative sanction in the form of license suspension, but does not pay the forced money, the Administrator shall be subject to administrative sanctions in the form of license revocation as referred to in Article 22 Section 2) letter d.

2) The implementation of administrative sanction in the form of license revocation shall be given by the Department of Investment and One-Gate Integrated Service with the approval from the Governor, and proposal from the Department of Environment.

Part 2

Administrative Sanctions for Business Practitioners at Shopping Centers, Modern Markets (Self-Service) and Traditional Markets

Article 29

1) Business Practitioners at Shopping Centers, Modern Markets (Self-Service), and Traditional Markets who deliberately allow the provision of Disposable Plastic Shopping Bags at the trading place for which they are responsible shall be subject to administrative sanctions in the form of a written warning.
2) The administrative sanctions as referred to in Section 1) shall be given by the Department of Environment.

CHAPTER 8
CLOSING

Article 30

This Governor Regulation shall come into force for 6 (six) months as from the date of promulgation.

For public cognizance, this Governor Regulation shall be promulgated by placing in the Provincial Regional News of the Special Capital Region of Jakarta.

Stipulated in Jakarta
On 27 December 2019
THE GOVERNOR OF THE SPECIAL CAPITAL REGION OF JAKARTA
(Signature)
ANIES BASWEDAN

Promulgated in Jakarta
On 31 December 2019
THE SECRETARY OF THE SPECIAL CAPITAL REGION OF JAKARTA
(Signature)
SAEFULAH

REGIONAL NEWS OF THE SPECIAL CAPITAL REGION OF JAKARTA
YEAR 2019 NUMBER 64003
This is a true copy of the original document
THE HEAD OF LAW FIRM OF THE REGIONAL SECRETARIAT
THE SPECIAL CAPITAL REGION OF JAKARTA

YAYAN YUHANAH
NIP 196508241994032003

Appendix 3. Interview questions

Figure 11. First expert interview with environmental services of Jakarta province (DLHDKI) through Zoom application

Interviewee: Yogi Ikhwan – Head of extension at DLH DKI (Environmental Services of Jakarta Province)

Welcome and thank you for participating in this research. I will be asking some questions about Regulation of Jakarta Governor No.142/2019 regarding plastic shopping bag ban in Jakarta. Before we start, are you okay with this interview being recorded for our research purposes?

Interview Questions in relation to Regulation of Jakarta Governor No.142/2019

1. Background of the regulation. Why was it inaugurated in 2019 while we know that other provinces have been running the pastic ban related laws even since 2017?
2. Are there any certain types of plastic bags that are banned in Jakarta? Could you explain if there is certain size of thickness of the plastic shopping bag?
3. There were scepticism arose from environmental researchers of ITB (Technological Institute of Bandung – West Java). They said that, considering there is research from DLH with the plastic bag diet movement, shopping bags only contribute 1% of total plastic waste in Jakarta. How does DLHDKI respond to this?
4. Could share the result from DLHDKI joint research with the plastic bag diet movement org?
5. Talking about the amount of fine imposed to the parties violating the plastic ban rules, so far, I see that the fines is still limited to business organizers / managers (supermarkets, markets, etc.). What about the fines for consumers? Is this also covered in the regulation? If not, will there be any sanctions for consumers in the future?
6. Where is the regulation implemented at? in grocery stores, street vendors, small shops, and not in traditional markets?
7. Is there a target from the DLH itself to reduce consumption of shopping bags?

8. In Chapter V article 20, it says that someone must submit a request to the governor in order to get an incentive for being able to follow the regulation. In case of unregulated traditional small shops, who is responsible to do that?
9. During covid, there have been so many online transactions. How is the supervision to make sure that the regulation still obeyed? According to LIPI, in the research of "The Impact of Large-Scale Social Restrictions (PSBB) and Work From Home (WFH) on Plastic Waste in the Greater Jakarta Area" , 96% of goods packages delivered to e-commerce users are wrapped in thick plastic and bubble wrap. How does DLHDKI respond to this?
10. Is there any special budget in your institution for this regulation? How much?
11. If there are other supporting materials / complementary information for the governor's regulation, please send it to ria.arinda@wur.nl.

Thank you for your participation in this interview. The result of this interview, together with prior questionnaire sent to Jakarta people will be used to analyze the behavioral changes in using plastic shopping bag in jakarta. Your answers are deeply appreciated. (If possible: ask them to join the thesis presentation).

Appendix 4. Regional Budget for Environmental Management in DKI Jakarta

No	Budget allocation program	Amount (Rp) for year 2020
1	Environmental pollution and destruction control program	75,526,363,466
2	Solid waste management program	2,026,124,700,420
3	Flora and fauna conservation program	121,165,628,933
4	Urban and environmental planning coordination program	367,463,700
5	Forest management program	1,002,314,071,802
6	Park management program	3,690,469,474,436
7	Clean water development and management program	208,641,464,822
8	Wastewater development and management program	640,773,069,213
9	Flood and abrasion control program	2,746,792,249,959
10	Operational transportation program	350,062,939,128
11	Spatial planning program	0
12	Groundwater conservation and subsidence control program	19,034,367,755
	Total	10,862,237,425,879

Source: (DLHDKI, 2020a)