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The Kenyan Ban on Plastic Bags: A study of attitudes and adaptation in Nairobi

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Declaration

I, Caroline Enge, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature.....

Date.....

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Abstract

The attention toward plastic pollution has increased in recent years, especially due to concern over marine pollution and microplastics. Although plastic bags constitute a small share of the total plastic waste, they have become the target of a number of local and national policies that aim to reduce the consumption of these bags. There are a large number of issues related to plastic bag pollution, especially in developing countries where insufficient waste management and lack of infrastructure can exacerbate the problems. However, implementing a policy and establishing new institutions can affect social groups and individuals differently. The effectiveness of such policies depends not only on the nature of the problem, but also the social context.

Plastic bag pollution is a classical environmental problem and a solution requires coordination of human behaviour. From a new institutionalist perspective, I attempt to describe and understand Kenya's recent ban on plastic bags in terms of how it is affecting behaviour and attitudes among people in Nairobi. Through interviews and a small survey among inhabitants in different parts of the city, I found that the implementation and enforcement of the ban was strict, but there were a number of exemptions. While the views on different aspects of the ban varied, the support for the ban was strong, and the support had increased after the ban was implemented. I also found that awareness of the problems caused by plastic bags seemed high among the respondents. In terms of adaptation, the lack of alternatives to the bags created challenges, especially for people in informal settlements. While the behavioural changes varied between groups and individuals, the ban had affected most of the participants.

Uncovering any actual effects of awareness and attitudes on behaviour under a strict ban is challenging. While the strict enforcement of the ban ensured compliance, long term changes in the motivation and attitudes of the actors are necessary for the ban to last. While a ban may alleviate some of the issues related to plastic bag waste, it cannot solve the underlying problems, including an insufficient system for waste management in a growing city.

Key words: Institutions, policy instruments, Kenya, plastic bags, pollution, attitudes, perceptions, behaviour, motivation.

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Abbreviations

AWEMAC	Africa Waste and Environment Management Centre
CO ₂	Carbon dioxide
EAC	East African Community
EALA	East African Legislative Assembly
EMCA	The Environmental Management and Co-ordination Act
EU	European Union
HDPE	High-density polyethylene
KAM	Kenya Association of Manufacturers
KEBS	Kenya Bureau of Standards
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
KSh	Kenyan Shilling (currency)
LDPE	Low-density polyethylene
NACOSTI	National Commission for Science and Innovation
NCAJ	National Council on the Administration of Justice
NEMA	National Environmental Management Agency
NGO	Non-governmental organisation
PP	Polypropylene
UNEP	United Nations Environment Programme
WEF	World Economic Forum
WWF	World Wide Fund for Nature
µm	Micron/ micrometre

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1. INTRODUCTION

Plastic bags were banned in Kenya 28 August 2017, after several attempts to reduce plastic bag waste in the country. An unsuccessful tax and standard on plastic bag production was replaced with a strict command-and-control instrument targeting both producers and consumers. In recent years many countries, states and cities have increased their efforts to reduce the consumption of plastic bags. While some have been successful, others had less impact or caused unintended side-effects. As more policies are adopted to combat plastic pollution and reduce the consumption of single-use plastics, it is necessary to gather knowledge on how these measures work, in order to select the most effective solution and avoid unforeseen consequences. The strict laws on plastic bags in Rwanda and now Kenya are often presented as ‘role models’, in particular for low-income countries. However, it has been argued that conventional measures to reduce plastic bag consumption will not have much effect in Nairobi (Njeru 2006), as underlying factors determine the use of plastic bags among low-income citizens. Based on fieldwork in Nairobi in April – June 2018, I analyse the effect on behaviour and perceptions of the recent ban on plastic bags. I hope this study may provide an example of how a plastic bag policy affects individual behaviour and perceptions within different socioeconomic groups in a large city in a developing country.

1.1 Aim of the thesis

My aim is to describe and understand how the Kenyan plastic bag ban is implemented and how it was intended to change people’s behaviour toward reducing the use of plastic bags. I chose the case of Kenya because the country has attempted to reduce plastic bag consumption for a long time, and the ban was so recent that it was possible to get an impression of the situation before and after implementation. From an institutional perspective I wanted to examine how the underlying mechanisms of this legal instrument may work to achieve behavioural change. By visiting Nairobi and conducting semi-structured interviews, a structured survey and observing the current situation, I was able to get a better impression of how the ban is implemented. To identify the factors that determine choices and adaptation, I analyse variances in behaviour and perceptions between different groups in the population. The research and analysis are based on the following three research questions:

- 1. What are the main characteristics and intentions of the ban on plastic bags, and how was it implemented in Nairobi?*

2. *How is the ban perceived by different members of the community, and what determines differences in their attitudes toward the ban?*
3. *How did individual behaviour change after the ban, and are socioeconomic factors relevant determinants of adaptation?*

1.2 Limitations

With the exception of a visit to a bag manufacturer in Mombasa, all data were collected in Nairobi. Plastic bag waste is a widespread urban problem. It is also affecting rural areas where most of the Kenyan population lives, but the focus in this thesis is primarily on Nairobi. Like I also discuss in the methodology chapter, the selection of interview subjects and survey respondents is not random, and the informants are not representative of any population other than the one that was sampled. While I have attempted to get a broad range of views and sources of information on the ban, all perspectives and opinions are not necessarily represented. The field work was conducted 8–9.5 months after the ban was implemented. The findings are therefore only a snapshot of the situation at the time, and I cannot predict the long-term effects of the ban or how it will be enforced in the future. As it was still too early to say much about environmental impact, I have chosen to focus on behavioural and social aspects of the ban in this thesis.

2. BACKGROUND

In this chapter I describe how plastic bags reached the environmental agenda globally, before outlining typical problems associated with plastic bags and policies aimed to alleviate or reduce these problems. I also summarise the regional context and how the plastic bag problem has been treated in Kenya. I then describe the geographical area, including relevant information about the country, the city of Nairobi and its inhabitants.

2.1 The ‘war’ on plastic

Parallel to the exponential growth in the plastic industry, there is an emerging agenda against the harms of plastic waste. Single-use plastics, and particularly shopping bags, have become a symbol of consumption and a throwaway society (Ritch et al., 2009). Plastic is a by-product from oil refining, and around six percent of the world’s total oil production is used for plastic (WEF 2016). Of the more than 300 million tons of plastic produced every year, 26 percent is used for packaging products. In 2013, an estimated 14 percent of plastic packaging was recycled, while 40 percent went into landfills and 32 percent leaked into the environment

(WEF 2016). According to the European Commission (2018), single-use plastics make up fifty percent of all marine litter. The consequences, from animals ingesting plastic bags to the accumulation of microplastics in water and living organisms, are causing growing concern. In February 2017 UN Environment launched its ‘Clean Seas’ campaign. This declaration of “war on plastic” (UNEP 2017b) aims to eliminate major sources of marine litter. Bans or taxes on plastic bags are among the measures encouraged by the UN. Similarly, the EU adopted a directive in 2015 requiring member states to reduce consumption of plastic bags. This is now part of the *European Strategy for Plastics in a Circular Economy* (European Commission 2018). In Africa, the intergovernmental organisation East African Community (EAC) has passed a bill imposing strict regulations on polythene materials, but the member states are still debating its implementation (Koech 2018).

Although plastic bags constitute a small share of the total amount of plastic litter, they have become a popular target of environmental policies. One reason could be that the bags are highly visible in the environment. Although improper disposal is the main problem, most policies aim to somehow reduce consumption. According to UNEP (2018, p. 65), data from more than 60 countries’ experience with plastic bag policies show that around 30 percent of the national bans or levies resulted in dramatic declines in plastic bag pollution. 20 percent had little or no impact. In the remaining 50 percent of cases, there was no information on the impact of the policy, due to recent implementation or weak monitoring. There are also many sub-national policies, for example more than 100 cities and counties in the United States have passed plastic bag regulations (Larsen and Venkova 2014). The overview provided by UNEP (2018) uncovers clear regional patterns. Africa currently has the largest number of countries with plastic bag bans, but more than half of these regulations were implemented in the past five years. Europe is the only continent with a majority of economic instruments and private-public agreements, while bans outnumber other instruments in the rest of the world. The pattern is similar at sub-national level.

2.2 Characteristics of plastic bags

As for other plastic products, the consumption of polythene shopping bags has escalated. Estimates vary between 1 and 5 trillion plastic bags used annually worldwide (UNEP 2018). Most plastic shopping bags used by supermarkets, food vendors and retailers consist of HDPE (high-density polyethylene). Other types, such as thicker glossy bags or filmy thin bags can also be made from LDPE (low-density polyethylene) (Muthu and Li 2014). There are also ‘fossil free’ alternatives available, such as bioplastics derived from corn starch or

sugar. These materials resemble plastic in many ways and are often only biodegradable or compostable under certain conditions that rarely occur in the environment such as high temperature over time. Bags made from bioplastics are therefore not regarded as an optimal replacement for regular plastic bags (UNEP 2018; WEF 2016). With regards to standards, plastic bags are often classified according to thickness, usually measured in microns (micrometre – μm) or gauge. The properties that made plastic bags so popular in the first place, such as low weight, portability, durability and low costs of production, are also causing a range of problems. Below I summarise common claims of negative consequences and reasons for reducing the consumption of plastic bags:

Environmental degradation:

- Plastic bags are non-biodegradable and stay in the environment for years. They eventually degrade into smaller pieces that become microplastic, which often ends up in the ocean.
- Wild animals, birds and fishes are injured or killed by getting entangled in, or ingesting, the bags.
- Bags in the soil may cause erosion and decrease soil fertility, indirectly threatening biodiversity.
- Most plastic bags are made from fossil raw materials, causing greenhouse gas emissions that lead to global warming and climate change.
- Some plastics contain toxic chemicals that leak into soil or water, and may also cause chemicals to accumulate, for example in microplastics.

Human health risks:

- Bags collect rainwater and become breathing grounds for mosquitoes, increasing risk of malaria and other viruses, as well as waterborne diseases.
- When plastic waste is burned, toxic gases are released into the air.
- In areas with little access to sanitation, plastic bags are used as “flying toilets”, which cause unhygienic conditions and spread diseases.
- During rainy season the bags cause blockages of pipes and drains, exacerbating floods that could pose a direct risk to human lives. Floods also increase the risks of unsanitary conditions and contamination of drinking water.
- When accumulated, some of the chemicals added to plastics can affect the human hormone system. This can be linked to health risks and certain types of cancer.

Economic issues:

- The effects on soil quality and livestock threaten food production and the livelihood of farmers.
- Bags accumulated in rivers, waterfalls, trees or other parts of the scenery are unaesthetic and may hurt tourism and other economic activities in certain areas.
- Marine plastic pollution hurts fisheries and shipping.
- The clean-ups of plastic debris and the damage created by bags are costly to abate.
- The low recycling rate of plastic packaging and limited usage means that most of the product’s value is lost after very short time.

Sources: European Commission (2018); Plastic Pollution Coalition (2016); Rayne (2008); Ritch et al. (2009); UNEP (2018); WEF (2016).

2.3 Regional context

The discussion on plastic waste has been ongoing for years within the East African Community (EAC), where Kenya is a member together with Burundi, Rwanda, South Sudan, Tanzania and Uganda. The EAC finance ministers agreed to ban plastic bags thinner than 30 microns as early as 2007 (Wakabi 2013). In 2017, the East African Legislative Assembly (EALA), passed the *Polythene Materials Control Bill* banning the manufacture, sale, import and use of polythene bags despite strong opposition from manufacturers (Karuhanga 2017). Kenya's current ban includes import and export of bags, but some argue that the country's porous borders threaten this policy. Several of the EAC member states have large plastic industries, and plastics are imported and exported across the region. According to the Kenya Association of Manufacturers (KAM 2017), 176 plastic manufacturing companies were employing 2.89 percent of the Kenyan workforce and another 60,000 people were indirectly earning their livelihoods from plastics. However, these numbers are contested by the Ministry of Environment (Kisika 2017). Another estimate is around 260 manufacturers employing 80,000 people in Kenya, Uganda and Tanzania together (Wakabi 2013).

Rwanda was one of the first African states to pass legislation on plastic bags in 2008 (Danielsson 2017). Among the East African countries, Tanzania and Uganda also have regulations, but enforcement is lacking (Kiprop 2017). What may draw special attention to environmental issues in Kenya, is the United Nations Environment Programme (UNEP) which has its headquarters in Nairobi. UNEP was involved in developing policy proposals and pushing toward economic instruments on plastic bags in Kenya in 2005. Njeru (2006) sees the proposed policy package as a part of UNEP's *Sustainable Cities Program* and also heavily influenced by the *Environmental Planning and Management* agenda. More recently, UNEP has also emphasised legal regulations on single-use plastics (e.g. UNEP 2018). When Kenya introduced the ban in 2017, the UNEP Secretary General stated that "Kenya should be commended for its environmental leadership. It's a great example that I hope will inspire others" (UNEP 2017a).

2.4 Previous efforts against plastic bags in Kenya

Article 42 of the Kenyan constitution states: "Every person has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures" (Laws of Kenya 2010). Kenya has a long history of environmental protection, particularly wildlife conservation. One of the prominent voices to raise the issue of plastic bags, was Nobel Peace

Prize laureate, assistant minister for Environment and Natural resources from 2003 – 2005 and founder of the Greenbelt movement, Wangari Maathai. She started the *Mottainai campaign* encouraging people to respect the environment and avoid wasting resources, in order to “eliminate waste plastic from littering the natural environment” (Green Belt Movement 2018).

The Kenya Association of Manufacturers (KAM) and the National Environment Management Authority (NEMA) worked together on a plastic bag management strategy already in 2003 (Mukui 2015). One of the proposed measures was a standard to get rid of the very thin, so-called ‘flimsy bags’. This was implemented in October 2005 by the Kenyan Bureau of Standards (KEBS), raising the minimum thickness of polythene bags produced in or imported to Kenya from 15 to 30 microns. It was anticipated that more durable bags would encourage reuse and recycling (Mukui 2015). In February the same year, Kenyan government agencies (including KIPPRA and NEMA) in collaboration with UNEP proposed a policy package of seven instruments “to be introduced gradually over a two to three year period”:

1. A ban on plastic shopping bags that are less than 30 microns in thickness
 2. Consumer awareness and anti-littering campaign
 3. Promotion of voluntary schemes such as a national code of practice for retailers
 4. A plastic bag levy collected from suppliers
 5. Support for development of environmentally-friendly alternative bags
 6. Support for development of an effective plastic bags recycling system
 7. Support for development of a managed disposal system to cater for the plastic bags that will enter the waste stream irrespective of the measures taken.
- (UNEP 2005, p. xiii).

A *Plastics Levy Management Committee* would oversee and ensure implementation. This committee, as well as monitoring and recycling activities, would be funded by revenues from the proposed levy. A number of stakeholders were consulted in the process, including government agencies, local government, industry, retailers and consumers (UNEP 2005). According to Kiprop (2017), the pilot project in 2005 collapsed “almost immediately”. Njeru (2006) criticised the proposal for failing to acknowledge the lack of sufficient municipal services in Nairobi, such as waste management and sanitation. Njeru (2006) also describes how plastic manufacturers pushed back by highlighting their role as major employers. They also argued that plastic contributes to forest protection (because paper bag production requires logging) in their efforts to avoid regulation. Despite the protests, the Ministry of Finance attempted to introduce an excise duty of 120 percent on plastics in 2007 (Mukui 2015). In 2011 a new standard was proposed, increasing the minimum thickness of plastic bags to 60 microns (Kiprop 2017). According to Mukui (2015), Nairobi County also

attempted to ban plastic bags below a certain size and thickness locally in 2014, but the bill was never passed. There are some examples of voluntary initiatives, like the collaboration between KAM and the supermarket chain Nakumatt who together have organised school children to pick plastic bags and bottles for recycling (ibid.).

2.5 The 2017 ban

28 February 2017, the Ministry of Environment issued a gazette notice, informing that:

the Cabinet Secretary for Environment and Natural Resources has with effect from 6 months from the date of this notice banned the use, manufacture and importation of all plastic bags used for commercial and household packaging defined as follows: (a) Carrier bag – bag constructed with handles, and with or without gussets; (b) Flat bag – bag constructed without handles, and with or without gussets (NEMA 2017b).

The law was *gazetted* directly by the Minister of Environment. It is not a separate bill passed in parliament, but an addendum under the existing law. In this case it is the *Environmental Management and Co-ordination Act* (EMCA 1999) chapter 3, which states that all Kenyans citizens are “entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment”, and chapter 86 on standards for waste. While often described as a complete ban on plastic bags, bags used for industrial packaging, such as bread and other food products, are exempted as long as they are “not available on sale at the counter or given freely outside the industrial setting” and “clearly labelled (Printed) the name of the industry and product” (NEMA 2017a). If approved, the actor responsible for the bags is expected to “take due diligence to segregate and direct all used plastics materials to recycling facilities and NOT DUMPED together with general waste” (ibid.).

According to the law, offences are punished by a minimum fine of 2 million KSh (approx. 2,000 USD), or one year in prison (NEMA 2017d). The ban is enforced by NEMA, and a joint implementation committee was established to manage the transition. NEMA (2017e) has responded to allegations that police and NEMA officers were stopping cars to search for bags and arresting people to pressure them for bribes. It was clarified that all NEMA officers have to identify themselves. The minister of environment at the time, Judy Wakhungu (2017) argues that awareness of the ban was raised mainly through media appearances. There was also a list of frequently asked questions about the ban on NEMAs website, in print and in newspapers. NEMA arranged awareness meetings with various stakeholders. On 24 and 25 August, just a few days before the ban went into force, the Ministry of Environment arranged a two-day exhibition of alternative packaging materials in Nairobi (NEMA 2017c). Immediately after the ban was in force, employees in the manufacturing industry protested in

Nairobi. There has also been attempts to stop the ban in court. In June 2018, the lawsuit against NEMA, the Minister of Environment and the Attorney General by several importers and exporters together with KAM over the ban was declined (Kakah 2018).

2.6 Description of the research area

A brief overview of Kenya

Nairobi is Kenya's capital and largest city with a population of 3.9 million. It is situated inland, north-west of the coast and east of Lake Victoria. The total Kenyan population is 47.9 million (Mälkki et al. 2017). Kenya is the economic centre in the East African region. Famous for its wildlife and national parks, it is also a popular tourist destination (Utenriksdepartementet 2018). Kenya is considered a lower middle income country. It has made big improvements in areas such as health, education and economic growth with an ambition to become a middle-income country by 2030 (Saferworld 2016). Kenya became a republic in 1963, after 68 years of British colonial rule. The country has a long history of ethnic conflicts and political marginalisation, that escalated in violence in the 2007 elections. A new constitution was adopted in 2010, devolving power to the 47 counties. Both rule of law and control of corruption are still quite weak, and public confidence in state and police is low (Mälkki et al. 2017). According to a survey by Transparency International (Pring 2015), 37 percent of Kenyans who used public services in the past 12 months had paid a bribe.

Standards of living

According to the Kenya National Bureau of Statistics (KNBS 2018), the unemployment rate in Kenya was 7.4 percent in 2015/16. More than 14 million Kenyans work in the informal sector, and wages vary greatly between rural and urban areas. In 2017, the monthly minimum wage for general labourers was 12,926.55 Ksh* in urban areas. The average annual wage in public and private sector was 684,097 KSh (57,008 KSh per month). The KNBS' definition of middle-income households is a monthly expenditure between 23,671 – 119,999 KSh, while households or individuals with a monthly expenditure per person less than 2,551 KSh are considered to live in extreme poverty (in core-urban areas). The definition of overall poverty is less than 5,995 Ksh in monthly expenditures per person. The sums are lower in rural areas. The share of people living in overall poverty is quite low in Nairobi (16.7 percent) compared to the national level (36.1 percent). The contrasts within the city are big, and there is a tendency of segregation between formal and informal settlements (K' Akumu

* 100 Kenyan Shilling \approx 1 US Dollar (2018)

and Olima 2007). Njeru (2006, p. 1051) writes that many city-dwellers view Nairobi as a second home after their rural birthplace, which may also affect their attitudes.

The status of plastic bags in Nairobi

The problem of plastic bag waste is exacerbated in urban areas by population growth and density, a large informal sector and lack of waste management services (UNEP 2005). Aurah's (2013, p. 96) study on plastic bag waste in Nairobi concludes that the problem is partly due to inadequate waste management and a "throw-away culture by the public". According to Njeru (2006, p. 1051) plastic bags used to be "part of the city cultural identity". In interviews with consumers, Njeru (2006, p. 1051) found that half of the respondents "were either unaware or did not understand the environmental consequences of improperly disposed plastic bag waste". Plastic bags were popular as they were cheap and had a wide range of uses. For example, people would use plastic bags on their hands to avoid touching food, and especially during water shortages plastic bags played "an important 'public health' role" (ibid.). This leads Njeru (p. 1056) to conclude that "[b]anning certain types of plastic bags, and doing awareness campaigns may be futile in the long-run in reducing consumption of plastic bags, because lack of sanitary services has forced Nairobi's poor city residents to devise other uses for plastic bags beyond those concerning shopping". Mukui's (2015) study of plastic material streams in Nairobi confirms the persistently unequal distribution of waste management services. She found that 24 percent of the plastic waste was not collected, which is causing accumulation of pollution and illegal dumping. Mukui (2015) concludes that there are big knowledge gaps on the amount of plastic materials in circulation in Nairobi.

Access to waste management

Nairobi County is responsible for solid waste management in the city, but it has been sharing this job with a number of private companies since 2002, when private actors were allowed to enter the waste management business (Mukui 2015). There are also a number of community-based organisations and youth groups that collect waste in low-income areas and informal settlements. Many of them are licenced by the county. According to Mukui (2015) these groups used to charge the households around 200 KSh per month to bring them plastic bags for waste and collect them. But as many cannot afford this, illegal dumping of waste along roads, in rivers and other open spaces, as well as private incineration in backyards became a problem. As little as 33 percent of the waste generated was collected in 2009. Residents in low-income areas generate less waste per person than high and middle-income residents, but the total amount of waste generated in these areas is much higher due to the population

density. While waste collection is readily available in high- and middle-income areas, the collection rate is low in the informal settlements (Mukui 2015). Most of the waste in Nairobi ends up at the Dandora open landfill around 7 kilometres east of the city centre. It was supposed to close in 2012, but it is still in use as the opening of a new dumpsite in Ruai has been delayed (Onyari 2017). Many people earn their livelihoods from scavenging waste there, and there is an ongoing turf war between different gangs (Mukui 2015).

3. LITERATURE REVIEW

In this chapter I first present an overview of theories on environmental problems and their solutions. I describe how different types of policy instruments are designed to establish or transform institutions that again affect behaviour and perceptions. I then describe some of the empirical evidence on different policies and efforts to reduce the use of plastic bags, especially with regards to changes in behaviour and attitudes. Although my main focus is on a ban, I find it useful to include theoretical perspectives and research on other policy types. Different instruments may activate other motivations but aim toward the same end, and these insights may also help to understand the previous situation in Nairobi better. Finally, I include a section on policy evaluation and challenges related to complex causality.

3.1 Coordinating environmental action

The nature of the problem

Environmental problems are usually triggered by our actions, and guiding human behaviour is essential to solve them (Young 2008). Problems of collective action occur when there are no sanctions or rules for using the common good (Hardin 1968). Even if cooperation is in everyone's interest to avoid overuse and collapse of the resource, it becomes rational for individuals to 'free ride' and exploit the resource as much as they can in the short term when 'everyone else' does it. Environmental conflicts typically arise either over access to resources or the side-effects of using them (Vatn 2015). In symmetrical conflicts the polluters bear the costs of their actions. If the consequences are unequally distributed, some gain more than others from coordination. Asymmetry can arise from spatial differences, for example a polluter located upstream in a river gains while the 'victim' downstream suffers the consequences. Polluters today can also shift the costs onto future generations. Asymmetry may also derive from economic differences, since "[poor] people use fewer resources (...) and are less able to defend themselves against negative effects" (Vatn 2015, p. 67).

Establishing the rules

The solution involves introducing a governance regime and establishing rules for access and interaction, or “abandon the commons” (Hardin 1968, p. 1248). Young (2008, p. 110) sees the process of creating environmental institutions “as exercises in overcoming collective-action problems”. A resource regime is essentially an institutional arrangement that settles who has the right to use the resource and thereby produce waste, and who is responsible for the consequences. In *The problem of social cost*, Coase (1960) writes that if activities like building a house or driving a car are seen as rights, then exercising them will deny others their right to a view or unpolluted air. The ‘harmful effects’ are inherent parts of the activity and the question is how to deal with them. Coase argues that if there were no transaction costs, the conflict over side effects could be settled in a contract where actor A agrees to compensate B for their loss. This is more efficient because the total loss is less than if A ceases production. In this ‘Pareto optimum’ the marginal gains of production and marginal costs of the externalities are equal, so changing the situation in any direction will make some of the actors worse off than before (Vatn 2015, p. 199). In reality, obtaining information and negotiating the contract can be costly. Coase (1960, p. 18) argues that sometimes government regulation is more efficient for allocating rights and responsibilities when transaction costs are high – especially if “a large number of people are involved”.

3.2 Motivations for human behaviour

Rational choice

To understand how policy instruments can coordinate action by affecting behaviour, it is useful to look at theories of human rationality. Classical economics base its models on rational choice theory, assuming that all individuals act to achieve as much personal gain as possible. The classical economic perspective assumes that all actors make fully informed decisions and that transaction costs are zero. In reality information and coordinating behaviour are costly, as pointed out by Coase (1960). The neoclassical or new institutionalist perspective take this into account and view the self-interested *economic man* as an ideal type, not a description of reality. It is still assumed that individuals make decisions to maximize their benefits and minimise costs. Institutions are perceived as constraints that shape individual behaviour and interaction. Since preferences are assumed to remain stable, people will only change their behaviour if institutional constraints such as prices or sanctioned rules change. Ostrom (2000) however, acknowledges that individual preferences are affected by

society, for example through experience or learning from others. In Vedung's view (1998, p. 34), policy instruments constitute of two parts: their 'action content' tells people what to do or how to behave, while the 'authoritative force' indicates how much power the government will use to make people comply.

Institutions as rationality settings

Social constructivists on the other hand, do not accept that rational choice theory alone can explain what motivates people's actions. It is argued that individuals always adjust their behaviour according to cultural or social setting. From this perspective, institutions are broadly defined as the "norms, conventions and formally sanctioned rules" that frame human interaction (Vatn 2015, p. 78). They provide 'cues' for what type of behaviour or rationality is appropriate in a given situation. 'I-rationality' or maximizing self-interest can still be appropriate in certain settings, while other times prioritising the collective interest, or 'we-rationality' is encouraged. For example, in an experiment where people are invited to play a 'community game' they become more willing to cooperate as the name indicates social rationality, than if the same game is called the 'Wall Street game' (Vatn 2015, p. 122). Sometimes, people may even act to the benefit of others at the expense of their own interest, so-called 'they-rationality' or true altruism. Motivation then comes from a combination of potential rewards and punishments that can be external or internal – in the form of feeling good or bad about our actions. In this view, a policy instrument can be defined as a change in underlying conditions and motivations for human action (ibid.).

Individual attitudes and perceptions

Even if institutions signal what rationality is expected, there is no guarantee that everyone interprets this the same way. Choices also reflect personal values, perceptions and experiences – that again depend on one's position in society (Vatn 2015, p. 178). Weber et al. (2004, p.281), argue that identity and social roles are central to understand how individuals behave in certain situations. This is based on a 'logic of appropriateness', suggesting that people decide what to do by implicitly asking "what does a person like me do in a situation like this?". Vatn (2015, p. 80) underlines that perceptions are key in environmental governance because what we believe determines how we behave. Van der Doelen (1998, p. 156) also emphasises the importance of knowing how the logic of a policy will affect people: "if the policymakers are unaware or misinformed as to the values, beliefs, behaviours, and incentive systems of the intended recipients of the instruments – the targets – the initiative is likely to have a poor rate of success".

Habits or reflection?

While the rationality types say something about how behaviour is shaped in theory, they can be difficult to observe empirically. In real life, gathering all available information for every little decision is not always rational or even possible. It is more efficient to base choices on the information available and make the best of it, so-called ‘satisficing’ or bounded rationality (Vatn 2015, p.119). There is debate over the role of information and reflection when so much everyday behaviour is based on habits and social practices. Strategies to affect behaviour are therefore not only about affecting motivation, but simply breaking habits. As Vatn (2015, p. 383) also mentions, ‘ex post’ environmental regulation is challenging exactly because strong interests and practices have already been established before the side-effects of the activity became apparent and required regulation.

3.3 The mechanisms of policy instruments

Typologies

Vedung (1998, p. 41) underlines the importance of analysing policy instruments as they express different types of power and are also “ends in themselves” (ibid.). A common way to categorize policy instruments are into legal, economic and informational instruments. Vatn (2015) adds infrastructure development to the three main types. Vedung (1998) uses a similar typology of regulatory, economic and informational policy instruments. He links these with Etzioni’s classification of power, based on the “means employed to make subjects comply” (1998, p. 28). Regulatory instruments, often also called command-and-control instruments (e.g. Hatch 2005) involve use of coercive power through physical sanctions. Economic instruments are linked to remunerative power based on control over material resources. Informational instruments employ normative or manipulative power through symbolic means. This threefold classification can further be divided into negative (sanctions) and affirmative tools (incentives) (Vedung 1998, p. 26). Van der Doelen (1998, p. 133) similarly divides economic, legal and information instruments into a category of negative, or repressive and positive or ‘stimulative’ instruments. Following the institutionalist perspective described above, the type of policy instrument will affect both distribution of rights and costs, as well as signalling what type of rationality is appropriate. There are of course other ways to categorize policy types. Lowi (1972) for example, distinguish between distributive, regulative, redistributive and constituent policies, according to the degree of sanction and whether they target individuals or groups.

Legal instruments

Regulating behaviour by law can be called “the government’s ‘stick’”, as violations are sanctioned with punishment (Lemaire 1998, p. 59). A legal instrument typically prohibits or prescribes certain types of behaviour or objects. While some regulations are absolute, others are conditional, and require for example a permission or notification (Vedung 1998, p. 42). Hatch (2005, p. 7) divides command-and-control policies into technological (prescription of specific equipment or procedures) and performance based (specify the level of permitted pollution). The enforcement comes from a legitimate government agency, and punishment can span from some form of mandatory action to paying a fine or imprisonment. It may also involve direct payments to the victim of the harmful action in the form of a compensation or redress, similar to what Coase (1960) describes. Lemaire writes that (1998, p. 64-65) in contrast to *economic regulations*, *social regulations* concern goods that are not measured in money. Such regulations are imposed to ensure “fairness, equity and justice”, for example preventing discrimination (1998, p. 72). From the rational choice perspective, individuals will comply if the cost of punishment is higher than what they expect to gain from breaking the law (Vatn 2015, p. 330). Looking at legal instruments with the logic of social rationality, individuals comply not just to avoid the punishment, but because it signals appropriate behaviour. Vatn (2015, p. 331) refers to Tyler’s classic study from 1990 that shows how the level of punishment rarely predicts the level of compliance. The importance of the legitimacy of the law supports the assumption that legal instruments can have normative effects.

Economic instruments

Vedung (1998, p. 43) divides economic instruments into positive and negative. Grants, subsidies and tax exemptions are examples of incentives that rewards a certain behaviour, while taxes, fees and tariffs provide disincentives that increase the cost of certain activities. Vedung (1998) includes economic instruments that are not exchangeable for cash, namely the provision of goods and services by the government. According to Vatn (2015, p. 332) economic instruments are based on rational choice theory. He argues that a negative instrument, such as a tax, imply that the right is with the ‘victim’ of the pollution and the one causing harm has to pay (polluter pays principle). In the case of positive instruments, like subsidies, the polluter gets paid as a motivation to cut their emissions or otherwise improve the state of the environment. While a subsidy or a tax may cause the same environmental impact, there are differences in the distribution of rights and costs. With regards to transaction costs, it is usually easier to regulate the pollution as output from a few producers. If the sources of pollution are many and diverse, however, for example in the case of CO₂, it

is better to tax inputs rather than measuring individual emissions. As Vatn (2015, p. 335) points out, if transaction costs of regulation are very high, the optimal level (in terms of economic costs and benefits) can be not to regulate pollution at all.

Informational instruments

Information campaigns, education programs or even labelling products can affect behaviour alone, but is often used in combination with other instruments. According to Vatn (2015, p. 337) information as a policy instrument has no role in rational choice theory which assumes that all actors are fully informed. But if the cost of information is taken into account, providing information can help actors choose the better option, and it facilitates adaptation to new policies. Vedung (1998, p. 48) writes: “If a regulation – such as a law or statute – is to be effective, individuals in the target group must be aware of its existence and contents”. It is also difficult to make people comply or change behaviour if they are not aware of the consequences of their actions. Knowledge can form individual preferences, and awareness may also activate a feeling of personal responsibility to change behaviour. In a social constructivist perspective information and education also shape social norms. Vatn (2015, p. 338) highlights that linking responsibility and awareness is a social process because determining what is a problem and how to respond to it usually happens “in communication with others”. Information can be used to manipulate, but it can also provide the basis for a constructive dialogue about the best solutions. However, what information people actually believe also depend on their personal values and interests (Vatn 2015, p. 390).

Combining instruments

“In real life, policy instruments come in packages” (Vedung 1998, p. 52). Depending on the issue at hand, several different instruments can be combined to affect behaviour. For example, a ban on certain types of harmful behaviour or goods can be combined with subsidies on less harmful options. In addition to the three main types of instruments mentioned above, Vatn (2015, p. 343) adds infrastructure developments that enable less harmful behaviour. For example, collective transport must be available for people to drive their cars less. Vedung (1998) might define infrastructure developments as a type of economic instruments because they are material goods provided to affect individual preferences and behaviour.

3.4 Existing research on plastic bag policies

Policy reviews

Much of the existing research on plastic bag regulations focus on consumer behaviour from an economic perspective, while there are fewer studies on the behavioural effects of legal instruments. There are some comprehensive overviews of existing policies (e.g. Clapp and Swanston 2009; Ritch et al. 2009; Miller 2012; Xanthos and Walker 2017). These mainly focus on how instruments are selected and why some succeed while others fail, partly with the aim of informing policy makers. Xanthos and Walker (2017, p. 22) recommend continuing to introduce “levies or, better still, outright bans” despite the lack of data on the environmental and social outcomes of such policies. Clapp and Swanston (2009, p. 316) argue that “the plastic bag case forces us to rethink some common assumptions about norm dynamics and their translation into policy in an international context”, because regulatory action emerged in countries in the global South before it became a concern in the North. This “anti-plastic bag norm” was not adopted through international level institutions, but rather “taken up at a combination of national and subnational levels around the world” (ibid.). Njeru (2006, p. 1049) points out that plastic bags are not primarily commodities, but rather they *facilitate* consumption. According to Ritch et al. (2009, p. 170), there is growing consensus that consumption patterns related to plastic bags “are leading to unsustainable development with serious economic, social and environmental repercussions”.

Types of instruments

Xanthos and Walker (2017) distinguish between bans, taxes and *partial* bans or taxes. For example, a ban can apply only to certain products, like bags made from non-biodegradable materials or plastic below a certain thickness. These standards are often combined with a levy on the bags that are still permitted. However, this may cause confusion as most people are not familiar with the technical differences (2017, p. 19). Miller (2012, p. 58) recommends avoiding many exemptions to a ban as it complicates enforcement and monitoring, and because misunderstandings among consumers “can create resistance or delay public acceptance”. Another option is to prohibit giving bags to customers for free, which resembles a levy but without fixed prices. There are also voluntary agreements, typically offered by the industry to avoid stricter policies. Agreements are technically not policy instruments and often weakly sanctioned (Miller 2012). Retailers are concerned that if they don’t provide bags, customers will be discouraged from shopping. Therefore, they prefer to offer a choice and rather incentivise reuse and recycling of bags, for example by giving bonus points (Ritch

et al. 2009). Blackman (2010) warns that voluntary agreements have little effect if the existing formal regulations are weak and warns against implementing informal regulation in developing countries if the pressure for reducing pollution is not already strong.

3.5 Legal instruments – bans and regulations

Motivation and costs

In a large survey Sharp et al. (2010) found that the ban on single-use bags below 35 microns in South Australia had little effect on attitudes among shoppers who did not hold “anti-consumption” values from before. The authors (2010, p. 473) write that it is “unclear whether shoppers forced to cease consumption of plastic bags will develop attitudes congruent with this new behaviour, or whether they will simply be behaviourally compliant”. Miller (2012, p. 58) argues that bans on plastic bags affect consumers negatively, because they are forced to find alternatives that “can be costly or inconvenient”. Retailers’ costs also increase due to staff training, new equipment and so on. Miller claims that governments’ transaction costs in terms of monitoring and enforcement are “irrecoverable because there is no direct revenue produced to offset the costs” (ibid.).

The case of Bangladesh: Strong norms, weak enforcement

Yet, many bans are introduced precisely to avoid costly damages. Bangladesh is one example. In 2002 it was the first country to completely ban polythene bags. It started in the capital Dhaka as a response to the 1989 and 1998 floods that were exacerbated by plastic bag waste, and the initiative received wide public support (UNEP 2018, p. 55). Manufacturing and use of all types of plastic bags became illegal and enforced through strict fines or prison, in addition to extensive promotion and information campaigns. According to Clapp and Swanston (2009, p. 325), the plastic industry “had difficulty convincing the public of the need for plastic bags. The underpinning norms regarding promotion of health and safety – primarily linked to their role in flooding – that were behind the local anti-plastic bag norm have proven difficult to counter”. UNEP (2018) highlights the lack of cheap alternatives as one of the reasons for the ultimate failure of the ban. Sources said to IRIN (2011) that plastic bags came back into use the next year due to lack of enforcement, inefficiency and corrupt enforcement officers. It seems that the public anti-bag norm could not transform behaviour alone, and despite the strict ban, plastic bags are still widely used in Bangladesh today.

Access to alternatives

Even if people know what is ‘right’ to do, it has to be attainable. Two years after implementation of Morocco’s ban on production, importation, sale and distribution of plastic bags, the NGO Zero Zbel (2018) conducted a survey. They found that a majority of the respondents were aware of the ban and the environmental impact of plastic bags. Plastic bags were still widely consumed, and some customers used up to 15 bags on one shopping trip. The main reasons were that bags are still free of charge and alternatives are either expensive or unpractical, especially for packaging products like fish, meat and oil (Zero Zbel 2018). According to UNEP (2018 p. viii), policies with little impact are usually associated with “(i) a lack of enforcement and (ii) a lack of affordable alternatives”. The first problem (i), suggests that people do not comply with the policy if they are not ‘forced’ to do so. In the case of (ii), the problem is not necessarily a lack of will, but a lack of opportunity to comply.

The case of Rwanda: Coerciveness and information

In 2008, Rwanda implemented a very strict ban on use, manufacturing and import of plastic bags, penalised with fines or imprisonment up to one year. Danielsson (2017) applies Van der Doelen’s (1998) categorisation of stimulative and repressive instruments. She concludes that a repressive legal instrument was chosen over other alternatives “mainly due to lack of technical and financial resources, as well as an inadequate environmental consciousness among Rwandan citizens”. The law was accompanied by information campaigns and promotion of alternatives, although Danielsson (2017, p. 42) finds that lack of documentation made it “hard to get an understanding of to what extent promotion of alternatives to plastic bags, such as the kaki handbags, have taken place”. She also found that the lack of substitutes initially gave rise to a black market for bags. It remains unclear to what degree non-compliance actually is punished. The Rwanda Environment Management Authority used Rwanda’s monthly community day to build national identity (as part of the genocide reconstruction) to arrange clean-ups and inform citizens about the harm of plastic bags. This way of including plastic bag issues in community building is an example of how governments can affect values and perceptions in order to internalize a norm. Danielsson (2017, p. 52) hypothesise that the authoritarian nature of Rwanda’s political system can explain why the ban largely succeeded in reducing plastic bag consumption and waste despite public protests. Although “well-suited” for Rwanda, Danielsson (2017, p. 57) questions the appeal of such a coercive approach in other countries.

3.6 Economic instruments – taxes and levies

Price effects

Many studies highlight that plastic bags are usually free of charge or very cheap. Economic instruments follow the logic of markets, and higher prices are assumed to reduce demand and production. Miller (2012) concludes that plastic bag levies are effective since consumers are free to choose between paying the levy or bringing their own bags. Sometimes just a small increase in price can have a large effect. An often-cited example of this, is the Irish levy on plastic bags. The 0.15-euro charge for bags introduced in 2002 reduced consumption by more than 90 percent. According to Convery et al. (2007, p. 4), the levy was very popular and worked as “a strong signal to consumers in order to change behaviour towards more sustainable modes of consumption”. They argue that a reason for the success is that the revenue from the levy is earmarked for an environmental fund. While the price is relatively low, the levy had a normative effect that even caused some consumers to feel guilty when they forgot to bring reusable bags (2007, p. 10). A study from Australia (Cherrier 2006) found similar effects: choosing reusable bags over plastic bags became a symbol of collective action and a way to express identity. When bringing reusable shopping bags became a habit, consumers also developed increased awareness on issues related to plastic bags (ibid.).

Who really pays?

According to Ritch et al. (2009, p. 170), levies on plastic bags are inherently redistributive instruments, but their effect on behaviour varies. Ayalon et al. (2009, p. 2030) argue that the plastic bag levy in Israel created social injustice, as every bag user had to pay the charge and not only the polluters. One of the first national economic instruments that targeted plastic bags came in Denmark in 1994 (Larsen and Venkova 2014). A tax on production of paper and plastic bags (per kg) was passed on by producers to retailers. Many shops started charging customers and plastic bag consumption dropped. In some cases, retailers or producers appear to absorb the costs of a tax instead of passing it directly on to consumers. This can still cause rising prices for other goods to cover the tax (Miller 2012). According to Dikgang et al. (2012) this happened in South Africa when a levy accompanied by a standard thickness and size of plastic bags was introduced in 2003. Initially prices were fixed, and consumption fell. But after a few months, retailers started absorbing the levy and the prices on bags fell. According to the authors (2012 p. 64), high-income retailers offered bags at a very low charge, while the low-income retailers had to charge their customers more for the

same type of bags. Over time consumers appeared to become used to paying for the bags, and when prices fell, demand for bags went back up.

Individual motivation

He (2010) conducted a survey among consumers before and after China introduced a regulation requiring all retailers to charge customers no less than the acquisition cost of plastic bags in 2008. Even though enforcement was incomplete, and more than half of the bags were free of charge four months after implementation, the consumption of plastic bags decreased by 49 percent. The policy influenced behaviour “in the direction of more efficient use, more reuse of plastic bags, and more use of substitutes”, although its effects differed “substantially across different groups of people and different locations” (He 2010, p. 19). For example, people in less developed areas used more bags. Usage also varied with age and education. While a large majority of respondents were initially positive toward the regulation, support dropped after implementation. As people who supported the regulation were likely to consume less bags, attitudes significantly affected the outcome of the policy (ibid.).

Jakovcevic et al. (2014) made similar conclusions on the charge on plastic bags in Argentina: the motivation for bringing reusable bags was based on support for the policy and concern for the environment.

3.7 Informational instruments – awareness and perceptions

Independent or reinforcing effect?

Most plastic bag policies are accompanied by some form of public information or awareness campaign. Their specific effect is often not documented, and Ritch et al. (2009, p. 172) question whether information alone is enough to make consumers change their habits. In several of the examples mentioned, campaigns seemed to reinforce the effect of other instruments. Arı and Yılmaz’ (2017) study in Turkey found that individuals who were aware of the environmental impact of plastic bags, or who felt social pressure to reduce their bag consumption, used fewer plastic bags and more reusable bags than others. In Scannell and Gifford’s (2013) study on effects of information on individuals’ attitudes toward climate change, people who felt a strong attachment to their local area were more engaged in climate issues. They also found that information highlighting local consequences had more effect on engagement than a globally framed message. There is a difference between providing ‘neutral’ information and actively motivating or encouraging behavioural change. Ohtomo and Ohnuma’s (2014) study in Japanese supermarkets found that use of plastic bags

decreased when the cashier asked the customers if they wanted a bag, thereby drawing them away from just taking one by habit.

Effect on behaviour

According to Steel (1996, p. 28-29), much of the research on correlation between environmental attitudes and behaviour focus on recycling. In this literature, it is found that attitudes and socioeconomic background are weak predictors of recycling, while availability and access are better predictors. Steel (1996) investigates the link between environmental attitudes and self-reported behaviour in USA. Among the methods was asking whether respondents had participated in activities such as recycling, being member of an environmental group and so on. They also answered to what degree they agreed or disagreed on a set of statements about environmental issues. The results showed that women were more likely to be involved in environmentally friendly behaviour, and that the gender difference increased with age. A possible explanation is that women are socialized to “perceive moral dilemmas in terms of interpersonal relationships”, and that women, especially in older generations, do more household labour (1996, p. 29). Barr’s (2007) study from the UK on self-reported waste reduction, reuse and recycling (including reuse of shopping bags) found that individual environmental values were important predictors of behaviour. Awareness of the problem was another important factor for reducing waste, while recycling depended much more on access to facilities. Barr (2007, p. 465) also found that women are more likely to reduce waste than men, which he attributes more to differences in shopping and consumption habits than “necessarily a fundamental division in values between females and males”. Balderjahn (1988, p. 56) on the other hand, found that the effect of attitudes on environmentally conscious behaviour was larger for men than for women, and that education played an important role. However, the conclusion from this study is that it is generally difficult to reveal any patterns between attitudes toward environment and behaviour, as “each specific behavioural pattern has its own cluster of predictors”.

3.8 Evaluating effects and causation

Output, outcome and impact

There is a broad range of approaches to analysing the effects of policy instruments and regimes. According to Underdal (2002) the first step is to define the exact subject of analysis. For example, an ‘institutional arrangement’ will cause a number of indirect effects and changes in behaviour during the process of establishing it, not only after implementation.

Underdal (2002) therefore distinguishes between output, outcome and impact. The *output* is the first stage of designing and effectuating the policy or regime change. The *outcome* is the implementation of the policy and behavioural change, which then may lead to an *impact* on the environmental issue or resource in question. Underdal (2002) underlines that nature is complex and there is always a degree of uncertainty. Even if everyone complies to the policy and change their behaviour accordingly, the actual outcome and impact will only be distinguishable a long time after the regime was effectuated.

Complex causality

Young (2008), Hughes (2004) and Underdal (2002) all underline that it is challenging to distinguish between the actual effects of the instrument itself and other underlying factors. Since causes and effects often go in several directions, Young (2008) argues that it is better to think of it them as ‘causal clusters’ than chains. Hughes (2004) illustrates the complexity of causal links in figure 1. In this chart, the regime (which a policy will affect) influences values and opinions, but values and opinions can also affect the strength of the regime. External factors such as technology and economic conditions also have an effect on, and are affected by, the outputs, outcomes and impacts of the regime. Young (2008, p. 36) writes that this ‘complex causality’ makes it difficult to distinguish the effects of institutions from other forces. An alternative approach is to focus more narrowly on how institutions affect the behaviour of key actors, as “behavior is easier to analyze rigorously than the impacts of institutions measured in terms of the degree to which they cause or solve problems” (2008, p. 19). This can still give an impression of the initial effects of the policy instrument. According to Young (2008, p. 9) it is also easier to identify recent causal connections that will “grow cold quickly as we move backward from one link in the causal chain to another”.

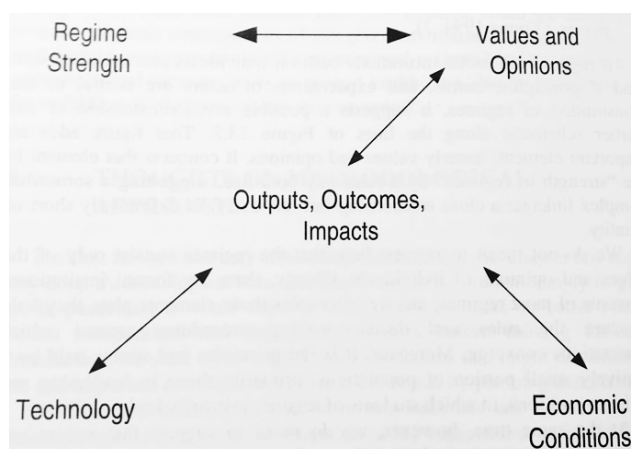


Figure 1. “A revised schematic of causal links around regime consequences” (Hughes 2004, p. 340).

Effectiveness

Another initial stage in Underdal's (2002) regime evaluation, is to identify the standard for success. Vatn (2015) emphasize that for the result of a regime or policy process to be perceived as legitimate, there needs to be effectiveness (reaching defined goals), efficiency (reaching the goals at lowest cost) and distributive justice. Even if a regime changes the situation, it is not necessarily for the better. Young (2008, p. 21) underlines that the question of performance is normative and differs from mere causality, because it asks whether the change meets a certain standard or produce the desired result. Defining success depends on the basis for comparison. For example, the regime can be measured by the relative change compared to a hypothetical situation without any regime at all. Alternatively, the benchmark can be the ideal state of the environment, or some degree of acceptable improvement (Underdal 2002, p. 7-8).

Distributive justice

While the ultimate goal is to protect the environment, a policy will also impact social arrangements. Therefore, the concept of fairness or justice is also an important criterion when analysing regime change (Young 2008). A feeling of fairness is essential to ensure a stable regime, according to Ostrom (2000, p. 150): "If some users get all the benefits and pay few of the costs, others become unwilling to follow rules over time". Underdal (2002, p. 19) argues that the more asymmetrical the distribution of costs and benefits becomes, the more difficult it will be to find a solution. However, distributive justice can be based on a variety of moral principles (e.g. Vatn 2015, p. 167). Should for example the benefits and costs be distributed equally without considering individual efforts or needs (strict egalitarianism), or is it more just to distribute goods to maximize social welfare? Some of these principles are mutually exclusive, while others can be combined. Cook and Hegtvedt (1983, p. 220) calls it "the concept of multiple justice principles or distributional rules". They divide Eckhart's concepts of equality into two main categories: concepts that depend on the characteristics of the individuals involved (subjective, relative and rank order equality) and types of equality in which everyone get the same amount of goods (objective equality) or equal opportunities. Studies have found that individuals may have different perceptions of fairness and just distribution, depending on social setting and their position. Principles of justice are therefore closely related to norms, and what is perceived as the 'right' rules to apply in a certain situation (ibid.). Other concepts of justice, for example procedural justice may also be important to ensure compliance. According to Young (2008, p. 25) behavioural change is easier when the subjects perceive the process of establishing the rules as fair and inclusive.

4. METHODOLOGY

I have already described much of the theoretical framework for the thesis in the previous chapter. Here I briefly summarise the framework for the analysis. Then the research methods applied during the field work and the analysis are described. Finally, the main relationships and concepts are presented followed by the expectations for the results.

4.1 Analytical framework

Immediate outcomes

Based on the literature and background, it is evident that a comprehensive evaluation of the Kenyan plastic bag ban is not attainable at this point in time or within the limits of a master thesis. The regime for pollution and waste management in Nairobi is of course much broader than the ban on plastic bags. However, the data can shed light on some immediate changes. The ban was quite recent, and I found it necessary to examine the output in terms of the policy and its intended effects on behaviour, before looking at actual outcomes. I also briefly describe the characteristics of the previous regime, since this is the basis of comparison for changes after the ban. I partly adopt the approach mentioned by Young (2008) and focus on actual changes in behaviour. I also look at outcomes in terms of attitudes toward the ban and perceptions of its consequences. While perceptions and attitudes are related concepts, I define perceptions as how people observe and interpret their surroundings. This includes awareness of the problem (whether plastic bags were perceived as causing problems) and their subjective views of the ban. An attitude involves expressing a more active evaluation of the concept in question.

New institutionalism

The thesis is based on a ‘new institutionalist’ approach, in which institutions are defined as social practices (Young, 2008). By altering institutions, policy instruments directly affect the distribution of resources and power relations in society. A policy for reducing plastic bag consumption in this perspective is not only a technical solution, but a question of what values and interests to promote. According to Vatn (2015, p. 186) institutions affect actions by influencing “(1) rights and responsibilities; (2) transaction costs; (3) perceptions; (4) preferences and type of motivation. It is therefore necessary to examine in what ways different policies affect and define social structures, and not only their environmental impact.

Mixed methods approach

The empirical data for this study was collected in Nairobi between 23 April – 7 June 2018. The ban on plastic bags had been introduced quite recently, and there was limited information about how the ban was actually enforced. Most official documents on the law are brief, and online newspapers were helpful when searching for information about the actual reception of the ban and current debates in Kenya. I have chosen a mixed-methods approach that combines a quantitative survey and qualitative interviews. The field work naturally entails some observation of behaviour, but I have not conducted any structured observations. While the survey gives an impression of behaviour and attitudes for a large group of people, there is little room for details or follow-up questions to clarify or explain. The qualitative data both enhances understanding of the social context and serve as a way of further explore and illustrate the findings in the survey. Bryman (2012 p.649), underlines that a truly mixed method approach should not keep quantitative and qualitative findings separate. In the analysis I have tried to combine the results so that the survey data and qualitative interviews naturally complement each other.

4.2 Quantitative methods

The Survey

The questionnaire was completed through structured face-to-face interviews with respondents in four different areas of Nairobi between 11 – 19 May 2018. The target population is people living in Nairobi above the age of 18, and the aim was to learn more about their perceptions of the ban and how they have adapted. The survey was completed over one day in each of the four areas, mainly on weekends. Three research assistants helped me recruit respondents, conduct interviews and translate when necessary. In total there were six different assistants who are members of YWCA Nairobi or students at AWEMAC. We interviewed approximately 50 respondents in each area. In the final sample the total number of respondents is 197. This is due to logistical and practical differences, and because a few questionnaires were not sufficiently completed and had to be discarded.

Sampling

The respondents were recruited on the street through convenience sampling. While I was interested in reaching a broad spectre of the population, I did not have the resources to get a randomly selected or more representative sample of the population. For example, a survey conducted by email or phone would be challenging as there is no official phone registry and

internet is not used by everyone (Mälkki et al. 2017). Systematically knocking on doors would also be difficult in the informal settlements. With regards to security, foreigners are advised against walking around in unfamiliar areas alone (Utenriksdepartementet 2018). The method I chose increases the chance of a selection bias, as only people who happened to be in the area at the time and who were willing to talk to the interviewer are recruited. This sample method is not optimal, but it is often used in social research because of the costs of probability sampling. The findings cannot be generalized but could still be useful, for example as a starting point for further research (Bryman 2012).

The survey areas

Two informal settlements on opposite sides of the city (Kiambu and Kibera), and two more affluent neighbourhoods (Buruburu and Kilimani) were selected. They are shown in the map in figure 2. Like most of Nairobi, these areas all have a large number of street vendors and small shops where plastic bags would be widely distributed before the ban.

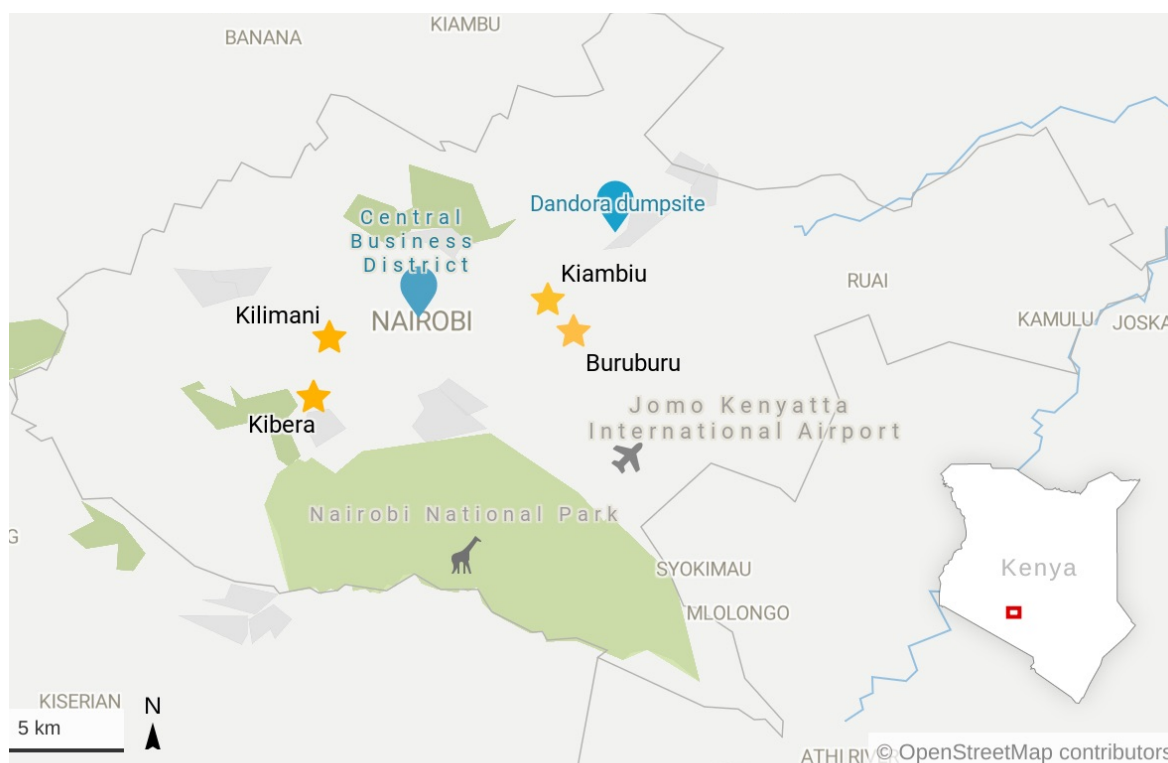


Figure 2. Map of Nairobi including the four survey areas.

Kiambu is an informal settlement in Kamukunji constituency located between the Nairobi river and Moi military airbase east of the city centre. Population estimates vary from 15.000-100.000, but I found no official sources. The area is divided between crowded apartment buildings and more provisional housing. Many inhabitants lack access to clean water and sanitation, and flying toilets used to be common (Kairu 2006).

Kibera is often referred to as one of Africa's biggest slums, but according to a study by Desgroppes and Taupin (2011), the population estimates were around 200.000 inhabitants. Population density is still high. Kibera is situated in Kibra constituency by the Nairobi river and the Nairobi dam south-west of the city centre. There is a large number of NGOs present in Kibera, and some parts of the area have undergone upgrading projects in recent years.

Buruburu estate is a middle-income residential area in Makadara and Kamukunji constituencies (Songoro 2015). Most homes are in apartment buildings and there are a number of shops and some small shopping malls.

Kilimani estate is situated in Upper Nairobi west of the city centre in Westlands constituency. It was initially established as an exclusive European settlement (K' Akumu and Olima 2007). It is still a high-income area with relatively low population density, and there are several large shopping malls.

Structured interviews

A pilot survey with 12 respondents was conducted on 28 April in Kibera with help from two research assistants. The feedback on the preliminary questionnaires was mainly positive, and most of the respondents were happy to share their views on the ban. After the pilot, some questions were reformulated, and a few options added or amended. I also received inputs on the survey from several people with knowledge on development in the city. The issue of flying toilets was sensitive as expected, and the interviewers said they got some 'funny looks' when asking about it. A question was therefore added on whether the respondent was *aware* of flying toilets in their neighbourhood. Another feedback from the interviewers was that many respondents avoided taking a stand on the statements on environmental issues and chose the middle variable. To avoid too many 'neutral' answers, one variable on the Likert scale was removed so respondents had to choose whether they agreed slightly more or less with the statement. The full questionnaire with 25 questions is in appendix 3.

Operationalisation

The survey results were transcribed and coded. Table 1 gives an overview of the variable types and what concepts they are operationalising.

Topic	Variable (survey question)	Type
Background / identity	Age (Q2)	Continuous
	Gender (Q3)	Categorical (dichotomous)
	Education (Q4)	Categorical (range)
	Neighbourhood (Q5)	Categorical
	Income (Q6)	Categorical (range)
Environmentally conscious	Number of environmentally friendly activities (Q25)	Count / discrete
	Opinion on responsibility for environment (Q22)	Categorical (range)
	Opinion on economy and jobs v. environment (Q23)	Categorical (range)
Behaviour before ban	Number of plastic bags used (Q8)	Count / discrete
	Compare use of bags to others (Q9)	Categorical (range)
	Paid for plastic bags (Q10)	Categorical (range)
	Uses for the bags (Q11)	Categorical (dichotomous)
	Awareness of flying toilets (Q13)	Categorical
Behaviour after ban	Substitutions for the bags (Q12)	Categorical
	Number of reusable/carrier bags used (Q14)	Count / discrete
	How ban affected everyday life (Q15)	Categorical / Qualitative
Perceptions / attitudes toward ban	- " -	Categorical
	Information on the ban (Q7)	Categorical
	Plastic bags impact on environment (Q16)	Categorical (range)
	Agreed with the ban before implementation (Q17)	Categorical
	Agreed with the ban after implementation (Q18)	Categorical
	Better alternatives to a ban (Q19)	Categorical
	Enforcement of the ban (Q20)	Categorical (range)
	Why complete ban (Q21)	Categorical / Qualitative
The ban helped raise awareness (Q24)	Categorical (range)	

Table 1. Operationalisations and type of variables for quantitative analysis

Basic information on background and identity is covered in the first set of questions on age, income, education and so on. The income category had only three broad options, as it is difficult to get detailed information about income from people working in the informal sector. The values of the categorical variable were based on available information on poverty and wages as described in chapter 2. To record environmental values, respondents were asked to what degree they agreed on these general statements: “everyone has a responsibility to work towards a better environment” and “job creation and a growing economy are more important than environmental issues”. I also included a list of activities that should be attainable for most people to indicate whether they are conscious about the environment. I believe this is more likely if they have participated in several of the activities than none, but there could of course be other explanations. The activities were: (1) being a member of/work for an environmental organization; (2) donating money to an environmental organization; (3)

volunteering in environmental activities such as clean-ups, etc.; (4) recycling waste at home; (5) collecting/selling used items.

To find out more about behavioural change, respondents were asked what they used plastic bags for before the ban, how many they used per week, and whether they paid for the bags. They were also asked how they replaced the bags after the ban, and how many of the new type of bags they used. I included two open-ended questions that are partially coded as quantitative data in addition to providing qualitative data. There are also a number of questions about attitudes and perceptions of the ban, including a set of questions on whether respondents thought the ban was the right decision at the time and what their opinion is today. Asking about their view before and after the ban at the same time can be inaccurate compared to actually asking at different points in time. However, since the ban was introduced quite recently, it may still reveal some differences.

4.3 Statistical analysis

Correlation and comparing means

To get an overview of the data, I started by looking at the central tendencies and distributions. Some of these are included in the analysis. I also did bivariate tests in order to identify relationships between sets of variables. Table 2 shows the type of test selected for different variable types. In the case where both variables are numerical, I used correlation (Pearson's R) which measures how much a change in the values of one variable is associated with change in the other variable from perfect (1/-1) to zero (Field 2009, p. 170). Where one of the variables is continuous and the other has only two possible outcomes, an independent t-test can be used to compare the means within the two different groups. The t-statistic indicates "whether the difference between the two means are significantly different from zero" (2009, p. 795). To make it possible to compare means using a t-test, some of the ordinal and categorical variables were recoded into dichotomous (dummy) variables. For example, respondents were separated into two income groups earning either less than 10.000 KSh (including students with no income) or more than 10.000 KSh. Similarly, I divided respondents into two education groups: lower (respondents who had from no education up to high school graduation), and higher (some university/college or a degree).

More bivariate associations

If one of the variables has more than two values while the other variable is numerical, ANOVA (analysis of variance) can be used to compare means. Here, the reported statistic is the F-ratio which compares the ratio of systematic to unsystematic variance in the data. These tests both assume that the variance within the groups is similar and that they are normally distributed (Field 2009). My sample is small and not random, and the data could violate these assumptions. Levene’s test for equality of variance is therefore also included in the tables. If the test was significant, I report the statistics based on equal variance assumed, but this was rarely the case. It is important to underline that the bivariate tests only indicate association between the variables, and not causation. Which variable is denoted as independent or dependent is therefore not important. For the relationships between categorical variables I used Pearson’s chi square. This test compares the frequencies within each category compared to the expected number of units within each category if there was no relationship (2009, p. 688). I therefore report and refer to expected counts for the chi square statistics.

		'Dependent' variable		
		Dummy (dichotomous)	Categorical	Count / continuous
'Independent' variable	Dummy (dichotomous)	Chi square	Chi square	t-test
	Categorical	Chi square	Chi square	ANOVA
	Count / continuous	t-test	ANOVA	Correlation

Table 2. Type of bivariate statistical test according to variable measurement level.

Regression

Finally, I also tested some relationships using multiple linear or bivariate logistic regression on a total of five different dependent variables. A regression model takes into account the causality in the relationship between the variables and changes in the independent variables are assumed to influence the dependent variable. It also makes it possible to test how several independent variables are affecting the dependent variable simultaneously. In a plot of all the observations, the regression line minimises the sum of squared distances from the observed values, and is termed ordinary least squares (Field 2009, p. 201). The regression coefficient indicates the slope of the line. The dependent variable (Y) can be expressed as a function of one or more independent predictors (X) that each have a coefficient (b) that indicates how much a change in X will affect Y. Total effect on Y also include a constant (a) and the residuals (e) that captures the difference between the predicted and the observed values (Field 2009, p. 210):

$$Y = a + b_1X_1 + b_2X_2 \dots b_nX_n + e$$

When the dependent variable is categorical, the outcome can only be one value or the other. It is still assumed that there is a linear relationship between predictors and the logit of the dependent variable (Field 2009, p. 273). Rather than predicting the value of Y, logistic regression predicts the probability (P) of Y occurring. It can be expressed as:

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1X_1 + b_2X_2 \dots b_nX_n)}}$$

For all the regressions I start with a basic model with only variables on background and environmental values, before adding other predictors. I report beta coefficients, significance level and standard errors. To find the model that best describe the data, I also test the overall predicting strength of the models. R² measures how much of the change in Y that can be predicted by the variables in the model. However, R² usually increases with the number of variables added, even when these variables alone are not strong predictors. It is therefore helpful to look at adjusted R², which takes the number of independent variables into account. In logistic regression, there are several types of ‘pseudo R²’ that can be interpreted in a similar way, although calculated differently. I report Nagelkerke R² which is based on the log-likelihood of the model and has, like R², a true range of zero to one.

Significance

The p-value indicates significance, or the probability that the associations between the variables is not just a coincidence. I have chosen a confidence interval of 95 percent. If the p-value is 0.05 or less (in a two-tailed test), the probability that the difference measured in the sample is not related to a real difference between the groups is less than 5 percent. The null hypothesis (that there is no association between the variables) is therefore rejected with 95 percent confidence. The higher the threshold for rejecting the null-hypothesis, the higher risk of making a type 2 error and believing that there is no effect even if there is (Field 2009, p. 56). However, in this study the sample is relatively small and not randomly selected. Any result should therefore be treated with care and seen as potential, rather than certain associations, even if the significance level is within the chosen values.

4.4 Qualitative methods

Semi-structured interviews

The interviews were arranged either by appointments with employees at various organisations and institutions – usually at their office, or in the field with people I met while conducting the survey. The interview guide (appendix 4) was followed to a varying degree, depending on the respondent and the time available. Most of the interviews lasted between 45 minutes to one hour. The interviews in the field were usually shorter due to more unpredictable conditions and interruptions. The interviews were conducted mainly in English, with help from the students as translators in the field when necessary. Interviews were either recorded (with consent) as audio and/or by taking notes and later transcribed and analysed. The qualitative interviews provided better understanding of the social context and the transition process toward the ban. Follow-up questions also provide better opportunities to verify that the answers are interpreted correctly (Bryman 2012, p. 475).

Observation

As mentioned, I did not conduct any systematic observation. Nevertheless, I tried to ask questions and take note of what street vendors were doing in situations where they would typically have used plastic bags before, and in situations where people were disposing of waste. I visited Dandora dumpsite in Nairobi as part of the research, and I joined a youth group on their weekly waste collection round in Kiambiu. I visited two plastic manufacturers in Nairobi and one producer of the new type of reusable bags in Mombasa to learn more about the production process and the alternatives. I also participated in the official event in Nairobi on World Environment Day on 5 June since the plastic bag ban was the official theme this year, although the main activity turned out to be tree-planting.

4.5 Assessment criteria

Reliability

Bryman (2012, p. 46) emphasize that “the most prominent criteria for the evaluation of social research are reliability, replication, and validity”. While the specific ways of assessing these measures differ between qualitative and quantitative research methods, the principles are similar. Transparent procedures can help avoid errors and biases, or at least identify where they are more likely to occur. Concerning reliability, the data for this study were collected quite recently after the ban. Choices and questions are described so that the survey should be possible to replicate, but the results will most likely differ to some extent. Several of the questions concern preferences and opinions that may change over time. Since replicability and generalisation of the results are not main objectives in qualitative research, Bryman

(2012, p. 49) proposes an alternative set of criteria for the *trustworthiness* of the study. I should underline that all data on behaviour and attitudes are self-reported. While the questions should be clear, individual perceptions can still diverge. For example, the question on how respondents compared their plastic bag consumption to others revealed a mismatch between their opinion and the actual distance to the sample mean. Some information about past events is possible to verify through other sources, but much of the interview data are of course subjective. Factors like the type of questions, how they were asked, the interview setting and so on, can all affect the responses. For example, respondents may adjust their answers to what they perceive as “socially desirable” (Bryman 2012, p. 227).

Validity

Validity concerns assessing whether the research methods applied are appropriate for measuring the intended concepts. I have presented the operationalisation of the different concepts in this chapter and I discuss why some measurements may be weaker than others. For example, asking people if they recycle could indicate a difference in environmental engagement. But the actual measure is level of recycling, as people could want to recycle but not have any opportunity to do so, or they recycle waste as a necessity rather than out of concern for the environment. I have also discussed challenges concerning causality and how the results cannot be generalised due to the sampling method. Although I met with all the assistants and explained the questionnaire before the survey was conducted, there were a few errors and differences that became apparent when the data was coded. As I get back to when describing the results, in a few cases the interviewers only wrote ‘bag’ without specifying what type, which can affect the precision of the findings. Missing values can occur due to a mistake or that the respondent simply did not want to answer. For example, more than eight percent of the respondents chose not to answer the question on income. This suggests that the topic was sensitive, or the question was difficult to answer. However, the same was the issue with age, suggesting that there might be some other reason for the number of missing values.

4.6 Ethical considerations and challenges

Identification and confidentiality

The project involves collection and processing of personal data, which require notifying the Data Protection Official for Research, Norwegian Centre for Research Data (NSD). All respondents were informed about the nature of the project and asked to approve the request for participation (appendix 5). The first survey question also concerns informed consent. All

participants are anonymised, and no sensitive personal data were collected. A combination of background information may still indirectly identify a person, which is why it is important to store the data in a way that ensures confidentiality. All research projects conducted in Kenya also have to go through a process to be approved by NACOSTI – National Commission for Science and Innovation (appendix 6). I have also partly anonymised the qualitative interviewees, especially the manufacturers did not want to be identified. However, as it is relevant that some of the subjects were representing organisations or agencies directly involved with the ban, this is included to their consent.

Interpretation and representation

Berg and Lune (2012, p. 8) underlines that “[research] on human beings affects how these persons will be viewed”. The way the findings are interpreted depend both on the researcher’s knowledge and views and the analytical framework chosen. There is always a chance that interviewees are misinterpreted or that answers are overly simplified. In the case of plastic bags in Nairobi, I find it very relevant to discuss questions of inequality and standards of living. But when dealing with questions of justice and differences, it is important to keep an open mind and avoid strong generalisations or contributing to stereotypical misrepresentations.

Other challenges

Most people in Nairobi speak fluent English, but sometimes translation was necessary. It was also helpful to get some local words and expressions explained. For example, many Kenyans say ‘plastic paper’, or just ‘paper’ for short when they are referring to polythene, which can be somewhat confusing. The questionnaire was only printed in English, partially because it was most practical, but also because it is the most neutral language. Kenya has a long history of ethnic conflicts, and traditionally some tribes have dominated political life and leadership. Hence, asking about tribal belonging or political views might signal a bias which is best avoided. While the survey respondents were quite easy to recruit, a number asked for money to participate. This was of course turned down. For the qualitative interviews, it was a challenge to get access to some of the interviewees, and a lot of time was spent on planning meetings that were later rescheduled or cancelled. Although I did ask for documents and records that could confirm the information I got in interviews, this was often challenging. Several times I was told that I could just search for it online, or email others. Since I do not have an overview of what documents would actually be possible to obtain, I am careful not to make too many assumptions about the actual process leading up to the ban.

4.7 Expectations for the analysis

Connecting the concepts

As discussed in chapter 3.8 on causality, distinguishing exactly what factors affect peoples' perceptions and attitudes is difficult. In figure 3 I attempt to illustrate the connections between the concepts in the analysis.

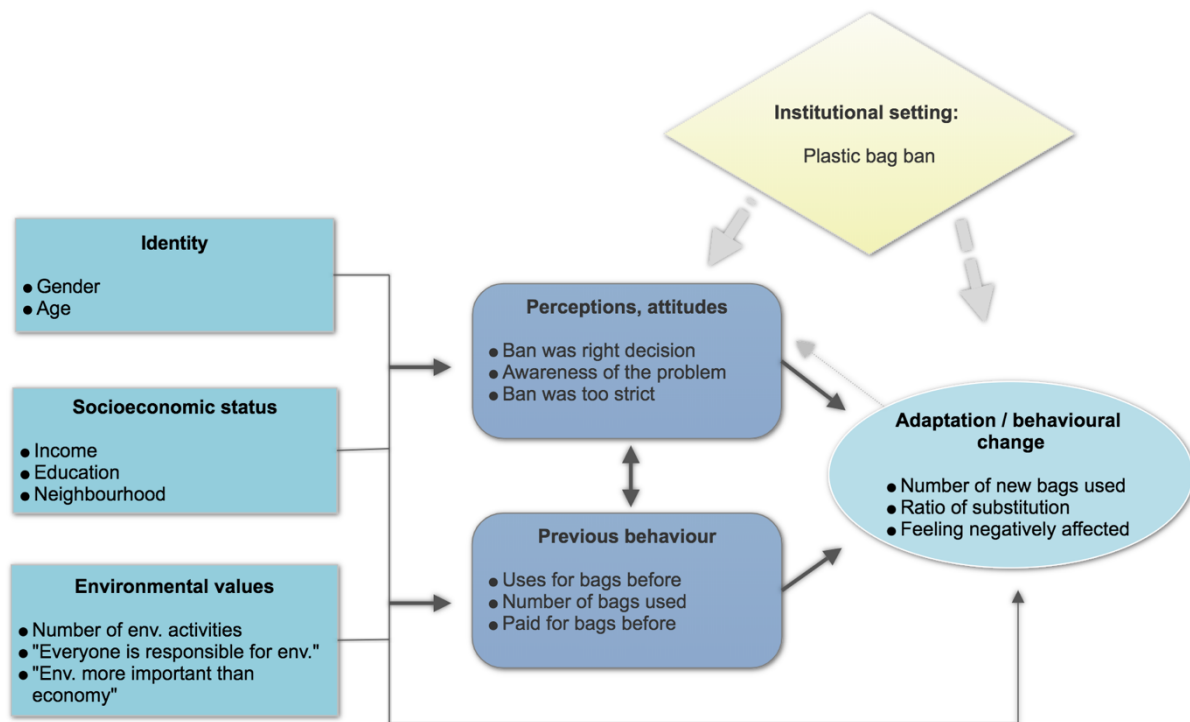


Figure 3. Potential connections between the analysed concepts and variables.

The chart visualises the potential associations between the variables that are part of the statistical analyses. The three boxes to the left (identity, socioeconomic status and environmental values) represent individual characteristics that are assumed not to be directly affected by the ban or other variables (environmental values may be affected in the long run, but for now I assume that these are more or less fixed). These factors shape individual perceptions, including awareness of the consequences of their actions, that again can motivate behaviour. Concerning previous behaviour, people may already have become used to certain behavioural patterns or habits that also affect the potential for behavioural changes. I also find it relevant to include the institutional setting in the model, as the ban is assumed to influence both perceptions and behaviour. However, I do not have data to analyse exactly which types of motivations or rationalities the ban activates for each individual, which is why these connections (arrows) are not as strongly defined in the chart as the other connections.

These potential relationships are only qualitatively described as part of analysing the implementation and intended effects of the policy instrument.

Preliminary expectations and hypotheses

As a guide before analysing and discussing the results, I summarise some of the expectations for the associations in the data below:

1. The ban and its general characteristics are analysed in chapter 5. This is represented as the 'institutional setting' in figure 3. How the ban affects change in behaviour and perceptions depend on factors such as implementation and enforcement, information and available alternatives to plastic bags. With regards to RQ1 about the characteristics of the ban, I would expect that:

- Strict punishments and enforcement were intended as the main motivations for behavioural change (as I had not found any information about incentives or other arrangements in the literature).
- The rights to use bags was revoked from the consumers.
- The ban entailed some degree of cost-shifting or distributional effects because plastic bags (that used to be free of charge) had to be replaced.

2. When examining the respondents' attitudes and perceptions, I also partially include the variable 'effect on everyday life', as many respondents mentioned seeing changes and perceived effects on this survey question. I also analyse perceptions communicated in interviews. With regards to RQ2, I would expect that:

- Awareness on the ban and consequences of plastic bags would be higher than what Njeru (2006) found in 2001.
- Support for the ban was lower after implementation than before.
- Environmentally conscious respondents and respondents who are aware of the environmental impacts of the bags were more supportive of the ban.

3. In the final chapter on the findings, I focus on adaptation. To capture actual changes, I look at behaviour both before and after the ban. The variable 'effect on everyday life' is partially analysed in this chapter as well, due to the fact that many of the respondents who felt negatively affected referred to issues of adapting after the ban. With regards to RQ3 on differences in individual behaviour, I would expect that:

- Consumption of the new types of carrier bags was lower than for plastic bags as they are costlier and not as versatile.
- People who are more environmentally conscious use less of the new type of bags.
- People with lower socioeconomic status (lower income, education and/or living in an informal settlement) used more plastic bags than other groups before, as the literature suggested that bags were used due to lack of sanitation/other services.
- People with lower socioeconomic status also struggled more to find substitutions, as they could afford less of the new type of bags.
- People with higher socioeconomic status (higher income, education and not living in an informal settlement) felt less affected by the ban in terms of behavioural change.

5. CHARACTERISTICS AND IMPLEMENTATION OF THE BAN

The analysis and discussion in this section are based on the first research question:

- *What are the main characteristics and intentions of the ban on plastic bags, and how was it implemented in Nairobi?*

The analysis is mainly based on data from the qualitative interviews (see appendix 2 for an overview), but there are also references to quantitative data from the survey. The survey sample is however presented in the next chapter before the statistical analyses.

5.1 Characteristics of the previous regime

Lack of enforcement

Previous attempts to regulate plastic bag pollution in Kenya combined economic instruments in the form of a tax on producers as well as a legal standard on minimum bag thickness. According to interviewees with knowledge of these policies, they were unsuccessful mainly due to weak enforcement and monitoring. The NEMA employees (interview 23) said “it became impossible to enforce” because the thin ‘flimsy bags’ were still imported to Kenya from its neighbouring countries. Many emphasized the strong resistance from the industry, as well as challenges with replacing the bags. According to one of the plastic manufacturers (interview 24), it was discouraging that other producers continued to operate without adhering to the rules. As some producers had to pay while others were ‘free-riding’, the general support for the tax appeared low. While the idea was that the revenue should go to waste management efforts, most said this had not happened. According to the employee at the

Ministry of Environment (interview 22) it was problematic that the revenue from the tax did not have any evident effects: “It was not a levy we could access, it was just a general fund for government. So we never gained from that excise duty. That is why the discussion continued, the environment was getting dirtier every day”.

Distribution of costs

While some claimed that the price of plastic bags actually increased due to the tax, many retailers absorbed the real costs. Several street vendors said they used to buy plastic bags at a relatively low price and give them to customers free of charge. One of the manufacturers (interview 20) also pointed out that producing bags “of the correct quality” according to the standard would increase the costs of the bags. Manufacturers who instead decreased the thickness of their bags were able to produce at lower costs. The WWF employee (interview 13) said that plastic was cheap despite the tax, “so that didn’t stop people from using [plastic bags]”. The data from my survey shows that 26.9 percent of the respondents said they always paid for plastic bags, while 20.3 percent never paid. The majority (52.8 percent) paid ‘sometimes’. It appeared that the previous regulation had hit manufacturers to some extent, while not directly affecting the users. Since plastic bags were still readily available at relatively low prices or for free before, the tax and regulation seemed to provide little motivation for regular consumers to change their habits.

5.2 Implementing the new regime

Many of the interviewees said lessons were learnt from the previous policies. Especially concerning monitoring and enforcement, it is easier to ban all plastic bags than differentiate on thickness. The ban was mainly intended as a negative regulation instrument in terms of Vedung’s (1998) archetypes. Enforcement relies on strict punishment by a third-party authority (NEMA, police and courts). The other main difference from the previous situation, is that responsibility is not only with producers anymore. Sellers and consumers alike can be punished for having the bags. While the punishment for non-compliance under the previous regime was unclear, the ban appeared simpler in terms of enforcement.

Enforcement and sanctions

Arrests for environmental offences can be made by NEMA’s enforcement officers or regular police. There was no official statistic available, but according to the NEMA employees (interview 23), around 100 street vendors had been arrested in Nairobi so far. The officers typically went to one of the markets in the city for controls and arrested a number of people

(around 10-15) each time. The sanctions varied a lot and were typically lower than the official minimum punishment. Fines are usually issued by a court or magistrate in Kenya (NCAJ 2015). The NEMA employees referred to examples of fruit sellers or butchers who had been fined between 10.000 – 60.000 KSh. Offenders unable to pay would be sentenced to prison, typically for around six months. However, market sellers and people with only a few bags could also get away with a verbal warning. The Burma meat market was the only market in Nairobi that was completely closed for violating the ban, while others had received warnings. In addition to the market vendors, three people with large stocks of plastic bags and around ten manufacturers had been arrested in Nairobi. It was unclear what their punishments were. Some cases had been withdrawn “because they have shown willingness to comply” (interview 23), while the other court cases apparently had not yet been settled. I did not meet anyone who had been imprisoned or fined in court, but a street vendor in Kiambiu (interview 7) claimed he had recently been arrested and let go after giving the police 3500 KSh. I was not able to confirm this story. The NEMA employees (interview 23) said they had received a few complaints about bribery, but they did not consider it a significant problem.

Motivation

While I get back to respondents’ views on enforcement in chapter 6, I here include some initial reactions to show how the ban was implemented. Most of the interviewees who either produced or sold bags, said that demand fell drastically when the ban came into force. The intention to deter people from using bags was confirmed by several interviewees who expressed concern about being arrested. A vendor in Kibera (interview 9) said stories about arrests in a nearby market scared her. The vendor in Kiambiu (interview 7) who claimed he had recently been arrested for possession of bags said “I don’t want to use plastic bags again, because it’s so expensive to get arrested”. But he still planned to repurchase plastic bags as he didn’t have any alternative packaging for his products. A Kilimani inhabitant (interview 21) said she would not risk having plastic bags in her car if she was stopped by the police. She assumed they would ask for a bribe: “It doesn’t make sense why a petty crime would now make you go and waste a whole day probably at the police station (...) You’d rather just pay them the money they’re asking for”. A Kibera inhabitant (interview 10) said people warned each other about NEMA inspections through social media groups, and he had heard of an arrest at the market: “She was using these plastic bags, and she had to give some money to the police. It’s not really a big deal, you know. Because you can always get away with it”. Since the fear of being caught was there, it is difficult to say how other factors play into the motivation for change. Like the environmental organisation member (interview 18) expressed

it: “We need a different mindset, because now it feels like the only reason I use this one [reusable bag] and not the other one, is because if I use the other one I will pay probably one million or four million, and I don’t want that”.

Conditionality

While the ban appeared strict, it was also conditional as certain bags for industrial packaging and waste were exempted if approved by NEMA. This means that plastic bags could still be used for certain purposes. The environmental organization member (interview 18) thought it was illogical that for example goods bought online came in plastic bags, and she questioned whether it was legal to reuse these bags for other purposes. The required labelling is also supposed to work as a guarantee that the producer should be ready to receive and recycle these bags. According to the manufacturers who were licenced to produce bags, this was not happening. The manufacturer who was also running a recycling company (interview 24), said the plastic could be recycled, but that a take-back system for each individual producer “is not possible”. The waste management company sales person (interview 26) explained that their company would be held responsible if the bags were not properly disposed of: “If it [a labelled bin liner] is found in Dandora dumpsite, we will be fined, to make us accountable. I hope it never happens”.

Information

It is unclear exactly how much and what information was provided before the ban. The theme of the annual World Environment Day 2018 in Nairobi was plastic pollution. But before the ban, there seemed to be more ‘pure’ information than motivational campaigns. In the survey, the majority (71 percent) of the respondents said they were first informed about the ban through radio and TV. Newspapers came second (12 percent), then social media (11 percent). Only three percent heard about it directly through public information. Some of the plastic producers said in interviews that they received a notice from NEMA with a request to declare their stocks. Most vendors said they heard about the ban in the media. I was given some flyers and posters from NEMA and the Ministry of Environment as examples of informational material, but I do not know how many people had seen or received these. The county employee (interview 25) said text messages had been sent by the telephone operators to all subscribers in Kenya to inform about the ban. The NEMA employees (interview 23) said they got much publicity for the ban in the media, and that a lot of resources went into preparing the public: “We used all forums (...) radio, TV, meetings. We would go to the market operators, meetings with institutions – we did all of that. I think the first three months,

there was nothing else we were doing other than sensitising Kenyans, saying prepare, this ban is coming”. The WWF employee (interview 13) disagreed and said the information on the ban was insufficient and came too late. She did not know of any coordinated efforts from other environmental organisations and said WWF had not engaged in the issue at the time due to lack of resources. As the organization is supportive of the ban, they were now engaged in awareness raising. Among the interviewees, some said they did not know much about the ban before it was implemented. On the other side, many also recognized that the issue of plastic bags had been discussed for years before the ban.

5.3 Costs of alternatives

A new market for nonwoven bags

According to the interviews there was little information available on alternatives to plastic bags until shortly before implementation in August. The NEMA employees (interview 23) said: “we were very keen on banning the plastic, but we didn’t imagine that it was our responsibility to ensure the alternative”. NEMA (2017c) encouraged innovation, and later suggested alternatives such as bags made from traditional materials like paper, jute, canvas and sisal, as well as bags and sacks made of polypropylene. From what I observed and was told during the field work, reusable so-called nonwoven carrier bags in different colours and sizes were available at most supermarkets and outdoor markets in Nairobi. It was unclear exactly how the nonwoven bags became a preferred alternative. These bags are more fibre-like than plastic bags and not waterproof. A number of people appeared unaware or uncertain about their composition, and some even claimed that they are biodegradable. One manufacturer (interview 20) said he thought the industry was trying to make the bags appear more environmentally friendly: “It’s a façade. It’s still plastics”.

To be certain, I had some of the bags from Nairobi analysed by *Grønt Punkt Norge AS* (a company administering recycling systems for packaging in Norway), who concluded that the bags consist of 100 percent polypropylene (PP). According to Muthu and Li (2014) such bags became popular in China after certain types of plastic bags were banned there. Nonwoven PP-bags are made from synthetic, non-renewable materials (petroleum). In an environmental impact assessment of shopping bags, they scored low on CO₂-emissions, biodegradability and recyclability. The authors (2014, p. 117) underline that since reusable bags require more resources, their impact will be much higher than that of single-use bags if they are not reused to their limit. Consumer behaviour is therefore key for these bags to be a sustainable option.

According to the NEMA employees (interview 23) the nonwoven bags were temporary. They said that since these bags are made from plastic and also end up in the environment (although not the same amount as polythene bags) they would also be banned in the future, but there was “no set date”.

Shifting the costs

The nonwoven bags are produced by different types of machines and the transition can be costly. The manufacturer in Mombasa (interview 4), said he had ordered new equipment for reusable bags around the time the ban was gazetted: “We started to see in the market that people were bringing these bags directly from China, Dubai, India and selling to people, making business. As I’m a manufacturer, I said we have to start working on a new way to change”. While some argued that the jobs lost in the plastic industry will be replaced by producing the nonwoven bags, the manufacturer disagreed. He said the number of workers at the factory was reduced by more than two thirds since the ban. He was also struggling to find a buyer for plastic bag machines. According to the manufacturers, the exempted printed plastic bags also require extra machines and resources. The conditions to get an exemption is therefore harder to meet for small scale producers. The environmental consultant (interview 1) called this discrimination: “Somebody who is having a formal industry is allowed [to use plastic bags], but if you are doing informal packaging you cannot be allowed (...). So the ban is discriminatory in terms of the users”.

Prices and motivation

The nonwoven bags typically cost between 10-30 KSh according to size. Several survey respondents thought they were too expensive. One Kibera inhabitant (interview 10) claimed that they would affect retail prices because sellers would attempt to absorb the price like they did with plastic bags: “Maybe I want to give it [nonwoven bag] for free, maybe I *have to* give it for free. In order for me to give it for free, I have to introduce that particular cost in the product”. But most market sellers charged for the reusable bags. This side of the ban is resembling an economic instrument, as the alternative bags are costly and many reported that it was annoying to forget to bring a bag. A Kilimani inhabitant (interview 21) said the price “forces us to think, because it is directly affecting our pockets. (...) every time you are forced to buy them [reusable bags], you know, it’s that whole psychological thing that happens”.

5.4 Discussion

Coordination

In Nairobi, the consumption and discarding of plastic bags is in a way a side-effect of economic activity. Kenya aims for rapid economic growth, and the consumption continued to increase despite several attempts to formulate a regime for handling the side-effects. But in fact, both the ban and previous policies were regulating the ‘input’ of the pollution rather than the actual ‘output’ in terms of littering. In light of Coase’s (1960) thoughts on transaction costs, stopping a large number of people from shifting their costs onto others is demanding, while stopping the ‘harmful effects’ at the source of a smaller number of producers is simpler. However, Coase would probably not approve of the tactic to completely end the activity, as this will result in higher total costs than paying a compensation if this was possible. The waste problem arose due to lack of coordinated behaviour (or collective action), and it was creating a conflict that can be seen as asymmetrical because the problems associated with the bags affected people in low-income areas and informal settlements more. But at the same time, these areas were also generating the most plastic waste because they are densely populated and lack waste management facilities (Mukui 2015).

Motivation and rationality before

The focus of the previous policies was mainly on reducing demand for bags by making them more expensive to produce, and at the same time limit the use of the thinnest bags that caused most nuisance. However, as Vatn (2015) argues, economic instruments usually encourage individual and not collective rationality because they directly affect material values. As seen in the literature (Ritch et al. 2009), it is not necessarily rational for producers and retailers to pass a tax directly on to their customers if they risk reducing shopping activities and demand for the bags. There were no requirements to pass the tax on in the form of a levy, and even if there had been, the informal sector is large and difficult to monitor. Similarly, the limited access to waste management can be seen in the perspective of individual rationality. With the large amount of plastic waste already in the environment, one bag more seemed to make little difference, and so it becomes a problem of collective action.

Motivation and rationality after

The new policy instrument on plastic bags was designed as a classic command-and-control instrument with negative sanctions. The ban has a repressive, but conditional approach. The main motivation for behavioural change is apparently very high costs of non-compliance.

Since it is now easy to spot an illegal bag (all plastic bags without the name of the manufacturer printed), monitoring is easier and possessing plastic bags is associated with some level of risk. While the actual punishments were lower than stated in the law, being arrested and taken to court is unpleasant and costly. The high level of corruption could play a part in undermining this mechanism, as it is possible to pay a bribe and avoid a court hearing. However, it seemed like most interviewees preferred to avoid any confrontations with the police. I should also remind that the ban is established under an existing law, which already stated that littering is an offence (EMCA 1999, p. 24 chapter 87). Without sanctions, the existing law seemed to have little signal effect on its own. The price of the alternatives was another side to the new arrangement that could also appeal to individual rationality. The nonwoven polypropylene bags were relatively expensive, creating an economic disincentive to continue previous behaviour when shopping. However, neither the nonwoven bags as the preferred alternative, nor their price were intentional parts of the initial policy, while they became an effect of it.

Norms and information

I had little information on the content in the messages about the ban, and whether the intention was to appeal to collective rationality and conscience in these messages. Since the media was emphasised as an important channel for communicating the ban, it seems likely that the main focus was on 'pure information'. But it is difficult to say much about the use of manipulative or normative power, as Vedung (1998) would call it. The normative content of the law is more difficult to observe under such a strict ban. While the thought of non-compliance made some interviewees feel scared or uncomfortable, it is uncertain whether this was somewhat related to the law itself or only due to the fear of being caught. Similarly, many felt annoyed when they forgot to bring reusable bags and had to buy the nonwoven type. But it is uncertain whether this 'bad feeling' partly comes from breaking a social norm, or simply the economic cost of buying one more bag.

Rights and responsibilities

While everyone appeared to have more or less the same right to use plastic bags before, the responsibility to only produce bags of a certain quality and pay a tax for the harm they were causing, was mainly put on producers. However, the revenue that could have gone to waste management and recycling was not used for this purpose, and no one were required to directly reduce consumption. This of course changed after the ban and the costs associated with the problems of bags was shifted onto the consumers. The right to use bags is still there,

but access to bags is more exclusive as they have to be approved and their use is limited. The right to make bags is now reserved for producers who can label and take responsibility for the bags they make. If the bags could actually be returned and recycled by the respective producer, it can be seen as establishing symmetry where rights are given to actors who take responsibility. In reality however, transaction costs and technical challenges are hindering this from happening. As mentioned in the theoretical chapter, when policies are put in place after the problem has occurred, power relations, social practices and interests are already established. In the case of Kenya, this is exemplified in an influential industry and established social practices related to plastic bags which will make them difficult to replace.

6. PERCEPTIONS AND ATTITUDES

In this chapter I describe the results related to attitudes and perceptions of the ban based on the second research question:

- *How is the ban perceived by different members of the community, and what determines differences in their attitudes toward the ban?*

6.1 Sample description

Before describing the statistical tests and survey material further, I find it relevant to present an overview of the survey sample that constitutes the basis for the analysis and discussion in chapter 6 and 7. When analysing the relationships between the different variables, I have done bivariate tests according to the type of variable and a few linear and logistic regressions as described in chapter 4 on methodology. I will discuss some of the most relevant relationships. All tests and significance levels can be found in appendix 1. In addition to the survey data, quotes and information from a total of 26 qualitative interviews are included in the analysis. In the text I identify the interviews with numbers. An overview of all the interviews can be found in appendix 2. Seven interviews are with residents in the four areas of the survey, but none of these are part of the survey sample.

The sample consists of a total of 197 respondents living in Nairobi. The respondents' age ranged from 18 to 72 years, with a mean of 31.4. There were slightly more men (59.7 percent) than women (40.3 percent). Figure 4 illustrates the distribution of age and gender.

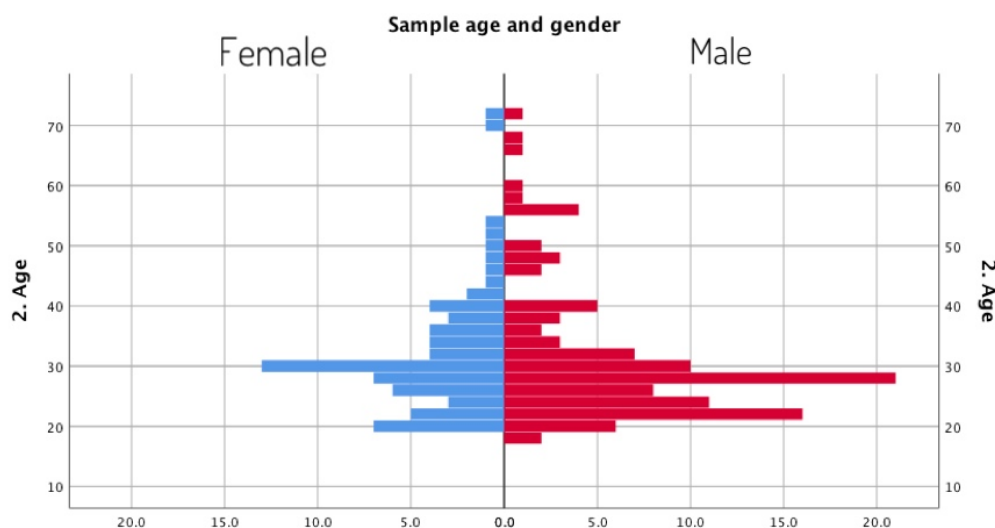


Figure 4. Gender and age distribution in sample. Frequencies on the x-axis. (N = 180).

	Informal settlements		Residential areas		Total
	Kiambiu	Kibera	Buruburu	Kilimani	
Gender					
Male	23	34	27	33	117
Female	23	20	19	17	79
Missing			1		1
Total					197
Age					
Mean	31.1	30	35.4	29.9	31.4
Standard deviation	10.3	12.2	13.7	6.7	11.1
Education					
None	1	0	1	0	2
Primary	10	3	3	4	20
Some high school	4	5	4	6	19
High school graduate	21	21	8	15	65
Some college/university	2	13	8	8	31
College/university graduate	6	11	20	15	52
Missing	2	1	3	2	8
Total					197
Income					
Student (no income)	1	6	1	5	13
0-10.000 KES	24	20	15	11	70
10.000-100.000 KES	12	17	23	24	76
>100.000 KES	5	7	2	7	21
Missing	4	4	6	3	17
Total					197
Environmental activities					
Mean	1.2	1.15	1.62	1.28	1.3
Standard deviation	0.75	0.69	1.01	0.81	0.83

N = 197

Table 3. Frequencies in the sample.

The majority of respondents lived in a constituency close to the neighbourhood where they were recruited for the survey. Particularly in the informal settlements, almost no respondents came from other parts of the city. Kilimani had a slightly higher share of respondents who were not from that part of Nairobi. While the survey was conducted in four different areas partly to get a more diverse sample, belonging to a certain neighbourhood is part of a person's identity. In Nairobi, it also indicates a difference in access to public services and proximity to the problems generated by plastic bag pollution. I divided the sample broadly into respondents recruited in informal settlements (Kibera and Kiambiu) or residential areas (Buruburu and Kilimani). Education and income levels indicate that the survey did capture some socioeconomic differences between the different areas. As table 3 shows, the number of respondents with higher income and education levels were higher in the middle-income areas than the informal settlements.

Considering environmental values, 10.7 percent of the respondents had not been engaged in any of the environmentally friendly activities. 58.9 percent had done one. Only 1.5 percent (3 respondents) had done 4 or 5. Volunteering in clean-ups or similar activities and recycling at home were the most common activities. View on environmental issues is also considered part of the respondents' identity or background. I found that 87.8 percent strongly agreed that "everyone has a responsibility to work towards a better environment", while only 5.6 percent strongly disagreed. The statement "job creation and a growing economy is more important than environmental issues" gave a less unanimous result: 49.5 percent strongly agreed, and 31.1 percent strongly disagreed. The number of respondents who somewhat agreed or disagreed was quite small. In the analysis the values are merged into only agree or disagree.

6.2 Perceptions of the ban

Environmental impact

Awareness of the problems related to plastic bags among the respondents seemed generally high. Most of the respondents (71.1 percent) said they believed plastic bags had a large impact on the environment in Nairobi, and only 4.6 percent thought they had no impact. A majority (68 percent) also said they strongly agreed that the ban had helped raise awareness about environmental issues, while 10.2 percent strongly disagreed with this statement. There was also a large majority (87.3 percent) who mentioned "environmental protection" or "cleaner environment" in the open-ended question about why the bags were banned. The WWF employee (interview 13) said: "If you tell people about plastics, or even just

environmental degradation, people are aware. But now the issue is of attitudes and practices”. In several interviews, the recent water shortage and memorandum on logging were mentioned as examples of how Kenyans are feeling the effects of environmental degradation and climate change. An environmental institute officer (interview 3) said that “Kenyans of now, you cannot compare them with the Kenyans of 2005” because they are more concerned with environmental issues. The respondents’ answers to the open-ended survey question on why they thought the bags was completely banned often involved environmental issues. Very few (3.6 percent) said they *didn’t know* why the ban was introduced. Although not to be taken as evidence that everyone was well-informed, it shows that most respondents had some idea about the reasons for banning plastic bags.

Developing norms

I got the impression that most interviewees thought the plastic bags should not be made legal again. They usually claimed that they would not go back to using plastic bags even if the ban was lifted. The exception were the vendors who still used bags to a certain extent. The man working in a bag shop (interview 2) claimed that he personally had become more responsible because of the ban, but that it had not changed people’ attitude in general: “I would not advice we go back. It will be a total mess. If we have no structure on waste management, then expect them to be dumped everywhere”. The environmental consultant (interview 19) similarly claimed that he personally would not use the bags again, but he believed that many people who thought the ban was inconvenient would. The environmental organisation member (interview 18) said she thought the ban had little effect on norms and thought more education on waste management was needed: “If someone came and reintroduced plastic bags in Kenya, we would say ‘yeah, okay’. The culture hasn’t changed”. The members of the youth group in Kiambiu (interview 14) also confirmed a divergence between environmental values and action. They emphasized that commitment to the environment was their reason for doing the waste collection. However, they ended their collection round by the river, where the content of the sacks and buckets was emptied on the ground. Recyclable pieces of plastic and metal were removed, and the food waste was left for chickens and other animals. The rest was simply pushed down a slope toward the river. The explanation was that they do not have access to a dumpsite. They also said that the river was already polluted by other people’s waste and that companies upstream had open lines of waste water directly into the river.

View on enforcement

Regarding the enforcement of the ban, the distribution was quite even between thinking it was very strict (35.4 percent), quite fair (36.9 percent) and not strict enough (24.1 percent).

Income and education levels had significant associations ($p > 0.05$) with view on enforcement. A larger share than expected among respondents with lower income thought the ban was very strict. The same was the case in the group with lower education. This was also reflected in interviews. An environmental consultant (interview 19) thought it was unfair that consumers and manufacturers both risked being fined, because “they have different ability to pay the fines”. He also pointed out that producers would benefit much more from breaking the law as they sell the bags, than consumers who are using them. This was also pointed out by the bag seller (interview 2), who said most of his customers were now afraid to use bags, while “the market remained” for large producers and industry actors. Many of the interviewees also said they were surprised that the ban was actually being implemented and enforced, as this was not the experience with previous regulations. Several interviewees were also sceptical to whether the ban would continue to be enforced after the Minister of Environment who initiated the ban left her position.

Opinions on alternative solutions

Many respondents thought other solutions to reduce plastic bags could have worked better than a ban. As figure 6 shows, 46.4 percent preferred having reusable bags given for free. A better system for recycling was the second most popular alternative. There was a significant difference ($p = .045$) in number of environmental activities between respondents depending on which option they preferred. The group who wanted reusable bags for free had the lowest average number of activities (1.09), while the ones who thought a tax or high fees were better had the highest mean (1.63). It could seem as environmentally conscious respondents more often chose the alternatives with higher personal costs. Almost all the interviewees mentioned the underlying issue of access to waste management and recycling systems. An environmental organization member (interview 18) said “I think the ultimate solution would be a solid waste management facility”. “I think in the short term it [the ban] was a good idea. But of course, we need to invest in long-term management of waste”, said the WWF employee (interview 13). An environmental consultant (interview 19) still thought the ban was necessary: “I think for plastics overall, even if there is a recycling system that would not be enough because they still leak [into the environment]”. Many also expressed that while they agreed that some plastic carrier bags should be banned, they would have preferred a

more incremental approach where certain types were phased out, while for example small bags for food packaging were still legal.

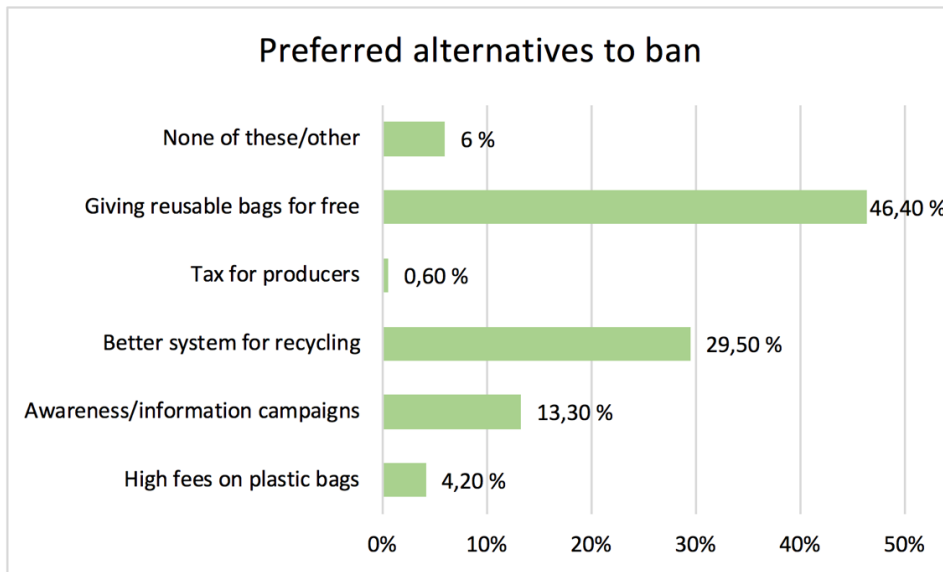


Figure 5. Preferred alternatives to the ban. (N = 166).

6.3 Attitudes toward the ban

Whether a ban was the right decision

There was broad support for the ban among the respondents. 75 percent said they thought banning plastic bags was the right decision when it was introduced in 2017. 19.4 percent disagreed, and 5.6 percent were undecided. At the time of the survey (May 2018), the share who thought it was the right decision had increased to 86.8 percent. 8.1 percent disagreed, and 5.1 percent were still undecided. This was reflected in many of the interviews, and seeing change was often emphasized: “I think the ban is good, because it was very dirty here” (vendor in Kiambiu, interview 6); “I’m happy about the ban. It has also changed my homeplace, because my cows and goats don’t eat the bags anymore” (vendor in Buruburu, interview 11). Others said they had not seen much difference in their surroundings after the ban. Among the respondents who appeared to have changed their mind, 12.7 percent said they were for the ban now, but against it before. A few respondents went in the opposite direction from being for the ban to against it, and some changed between ‘yes’ and ‘undecided’. 80.7 percent had not changed their mind in any direction.

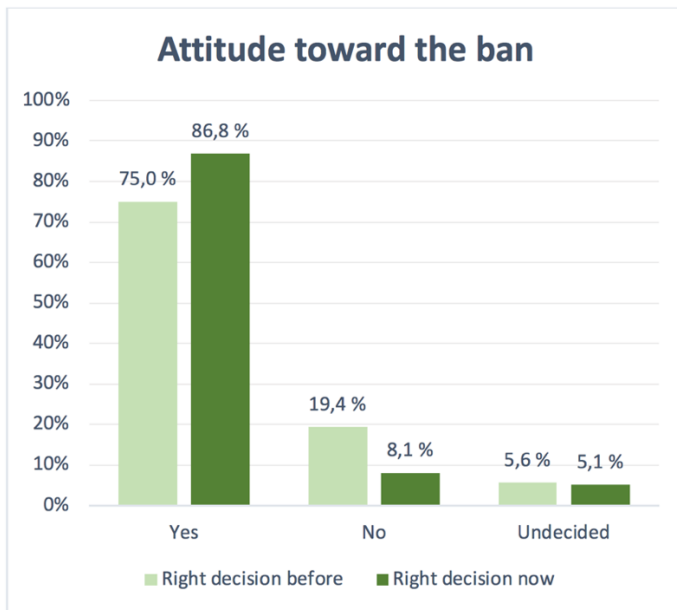


Figure 6. Views on the ban before and after implementation ($N = 196$).

Individual variations

Looking at associations between attitudes toward the ban and background variables (see also table 1-3 in appendix 1), there was no significant difference related to gender. The number of respondents with higher income who were for the ban was higher than expected both before and after implementation, but the association was not significant (p. 076 and .078).

Considering age, the respondents who were for the ban now were on average 4 years younger than the ones against it, but this difference was not significant (p .092) and standard deviation quite high. Among the respondents with higher education, a higher number than expected was for the ban both before and after implementation, and this association was significant (p .003 and .037). Number of environmentally friendly activities also had a significant (p .017) association with being positive toward the ban at the time of implementation. A possible explanation could be that individuals who are more conscious about the environment would be more positive toward a new policy in general, while others had to see the change for themselves first. There was no significant difference in views on the ban after implementation. This could mean that changing opinion on the ban happened more often in the group of people who were not that environmentally conscious. However, the number of respondents in this group is very small.

6.4 Determinants of attitudes

To find out more on how the background variables affected attitudes toward the ban together with other views, I used binary logistic regression. The dependent variables are (1) opinion

on the decision to ban the bags (before) and (2) opinion on the decision to ban the bags (now). While I could also have identified respondents who changed their mind about the ban, the changes went in several directions (yes – uncertain – no), and the group in total was quite small. I therefore decided to look at differences in factors predicting support for the ban before and after implementation, as these are the only data that can directly measure the effect of the ban. In the first model I did not include opinion on the enforcement of the ban, as it had not ‘occurred’ yet.

Model 1: The ban was the right decision (before)

Model 1	Dependent variable: The ban was the right decision (before)											
	1A				1B				1C			
Independent variables	B	S.E.	Exp. B	p	B	S.E.	Exp. B	p	B	S.E.	Exp. B	p
Background / Identity												
Age	-.016	.017	.984	.342	-.008	.018	.992	.668	-.007	.018	.993	.690
Gender	-.576	.371	.562	.120	-.733	.388	.481	.059	-.589	.401	.555	.142
Education level	.429	.413	1.535	.300	.355	.422	1.427	.400	.351	.437	1.421	.421
Income level	.436	.389	1.547	.262	.407	.411	1.502	.322	.396	.427	1.486	.354
Neighbourhood type	-.352	.385	.703	.360	-.263	.407	.769	.518	-.145	.424	.865	.732
Environmental values												
Activities					.582	.281	1.790	.038*	.545	.285	1.725	.056
Everyone has responsibility					-.848	.346	.428	.014*	-.870	.346	.419	.012*
Economy bef. environment					-.038	.203	.963	.853	-.041	.210	.960	.845
Awareness												
Info on ban									.322	.412	1.380	.435
Bags had env. impact									.024	.451	1.024	.958
Omnibus test chi sq. (sig.)												
	9.54 (.089)				18.82 (.016*)				16.15 (.095)			
Nagelkerke R²												
	.082				.159				.143			
-2 log likelihood												
	179.77				169.89				163.22			
N												
	165				164				159			

Table 4. Binary logistic regression models – the ban was the right decision (before)

Model 1a: The first and most basic model showed no significant associations with the dependent variable. The overall model was not significant and Nagelkerke R² was quite small (.082) compared to the other models.

Model 1b: As the bivariate tests also showed, environmental values were strongly associated with support for the ban before. In the regression model, having a higher number of environmental activities increased the chances of thinking the ban was the right decision before (p .038). A bit surprising, thinking everyone has a responsibility toward the environment had a significant (p .014), negative association with the dependent variable. I do not have any explanation for this association, but it is possible that people who believe that everyone should take responsibility for the environment also believed that a ban was not an

appropriate solution to the problem. The relationship was also quite weak. The model was significant (p. 016) with the highest R², which makes it the strongest of three models.

Model 1c: There appeared to be no association between being for the ban before with either how respondents had received information about the ban or their awareness on the environmental impact. This is a bit surprising, considering that awareness of the problem is expected to be related to support for a policy. Especially a problem with local consequences such as the plastic bags in Nairobi. Again, I cannot say for certain, but the explanation could also be that the respondents thought some other solution to the problem was needed. The association with environmental activities was no longer significant (p .054). The number of cases in the model had decreased, and the overall model was not significant.

Model 2: The ban was the right decision (now)

Model 2	Dependent variable: The ban was the right decision (now)											
	2A				2B				2C			
Independent variables	B	S.E.	Exp. B	p	B	S.E.	Exp. B	p	B	S.E.	Exp. B	p
Background / Identity												
Age	.058	.032	1.059	.069	.055	.032	1.057	.082	.062	.040	1.064	.117
Gender	-.884	.504	.413	.079	-.895	.506	.408	.077	-.592	.581	.553	.308
Education level	1.657	.677	5.245	.014*	1.645	.683	5.182	.016*	1.502	.733	4.489	.040*
Income level	.290	.509	1.336	.569	.362	.535	1.436	.499	.229	.594	1.258	.699
Neighbourhood type	-.296	.522	.744	.571	-.261	.544	.770	.631	.112	.609	1.118	.854
Environmental values												
Activities					-.058	.320	.943	.856	-.136	.350	.873	.697
Everyone has responsibility					.316	.917	1.372	.730	-.321	.486	.725	.509
Economy bef. environment					-.284	.538	.753	.598	-.367	.319	.693	.250
Awareness / view												
Info on ban									.188	.606	1.207	.756
Bags had env. impact									-.126	.596	.882	.833
Enforcement									-1.612	.589	.199	.006**
Omnibus test chi sq. (sig.)	17.29 (.004**)				17.44 (.026*)				21.48 (.029*)			
Nagelkerke R ²	.182				.184				.254			
-2 log likelihood	112.58				112.14				89.36			
N	166				165				153			

Table 5. Binary logistic regression models – the ban was the right decision (now)

I used the same model and independent variables as before, but I could now add whether the respondent thought the enforcement of the ban was too strict as an independent variable.

Model 2a: Looking first at background variables, education level was significantly (p. 014) related to attitude toward the ban now, with a positive Beta coefficient far from zero, which means that a respondent with high education level have a much higher probability of agreeing to the ban than one with lower education. The model is significant with a Nagelkerke R² of .182.

Model 2b: In this model, education was still significant, and the coefficient and standard error had not changed much. Contrary to what I expected, there was no association with the environmental value variables in this model, and the association from before the ban was gone. The overall model was still significant while log likelihood and R^2 were about the same as model 2a, which indicates that the variables on environmental values were not good predictors of whether a respondent supported the ban after implementation.

Model 2c: In the model with variables on awareness and views on the effects of the ban, the association with education level was still significant ($p .040$). The coefficient was a bit smaller and standard error slightly higher, which means it was not quite as good for explaining attitude as before. Among the last set of variables, I expected awareness of the environmental impact of plastic bags to be associated with attitudes toward the ban. This was not the case. However, opinion on enforcement was significant ($p .006$). The relationship is negative, which means that thinking the ban was very strict reduces the chance of being for the ban. This could indicate that a feeling of unfairness made some respondents disagree that a ban was the right decision.

6.5 Discussion

Awareness

According to Njeru (2006) who conducted a survey in Nairobi in 2001, awareness on the consequences of plastic bag waste in Nairobi was low. In my survey, most respondents said they knew about the effects of plastic bags and associated the ban with environmental protection. But measuring concrete effects on awareness and attitudes is challenging, and it is very likely that general awareness on environmental issues among Nairobians increased independent of the ban. As mentioned in the background chapter, the whole world is now focusing more on plastic pollution than some years back. In addition, Kenyans have gotten more first-hand experience with the consequences of environmental deterioration and climate change in recent years. Floods and draughts are more common, and plastic bag waste has a role in these emergencies.

As it was also pointed out in the literature, attitudes and perceptions can be affected by information, but what information we believe depends on personal values and interests. While I cannot comment on the specific content in messages and information on the ban, I

found a significant association with hearing about the ban through traditional media and agreeing that it created awareness. The information conveyed by a news station could be interpreted as more impartial than for example a government campaign. However, there could be other underlying links that I was not able to capture. Of course, an individual who felt they were well informed and aware may also believe that others are also more aware. Respondents agreeing that everyone is responsible for the environment were more likely to believe that the ban created awareness. This could be due to a generally positive view on environmental policies, or that they are more sensitive to an actual increase in awareness.

Perceptions of justice

The assumption that socioeconomic conditions matter, is somehow strengthened by the relationship between disagreeing with the ban and thinking it is too strict. Other findings in chapter 5 indicated that small scale manufacturers and vendors have less opportunities to get exemptions from the ban and to find other alternatives. A feeling of inequality can make people more negative toward the ban, and some thought getting bags for free could have been an appropriate compensation. Even if the ban was perceived as unfair, an economic regulation making plastic bags very expensive could have been even more problematic. According to the literature (Vatn 2015, p. 67), poor people are often in unsymmetrical conflicts because they are more vulnerable to the consequences of environmental issues. While the ban was not reducing inequality, it was not necessarily making it worse either. Perceptions will depend on which definition of fairness or equality is applied, as many also thought that the ban was fair exactly because it made everyone responsible.

Individual attitudes

The support for the ban was high both before and after the ban. Contrary to what I expected and what He (2010) found in terms of declining support for the Chinese policy on plastic bags, even more respondents in my survey seemed to be supportive after the ban. As discussed, asking *ex post* about opinions in the past can cause inaccuracy, as views on the ban now can affect how people think about their previous attitudes. Some of the expected connections between attitudes and individual characteristics were not supported in the models. However, it is important to keep in mind that the number of people who supported the ban was very high compared to the ones who were undecided or against it which could affect the reliability of the statistical analysis. Environmental consciousness seemed to be relevant for predicting likelihood of supporting the ban before implementation, but not after. This could mean that seeing actual effects of the ban made people more supportive. The

question was whether the ban was the ‘right decision’, indicating not only that they agreed to the ban as tolerable, but that it was in fact necessary. But there could also be other factors that have affected respondent’s attitudes, for example being convinced by peers, media stories, and so on.

The fact that education was a significant predictor for agreeing whether the ban was the right decision after implementation, could point toward a difference in socioeconomic background. But since income and neighbourhood were not significantly associated, another explanation could be that people with more education have a higher awareness of environmental issues and therefore are more supportive of the ban. The qualitative interviews supported the assumption that perceived effects of the ban are connected to support for the ban. The respondents who mentioned positive effects of the ban often said they thought the environment was greener and better now. As Scannell and Gifford (2013) found, people who have a strong attachment to their local area are more engaged in the environment. Of course, this relationship can go both ways. It could be that people who are positive toward a ban will more easily appreciate its positive outcomes. Or, people who experience positive changes are more supportive of the ban. This is particularly interesting when taking into account the statements that the reason the tax and standard did not work, was partly due to the fact that it was difficult to see any effects. It has to be possible to imagine the change, and when the policy is implemented people expect to observe this in reality.

7. BEHAVIOUR AND ADAPTATION

In the following section I describe the results related to the third research question:

- *How did individual behaviour change after the ban, and are socioeconomic factors relevant determinants of adaptation?*

7.1 Behaviour before the ban

Consumption

In order to analyse changes, I start by describing behaviour related to plastic bags before the ban. The average number of plastic bags used per week before was 34.2 with standard deviation 59. The highest value was 400, but this is an outlier as both median and mode was 10. A potential explanation is that some respondents could have included the number of bags they used for packaging or transportation of products, and not just personal use. Some of the

street vendors said in interviews that they used to buy bags in bulks of 100 or 200. It is possible that some survey respondents also did this. The outliers make it difficult to analyse consumption of bags related to other variables. I attempted to deal with this by removing all units (13 respondents) with a value >100, but findings could still be affected. The mean after removing the outliers was 21.2 with a standard deviation of 27.9. While the differences were not significant between the groups, the data showed that number of bags consumed was higher both for respondents with higher income and education level. This contradicts the expectation that poorer people used more plastic bags because they have more varied uses for them. There was also a significant association between being involved in several environmental activities and paying for bags, which could indicate that environmentally conscious respondents paid more often for bags (or at least they said they did).

Uses for plastic bags

Plastic bags had a wide range of uses, defined into eight categories (based on the pilot survey results), but respondents could also fill in other uses. As only one respondent did so (they used plastic bags as book covers, but now used old newspapers instead), this answer is not included in the further analysis. As figure 7 shows, shopping in general was the most common purpose for plastic bags, followed by food packaging, carrying groceries and waste. Some used plastic bags to carry goods from the market or supermarket, while street vendors and kiosks also used small plastic bags to repackage household products such as cooking oil and washing powder in smaller quantities. This makes it affordable even to very poor people and is sometimes referred to as the ‘*kadogo* economy’. Many vegetable sellers also sold pre-cut spinach and cabbage in plastic bags.

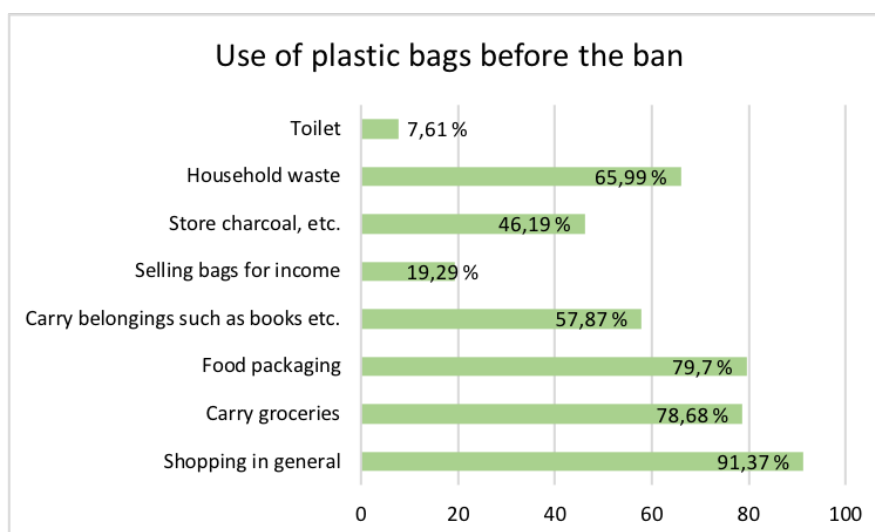


Figure 7. Uses for plastic bags before (N = 197).

The least common use was not surprisingly for human waste, or ‘flying toilets’. According to

the organization who provides alternatives to flying toilets (interview 12), people don't like to talk about sanitation in general. They said lack of space and sanitation in informal settlements was the reason people rather use plastic bags and throw them in a pit or "just wherever it lands". To the less sensitive question on whether the respondent *was aware* of plastic bags being used for this purpose in their neighbourhood, 43.3 percent said 'yes'. This varied between the different areas. For example, 70.5 percent of respondents in Kiambiu said flying toilets were used in their neighbourhood. Bivariate tests showed that awareness of flying toilets was associated with education and income level. The low-income group had a higher share of respondents with flying toilets in their neighbourhood than the high-income group, but the association was not significant ($p = .09$). The group with lower education had a significant ($p = .039$) higher share of respondents who said they were aware of flying toilets. As flying toilets mostly occur in poor areas, this could indicate that level of education was in fact a better measurement of socioeconomic background than income. The sum of uses for bags was similarly higher in the high income-group with a significant association.

7.2 Behaviour after the ban

Substitutions for plastic bags

The respondents listed a wide variety of substitutions for the plastic bags. I categorized substitutes with similar qualities into a total of 14 types. In table 4 below are frequencies and percentages for each use and type. For example, 65 percent of the respondents who used plastic bags for shopping before, now use the new nonwoven bags instead. Some mentioned more than one substitute, which is why the sum of substitutes is >100 percent for some uses. As mentioned in the methodology chapter, a few interviewers unfortunately only wrote 'bag' instead of specifying the kind of bag the respondent was talking about. I kept this category separate to show that a substitution was found, but it is unclear what type. 'None' either means the respondent said they could not find a substitute, or the question was left open.

Substitution	Shopping	Carry groceries	Food packaging	Carry belongings	Selling bags	Storage	Household waste	Toilet
Reusable/ carrier bag (nonwoven)	117 (65%)	50 (32.3%)	11 (7%)	20 (17.5%)	11 (28.9%)	24 (26.4%)	6 (4.6%)	-
Wool/ cotton/ cloth bags	10 (5.6%)	4 (2.6%)	5 (3.2%)	3 (2.6%)	-	3 (3.3%)	-	-
Handbag/ backpack/ sisal bag	12 (6.7%)	-	-	19 (16.7%)	-	1 (1.1%)	-	-
Sacks/ jute / gunny/ maize sack	4 (2.2%)	8 (5.2%)	2 (1.3%)	3 (2.6%)	-	20 (22%)	25 (19.2%)	-
Paper (khaki) bag	1 (0.6%)	13 (8.4%)	12 (7.6%)	1 (0.8%)	-	-	-	-
Box/ carton/ crate/ basket	14 (7.8%)	2 (1.3%)	-	7 (6.1%)	-	5 (5.5%)	6 (4.6%)	-
Plastic container/ tin/ can/ basin/ paper plate/ dishes	-	21 (13.6%)	66 (43%)	-	-	10 (11%)	2 (1.5%)	-
Newspaper/ magazine/ manila paper/ envelopes	-	8 (5.2%)	15 (9.6%)	-	-	-	-	1 (6.7%)
Plastic wrap/ net/ aluminum foil	-	-	4 (2.6%)	-	-	-	-	-
Toilet paper/ tissue	-	-	-	-	-	-	-	2 (13.3%)
Dustbin/ bucket	-	4 (2.6%)	2 (1.3%)	-	-	9 (9.9%)	41 (31.5%)	4 (26.7%)
County provided /approved garbage bags	-	-	-	-	-	-	16 (12.3%)	-
Plastic bags (banned)	-	-	-	-	-	-	6 (4.6%)	1 (6.7%)
Just "bag"	21 (11.7%)	21 (13.6%)	7 (4.5%)	30 (26.3%)	2 (5.3%)	2 (2.2%)	-	-
None	5 (2.8%)	32 (20.7%)	37 (23.6%)	37 (32.5%)	25 (65.8%)	22 (24.2%)	33 (25.4%)	7 (46.7%)
N	180 (100%)	155 (100%)	157 (100%)	114 (100%)	38 (100%)	91 (100%)	130 (100%)	15 (100%)

Table 6. Uses and substitutes for plastic bags according to survey responses (N = 197).

Shopping bags

For shopping or carrying things, the new reusable carrier bags (nonwoven) were widely used. Other typical replacements were cartons, baskets, handbags or traditional sisal bags. Some respondents said they simply carried things with their hands instead. There are also other solutions, for example one respondent said that instead of buying charcoal in bags, they just brought their *jiko* (portable stove) directly to the seller to fill it up.

Food packaging

Many of the issues when substituting the bags were related to food. For whole fruits and vegetables, plastic nets were viable alternatives. Other products are more challenging to package. For example, two survey respondents who worked in butcheries said they had difficulties finding alternative packaging. Another found it “very hard to find cans and containers” for milk. In total 38 survey respondents said they had lost customers or received complaints when they stopped using plastic bags. As commercial producers of bread and other products are usually exempted from the ban, these respondents most likely work in the informal sector. According to an employee in a bag shop (interview 2), plastic bags are difficult to replace as “the customer must see what he is buying”. Others said paper bags

become greasy very quickly, and that they do not keep the food fresh as long as plastic bags. A consultant (interview 1) questioned the health effects of using *khaki* (paper bags) for food: “the public health point of view has been challenged by the alternative materials”. He also mentioned that many of the substitutions for food packaging, such as plastic foil and wrapping can cause similar environmental problems as plastic bags. Only six of the survey respondents directly mentioned unhygienic conditions or ‘germs’ when talking about negative effects of the ban.

Waste handling

Some respondents said they used the reusable nonwoven bags for waste. This was confirmed by observation, as a number of people at the Dandora dump site were collecting and washing these bags. Others said they used bins and sacks. A total of 16 respondents said they used county approved bin liners for waste. Although the number is so small it is difficult to draw any conclusions, none of the respondents who used approved bin liners lived in Kiambiu, and just two of them were at the lowest income level. A Kilimani inhabitant (interview 21) said she was concerned about the waste bags before finding out they were exempted from the ban: “The trash has not really been a problem, because they’ve [waste collectors] been providing the trash bags”. The recycling firm sales manager (interview 26) confirmed this. She said clients are provided with new, printed plastic bags from the company every month.

The lack of sufficient waste management in the informal settlements was evident in the survey and interviews. The youth group collecting waste in Kiambiu (interview 14), said their work had become more difficult now that people didn’t use plastic bags for waste. They used *gunny* sacks, buckets or wheelbarrows to collect waste in the neighbourhood for a fee of 20 KSh per household a week. They said they also cleaned between the houses with shovels every month. The waste usually piled up again, but “the closer to the river we get, less people have garbage, because they throw it in the river themselves”. One of their clients, a Kiambiu inhabitant (interview 15) said he preferred to use a waste bin or sacks, because “the plastic bags used to tear easily, and spill the garbage”. An environmental organization member (interview 18) thought the lack of waste management was exacerbated by the ban: “Nairobi looks worse. With the plastic bags, people used to put their dirt inside the bags and throw away or whatever, but then with these [reusable] bags, they decompose easily, so when waste is thrown in open spaces it just floods everywhere. It doesn’t look nice”.

'Flying toilets'

Very few had a substitution for 'flying toilets'. According to the representatives for the NGO working with sanitation in Kibera (interview 12), a few areas in the informal settlements still have open pit latrines, and it is difficult to declare an area totally "free of open defecation". According to the public toilet attendant (interview 9) there were around seven public toilet houses in Kiambiu. They charged five shillings to use the toilet and ten shillings to shower. The attendant and his colleagues had only worked there for a few months, but they had the impression that the number of customers had increased. They said they usually made around 1000 KSh per day in total, while this sum reportedly was considerably lower before. In most of the interviews I got the impression that the problem of flying toilets was reduced since the ban. A Kibera inhabitant (interview 10) said flying toilets was a problem until recently and mentioned that communal toilets had been built in the area. However, the NGO representatives (interview 12), thought awareness and attitudes toward sanitation and diseases had considerably improved over time, independent of the plastic bag ban.

Selling bags

Most of the respondents who said they had been selling plastic bags before the ban, were either selling reusable bags or had no substitute. While selling bags was the main source of income to some people, others sold plastic bags in addition to other products as part of their informal business. One respondent said they did not feel that impacted, as customers now bought nonwoven bags instead. Others said there was little profit because sales of the nonwoven bags are slow. The woman selling recycled bags from Dandora (interview 17) said that before the ban she could go to the market more often and make up to 5000 KSh on a day selling plastic bags, while now she went to the market only once a week and would make around 1200 KSh as demand was lower. The man working at a bag shop (interview 2) said most of their customers were small scale traders, but many of them had gone out of business after the ban. Because the nonwoven bags can be reused, the sales were "drastically reduced" compared to before the ban. He said several of his colleagues at the shop lost their job after the ban, and that his fixed salary and sales commission were reduced.

Many vendors were not selling plastic bags directly but depended on them for selling food. According to a vendor in Kibera who used bags for selling vegetables (interview 9) "customers said they didn't want to buy when there were no bags", but they started returning after a few months. Other street vendors also said the immediate decline in customers after the ban had stabilized. A street vendor in Kiambiu (interview 6) said some customers did not

want to buy the food without plastic bags, but then “you’re forced by your stomach to come with your tin the next time”. Some vendors used other materials to package their products, while others rather had customers bring their own dishes or containers. A Kibera inhabitant (interview 10) said the “flow of customers hasn’t really changed, because at the end of the day it’s not like you have an option. (...) You won’t stop eating because you have no plastic bag”. One survey respondent even said it was easier to work now that the customers brought their own container. A fruit seller in Buruburu (interview 11) said he had less customers than before, but he blamed the economy and not the plastic bag ban for this.

Compliance

While it was rare to see people actually carrying things in plastic bags or having them on display in shops and markets, Nairobi was not completely plastic bag free. Seven survey respondents specifically mentioned that they still used plastic bags. There is obviously a chance of underreporting as this is now illegal. Several of the vendors I interviewed still had a small supply of transparent plastic bags. A vegetable seller in Kibera (interview 9) said the bags were remaining stock from before the ban: “Most people come with containers now, these are just for emergencies”. According to a food vendor in Kiambiu (interview 6), “people come by to ask you if you want to buy [plastic bags] daily”, but they are “very expensive”. Another vendor (interview 10) said she still gave customers free plastic bags for tomatoes and other food items. The same supplier as before the ban came by every day, but prices had gone up. She said that as long as plastic bags were available, she would keep using them: “everyone else does. (...) If you want us to stop this, you have to stop this [plastic] paper from where they left”. A Kilimani resident (interview 21) said that she would obtain zip lock bags for food packaging when travelling abroad, and that she had also asked friends to do the same.

Ratio of substitution

Based on the survey data, I calculated the ratio of substitution against number of uses for each respondent. For example, if a respondent specified four uses for plastic bags and had (at least) one substitute for each category, the ratio of substitution is 100 percent. The average substitution ratio in the sample was 80 percent. I want to note that I do not believe respondents with no substitutions simply stopped shopping or throwing their garbage. There could be many reasons for a lack of substitutions. However, the ratio can somehow measure whether the respondent found it easy or hard to replace the bags, and if they had become accustomed to using something else. I found that ratio of substitution had a significant,

positive relationship with age, meaning that an older respondent is more likely to have a high ratio of substitution for plastic bags than a younger one. While the mean ratio of substitution was almost 5 percent lower for respondents in informal settlements, this association was not significant (p. 226). It also turned out that respondents with a higher income specified a significantly higher number of uses for the bags. This is again contradicting my expectation that poorer people used bags for more purposes, and it is a bit surprising as plastic bags were considered the cheap option before the ban.

Consumption of new bags

The number of new nonwoven bags used per week was considerably lower than the number of plastic bags used before. The mean was 3.6 bags per week, with standard deviation 3.9. The maximum was 25 bags per week. There was a difference in mean indicating that groups with low education or income used less of the new types of bags than people with high income or higher education. This is in line with what I expected, but as the relationships are not significant, the difference between the groups could also be coincidental. Several interviewees said they often forgot to bring a bag when they went to the supermarket, especially when stopping by a shop on their way home from work, and therefore had to buy more reusable bags.

Effect on everyday life

I also converted the answers to the open-ended question on how the ban had affected respondents' everyday life into a quantitative variable, by broadly categorizing them into positive, negative or neither. The positive answers (12.3 percent) typically highlighted that the respondent had noticed visible improvements, such as "less litter on the streets" or "it is greener where I live", as also mentioned in chapter 6. Others said it was easier when customers brought their own bags, or that the new bags last longer than plastic bags. The negative answers (63.6 percent) ranged from high costs of substitutions and inconvenience when shopping, to less customers, or that hygiene and waste management had become worse. 24.1 percent of the respondents said the ban had no effect on their everyday life. A higher number of respondents than expected counts (if no effect) in the high-income group said they did not feel affected by the ban. This association was not significant, although there is more than 90 percent chance that the difference is not a coincidence (p .084). The respondents who felt positively affected by the ban had a higher mean of environmentally friendly activities (1.67) compared to the group who had been negatively affected (mean 1.21). These relationships were significant (p .025 and .013) and indicate that people who are more

conscious about the environment are less likely to feel negatively affected and see the positive consequences of the ban.

7.3 Determinants of adaptation

Multivariate models

In order to analyse whether socioeconomic groups adapted differently, I looked at the background variables and their association with three dependent variables: (1) consumption of bags of the new type; (2) ratio of substitution and (3) the effect of the ban on everyday life. I also considered the effects of individual environmental values and previous behaviour on these outcomes. I used the same type of models for the variables to see which one fit best. The biggest model includes a total of 16 independent variables. There is reason to question the number of variables, as this will usually influence R^2 and could give the impression that the model explains more than it can. However, I have also reported adjusted R^2 , which takes into account a high number of variables.

Model 3: Number of bags (nonwoven) used now

Model 3	Dependent variable: Number of bags used now											
	3A				3B				3C			
Independent variables	B	S.E.	Beta	p	B	S.E.	Beta	p	B	S.E.	Beta	p
Background / Identity												
Age	.021	.030	.054	.497	.006	.030	.017	.838	.009	.029	.026	.761
Gender	.855	.651	.104	.191	.539	.614	.072	.382	.526	.569	.077	.357
Education level	-.147	.689	-.018	.831	-.363	.630	-.050	.565	.095	.582	.014	.870
Income level	.137	.678	.017	.840	.687	.648	.095	.291	.698	.589	.105	.239
Neighbourhood type	-2.108	.675	-.262	.002**	-1.956	.683	-.271	.005**	-1.803	.613	-.273	.004**
Environmental values												
Activities	-.228	.392	-.047	.561	-.427	.412	-.092	.302	-.209	.379	-.048	.583
Everyone has responsibility	-.737	.591	-.100	.215	.896	1.108	.068	.420	1,544	1,028	.127	.136
Economy bef. environment	.132	.671	.016	.844	.593	.634	.079	.352	.768	.590	.112	.195
Previous behaviour												
No. of plastic bags before					.032	.011	.253	.004**	.017	.010	.146	.093
Paid for bags					-.755	.744	-.090	.312	-.434	.693	-.057	.532
Sum uses for bags					-.050	.165	-.026	.763	.040	.154	.022	.796
Aware of flying toilets					.989	.675	.136	.146	.048	.626	.007	.939
Awareness / attitude												
Info on ban									-.320	.576	-.046	.579
Bags had env. impact									1.560	.612	.216	.012*
Enforcement									.236	.587	.034	.688
Ban right decision (now)									-2.784	.966	-.247	.005**
F (sig.)	1.67 (.109)				1.99 (.030*)				2.53 (.002**)			
R ² (adjusted)	.080 (.032)				.150 (.074)				.252 (.153)			
S.E. of estimate	3.96				3.49				3.05			
N	162				147				136			

Table 7. Multiple linear regression models – number of bags used now.

Model 3a: In the model with background variables and environmental values, type of neighbourhood had a significant ($p = .002$) standardized coefficient of $-.262$. This makes it the strongest predictor in the first model. It indicates that a respondent living in an informal settlement will probably use less bags of the new type (nonwoven reusable bags) per week than other respondents. Environmental concern did not seem very relevant for predicting the number of new bags used. The overall model was however not significant ($p = .109$) with an adjusted R^2 of $.032$.

Model 3b: As variables on previous behaviour were included in the model, neighbourhood type remained significant. The Beta coefficient and standard error had not changed substantially, and the neighbourhood-variable could still predict some of the change in number of used bags. In this model number of plastic bags used before was also significant ($p = .004$), with a positive Beta coefficient of $.253$. This means that the higher number of bags a respondent used before, the more probable it is that their consumption of new nonwoven bags is also high. The sample size (n) decreased in this model because I had removed some of the most extreme cases of number of bags used before. Model 3b was significant ($p = .030$) and adjusted R^2 was $.074$.

Model 3c: Adding variables on views on the ban and awareness affected the assumptions in the model. Neighbourhood was still a strong predictor of the dependent variable, but number of bags used before was no longer significant. This could be related to the even smaller N for this model as more variables with missing values were added. It turned out that awareness had a significant ($p = .012$) positive association with the number of bags used now. This means that being aware about the environmental effects of plastic bags increased the probability of using *more* nonwoven bags. This contradicts my expectation, but it could indicate that some of the respondents who buy these bags are under the impression that they are better for the environment. In addition, agreeing that the ban was the right decision had a significant ($p = .005$) negative relationship with the dependent variable, so that respondents who thought the ban was the right decision were likely to use fewer nonwoven bags than others. The overall model was significant ($p = .002$) with an adjusted R^2 of $.152$, which means that the variables in the model together can predict around 15 percent of changes in the dependent variable. This makes it the strongest of the three models.

Model 4: Ratio of substitution

Model 4	Dependent variable: Ratio of substitution											
	4A				4B				4C			
Independent variables	B	S.E.	Beta	p	B	S.E.	Beta	p	B	S.E.	Beta	p
Background / Identity												
Age	.414	.234	.139	.078	.317	.256	.101	.219	.030	.262	.009	.908
Gender	-6.833	5.011	-.106	.175	-8.661	5.182	-.132	.097	-5.344	5.010	-.079	.288
Education level	-3.615	5.292	-.057	.495	-6.559	5.349	-.103	.222	-11.809	5.215	-.181	.025**
Income level	-2.167	5.204	-.035	.678	-2.701	5.374	-.043	.616	-3.422	5.112	-.052	.504
Neighbourhood type	-.602	5.182	-.010	.908	-1.907	5.783	-.030	.742	-3.366	5.475	-.052	.540
Environmental values												
Activities	2.161	2.952	.059	.465	1.903	3.373	.048	.574	3.641	3.269	.088	.268
Everyone responsibility	-6.726	9.153	-.058	.464	-8.353	9.445	-.071	.378	-13.277	9.261	-.110	.154
Econ. bef. environment	-12.208	5.133	-.189	.019*	-12.542	5.344	-.190	.020*	-12.675	5.251	-.187	.017**
Previous behaviour												
No. of pl. bags before					.168	.094	.149	.075	.176	.091	.152	.055
Paid for bags					14.793	6.251	.202	.019*	15.431	6.176	.208	.014**
Aware of flying toilets					-4.536	5.681	-.071	.426	-7.216	5.557	-.110	.197
Awareness / attitude												
Info on ban									-18.093	5.150	-.260	.001**
Bags had env. impact									20.033	5.511	.281	.000**
Enforcement									-3.083	5.221	-.045	.556
Ban right decision (now)									-1.230	8.383	-.011	.884
F (sig.)	1.93 (.060)				2.71 (.003**)				4.65 (.000**)			
R ² (adjusted)	.090 (.043)				.177 (.111)				.360 (.283)			
S.E. of estimate	30.72				30.0				27.62			
N	165				151				139			

Table 8. Multiple linear regression models – ratio of substitution.

The independent variables in model 2 were the same as in model 1, except that the variable for sum of uses for bags was not included. This variable is the basis for calculating the ratio of substitution and would therefore have a very high correlation which could distort the predictions of the models.

Model 4a: None of the background variables were significantly associated with the dependent variable. Of the variables on environmental values, agreeing that jobs and economy is more important than environmental issues gave a significant (p. 019) probability of a lower ratio of substitution. The overall model was not significant (p .060) with adjusted R² .043.

Model 4b: The environmental value was still significant, with little change in Beta coefficient and standard error. In addition, having paid for bags before increased the probability of a higher ratio of substitution. A possible explanation could be that people who could afford paying for bags before, also have better opportunities to find substitutions for bags after the ban. Including variables on previous behaviour increased adjusted R² and the overall model was significant (p. 003).

Model 4c: In this model, education level also appeared to have a significant association with ratio of substitution. The reason for this new association, could be the decrease in N in this model. The environmental value and paying for bags remained significant and there were no big changes in Beta coefficients or standard errors. Adding the last set of variables increased the explanatory strength of the model. Receiving information on the ban from traditional media (radio or TV) had a negative coefficient, and thereby decreased probability of a high ratio of substitution. Awareness of the environmental impact of plastic bags on the other hand, increased the probability of a high ratio of substitution. This model was significant (.000) and had the highest adjusted R² (.283).

Model 5: Negative effect on everyday life.

Model 5	Dependent variable: Negatively affected by the ban											
	5A				5B				5C			
Independent variables	B	S.E.	Exp. B	p	B	S.E.	Exp. B	p	B	S.E.	Exp. B	p
Background / Identity												
Age	-.008	.016	.992	.616	-.022	.019	.978	.255	-.011	.021	.989	.610
Gender	.313	.367	1.367	.394	.281	.409	1.324	.492	.487	.456	1.627	.286
Education level	.688	.388	1.990	.077	.935	.415	2.546	.024*	1.272	.486	3.570	.009**
Income level	-.548	.377	.578	.146	-.552	.423	.576	.192	-.668	.474	.513	.159
Neighbourhood type	-.164	.375	.849	.662	-.283	.445	.754	.526	-.141	.485	.869	.772
Environmental values												
Activities	-.469	.211	1,597	.026**	-.670	.261	.512	.010**	-.861	.290	.423	.003**
Everyone responsibility	.468	.616	1,325	.447	.091	.655	1.095	.890	.185	.752	1.203	.806
Econ. bef. environment	.282	.367	2,587	.443	.360	.403	1.433	.371	.418	.451	1.519	.354
Previous behaviour												
No. of plastic bags before					.008	.008	1.008	.324	.009	.008	1.009	.270
Paid for bags					-.147	.475	.864	.758	-.087	.528	.917	.869
Sum uses for bags					.125	.104	1.133	.230	.052	.117	1.053	.656
Aware of flying toilets					.105	.433	1.111	.808	.143	.499	1.153	.775
Awareness / attitude												
Info on ban									1.149	.454	3.154	.011**
Bags had env. impact									-.937	.519	.392	.071
Enforcement									-.034	.467	.967	.943
Ban right decision (now)									-.516	.751	.597	.492
Omnibus test chi sq. (sig.)	13.3 (.102)				19.3 (.081)				30.2 (.017**)			
Nagelkerke R²	.108				.168				.272			
-2 Log likelihood	196.4				172.2				146.8			
N	163				149				138			

Table 9. Binary logistic regression models – negative effect on everyday life.

The independent variables are the same as for model 1 and 2, but as the dependent variable is categorical (dichotomous) the regression is binary logistic. The dependent variable is whether the respondent felt negatively affected by the ban or not. While I do not want to focus on negative effects only, I find this variable more useful than ‘not affected’ when looking at adaptation. The reason is that the positive answers were mainly related to seeing

improvements in the environment (as discussed) while the negative answers were more related to difficulties in adaptation. I therefore find it more logical to group the ones who felt positively and little affected, and therefore did not feel like adjustment was a problem on one side, and the majority who felt that the ban had caused inconvenience on the other.

Model 5a: There was a significant (p. 026) association with environmental activities and the dependent variable. It seemed that involvement in many environmental activities would decrease the probability of feeling negatively affected by the ban. The overall model was however not significant (p .102).

Model 5b: When adding the variables on previous behaviour, the association with education was significant (p .024). The association with environmental activities was still significant, and slightly stronger. R^2 increased as expected with the number of variables. This model was not overall significant (.081), and none of the variables on environmental values seemed to be very good predictors of feeling negatively affected by the ban.

Model 5c: In the largest version of model 5, the associations with education and environmental activities were still significant and slightly stronger. Among the last set of variables, information on the ban had a significant positive association. This indicates that receiving information about the ban via traditional media increased the probability of feeling negatively affected by the ban, but no other variables on attitude and awareness were significant. The association with this last variable is therefore difficult to explain. The last model was significant (p .019) with a Nagelkerke R^2 of .272.

7.4 Discussion

Behavioural changes

As expected from the literature, behaviour related to plastic bags among citizens in Nairobi was partly related to other economic and social issues. The most distinct example of this is the use of *flying toilets* that occurs in the informal settlements. While plastic bags used to be cheap replacements for lack of sanitation, toilets and waste management, the difference in number of bags and uses for them was not as big as expected between the groups. This could of course be coincidental as my sample is small, but it was nevertheless an interesting result. The differences in behaviour after the ban were not that big either. A reason for this can of course be the strict sanctions. While it might be costlier in relative terms for a street vendor to

be arrested than someone well off who can afford to pay a bribe, most of the interviewees and respondents seemed motivated by avoiding punishment. Some street vendors were still openly using plastic bags. The fact that most people who were arrested worked in the informal food business, could indicate that they are struggling most with changing their behaviour. But it could also mean that they are more targeted by enforcement officers, or that their use of bags is more obvious and in plain sight. As the data showed, food packaging was also what was most respondents found it difficult to substitute.

Socioeconomic factors

Considering the high levels of inequality in Nairobi, it is almost inevitable that there are some differences between socioeconomic groups in ability to adapt. Firstly, some of the most practical alternatives to bags are only affordable to middle- and high-income groups, which makes the transition more effortless. For example, many products from supermarkets and shopping malls are packaged in bags exempted from the ban. Unlike the customers at outdoor markets, no one has to bring their own container to purchase bread or milk at the supermarket. Similarly, people who live in houses or apartment buildings and pay private companies to collect their waste, will not struggle to find substitutions as exempted bin liners are delivered as part of the service. The data from my survey possibly reflects this as there was a relationship (but not significant) between high income and not feeling affected by the ban in any way (appendix 1 table 7). There was also a clear pattern that people in informal settlements use fewer of the expensive nonwoven bags. Still, the association between socioeconomic background and finding replacements for the bags (ratio of substitution) was not strong. It seemed that while it might be more challenging to replace the bags for some groups, they all managed to find substitutions. This was not very surprising. Despite all the differences in life styles and resources, very few people in Nairobi can go on behaving exactly as they did before. The ban forces everyone to somehow change their habits although the costs and effort of doing this differs. Even the people who were still using bags had to change their behaviour to avoid being caught.

Costs and distributive justice

Most of the people who risked using plastic bags after the ban, said the cost of replacing them was too high or that they could not find any suitable substitutes. It is important to keep in mind that in low-income countries, small changes in a policy may have wide implications, because many people's livelihoods are so marginal. For example, most of the experts I interviewed argued that 10-30 KSh for a nonwoven bag is something 'everyone' can afford.

But when taking into account all the uses for the free plastic bags which cannot be directly substituted by these bags (such as garbage collection and *flying toilets*), the total expenses become a lot higher. Many of the fruit and vegetable vendors I interviewed blamed the ban for a decrease in customers. For some people, giving up the benefits of plastic bags was not really an option. To change this behaviour would mean not only providing an incentive to stop using the bags, but also availability of less costly alternatives. As seen in chapter 2, free reusable bags was also the most preferred alternative policy to the ban. I am not implying that using plastic bags instead of waste bins and proper sanitation are in any way desirable solutions, but it shows that the problem is more complex than just replacing plastic shopping bags with a more durable option.

Individual factors

As discussed in the theory chapter, individual differences should not be underestimated when analysing motivation and behaviour. I did not detect similar patterns as for example Steel (1996), who found that age and gender are associated with environmentally friendly behaviour. As underlined by Balderjahn (1988), the actual predictors for behaviour usually vary from case to case. When looking at individual ‘predictors’, it appeared that previous behaviour affected some of the behavioural changes. This is in line with Vatn’s (2015) writings on habit and ‘satisficing’. I did not expect habits to be decisive since, as discussed above, many people simply could not afford to continue their habits. It turned out that awareness of the environmental impact of plastic bags was a relevant predictor of current behaviour. As I have discussed, the normative and ‘moral’ sides of the law are difficult to detect because there was not much freedom of choice. However, I found that environmental values were in fact associated with how the respondents reported that they had been affected. This is in line with previous research that ‘activating’ environmentally friendly behaviour and values only work if the subjects already hold these values (Sharp et al. 2010).

Need for new solutions

In this study I have focused mainly on change in actual behaviour and attitudes toward the ban. It can be argued that how people feel is not that relevant, as long as they comply. But for a law to be sustainable over time, it is essential that its content is internalised as a social norm. While some interviewees said they personally would not go back to their previous behaviour if the ban was lifted, they still thought other people would start using and throwing the bags in the environment again. Without a norm, strict enforcement is the only thing preventing the collective action problem from reoccurring. This also implies that while rights

to use bags were defined in the policy, the responsibility to dispose of the bags was not as clearly addressed. Although plastic bags were not in common use anymore (at least openly), behaviour related to other types of plastics and pollution did not seem to have changed much. Several people were talking about how the ban could be expanded to plastic bottles, as they also contribute to clogged drains and similar issues as the plastic bags. But seeing a need for more bans, indicate that the ban on plastic bags has not had any effect on how other types of waste are treated.

While I did not go into why plastic bags were so often carelessly disposed of before the ban, it was obvious that the underlying cause for the problems in Nairobi was the lack of infrastructure and sufficient waste management. Dumping waste in rivers, ditches or backyard incineration is still the only option for many. Since people will not stop doing their everyday activities, banning everyday items that are not easily replaced is only a short-term solution. While some environmental policies are necessary to solve an acute issue, there is reason to question the plastic bag ban as a model for similar policies. One reason is that more knowledge is needed about the effects and viability of the alternatives. As consumption increases and the substitutions for the bags accumulate, they may also become a problem. The long-term solution is to invest in and create support for long-term waste management and recycling solutions. There is also need for internalization of norms related to littering and disposal of waste of all types, not just plastic bags.

8. CONCLUSIONS

In this thesis I have presented the results of a study on Kenya's 2017 ban on plastic bags. The data was analysed using institutional theory and theories on human motivation and behaviour, as well as common typologies of environmental instruments. Studies on plastic bag policies often explore economic instruments. I chose an alternative approach by focusing more on the social consequences of a legal instrument. I have treated plastic bag pollution as a classical environmental conflict arising from side-effects of economic activity, assuming that solutions require coordination of behaviour and defining rights and responsibilities. The ban was characterised by affecting behaviour through negative sanctions. Punishments were adjusted according to the offence, and it seemed that enforcement was mainly targeting market vendors and producers. Still, this seemed to have a deterring effect on consumers as well. The right to use bags was still there, but access to bags was limited to certain uses. While awareness of the environmental impact of plastic bags seemed high, the ban is not necessarily

the reason for this. Contrary to my expectations, I found that support for the policy had increased. While environmental consciousness partly was associated with support, perceiving actual effects was another important factor. In a city with high levels of inequality like Nairobi it is not surprising that different groups had different access to alternatives and opportunities to adapt. Looking at behavioural changes, the differences between socioeconomic groups might not be as large as expected.

Policy implications

By exploring the differences between various types of policy instruments, I have concluded that the characteristics of the recent ban on plastic bags are different from the previous attempts of regulating plastic bags in Kenya. While the necessity to implement a strict ban derives from a lack of fundamental services such as waste management and sanitation, there is great potential for visible changes. Most respondents and interviewees acknowledged that the situation and policy are not ideal, but the ban still had strong support. While individuals' socioeconomic background somehow gave different patterns in behaviour and perceptions, these differences were relatively small. Most respondents associated the ban with environmental issues. It remains to be seen if the ban is sustainable over time like in Rwanda, or if people fall back into their old habits like for example Bangladesh. Even if motivations and perceptions have fundamentally changed Kenyans bag habits, much of the ban's success depends on resources in terms of affordable and convenient substitutes, as well as persistent enforcement and monitoring. Although Kenya follows an international trend on plastic bag policies, different countries have different preconditions and capacities to enforce and monitor such policies. This is important to keep in mind when commending outright bans as the ideal solution. I would recommend thoroughly assessing the available alternatives and possible motivations for changing behaviour before choosing a policy to deal with a common environmental problem which has different causes and effects around the world.

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APPENDICES

Appendix 1: Statistical tables

A total of eleven tables presenting tests of association between variables in the sample. The types of test are selected depending on variable type (see chapter 4 on methodology).

Explanations:

Chi	Pearson's chi square
dif.	difference (in mean between two groups)
exp. count	expected count (if H ₀ is true - no association)
F	F-ratio for analysis of variance (ANOVA)
N	sample size
r	Pearson's R correlation
Sig.	significance
Std. dev.	Standard deviation
t	t-statistic for comparing means

*Association is significant at 0.05 level (2-tailed)

** Association is significant at 0.01 level (2-tailed)

Perceptions before and after the ban – attitudes, knowledge and values

Appendix table 1	Gender (M/male=0, F/female=1)				Age (18-72)					
Attitudes	Chi	Count (exp. count.)	N	Sig.	t	F	Mean	Std.dev.	N	Sig.
For ban bef.	1.313	M: 91 (87.6) / F: 55 (58.4)	195	.252	.896		31.01 (1.710 dif.)	10.687	179	.371
For ban now	2.284	M: 105 (101.5) / F: 65 (68.5)	196	.131	-1.695		32.0 (-4.040 dif.)	11.617	180	.092
Enforcement	1.769		187	.413		.285			172	.752
Very strict		M: 37 (41.1) / F: 31 (26.9)					30.34	10.729		
Fair		M: 47 (43.5) / F: 25 (28.5)					31.76	11.330		
Not strict		M: 29 (28.4) / F: 18 (18.6)					31.40	10.607		
Ban = awareness	.002	M: 98 (97.9) / F: 66 (66.1)	196	.968	-.122		31.48 (-.277 dif.)	11.398	180	.903
Better alt. to ban	1.161		155	.762		1.630			146	.185
Fee/tax		M: 6 (4.9) / F: 2 (3.1)					32.86	10.542		
Info. Campaign		M: 13 (13.5) / F: 9 (8.5)					35.63	14.092		
Recycle		M: 31 (29.4) / F: 17 (18.6)					29.98	10.705		
Free bags		M: 45 (47.2) / F: 60 (60.0)					29.89	9.800		

*Correlation is significant at 0.05 level (2-tailed) ** Correlation is significant at 0.01 level (2-tailed)

Appendix table 2	Income (<10.000/Low = 0, >10.000/High = 1)				Education (none - hs grad/Low = 0, >hs grad/High = 1)			
Attitudes	Chi	Count (exp. count.)	N	Sig.	Chi	Count (exp. count.)	N	Sig.
For ban bef.	3.145	L: 56 (61.2) / H: 76 (70.8)	179	.076	4.349*	L: 72 (78.2) / H: 68 (61.8)	188	.037*
For ban now	3.098	L: 69 (72.9) / H: 89 (85.1)	180	.078	9.116**	L: 85 (92.0) / H: 79 (72.0)	189	.003**
Enforcement	7.334		171	.026*	14.732**		180	.001**
Very strict		L: 36 (27.9) / H: 26 (34.1)				L: 46 (37.2) / H: 21 (29.8)		
Fair		L: 22 (28.8) / H: 42 (35.2)				L: 25 (37.2) / H: 42 (29.8)		
Not strict		L: 19 (20.3) / H: 26 (24.7)				L: 29 (25.6) / H: 17 (20.4)		
Ban = awareness	3.543	L: 65 (69.6) / H: 86 (81.4)	180	.060	1.424	L: 85 (88.1) / H: 72 (68.9)	189	.233
Better alt. to ban	.868 ††			.833 ††	2.608 ††		150	.456 ††
Fee/tax		L: 3 (3.6) / H: 4 (3.4)				L: 3 (4.7) / H: 5 (3.3)		
Info. Campaign		L: 8 (9.3) / H: 10 (8.7)				L: 14 (12.5) / H: 7 (8.5)		
Recycle		L: 22 (22.3) / H: 21 (20.7)				L: 26 (27.9) / H: 21 (19.1)		
Free bags		L: 41 (38.8) / H: 34 (36.2)				L: 46 (43.9) / H: 28 (30.1)		

*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed)
 ††2 cells (25%) have expected count less than 5.

Appendix table 3	Values (E/Environment = 1, NE/Not Env. = 0)				Environmental activities (0-5)					
Attitudes	Chi	Count (exp. count.)	N	Sig.	t	F	Mean	Std.dev.	N	Sig.
For ban bef.	.668	E: 95 (97.3) / NE: 51 (48.7)	195	.414	-2.402*		1.39 (-.327 dif.)	.852	196	.017*
For ban now	1.376	E: 111(113.6) / NE: 59 (56.4)	196	.241	.020		1.30 (.004 dif.)	.065	197	.984
Enforcement	6.543*		187	.038*		.087			188	.917
Very strict		E: 45 (46.5) / NE: 24 (22.5)					1.33	.834		
Fair		E: 55 (47.8) / NE: 16 (23.2)					1.32	.819		
Not strict		E: 26 (31.7) / NE: 21 (15.3)					1.38	.848		
Ban = awareness	.063	E: 109(109.6) / NE: 55 (54.4)	196	.802	-.173		1.31 (-.028 dif.)	.831	197	.863
Better alt. to ban	11.288** ††		155	.010** ††		2.747			156	.045*
Fee/tax		E: 5 (5.7) / NE: 3 (2.3)					1.63	.916		
Info. Campaign		E: 16 (15.6) / NE: 6 (6.4)					1.36	.848		
Recycle		E: 26 (34.1) / NE: 22 (13.9)					1.47	1.043		
Free bags		E: 63 (54.6) / NE: 14 (22.4)					1.09	.632		

*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed)
†† 1 cell has expected count less than 5.

Appendix table 4	Pos. affected				Neg. affected				Not affected			
Attitudes	Chi	Count (exp.)	N	Sig.	Chi	Count (exp.)	N	Sig.	Chi	Count (exp.)	N	Sig.
For ban bef.	6.454*	23 (17.9)	24	.011*	16.152**	81 (92.7)	124	.000**	6.612**	41 (34.4)	46	.010**
For ban now	4.025*†	24 (20.9)	24	.045*†	1.908	105(108.1)	124	.167	.000	41 (41)	47	.990
Enforcement	.133		23	.935	.558		119	.756	.775		44	.679
Very strict		9 (8.4)				45 (43.5)				14 (16.1)		
Fair		8 (8.8)				46 (45.4)				17 (16.8)		
Not strict		6 (5.8)				28 (30.1)				13 (11.1)		
Ban = awareness	2.991†	23 (20.1)	24	.084†	.068	103(103.7)	124	.794	1.069	37 (39.3)	47	.301
Better alt. to ban	11.220**††		16	.011*	9.036*†		103	.029*†	5.790†		35	.122†
Fee/tax		3 (.8)				5 (5.4)				0 (1.8)		
Info. Campaign		4 (2.3)				10 (14.7)				8 (5.0)		
Recycle		6 (5.1)				30 (32.8)				13 (11.1)		
Free bags		3 (7.8)				58 (50.2)				14 (17)		

*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed)
† 1 cell has expected count less than 5 †† 2 cells have expected count less than 5.

Appendix table 5	Info (TV = 1, all else = 0)				Ratio of substitution (0-100)					
Attitudes	Chi	Count (exp.)	N	Sig.	t	F	Mean	Std. dev.	N	Sig.
For ban bef.	.030	98 (97.5)	130	.861	.851		78.90 (4.429 dif.)	32.318	147	.396
For ban now	1.595	110 (112.8)	130	.207	-.517		80.39 (-3.430 dif.)	31.164	171	.606
Enforcement	.197		127	.906		6.226**			188	.002**
Very strict		46 (46.6)					78.54	31.944	69	
Fair		50 (48.6)					72.04	36.030	72	
Not strict		31 (31.7)					92.55	19.705	47	
Ban = awareness	.207	110 (108.9)	130	.649	1.603		78.36 (9.699 dif.)	31.996	165	.111
Better alt. to ban	1.679†		108	.642†		2.900*			156	.037*
Fee/tax		5 (5.5)					80.88	34.975	8	
Info. Campaign		15.2 (22)					83.00	33.106	22	
Recycle		33.9 (49)					86.43	27.350	49	
Free bags		53.3 (77)					69.81	35.103	77	

*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed)
† 1 cell has expected count less than 5 †† 2 cells have expected count less than 5.

Behaviour before and after the ban – uses and substitutions

Appendix table 6		Age (18-72)						
Prev. behaviour	r	t	F	Mean	Std.dev.	N	Sig.	
No. bags bef.	.131					167	.092	
Paid for bags			2.203	31.44	11.115	180	.113	
Always				31.24	9.237			
Sometimes				30.29	11.211			
Never				31.44	12.767			
Sum uses bags	.068					180	.366	
Flying toilets aw.		.914		(1.523 dif.)			.362	
Yes				30.43	11.193			
No / Don't Know				31.95	10.912			
Adaptation								
No. bags now	.079					177	.294	
Ratio of subst.	.157*					180	.035*	
No eff. daily life		.632		30.45 (1.267 dif.)	9.751	178	.528	
Pos. eff. daily life		-1.591		34.87 (- 3.947 dif.)	13.088	178	.113	
Neg. eff. daily life		.558		31.09 (.977 dif.)	11.167	178	.578	
*Correlation is significant at 0.05 level (2-tailed)								
** Correlation is significant at 0.01 level (2-tailed)								

Appendix table 7		Income (recoded dichotomous: <10.000/Low = 0, >10.000/High = 1)						
Prev. behaviour	Chi	Count (exp. count.)	t	Mean	Std.dev.	N	Sig.	
No. bags bef.			-.879	H: 22.68 / L: 18.85 (-3.824 dif.)	H: 30.161 / L: 25.168	168	.381	
Paid for bags	1.916					180	.384	
Always		L: 27 (23.1) / H: 23 (26.9)						
Sometimes		L: 42 (43.8) / H: 53 (51.2)						
Never		L: 14 (16.1) / H: 21 (18.9)						
Sum uses bags			2.232*	H: 4.81 / L: 4.19 (-.622 dif.)	H: 1.770 / L: 1.966	180	.027*	
Flying toilets aw.	2.880					178	.090	
Yes		L: 42 (36.4) / H: 37 (42.6)						
No / Don't know		L: 40 (45.6) / H: 59 (53.4)						
Adaptation								
No. bags now			-.799	H: 3.81 / L: 3.34 (-.471 dif.)	H: 3.722 / L: 4.121	177	.425	
Ratio of subst.			.105	H: 80.16 / L: 80.65 (.486 dif.)	H: 31.436 / L: 30.255	180	.916	
No eff. daily life	2.984	L: 13 (17.7) / H: 26 (21.3)				39	.084	
Pos. eff. daily life	.000	L: 10 (10) / H: 12 (12)				22	.996	
Neg. eff. daily life	2.277	L: 58 (53.2) / H: 59 (63.8)				117	.131	
*Correlation is significant at 0.05 level (2-tailed) ** Correlation is significant at 0.01 level (2-tailed)								

Appendix table 8		Gender (M/male=0, F/female=1)						
Prev. behavior	Chi	Count (exp. count.)	t	Mean	Std.dev.	N	Sig.	
No. bags bef.			-1.576	M: 18.55 / F 25.21 (-9.714 dif.)	M: 26.239 / F: 30.146	182	.117	
Paid for bags	1.513					196	.469	
Always		M: 32 (31.6) / F: 21 (21.4)						
Sometimes		M: 58 (61.5) / F: 45 (41.5)						
Never		M: 27 (23.9) / F: 79 (79.0)						
Sum uses bags			-1.900	M: 4.26 / F: 4.77 (-.516 dif.)	M: 1.881 / F: 1.839	196	.059	
Flying toilets aw.	.332					193	.564	
Yes		M: 52 (50.1) / F: 32 (33.9)						
No / Don't know		M: 63 (64.9) / F: 46 (44.1)						
Adaptation								
No. bags now			-.457	M: 3,54 / F: 3.8 (-.262 dif.)	M: 4.101 / F: 3.642	193	.648	
Ratio of subst.			.841	M: 81.39 / F: 77.53 (3.862 dif.)	M: 31.277 / F: 31.888	196	.401	
No eff. daily life	.094	M: 29 (28.1) / F: 18 (18.9)				47	.759	
Pos. eff. daily life	.024	M: 14 (14.4) / F: 10 (9.6)				24	.876	
Neg. eff. daily life	.028	M: 73 (73.5) / F: 50 (49.5)				123	.868	
*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed)								

Appendix table 9 Education (recoded dichotomous: none - high school grad/Low = 0, >high school grad/High = 1)							
Prev. behavior	Chi	Count (exp. count.)	t	Mean	Std.dev.	N	Sig.
No. bags bef.			-1.578	L: 17.78 / H: 24.46 (-6.687 dif.)	L: 23.522 / H: 31.460	176	.117!
Paid for bags	.665					189	.717
Always		L: 32 (29.7) / H: 21 (23.3)					
Sometimes		L: 53 (55.5) / H: 46 (43.5)					
Never		L: 21 (20.8) / H: 16 (16.2)					
Sum uses bags			-.672	L: 4.37 / H: 4.55 (-.186 dif.)	L: 2.006 / H: 1.734	189	.502
Flying toilets aw.	4.270*					187	.039*
Yes		L: 53 (46) / H: 29 (36)					
No / Don't know		L: 52 (59) / H: 53 (46)					
Adaptation							
No. bags now			-.594	L: 3.55 / H: 3.90 (-.349 dif.)	L: 4.033 / H: 3.885	186	.553
Ratio of subst.			.817	L: 81.58 / H: 77.83 (3.754 dif.)	L: 30.501 / H: 32.378	189	.415
No eff. daily life	1.048	L: 28 (25) / H: 17 (20)				45	.306
Pos. eff. daily life	.009	L: 13 (12.8) / H: 10 (10.2)				23	.926
Neg. eff. daily life	.948	L: 63 (66.2) / H: 56 (52.8)				119	.330
*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed) ! Levene's test for equality of variances in significant (p-level <0.01). Equal variances not assumed.							

Appendix table 10 Environmental activities (0-5)							
Prev. behavior	r	t	F	Mean	Std.dev.	N	Sig.
No. bags bef.	.052					183	.482
Paid for bags			10.298**			197	.000**
Always				1.38	.860		
Sometimes				1.46	.081		
Never				.80	.096		
Sum uses bags	-.085					197	.234
Flying toilets aw.			.741			194	.390
Yes				1.25	.890		
No / Don't Know				1.35	.797		
Adaptation							
No. bags now	-.040					194	.576
Ratio of subst.	.040					197	.576
No eff. daily life		-1.068		1.43 (-.149 dif.)	.878	47	.287
Pos. eff. daily life		2.251*		1.67 (-.404 dif.)	.868	24	.025*
Neg. eff. daily life		2.503*		1.20 (.305 dif.)	.786	124	.013*
*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed)							

Appendix table 11 Neighborhood type (1 = Informal settlement, 0 = Formal settlement)							
Prev. behavior	Chi	Count (exp. count.)	t	Mean	Std.dev.	N	Sig.
No. bags bef.			-.444	L: 20.29 / F: 22.13 (1.836 dif.)	L: 29.745 / F: 26.143	183	.658
Paid for bags	8.752					197	.013*
Always		L: 36 (26.9) / F: 17 (26.1)					
Sometimes		L: 45 (52.8) / F: 59 (51.2)					
Never		L: 19 (20.3) / F: 21 (19.7)					
Sum uses bags			.099	L: 4.48 / F: 4.45 (.026 dif.)	L: 1.997 / F: 1.744	197	.922
Flying toilets aw.			32.158			194	.000**
Yes		L: 62 (42.4) / F: 22 (41.6)					
No / Don't Know		L: 36 (55.6) / F: 74 (54.4)					
No. bags now			-2.636	L: 2.91 / F: 4.36 (-1.456 dif.)	L: 2.943 / F: 4.591	194	.005**
Ratio of subst.			-1.078	L: 77.56 / F: 82.39 (-4.83 dif.)	L: 32.23 / F: 30.6	197	.226
No eff. daily life	.043	L: 23 (23.6) / F: 24 (23.4)				195	.835
Pos. eff. daily life	.001	L: 12 (12.1) / F: 12 (11.9)				195	.979
Neg. eff. daily life	.041	L: 63 (62.3) / F: 61 (61.7)				195	.839
*Association is significant at 0.05 level (2-tailed) ** Association is significant at 0.01 level (2-tailed) ! Levene's test for equality of variances in significant (p-level <0.01). Equal variances not assumed.							

Appendix 2: List of interviewees

Interview no.	Who	Gender (age)	Organisation	Place	Date
Interview 1	Consultant /professor	Male	AWEMAC – Africa Waste and Environment Management Centre	Office, Nairobi	25.4.18
Interview 2	Employee	Male (36)	Bag shop (prev. plastic bags, now paper, reusable)	Café, Nairobi	28.4.18
Interview 3	Senior officer	Male	EIK – Environmental Institute of Kenya	Office, Nairobi	30.4.18
Interview 4	Owner/manager	Male	Nonwoven bag manufacturing company (prev. plastic bags)	Factory, Mombasa	10.5.18
Interview 5	Employee	Male (43)	Nonwoven bag manufacturing company (prev. plastic bags)	Factory, Mombasa	10.5.18
Interview 6	Medicinal herb seller	Male (25)	Self-employed	Kiambiu, Nairobi	11.5.18
Interview 8	Chapati street vendor	Male (26)	Self-employed	Kiambiu, Nairobi	11.5.18
Interview 9	Employee	Male (23)	Public toilet facility	Kiambiu, Nairobi	11.5.18
Interview 10	Vegetable/fruit vendor	Female (42)	Self-employed	Kibera, Nairobi	12.5.18
Interview 11	Inhabitant in Kibera + vegetable vendor	Male (23) + female	Self-employed computer programmer + relative who is a street vendor	Kibera, Nairobi	12.5.18
Interview 12	Fruit street vendor	Male (32)	Self-employed	Buruburu, Nairobi	12.5.18
Interview 13	Employees / project managers	Two females	IAS – International Aid Services	Office, Nairobi	17.5.18
Interview 14	Senior employee	Female	WWF Kenya	Office, Nairobi	18.5.18
Interview 15	Group of five waste collectors	Males (21-23)	Members of local youth group	Kiambiu, Nairobi	20.5.18
Interview 16	Social researcher	Male	None (former resident in Korogosho next to Dandora dumpsite)	Dandora, Nairobi	20.5.18
Interview 17	Bag collector at dumpsite	Female (27)	Self-employed	Dandora, Nairobi	20.5.18
Interview 18	Member of environmental organisation	Female	Kenya Young Greens - KYG	Café, Nairobi	22.5.18
Interview 19	Environmental consultant/ ph.d. student	Male	Previous member of environmental organisation	Café, Nairobi	24.5.18
Interview 20	Manager	Male	Plastic manufacturing company	Factory, Nairobi	24.5.18
Interview 21	Inhabitant in Kilimani	Female (39)	Self- employed project manager	Kilimani, Nairobi	24.5.18
Interview 22	Senior employee	Male	Ministry of Environment	Office, Nairobi	25.5.18
Interview 23	Two senior employees	Female + male	NEMA	Office, Nairobi	25.5.18
Interview 24	Operation officer	Male	Plastic, paper bag (prev. plastic bags) manufacturing company	Factory, Nairobi	26.5.18
Interview 25	Senior employee	Male	Nairobi City County	Office, Nairobi	7.6.18
Interview 26	Sales manager	Female	Waste management and recycling company	Office, Nairobi	7.6.18

Appendix 3: Survey questionnaire

Survey of Nairobi citizens' opinions and experiences related to the ban on plastic bags



Date: _____ Place: _____

**NOTE: Participant must currently reside in Nairobi and be above the age of 18!*

1. Have you been informed on the nature and purpose of this study? Yes No

Please tell us just a bit about yourself

2. Your Age

Please fill in (whole number): _____ Prefer not to respond

3. Your Gender

Female Male Prefer not to respond

4. Your Education Level

None Primary school Some high school High school graduate
 Some college / university College / university graduate Prefer not to respond

5. Where in Nairobi do you live?

Please fill in Estate/Neighbourhood: _____ (please also select constituency):

Dagoretti N / Dagoretti S / Embakasi E / Embakasi C / Embakasi N / Embakasi S / Embakasi W /
 Kamukunji / Kasarani / Kibra / Langata / Makadara / Mathare / Roysambu / Ruaraka / Starehe / Westlands

6. What is the monthly income of your household (approximately)?

0-10,000 KSH 10,000 - 100,000 KSH > 100,000 KSH
 Student (no income) Prefer not to respond

Use of plastic bags before the ban

7. How did you learn about the ban on plastic bags in Kenya?

Newspaper / online news Radio / Television Social media Public information
 Family / friends Neighbours Other (please fill in): _____

8. Before the ban, approximately how many plastic bags did you obtain (bought or otherwise received) per week?

Please fill in (whole number): _____

9. Before the ban, how do you compare your consumption of plastic bags to other people living in Kenya?

Above average Average Below Average

10. A fee was introduced on certain plastic bags some years ago. Before the ban, how often did you pay for plastic bags?

Always Sometimes Never

11. Before the ban, what did you use plastic bags for?

(you can cross more than one)

- Shopping in general
- Carry groceries
- Food packaging
- Carry belongings, such as books or other things
- Selling bags for income
- Store charcoal, or other household items
- For household waste
- For human waste (toilet)
- Other (fill in): _____

12. After the ban, what have you used as main substitute for this?

(please fill in for each use)

- Substitution: _____
- Substitution: _____
- Substitution: _____
- Substitution: _____
- Substitution: _____
- Substitution: _____
- Substitution: _____
- Substitution: _____

13. Are you aware if plastic bags have been used for "flying toilets" in your neighbourhood?

Yes No Don't know Prefer not to respond

14. Now after the ban, approximately how many reusable carrier bags do you buy per week?

Please fill in (whole number): _____

15. In what way has the ban affected your everyday life?

Please fill in your answer:

Perceptions of the ban on plastic bags

16. Overall, do you think plastic bags have had a negative impact on the environment in Nairobi?

- No impact Some impact Large impact Don't know

17. At the time when plastic bags were banned in 2017, did you think it was the right decision?

- Yes No Undecided

18. Today more than half a year has passed since plastic bags were banned. Looking back, do you think it was the right decision?

- Yes No Undecided

19. Do you think any of the following alternatives could have worked better than a ban?

- High fees on plastic bags Awareness raising / information campaigns Better system for recycling
 A tax for producers Giving out reusable bags for free None of these Other

20. What do you think about the enforcement of the ban so far?

- Very strict Quite fair Not strict enough Don't know

21. Why do you think the Kenyan government decided to ban plastic bags completely?

Please fill in your answer:

Other opinions

How much do you agree on the following statements?

22. Everyone has a responsibility to work towards a better environment.

- 1 (strongly disagree) 2 3 4 (strongly agree)

23. Job creation and a growing economy is more important than environmental issues.

- 1 (strongly disagree) 2 3 4 (strongly agree)

24. The plastic bag ban has helped raise awareness about environmental issues in Kenya.

- 1 (strongly disagree) 2 3 4 (strongly agree)

25. Have you engaged in any of the following activities?

(you can cross more than one)

- I am a member of (or work for) an environmental organisation
 I have volunteered in environmentally friendly activities (such as cleaning up pollution, conservation, etc)
 I have donated money to an environmental organisation
 I recycle the household waste at home
 Collecting and selling used items / waste

Feedback on the questions in this survey (optional):

Appendix 4: Interview guide

The interview guide was adjusted and followed to a varying degree depending on the participant and setting. Here I have gathered the main questions for each participant group.

- Information about the participant: title / role description
- Date, place.

Questions for all participants:

- Intro: Tell me a bit about yourself and what you do.
- Did you agree on the ban on plastic bags - why / why not?
- Why do you think a strict ban was the preferred policy option?
- Do you think any other solution could have worked better?
- What is the biggest difference in Nairobi after the ban?
- Do you think some people or groups are more affected than others?
- if so, who/in what way?
- What do you think about the alternatives available to the bags?
- When did you know the ban was coming - what information did you receive?
- Do you think the ban will last - why / why not?
- How would you feel if bags became legal again?

- End: Is there anything I haven't asked that you think I should know / that you want to add?

For regular inhabitants / vendors:

- Who are your customers, what do you sell?
- What did you use plastic bags for?
- What alternatives do you use now?
- if still plastic bags – why?
- What do you think about enforcement? - have you heard of arrests?
- Was flying toilets an issue here?
- if so, how is it now?

For professionals / people involved in the policy process or enforcement:

- What is your view on Kenya's history with plastic bags?
- Can you describe the debate / previous attempts to deal with plastic bags?
- Have you been involved in the process of adopting the new policy on plastic bags?
- if so, in what way?
- What was your advice/opinion on how to solve the plastic waste problem?
- Who do you think are the main stakeholders in this situation?
- What do you think was the reason the levy and policy package introduced in 2005 failed?
- How was the ban communicated to the public?
- What are alternatives to plastic bags? - how were they chosen?
- What are the biggest challenges ahead?

For manufacturers:

- What type of products did you make before and now?
- Describe the factory, number of workers and activities.
- Explain the transition process – what changes were made, and when/how?
- How did the previous tax and regulation for plastic bags work?
- How were you informed, any contact with NEMA / KAM?
- How does the exemptions work, have you applied for a licence?
- Can you recycle bags and other plastics here
- if so, how / why not?

Appendix 5: Request for participation



Request for participation in research project (master thesis)

Background and Purpose

This study is a part of a master thesis in International Environmental Studies. It is conducted by Caroline Enge, student at the Norwegian University of Life Sciences. The affiliated institution in Kenya is the Jaramogi Oginga Odinga University of Science and Technology (JOOUST).

The purpose of the study is to analyze the current policy on plastic bags, and how it has affected Kenyan citizens' behaviour and everyday lives. The recruitment for the study is done either via organisations and networks, or for the survey by recruiting participants at convenience on streets, shops or other places where plastic bags used to be distributed or used.

What does participation in the project imply?

The data collection is done through interviews, a questionnaire/survey and observation. The questions will concern general information about you, habits related to plastic bags before the ban, and your opinion on the current policy and environmental issues. The data will be collected by filling out a survey form, or by notes / recordings in longer interviews.

What will happen to the information about you?

All personal data will be treated confidentially. Only the researcher and supervisor at NMBU will have access to the data collected. The data, notes and recordings will not be connected to your name to ensure confidentiality. Participants will be described in general terms in the thesis, such as "employee in Kenyan environmental organisation". You will be informed about the description so that you can give consent to a wording you are comfortable with.

The project is scheduled for completion by December 2018. Any indirectly identifiable personal data, such as place of residence, age, gender and occupation will only be used for this project and stored according to ethical guidelines and deleted by the end of the project. Any recordings will also be deleted, and the transcribed interviews and other notes will be stored securely by the Norwegian Centre for Research Data (NSD).

Voluntary participation

It is voluntary to participate in the project, and you can at any time choose to withdraw your consent without stating any reason. If you decide to withdraw, all your personal data will be made anonymous.

If you have any questions concerning the project, please contact:

Researcher: Caroline Enge, caroleng@nmbu.no / caroline.enge@gmail.com, +47 454 47 990
Supervisor and professor at NMBU: Espen Olav Sjaastad, espen.sjaastad@nmbu.no

The study has been notified to the Data Protection Official for Research, NSD - Norwegian Centre for Research Data.

Consent for participation in the study may be attained in writing or verbally.

I have received information about the project and am willing to participate

(Signed by participant, date)



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