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A Comparative Study of Waste management in EU and non-EU country capitals - Zagreb (Croatia) and Sarajevo (Bosnia and Herzegovina)

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Declaration

I, Zeljana Eres, hereby declare that this thesis is a result of my original research work and findings. All sources of information other than my own have been acknowledged and referenced. This thesis has not been submitted to any other University than the Norwegian University of Life Science (NMBU) for award of any type of academic degree.

Signature: _____

Date: _____

Aknowledgements

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Abstract

This study is an analysis of current household waste management in the capital of Croatia – Zagreb, and the capital of Bosnia and Herzegovina – Sarajevo. It is a comparative study which examines the differences between the waste management policies and implementation in an European Union country (Croatia) and a non-European Union country (Bosnia and Herzegovina). The analysis is done by using the framework for analysing resource-use problems, by Vatn (2005). By analysing waste-use problems in these capitals we can better understand the reasons behind the efficiency of the current waste management. The data is obtained from various policy documents, statistics and reports, but also from interviews with relevant respondents from Croatia and Bosnia and Herzegovina. The findings on the current institutions/regimes affecting the waste, main agents and their choices, technologies available for the utilizaton of waste, attributes of waste and the outcomes of their interactions are presented in the framework for both Zagreb and Sarajevo. The findings suggest that both cities are in need of a more efficient waste management. Both Zagreb and Sarajevo are facing a number of problems when it comes to waste mismanagement: a degraded environment, inappropriate waste disposal as an endangerment to human health, loss of the potential financial gains, negative public's perception on waste, desperate need for establishing selective disposal and collection, as well as the fully operational waste management facilities, insufficient funding and all waste is treated as garbage. The results also suggest that Zagreb, although it has better conditions than Sarajevo, and it has been a member of the European Union since 2013, does not have a more efficient waste management than Sarajevo. The findings also indicate that various changes need to happen in order to achieve adequate waste management in both cities, like changing the negative public's perception on waste and establishing a functional waste management center.

Contents

1. INTRODUCTION

Whether it spreads through the atmosphere by burning, breaks down in groundwater, or simply piles up on the ground, waste poses a serious threat to our well-being and the environment. This specially refers to improperly managed or unmanaged waste. According to the World Bank (2018, p3), ‘’the world generates 2.01 billion tonnes of municipal solid waste annually’’, and the amount of generated waste will probably reach more than 3 billion tonnes by the middle of this century. Also, as the World Bank (2018, p1) states: ‘’Solid waste management is a universal issue affecting every single person in the world’’. Therefore, waste management is one of the most serious issues environmental governance is facing.

In my thesis I will try to show in what ways waste management laws and practices are different in Croatia and in Bosnia and Herzegovina. My aim is to see to what extent the European Union (EU) directives on solid waste management are applied in Croatia’s capital Zagreb and in Bosnia and Herzegovina’s capital Sarajevo.

I will explain all the main attributes of waste, how certain agents affect the waste management, which technologies are available for its processing and what are the outcomes of the current waste management. I want to show a perspective of waste separately from all the actors that are in any way involved with it. I also need to point out institutions which make policies and in that way affect the agents. In order to provide an understanding of how all of these factors interact and finally make effective or ineffective policies on waste, I will use Vatn’s (2005) framework for analyzing resource-use problems. While focusing on the current situations in the capitals, I will also try to determine how Zagreb is doing on waste management compared to Sarajevo. Also, I would try to analyse what the most likely future scenarios for both cities are.

1.1. Background

As the World Bank data shows in the latter part of this chapter, waste is definitely a growing problem of our global society. Humans are the only living creatures on Earth that create waste that cannot biodegrade. One of the main characteristics of our consumer society is a constant consumption growth. We meet most of our needs by producing and using huge amounts of

different products which, after use, become waste (food, clothes, machines, tools…). According to the claims in the preface of his *The Ethics of Waste,* Hawkins (2006) wrote that ‘’desire to possess and accumulate things is completely disconnected from the issue of how commodities are produced and where they end up once we decide they are valueless’’. Constant and increasing consumption is seen as a way of demonstrating personal freedom and choice. Lovejoy (1912) wrote about how the total amount of garbage and waste we are dealing with can be seen as a sort of a punishment for all the extravagances we are enjoying.

Waste has a very negative reputation - a reputation as a pollutant and a problem. This is mainly because of the long history of mismanagement. Additionally, most people see waste as something no longer needed. Furthermore, the terms *waste* and *garbage* have been misused as synonyms. As Herceg (2013) claims, *garbage* is something discarded, unnecessary, unsorted and unclassified. On the other hand, *waste* is also something discarded and no longer necessary, but it is disposed of in designated areas, sorted, processed and recycled. *Waste* includes all material remains of raw materials, semi-finished products and products that are useless and redundant, but which still hold some particular utility and in practice and in theory could still be used. Different from waste, garbage holds practically no value, since dealing with it does not bring any profit or utility.

In some countries waste is still seen as a problem that has and that should be disposed of at minimum costs. However, with the development of technology and raising awareness, this perception of waste has been slowly changing. This is happening also due to the increasing evidence that waste is actually a resource that is exploitable and profitable. Societies are starting to understand waste as a valuable raw material and also as an energy generating product. That is why it is often called a secondary raw material or a resource in a wrong place.

Furthermore, we can say that the future lies in using the secondary raw materials and Herceg (2013) gave a good example to support this claim. He writes that 1,3 billion cell phones are now produced every year all over the world. However, only 10% gets to be recycled. This means that the 90% of cellphones gets discarded as garbage, without being sorted and classified, treated as no longer needed. Why is this so relevant? Well, as one example, 90% of cellphones holds

approximately 20 tonnes of gold! This is due to the facts that an average cell phone contains around 23 milligrams of gold. According to this, with good waste management, huge amounts of gold could actually be reused.

Moreover, as the European Commission (2005, p6) stated, waste is ‘’complex, difficult to grasp, difficult to gather good statistics on, and difficult to regulate and manage’’. It affects businesses, public authorities, different organizations and all citizens. It impacts the environment, finances and health. Waste is a source of air, ground, water and ocean pollution and greenhouse gas emissions and it is contributing to climate change. Therefore, waste represents one of the biggest environmental issues of our time and it poses a serious challenge to environmental governance. It can be said that, in many ways, waste management is like a ‘’frontier’’ field, where new politics, technologies, social organizations and management are meeting. It is driven by a mix of drivers from economics to the environment, and enhanced by technological innovations. Because of this and because of the value that it poses as a secondary raw material, it is extremely important to develop and apply adequate governance management systems, to overcome existing institutional obstacles and improve coordination between the governments and state organizations.

1.2. Overall and global waste perspectives

The global population is increasing rapidly and the majority of the populations in many countries now live in cities (57%). Ever since the second half of the 20th century, the population has been marked with a speedy development of high technologies and a modern way of life. All of this leads to more hunger, more poverty, more serious environmental degradation, and after all, more waste.

In order to tackle different global challenges, the UN adopted 17 Sustainable Development Goals in 2015. These goals are a part of the UN’s 2030 Agenda for Sustainable Development. The Goals target to end poverty, fight climate change and all types of inequity, and to promote prosperity among all countries, while protecting the planet. As the UN (2015) states, these goals ‘’recognize that ending poverty must go hand-in-hand with strategies that build economic growth and addresses a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection’’. According to the UN, all 17 goals are interconnected and they are shown in the picture below.

Figure 1: Sustainable Development Goals.

(The UN, 2015)

When it comes to waste, as the World Bank (2012) states, ‘’the world generates 2.01 billion tonnes of municipal solid waste annually’’, and around 30% of that waste is not managed adequately. Even in the areas that are only moderately developed, around 1 kg of waste per capita occurs daily. Those amounts are much bigger in more developed countries. According to the World Bank (2018), the amount of waste generated in high-income countries is as high as 4.5 kg per capita per day. According to the World Bank’s report on solid waste management from 2018, waste generation rates will be doubled in lower income countries over a 20 years period. Furthermore, the World Bank (2018, p1) stated that ‘’global waste is expected to grow to 3.40 billion tonnes by 2050’’ and that ‘’the East Asia and Pacific region is generating most of the world’s waste, at 23%, and the Middle East and North Africa region is producing the least in absolute terms, at 6%. However, the fastest growing regions are Sub-Saharan Africa, South Asia, and the Middle East and North Africa, where by 2050, total waste generation is expected to more than triple, double, and double respectively’’. These projections are shown in Figure 1.

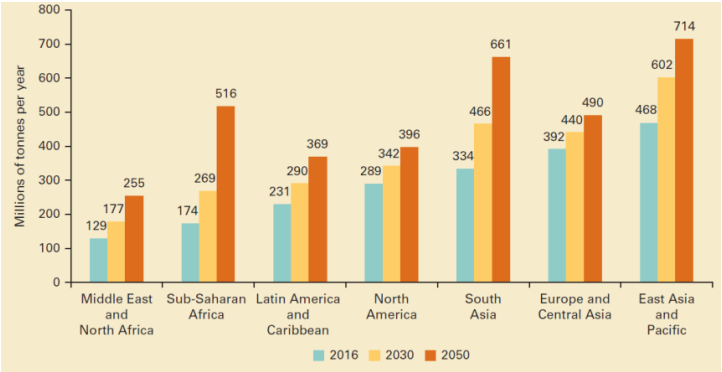


Figure 2: Projected waste generation by region - millions of tonnes/year.

(The World Bank, 2019)

Furthermore, according to the European Commission (2015), ‘’waste generation in the EU is estimated at about 1.3 billion tonnes per year’’. Furthermore, as shown below in Figure 2, Eurostat (2018) stated that the EU countries on average ‘’generated 487 kg of waste per person in 2017’’ and also ‘’that is only 8 kg less than the 496 kg generated back in the 1997, when figures were first compiled’’. The figure shows that EU’s peak was in 2007, when the countries produced 524 kg of waste per person, and that the lowest amount occurred in 2013, 479 kg per person. This analysis was referring only to waste from households and offices. Also, Eurostat (2018) stated that Germany, Denmark, Cyprus, Malta and Luxembourg generate the most waste in the EU - over 600 kg per person yearly. Additionally, Eurostat (2018) states that ‘’overall in the EU, 30% of the waste was recycled, 17% composted, 28% incinerated and 24% landfilled in 2017’’. It has been concluded that ‘’waste incineration has sharply increased over time - 74 kg per person in 1999 as opposed to 133 kg in 2017’’.

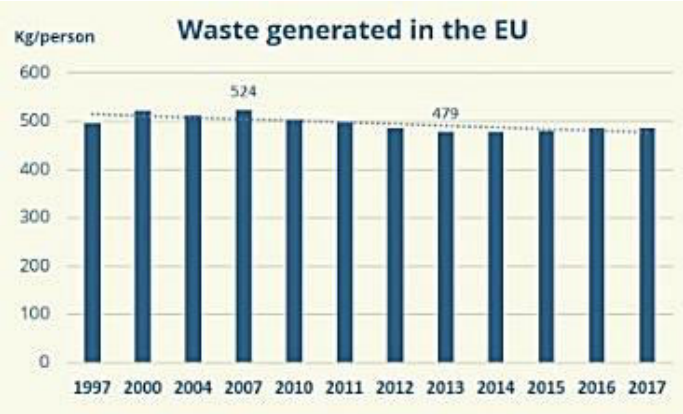


Figure 3: Waste generated in the EU 1997-2017.

(Eurostat, 2019)

These numbers show very little or no progress in the EU countries when it comes to proper waste treatment and reduction. This is why adequate waste management is crucial. Decreasing the amount of the new waste and safe and efficient management of the existing waste must be seen as the priority in society's environmental policies.

1.3. History of field

1.3.1. Brief history of waste

According to Barles (2014), the word waste has roots in the word vastum, that the old French used to describe a region that is ruined or neglected. Barles (2014) states there are three categories of the vocabulary that describe waste:

- Words that mean loss and uselessness (dechet in French - same meaning as vastum, refuse and garbage in English, residuo in Spanish, rifiuti in Italian, Abfall in German, avfall in Norwegian);
- Words that mean dirty nature of materials (immondice and ordure in French, immondizia in Italian);
- Words that describe the materials waste is made of (boues in French, spazzatura in Italian, rubbish in English).

Although waste is an issue of the modern civilization and it became one of the central environmental problems only in the past couple of decades, its roots go back to the distant past. According to Rihn (2016), the first organized landfill originated in Greece, about 3 000 years BC. In the city of Knossos on the island of Crete people dug holes outside of the city in order to get disposed of their waste. As Herceg (2013) states, about 2 500 years BC, Athens had a somewhat organized waste collection system and a landfill. Barles (2014) claims ancient Romans are also known for building sewage systems and the Roman Empire had the first known organized waste collection service. They are famous for their sewage systems called cloaca maxima (subsurface drainage systems and uncovered canal systems that were built under the halls they were gathering in). Barles (2014) also claims that most cities in Europe used their example and built the same systems until the beginning of the Middle Ages. Ancient India and China had organized city cleaning services.

In the Middle Ages the human population grew, which meant that the amounts of waste got much bigger when compared to ancient times. Cities started to build surface runoff systems and simple holes in the ground for dumping waste (pit privies). According to Herceg (2013), waste was treated extremely irresponsibly. Barles (2014) states that until the 13th century, the city waste was dumped in the Seine River in Paris. Garbage was piling up on the streets and towns were choking in garbage smell. As Rihn (2016) states, piles of garbage contributed to the outburst of the Bubonic Plague in the 14th century. Herceg (2013) writes that around the beginning of the 14th century first laws that forbid dumping garbage on the streets without any control were adapted in England, and around the beginning of the 15th century French King Henry IV. forbids dumping garbage on the streets before the collection services arrived. Barles (2014) claims that the health rates were extremely low in the cities until the 18th century and piled up garbage was one of the reasons for that. There were no significant changes in the waste disposal and management before the 18th century.

As Barles (2014, p1) claims, by the 18th and 19th century the ‘’Neo-Hippocratic medicine, which considered the tainted environment and air to be the principal causes of urban excess mortality, prompted the implementation of new policies and management techniques in Europe to clean up the cities’’. As she mentions, doctors started to closely look at the Hippocrates’ theories and they started analyzing the environment to find out why cities have high mortality rates. This led to: ground covering, more adequate excreta management and more regular sweeping and cleaning in cities. According to Rihn (2016), the ‘’Age of Sanitation’’ begins in 1842, with the release of a report that connected bad environmental state with various disease. Since then, cities started focusing more on their waste management. However, Barles (2014) states that from 1870s to the 1960s, the aim of waste management was to minimize waste disposal costs and the environment was seen as a waste depository. Herceg (2013) writes that by the 1920 there were more than 300 landfills in the United Kingdom. By the 1930s almost all cities had an organized waste collection service and those services started being charged (Vienna was the first city that started charging for waste collection service). Barles (2014, p2) writes that since the 1960s ‘’the environmental crisis has translated into a waste crisis for which only imperfect solutions have been found’’.

1.3.2. History of the EU waste framework

As far as the European Union is concerned, the history of dealing with waste goes back to 1958. That is when the European Commission was founded and started addressing waste and its impacts on the environment. Actually, according to the European Commission, addressing waste marked the beginning of the environmental policy history in the EU.

According to the European Commission (2005), until 1975, all European Commission member states dealt with their waste locally (through local rules and regulations). However, inadequate waste handling caused several scandals in the 70s and the 80s. For example, in the 80s it was discovered that Italy had been shipping its hazardous waste to Nigeria for years. Two Italian firms were paying Nigerian villagers to store thousands of drums with toxic waste, and by the time the scandal was revealed the drums were leaking causing the villagers to get sick. This and other similar scandals with waste alerted the policy-makers and Member States started to take more control when it comes to waste management. The aim was to offer a national framework for waste policy, with measures that had to be applied in all member countries. In 1975 the European Commission adopted the Waste Framework Directive and the Hazardous Waste Directive. Together with the later Waste Shipment Regulation, these Directives provided the basis for regulating waste. As the European Commission states on its website, ‘’they define waste and other key concepts, ensure waste is handled without causing damage to the environment or human health, and impose controlled conditions for moving waste throughout the EU’’. Furthermore, the European Commission did not stop there. Numerous other legislations on waste were adopted and revised. In the 1989 the Basel Convention was adopted, addressing cleaner production, minimization of hazardous waste and control of its movement.

However, as the European Commission itself states, these first Directives had some weak points. They failed to define acceptable parameters for the emission from landfills, incineration and recycling facilities. In relation to this, in 1996, the Directive on Integrated Pollution Prevention and Control (IPPC) was adopted. Even though it tackled pollution from agricultural and industrial facilities and set standards for all the activities related to waste, there were still some details left to be defined. Waste management needed to be improved and recycling, re-use and energy recovery had to be promoted. In order to achieve that, the European Commission adopted

the Waste Strategy Communication in the 1996. As the Commission states on its website, the Strategy ‘’reinforced the notion of a waste hierarchy, re-affirmed the ‘polluter pays’ principle (so that those who produce waste should have to pay the cost of treatment), developed the concept of priority waste streams’’. Also, the Community Strategy for Waste Management (97/C76/01) was adopted by the Resolution of the European Council in 1997.

Furthermore, numerous other legislations on waste were adopted and revised, such as:

- Directive on the Protection of the Environment, and in Particular of the Soil (1986),
- Directive on Packaging and Packaging Waste (1994),
- Directive on the Landfill of Waste (in 1999),
- Waste Incineration Directive (in 2000),
- Landfill Directive (2001),
- Regulation on Waste Statistics (2002),
- Regulation on Shipments of Waste (2006),
- Interpretative Communication on Waste and By-products (2007),
- Waste Framework Directive (2008),
- Directive on Industrial Emissions (2010),
- Directive on Electrical and Electronic Equipment Waste (2012),
- Circular Economy Strategy (2014), and others.

According to the European Commission, the main authority bodies responsible for waste management legislation and policies today are the European Commission, the Council of the European Union and the European Parliament. European Commission website states that: ‘’The Commission proposes policies and legislation that protect natural habitats, keep air and water clean, ensure proper waste disposal, improve knowledge about toxic chemicals, and help businesses move towards a sustainable economy’’. Furthermore, the policies and legislation are adopted by the Parliament and the Council.

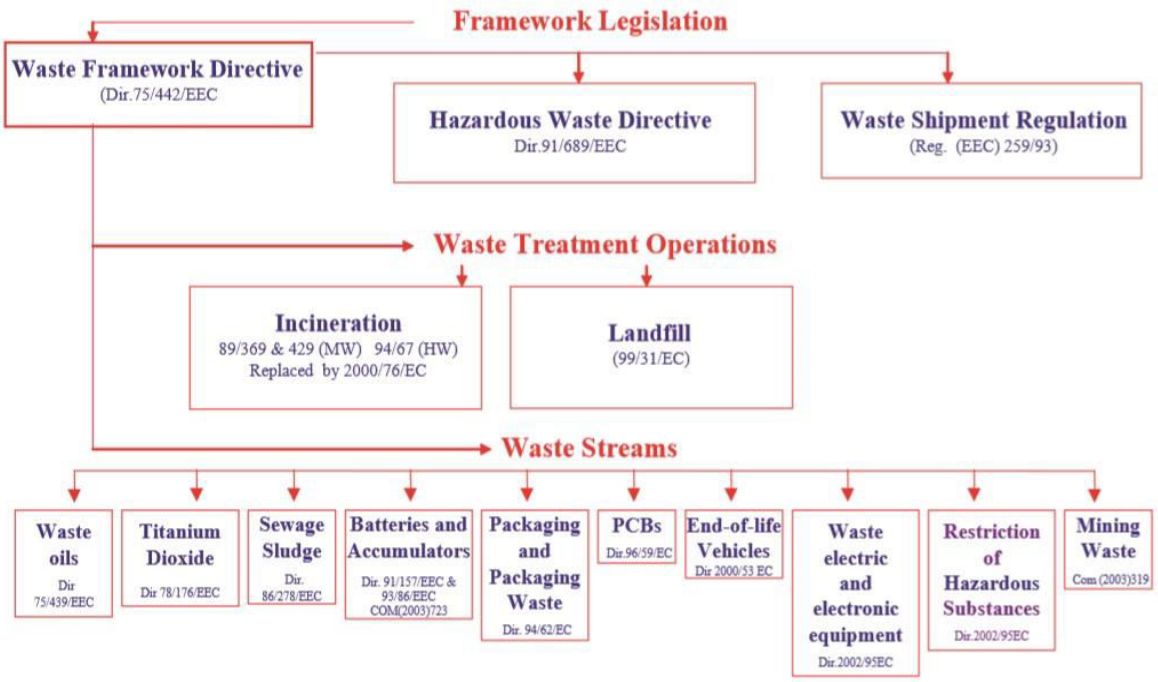


Figure 4: EU waste legislation framework.

(European Commission, 2005)

As the European Commission website claims, the EU's Waste Framework Directive from 2008 ''explains when waste ceases to be waste and becomes a secondary raw material (so called end-of-waste criteria), and how to distinguish between waste and by-products''. The Directive sets some ''basic waste management principles: it requires waste management without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odors, and without adversely affecting the countryside or places of special interest''. The Directive included two new recycling and recovery targets to be achieved by 2020:

➢ 50% preparing for re-use and recycling of certain waste materials from households and other origins similar to households,

➢ 70% preparing for re-use, recycling and other recovery of construction and demolition waste.

According to the European Commission, the Directive requires that Member States adopt waste management plans and waste prevention programs. Also according to the European Commission,

all of the EU waste legislations and policies must follow the waste management hierarchy, shown in the picture below.

Figure 5: EU waste management hierarchy.
(European Commission, https://ec.europa.eu)

In May 2018, the EU adopted new measures and targets on waste. The targets came as a part of the wider Circular Economy plan and it was approved by all of the EU member countries. Circular Economy has various definitions across literature. As Murray et al. (2015p) state: ‘’Circular Economy represents the most recent attempt to conceptualize the integration of economic activity and environmental wellbeing in a sustainable way’’. According to Ghisellini et al. (2016, p11): ‘’Circular Economy aims to increase the efficiency of resource use, with special focus on urban and industrial waste, to achieve a better balance and harmony between economy, environment and society’’. As the European Commission (2018) states, the targets are as following:

a) Hazardous household waste will have to be collected separately by 2022,
b) Bio-waste will have to be collected separately by 2023,
c) Textiles will have to be collected separately by 2025,
d) Recycling targets for municipal waste: 55% by 2025, 60% by 2030, 65% by 2035.

The result of these Directives, measures and targets are sets of general principles and defined procedures on waste and waste management that need to be in place to ensure human health, sustainable development and environmental protection across the EU countries. Naturally, with

time, some of the Directives, measures and targets will have to be revised and new ones will need to be adopted, together with new technologies.

1.4. Justification for the thesis

When it comes to Republic of Croatia, waste management is considered one of the biggest environmental issues. In Croatia, the Parliament is responsible the relevant waste legislation and national strategies. The Ministry of Environmental Protection, Physical Planning and Construction is a central body responsible for all the preparations of legislations, strategies and plans on waste management. Croatia joined the EU in 2013, but already in 2004 Croatia adopted the new Waste Act, in accordance with the EU legislation. Waste management is regulated by the Waste Management Strategy from 2005, and the Waste Management Plan from 2017, as well as by other regulations adopted through joining the EU.

Furthermore, Croatia officially had until 2015 to change its laws and practices on waste, and make them in full accordance with the EU's rules. In 2015, the European Commission even threatened with referring this case to the EU's Court of Justice, if Croatia did not start to modify its laws on waste and implementing adequate practices. According to Eurostat, in 2016 Croatia was recycling 21% of its municipal waste, while the EU average was 47%. It became obvious that this country was far behind EU's plans for recycling 50% of its municipal waste by 2020. Additionally, as the European Commission claimed, in 2018 Croatia had the second worst performance when it comes to adequate waste management among all the EU member countries. Finally, in 2019 the Commission stated that the ''Croatian legislation now fully conforms to the Waste Framework Directive'', and it is now left to implement that legislation a lot more efficiently. However, there seems to be an institutional mismatch between the ideal rules, regulations and polices on waste and their actual performance. Also, when it comes to the Croatian capital, waste management problem is still at its peak. According to Eurostat data from 2015, Zagreb recycles only 1% of its waste and it is now known as ''the European capital of garbage''. It does not even have a fully operational and modern landfill or waste management centre.

Picture 1: Headlines about Croatia's problems with waste.

(google.com, 2019)

When it comes to Bosnia and Herzegovina, that country is in an extremely complicated political situation that affects all areas of life. It is a liberal democracy with several governance levels in its political structure. The country's constitution emerged out of the Dayton Peace Agreement in 1995. The Agreement ended the devastating independence war (1992-1995).

The highest level of governance divides the country into two entities (Federation of Bosnia and Herzegovina and Republic of Srpska) and one district (Brčko District). The country has three constitutional groups of people (Croats, Serbs and Bosnians) and there are three presidents. There is no official state language, but on the entity level people use Croatian, Serbian and Bosnian. There are four ''official cities'', but the capital is Sarajevo and it is situated in the Federation. Despite all of its inner obstacles, Bosnia and Herzegovina has applied for an EU membership, and it has the status of a potential candidate. When it comes to waste, this means that it will have to fully coordinate its waste management practices with EU's laws and regulations, in order to become a member.

In Bosnia and Herzegovina, the state level authority has almost no responsibility for waste management. The institutions of an entity, canton and municipality deal with waste management separately. Since I am focusing on the city of Sarajevo and its waste management practices, I will only present the relevant policies from the Federation of Bosnia and Herzegovina. The Federation's Waste Management Act is adopted by the Parliament and it is valid for a five years period. The main institution responsible for all the environmental issues at the Federation level is

the Ministry of Environment and Tourism, while each canton has its own responsible ministry too. Waste management is regulated by the old Federal Waste Management Plan 2012-2017 (from 2011) and other Federal acts, like the Federal Environmental Protection Strategy 2008-2018. It is important to point out that some Federation's data on waste is still missing or incomplete. Despite all of its issues, Bosnia and Herzegovina formally applied to become an EU member in 2016. Although it did not get the EU membership, the Federal Waste Management Plan has all the basic EU waste legislations included.

As far as Sarajevo is concerned, as many media and academic sources state, the general situation with waste is very negative. According to the report *B&H – A Chronic Special Case,* conducted by the British Embassy in Sarajevo in 2012, Sarajevo recycles around 10% of its waste. However, this is not supported by any other official data. As the Canton of Sarajevo's Waste Management Plan (2015, p41) states: ''There are no adequate household waste treatment facilities in the city of Sarajevo area''. According to this Plan, all of the city's waste is being dumped at the only landfill in the area, landfill Smiljevići. The Plan mentions there is a need for its expansion and restoration. Various media sources state that the landfill is not fully operational and that it will reach its full capacity in the next couple of decades. It is clear that the city is in urgent need of more adequate solutions for waste problems.

Furthermore, because of its complicated political situation and general underdevelopment, the Federation of Bosnia and Herzegovina is dealing with many more politically difficult issues than Croatia. However, the two countries share similar waste management problems. For example, the public sector has a major role in waste management in both countries, while the private sector is just starting to take small part in waste management. Furthermore, the government shifts slow down all waste management initiatives. Also, because of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, the people get almost all projects dismissed (due to the NIMBY effect - Not In My Back Yard).

Picture 2: Headlines about Sarajevo tackling waste problems.

(google.com, 2019)

These two microregions can serve as good examples on what should and should not be done when it comes to waste management. By comparing these two cities and their waste management structures and outcomes, this study can provide some relevant facts on the current and possible future waste management scenarios.

1.5. Problem statement, objectives and research questions

This thesis presents a comparative approach to waste management and governance in Zagreb and Sarajevo. I aim to show that both cities have poor waste management and to point out the main reasons for this situation. If I want to look at the issues with waste in the two capitals, I need to focus on looking at the relationships between human actions and waste in those countries. I also need to focus on the institutions under which certain choices are made.

Bosnia and Herzegovina is considered economically and even politically underdeveloped and it is only a potential EU candidate. Croatia, on the other hand, is more economically and politically developed, and already an EU member. Both countries adopted EU policies on waste. Both cities are in need of more advanced waste management systems and future scenarios have to be determined. Since waste management is not only an environmental topic, but also a political one, how waste is dealt with is in the focus of environmental governance. The EU has different policies on waste and they have to be applied in all member states. Since Croatia is a member state and Bosnia and Herzegovina is a potential candidate, I consider government officials from

these countries know the main EU waste policies and goals, as well as the main authority bodies that deal with waste. My first objective is therefore to find out to what extent the government officials are familiar with these policies and goals, and also to what extent they think those are applied in Croatia and Bosnia and Herzegovina.

Also, when it comes to problems with waste in both countries, certain entities must be defined – entities that are essential for understanding what causes those problems. Therefore, my second objective is to identify the entities that affect waste and all the linkages between them.

Additionally, since waste management in both countries suffers from ineffectiveness, my third objective is to define possible future scenarios, so that at least some problems are recognized in time and there is a chance for preventing them from happening in the future.

Objective 1. What are the EU policy measures on waste?

RQ 1: Which EU institutions and governance structures play the biggest role in defining the current waste management policies and legislations?
RQ 2: What obligations and targets come from the current EU policy packages and strategies on waste?
RQ 3: What are the EU waste management policies/strategies for Croatia, compared to those for Bosnia and Herzegovina?

Objective 2. According to the framework for analyzing resource-use problems, what is the current state of waste management in Zagreb and in Sarajevo?

RQ 1: What are the attributes of the resource and what technology is available for its utilization in Zagreb and in Sarajevo?
RQ 2: Which institutions/regimes are currently affecting waste management and who are the agents that affect the waste management situation in Zagreb and Sarajevo?
RQ 3: How much garbage is generated, collected and sorted in Zagreb and Sarajevo?

RQ 4: What are the outcomes for the two capitals created by the patterns of interaction between the attributes and technology, institutions/regimes and agents and their choices?

Objective 3. What are the most likely future scenarios for these two cities when it comes to waste management?

RQ 1: What are the most likely future scenarios for Zagreb?
RQ 2: What are the most likely future scenarios for Sarajevo?
RQ 3: Can sustainable waste management be seen as a tool that can change the negative perception people in these cities have on waste?

2. THEORY AND LITERATURE

2.1. Waste - definitions and classification

As the European Commission states, the European Union adopts different *regulations, directives* and *decisions* on waste, and all member countries must act accordingly. According to the *Review of Waste Classification Procedures and Identification of Alternative Approaches* (2011, p14): ‘’regulation must be implemented by each member state according to the details of the regulations, and no adoption of the regulation to national law is required. Directives, on the other hand, establish policy and targets that must be met, but leave it for each member state to determine how it chooses to meet the policy and target(s) of the Directive; it is therefore necessary for member states to amend or adopt domestic legislation for the purpose of meeting the requirements of a Directive. Directives may therefore be considered as framework legislation, and they establish what must be achieved, but not how it must be achieved. Decisions are secondary legislation, which bind member states and which typically provide a technical basis for implementation of a Regulation or Directive. EU legislation relating to waste is mainly based on Directives’’. Also, if a member state considers that some segments of waste management legislation are not properly defined by the EU, they are allowed to adopt their own legislation. However, if they do that, their legislation still has to be in accordance with the EU.

According to White et al. (1995), waste can be defined as a useless by-product of human activities that has all the same substance as the useful product. The Environmental Protection Agency’s Waste Management Acts from 1996 and 2001 defined waste as “any substance or object belonging to a category of waste specified in the First Schedule [of the Waste Management Act] or for the time being included in the European Waste Catalogue which the holder discards or intends or is required to discard, and anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste until the contrary is proved’’. Also, Dijkema et al. (2000) states that a certain material becomes waste only when its owner declares it as such. The European Commission defines waste as ‘’any substance or object which the holder discards or intends or is required to discard’’ (Waste Framework Directive 2008/98/EC). As Basu (2009) claims, any products or materials that are no longer useful for the producer can be described as waste.

Furthermore, there are several definitions of waste management. In 1993, Tchobanoglous et al. wrote about solid waste management and explained it as handling of waste in a way that it is safe for the environment and the public. Tchobanoglous et al. (1993) also wrote that solid waste management is an interdisciplinary term, because it uses theory and practice from other fields, such as finances and administration. Furthermore, Brunner and Feller (2007) wrote that the main goals of managing waste are the protection of human health and the environment, as well as resource conservation. Demirbas (2011) claims waste management is a practice we use to gather, transport and process waste. Herceg (2013) writes that waste management is the main focus of all environmental protection strategies and environmental actions, in both developed and developing countries.

Also, according to the European Commission, the EU bases waste management on these four main principles:

1. **Prevention principle** - minimize and avoid waste production as much as possible;
2. **Producer responsibility and polluter pays principle** - those who produce waste or contaminate the environment should pay the costs for handling that waste;
3. **Precautionary principle** - potential problems and issues with waste and its management should be anticipated.
4. **Proximity principle** - if waste is produced at a certain location, it must be disposed of as closely as possible to that place.

Furthermore, Herceg (2013, p210) states that, according to the EU legislatives and strategies, ‘’adequate waste management nowadays means applying the 4R + 3E concept:

- **R**educe (reduce the amount of waste at its source)
- **R**euse (repeatedly use the original form of an object/material)
- **R**ecycle (use reusable waste to obtain new products)
- **R**ecover (use harmless materials and use waste for energy purposes)
- **E**ducate (raise awareness/educate about responsible waste management)
- **E**conomise (reduce waste management and disposal costs and include the costs into the products/services price on the ‘’polluter pays’’ principle)

- **E**nforce (apply all the waste management concepts in legislation and practice, and use them in planning, decision-making and management)''.

Besides the main principles, the waste management in the EU follows the previously shown waste management hierarchy (prevention of waste, preparing for re-use, recycling, recovery, and disposal). Additionally, Herceg (2013) mentions other important waste management principles, such as:

▪ **Zero waste principle** (the product is designed for the environment and not for dumping, in a way that all unnecessary materials or products are resources and not garbage),

▪ **The principle of public participation in decision making processes** (Aarhus Convention from 1998).

Furthermore, as the European Commission (2017) states, there are some main challenges and priorities that should be in focus:

a. ''Ensuring an adequate network of safe and legal waste disposal and recovery facilities. Matching the capacity of waste infrastructure to the volume of waste generated is fundamental to good waste management. Waste management plans can help ensure the necessary capacity, but only if they are effectively implemented.

b. Reducing and better managing certain waste streams. The achievement of certain EC waste reduction and management goals, such as the diversion of biodegradable waste from landfills and the collection of end-of-life vehicles and waste electrical and electronic equipment (WEEE), also depends on adequate forward planning and the development of the necessary organisational arrangements and recovery facilities.

c. Combating the illegal waste trade and illegal waste disposal. Tackling the use of thousands of illegal landfills in several Member States requires strategic action across several fronts to comply with the Waste Framework Directive and the Landfill Directive: investments in legal facilities; better systems of national detection, enforcement and deterrence; and adequate site clean-up. Adequate controls on trans-frontier waste shipments are also essential. The

Commission has taken horizontal action for lack of controls on illegal landfills and there have been several important rulings by the European Court of Justice''.

Moreover, the European Commission (2017) states ''EU's waste management policies also seek to achieve a number of other objectives'', such as:

- All Member States have to use a common definition of waste.
- Development, manufacturing and consumption of clean products must be encouraged.
- Use of economic instruments (taxes on waste production for example) must be encouraged.
- Shipments of waste have to be regulated.
- There has to be a balance between the high level of the environmental protection and the internal market functioning.

When it comes to the classification of waste, different authors divide waste in different groups and by different characteristics. For example, according to White et al. (1995), waste can be divided into three main types, based on its physical state:

1. **Liquid,**
2. **Solid,**
3. **Gaseous waste.**

Moreover, according to Amasuomo and Baird (2016), one of the most commonly waste classifications divides waste into:

A. Household/domestic waste,
B. Industrial waste,
C. Agricultural waste,
D. Commercial waste,
E. Demolition and construction waste,
F. Mining waste.

As Herceg (2013) states, the European waste is described and classified in the European Waste Catalogue (EWC). This Catalogue was established by the European Commission Decision

2000/532/EC. More than 800 different sorts of waste had been systematically described and divided into 20 main chapters (marked from 01 to 20). Each chapter is divided into sub-chapters (marked with four-digit codes), according to the waste characteristics. Within the sub-chapters each sort of waste is individually described (and marked with a six-digit code).

Description	Waste EU-Code	Notes
Kitchen and canteen waste (food waste)	20 01 08	from households, restaurants, canteens, bars, coffee-shops, hospital and school canteens, etc.
Waste from public markets	20 03 02	only biodegradable materials equivalent to codes n°200108 and n°200201
Garden and park waste (yard waste)	20 02 01	from private gardens and public parks and areas, etc.
Wood waste	20 01 38	not containing dangerous substances; no furniture and bulky household-waste

Table 1: An example of waste classification from the European Waste Catalogue. (researchgate.com, 2019)

According to Herceg (2013), the European Waste Catalogue divides waste by its origin and by the danger that it poses for human health and the environment. Another classification was made according to the waste's possibilities of transforming in the environment.

Firstly, if we look at the origin of waste, Herceg (2013) states there are:

1. **Municipal waste** - waste from households, waste created by cleaning public areas and waste generally similar to household waste, also waste that is produced by the economy, different services and institutions. Also, as Bruner and Fellner (2007) claim, ''municipal waste is waste collected by, or on behalf of the municipality''.
2. **Technological (or electronic) waste** - waste generated in industry, agriculture and businesses, all waste generated through any production processes, waste that has different composition and properties from the municipal waste.
3. **Waste that originates from plants and animals** - this means food waste, animal nutrition waste, waste generated from meat and vegetables products, skin waste, etc.

4. **Waste of mineral origin, including the processes of breeding** - mining waste, mechanical engineering and energy waste that does not contain metals, scrap metal waste (like iron and other metals), sludges containing metals.
5. **Chemical processes waste** - acids, pharmaceutical waste, oxides, hydroxides, waste generated by the oil and gas transport, waste generated by the plant protection agents and pest control products, waste generated by coal processing, etc.
6. **Radioactive waste** - waste generated by the uranium extraction and processing.

Secondly, Herceg claims the Catalogue divided waste according to the danger that it poses for human health and the environment and there are:

a. **Inert waste** - this means waste which is not subject to physical, chemical or biological changes, does not dilute, does not burn or reacts in other ways physically or chemically. It is not biodegradable and it does not affect other materials in ways that can lead to environmental pollution or endangering human health. This waste does not contain or contains very few substances that are subject to degradation, but does not threaten the environment.

b. **Hazardous waste** - this is waste that contains explosive, mutagenic, inflammable, infective, carcinogenic, reactive, irritable, corrosive, teratogenic or toxic substances.

Picture 3: Hazardous waste signs.
(cascadebusnews.com, 2018)

c. **Non-hazardous waste** - waste that does not contain any of the dangerous substances that characterize hazardous waste, it is non-harmful waste from gardening, hunting, fishing, food and beverages preparation, etc.

Finally, as Herceg writes, according to the waste's possibilities of transforming in the environment waste can be:

1) Biologically transformable waste materials (organic waste, like paper and food).

2) Chemically transformable waste materials (metal parts and some chemical products can transform by the processes of oxidation).

3) Physically transformable waste materials (like clay or ceramics).

4) Non-transformable waste materials (materials that cannot biodegrade, like plastics).

These basic classifications and definitions of waste are explained to offer a better understanding of the whole concept of waste, before I start focusing concretely on my objections.

2.2. Environmental governance and resource regime analysis framework

As it was previously stated, waste is also a resource. In order to recognize and analyze the issues of waste management, we first need to understand the concepts of governance, governance structure, environmental governance, environmental governance systems and resource regimes.

When it comes to defining these concepts, according to Vatn (2015), institutions have a key role in environmental governance. Therefore, first we need to briefly look at the institutional theory. There are different definitions of institutions. Vatn (2015, p78) claims that ''the concept of an institution covers a very diverse set of constructs''. He states (2015, p78) ''institutions are conventions, norms and formally sanctioned rules of a society. They provide expectations, stability and meaning essential to human existence and coordination. Institutions support certain values, and produce and protect specific interests''. Furthermore, according to North (1990), institutions are the rules of the game, rules that form human interactions in a society. Also, as Vatn (2015, p115) writes, ''Veblen defined institutions as ''settled habits of thought common to the generality of man''. Institutions provide rules for those actors and their interaction and define the costs of those interactions. When it comes to policy making, institutions direct human behaviour, and they need to motivate people to act accordingly. Therefore, if there is an

environmental problem caused by human action, it means that people's interests and preferences regarding that specific problem must be changed. A policy is considered successful if it manages to change the institutions regarding that specific issue.

PROBLEM	CONSEQUENCE	TYPE OF INSTITUTION
Complex world	Need for coordination	Conventions
Interrelated actions type I: interests can be harmonized	Potential for creating common values	Norms
Interrelated actions type II: interests cannot be harmonized	Need to regulate conflict	Formally sanctioned rules

Table 2: Institutions as responses to different problem solutions.

(Vatn, Institutions and the Environment, 2005)

Furthermore, there are different definitions of governance too. In 1997, the United Nations defined governance as the ''exercise of economic, political and administrative authority to manage a country's affairs at all levels. It comprises of the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences''. According to Evans (2012, p34), governance ''seeks to coordinate collective action between actors''. Also, as Vatn (2015, p 134) claims, ''governance is more than government'', and it ''encompasses the processes that shape social priorities, how human coordination is facilitated and how conflicts are acknowledged and possibly resolved''. According to Vatn (2015), it includes different actors (NGO's, communities, businesses) and it covers issues on both local and global scales. In addition to this, Vatn (2015) states environmental governance focuses on above mentioned issues, but in relation to how we use and protect environmental resources. Also, Paavola (2007, p1) suggests ''environmental governance is best understood as the establishment, reaffirmation or change of institutions to resolve conflicts over environmental resources''. Additionally, Vatn (2015) claims governance structure includes actors, institutions and resource regimes. The structure and linkages are shown in Figure 6.

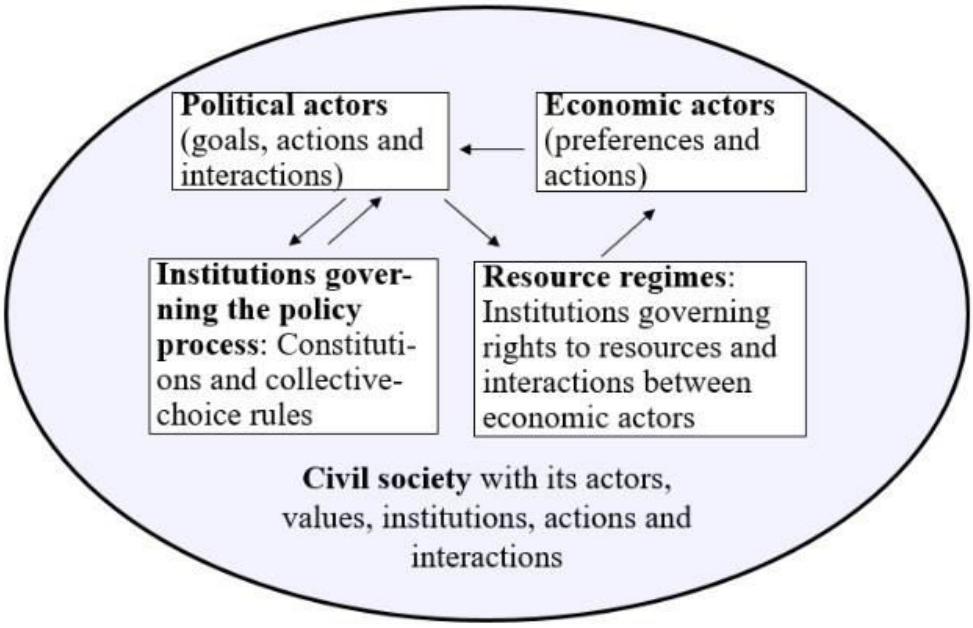


Figure 6: Governance structures.

(Vatn, Environmental governance, 2011)

Furthermore, Vatn (2015) claims environmental governance systems distinguish between different actors, with different types of motivations, and different institutions with different roles. To establish the full Environmental Governance System framework, Vatn (2015) stressed that all the main aspects have to be included when studying environmental problems. So, he added resources and processes, technology and infrastructure, patterns of interactions, and outcomes (resource use and the state of the environmental resource), and the result was the full Environmental Governance System framework.

Moreover, when it comes to institutions governing the use of a certain environmental resource, we need to understand the concept of resource regimes. As Vatn (2015, p158) claims, ‘’two sets of institutions are the key: rules concerning access to environmental resources, and rules concerning the interaction within and between actors having access to such resources, as well as being influenced by decisions regarding them’’. First set of rules is about property and use rights, while the second set of rules concerns the interaction and coordination of the resource use. Additionally, Vatn (2015) suggests four factors that have to be in the main focus of environmental governance: the institutions, the actors, the environmental resources and the technologies used. This is when the framework for resource regime analysis comes to focus.

Finally, based on the framework for studying environmental governance systems, resource regime analysis framework (Figure 7) helps recognizing what is the root of caused environmental problem. In this case, it gives a perspective of the waste separately from all the actors that are in any way involved with waste. It also shows institutions which make policies and in that way affect the agents. It provides an understanding of how all of these factors interact and finally make effective or ineffective policies on waste.

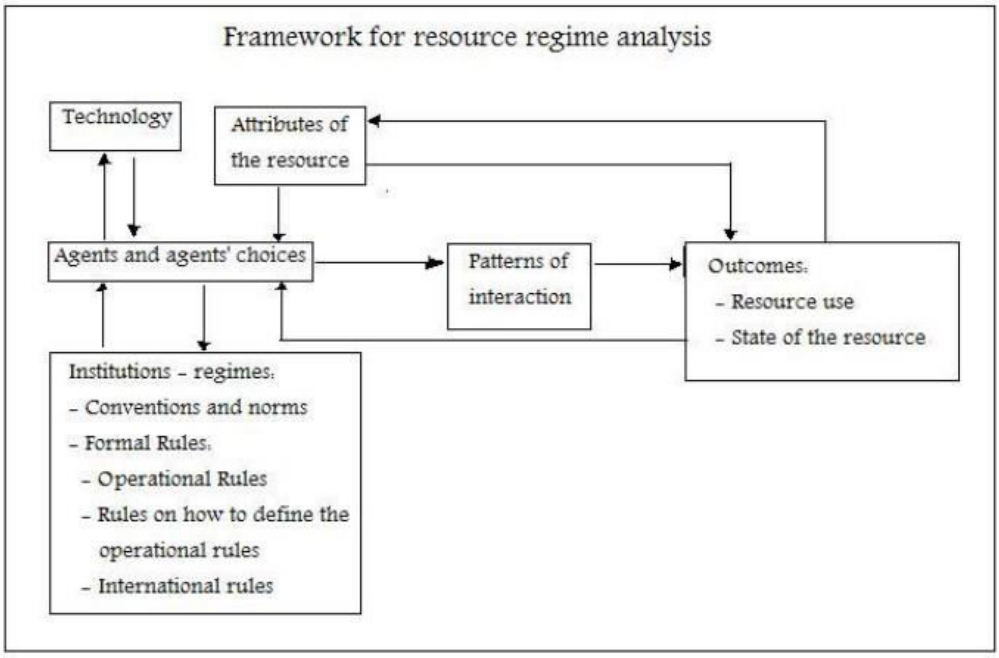


Figure 7: Framework for resource regime analysis.
(Vatn, Institutions and the Environment, 2005)

I will use this framework for resource regime analysis to explain the problems with waste management in Sarajevo and in Zagreb. According to Vatn (2005), the framework is based on the work of Ostrom (1990), Oakersson (1992) and Ostrom et al. (1994). The framework identifies the linkages between the attributes of waste and the technology available for its usage, agents and agents' choices, institutions and regimes, and helps explain how all of their interactions lead to certain outcomes (resource use and state of the resource). Since issues with waste are not about depletion, but about policy failures, this framework's entities are fit to use to explain if and why waste management fails in these two countries.

2.3. Existing research globally and for case in question

There are no concrete research case done when it comes to putting Sarajevo and Zagreb side to side and comparing their waste management situation. Both Croatia and Bosnia and Herzegovina basically started dealing with modern waste management relatively late. It happened when they applied to enter the EU (Croatia from 2003, Bosnia and Herzegovina from 2008). Before that, data on waste management barely existed and they did not deal with waste properly. Therefore, there are still knowledge gaps when it comes to waste management in both countries (some data on waste is still being collected or missing).

In order to write this thesis, I had to go through the current studies on this topic. I tried to find out find out why both Croatia and the Federation of Bosnia and Herzegovina still have big problems dealing with waste, what exactly are those problems, why did they occur, how can they be reduced and what would be some positive and negative examples from the capitals of those two countries. In order to do that, I looked into the some of the existing research on global level. Mainly, I looked into the concepts and theories as defined by Vatn in *Environmental Governance* (2015) and in *Institutions and the Environment* (2005). The main body of literature I used for this study comes from EU policies and official state documents on waste management, as well as available literature and statistics on waste in general. In theory, different EU reports, law acts and press releases provide info on current policies (*Waste Framework Directive, Community Strategy for Waste Management, Environmental Implementation Reviews*, etc.). When it comes to cases from Croatia and Bosnia and Herzegovina, both have issued their official waste management *Plans* and *Strategies*, which are valuable tools in exploring the current situations and finding out the differences that led to these. I used the waste management terms as defined mainly by Herceg (*Environment and Sustainable Development*, 2013). The full reference list is found at the end of this study.

Some of the existing research that might provide useful insights too are: *Management of municipal solid waste in Croatia: Analysis of current practices with performance benchmarking against other European Union member states*, by Traven, Kegalj and Sebelja (2018), *Basic indicators of integrated solid waste management*, by Ristic (2005), and *Environmental comparison of solid waste management systems: a case study of the cities of Iasi, Romania and*

Enschede, Netherlands, by Ghinea et al. (2012). Also, the *Application of multi-criteria decision-making on strategic municipal solid waste management in Dalmatia, Croatia* by Vego, Kucar-Dragicevic and Koprivanac (2008); *Solid Waste Management in Croatia in Response to European Landfill Directive* by Stanic-Maruna and Fellner (2012); *Waste and Water Management in Croatia* by Matkovic (2015); *Comparison of WM strategies and its influence on GHG emissions in Federation of Bosnia and Herzegovina* by Daul and Geol Geosci (2014); *From mixed to separate collection of solid waste: Benefits for the town of Zavidovici (Bosnia and Herzegovina)*, by Vaccari et al. (2013); *Environmental assessment of waste management in Banja Luka region with focus on landfilling* by Bjelic et al. (2015), etc.

2.4. Linking problem statement, objectives and research questions to theory

Personally, I have chosen to write about waste management in Croatia and Bosnia and Herzegovina because of my background. Being a citizen of both of these countries makes me interested in such issues. Moreover, by doing my Bachelor in Tourism and Environmental Protection I learnt about waste management and its problems concerning the two countries. I moved to Norway to do my masters and got a deeper insight into the environmental governance terms, and I have seen how efficient waste management systems can be. I could not help to think that this research of mine might contribute to point out crucial issues and possible solutions and future scenarios when it comes to waste management in Croatia and Bosnia and Herzegovina, with a focus on Zagreb and Sarajevo.

3. METHODOLOGY

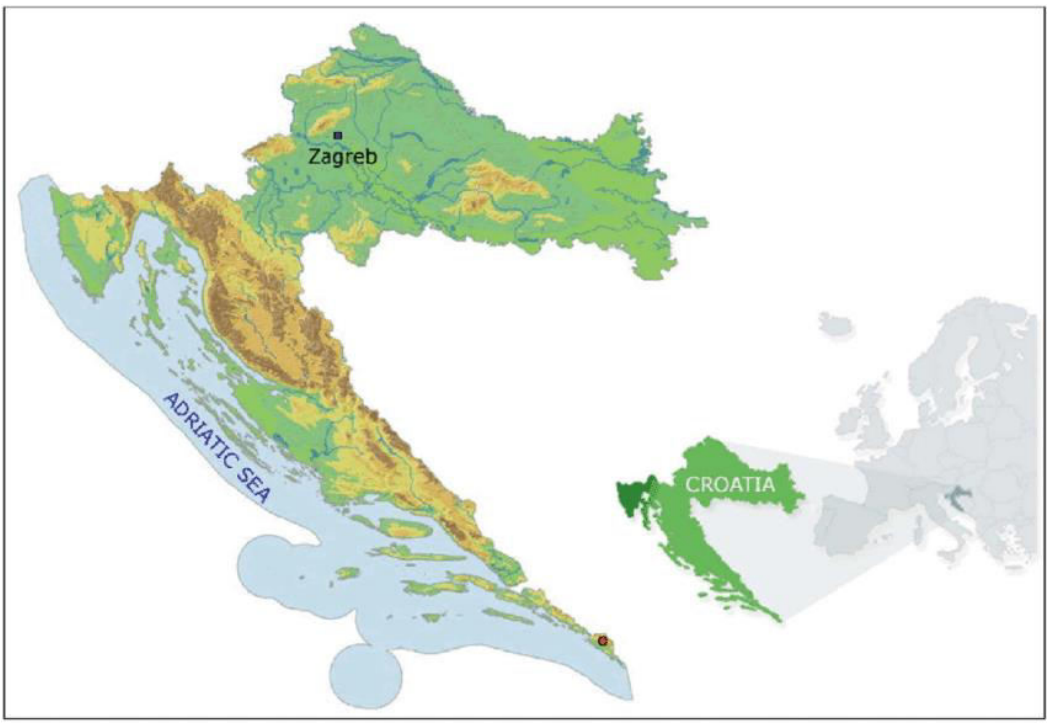
3.1. Description of study area

The study area I will focus on is found in Southeast Europe. There are eleven states situated on the Balkan Peninsula. Croatia and Bosnia and Herzegovina are two of those. They are neighboring countries and share many cultural similarities. However, the economic and political situation and practice differ significantly.

I chose to do a comparison between the capital cities of these two countries. There are two main reasons for this. The first reason is my time limit. I only have around two months to do my research, and that is why I chose to look into the waste management on the capitals level, and not on the countries level. Focusing on countries would take a lot more time and research. Also, my focus is only on the capitals also because of the Bosnia and Herzegovina's extremely complicated political situation (which is explained in chapter 1.4.). Explaining and researching how waste management works in that country would require a great number of resources (especially financial), bigger groups of interviewees, several questionnaires and a huge amount of time (probably not less than a year), and it would have to be a thesis on its own. Choosing to focus on the capitals gave me a good opportunity to research and explain all the relevant waste management issues in these two cities and present it in this thesis.

3.1.1. Croatia

Croatia or, officially, the Republic of Croatia, is considered a crossroad country between Central and Southeast Europe, on the coast of the Adriatic Sea. It covers an area of 56 594 km^2. Croatia borders Bosnia and Herzegovina, Montenegro, Serbia, Hungary and Slovenia. It is a country with a long history and rich culture. The country is often classified defined as a Central European and Mediterranean country by various authors.



Picture 3: Croatia's position in Europe.

(www.researchgate.com, 2018)

Croatia's history is way too long and complex to fit into this one chapter so I will only present some main facts. According to the Miroslav Krleza Institute of Lexicography's publication *Croatia, land and people,* a few powerful civilizations ruled over its territory over the years (the Ancient Greeks, the Romans, the Byzantines, the Franks, the Hungarians, the Ottomans, and the Venetians). After being a part of the former Socialist Federal Republic of Yugoslavia since 1918, Croatia managed to gain independency and international recognition in 1991. The important part of its newer history is the Croatian War of Independence, which was fought from 1991, precisely because of declaring the independency. Croats fought the Yugoslav People's Army, led by Serbs, and local Serbian forces. The war ended in 1995, when the Croatian government regained control over the territories that were held by rebel Serbs and helped end the Bosnian War, where there was a war between the Bosnians, Croats and Serbs.

According to *Croatia, land and people*, Croatia stretches from the town of Vukovar in the northeast, past its capital Zagreb in the west, and to the town of Dubrovnik in the far south. It is often said to be shaped as a horseshoe or a boomerang. Its territory consists of extensive plains, mountainous areas and a long coastline, and around a half of its territory is karst. Croatia's

climate is predominantly moderate, while the coast has Mediterranean climate. Also, Croatia has more than a thousand islands and the second longest coast line in Europe (after Norway). This proved to be of major significance in developing tourism. According to the Eurostat, it is the third European country when it comes to richness with natural water resources. Its environment is well-preserved and it is enriched with hundreds of endemic flora and fauna species. There are 8 national parks, 11 nature parks and two strict nature reserves in Croatia.

Picture 4: One of the biggest attractions, Plitvice Lakes National Park.
(index.hr, 2018)

Politically, Croatia is a parliamentary democracy. It is organized as a unitary republic. The Croatian parliament has a long parliamentary tradition and its officials are elected for a four-year period. The President of the Republic is elected for a five-year period and represents the country abroad, cooperated with the Government in matters of foreign policy and has the command over the army. Administratively, Croatia is divided into 20 counties and the capital, the City of Zagreb. Its national flag has been in use since 1990, and it is made of three colors: red, white and blue, with the coat of arms in the centre.

Demographically, Croatia's official language is Croatian and the writing system is Latin. A high majority of people are Croats. It has a population of around 4 million people. More than 50% live in urban areas.

In terms of the economy, according to Eurostat, Croatia is considered to be a developed country with a rather high living standard. It is a country with one of the strongest economies in this part of Europe.

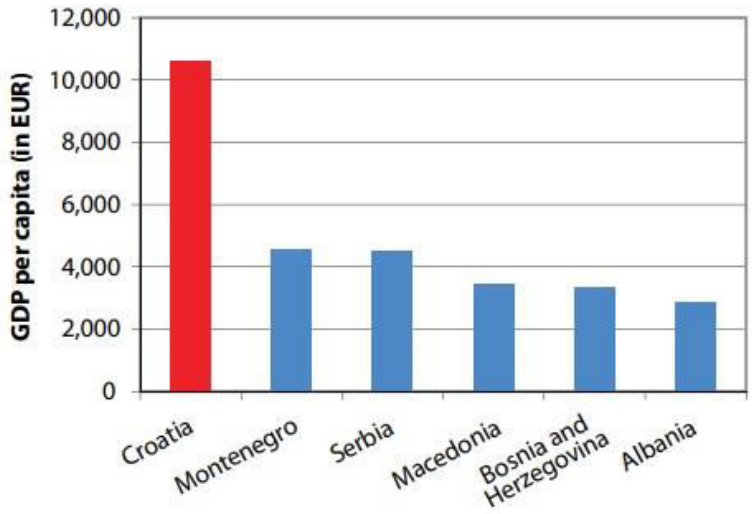


Figure 8: Croatia's GDP per capita in 2011, compared to other South-eastern European countries. (croatia.eu, 2019)

Eurostat also stated that, although it was raising and dropping from 1993, Croatian GDP per capita stood at 62% of the average in the EU in 2017. Industrial sectors, agriculture and service dominate its economy, and tourism is the biggest source of revenue (with more than 10 million foreign guests per year). The most serious problem the economy is dealing with right now is the high level of unemployment. The country has a rather developed infrastructure and it is an important link between the Central and Eastern Europe. Croatia became a member of the EU in 2013, and it is a member of many other organizations (WTO, UN, NATO…).

Year	1993	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
GDP in $ (PPP)	36.02 Bln.	42.41 Bln.	54.51 Bln.	76.28 Bln.	82.38 Bln.	88.94 Bln.	92.54 Bln.	86.36 Bln.	86.17 Bln.	87.66 Bln.	87.28 Bln.	88.11 Bln.	89.61 Bln.	92.71 Bln.	96.86 Bln.	101.34 Bln.
GDP per capita in $ (PPP)	7,790	9,524	12,441	17,173	18,556	20,049	20,872	19,499	19,505	20,483	20,450	20,703	21,144	22,052	23,227	24,424

Table 3: Croatia's GDP 1993-2017.
(CIA World Factbook, 2017)

When it comes to the capital, as *Croatia, land and people* states, Zagreb is Croatia's largest city. It represents the political, cultural, economic, scientific and administrative center of the country. It is a home to the Croatian Parliament, the Government and President. The bodies of the city's administration consist of the City Assembly and the City Mayor. It covers an area of 641 355 km^2 and its wider area has the population of almost a million people. According to the city's official website, Zagreb's economy is dominated by the production of electric machines, chemical, pharmaceutical, textile products and food and beverages. The city has an important role as the crossroad between Central and East Europe, and it is an international trade and business center. Zagreb is culturally rich, with more than 40 cultural institutions, which include 10 museums. There are more than 20 institutes in areas of social and natural sciences, and the University of Zagreb is the oldest in Croatia and one of the oldest universities in Europe (founded in 1669).

Picture 5: Croatian capital – Zagreb.
(www.croatia.hr, 2018)

3.1.2. Bosnia and Herzegovina

Bosnia and Herzegovina is Croatia's neighbor, but much less economically and politically developed and with an extremely complicated constitution and governance structure. It covers an area of 51 129 km^2. It borders with Serbia, Croatia and Montenegro.

Picture 6: Map of Bosnia and Herzegovina, with marked entities.

(https://legacy.lib.utexas.edu, 2018)

In terms of history, Bosnia and Herzegovina was shaped into a complex state in every sense (culturally, socially, politically, and economically). According to the UN, through the history it was controlled externally by different countries and cultures (Ottoman rule from 1463 to 1878, Austro-Hungarian rule from 187-1918, Yugoslavian monarchy from 1918-1941 and Socialist Federal Republic of Yugoslavia from 1945-1992). Briefly put, after the collapse of Yugoslavia, the country went through a four-year, because the largest ethnic groups (Bosnians, Croats and Serbs) disputed over the country's future status and territory. During the Bosnian War the first genocide in Europe after the World War II occurred. There were more than 100 000 casualties and more than 2 million people were displaced. The war officially ended in 1994 with the signing of the Washington Agreement. The Agreement was sign by the representatives of the three ethnic groups. However, the Bosnians and Croats united against Serbs after the Washington Agreement, and founded the Federation of Bosnia and Herzegovina. Serbs did not stop fighting until the end of 1995, when NATO intervened to stop their forces. Finally, the war was finished in 1995, by signing the Dayton Peace Agreement.

Politically, the UN states Bosnia and Herzegovina is today a liberal democracy that has several governance levels in its political structure. As previously mentioned, it is divided into two entities and one district and it has three presidents (a Bosnian, a Croat, and a Serb). The Federation is divided in cantons, and each canton has its own government. Also, there are 74 municipalities in the Federation, while the Republic of Srpska has 63, with each of them having their own local government and local communities. The Federation covers about 50% of the territory, the Republic of Srpska covers about 49%, while the District of Brčko covers about 1% of the country (and it operates under a special, internationally supervised administration). In Bosnia and Herzegovina there are: 14 legal systems, 13 constitutions, 13 prime ministers, 5 levels of administration and more than 150 ministries.

In terms of geography, the UN writes that the country is located in the South-eastern Europe, on the Balkan Peninsula. Northeast parts of the country are mostly flatlands, central and eastern parts are mountainous, while the northwest is mostly hilly. Bosnia and Herzegovina also has a narrow exit to the Adriatic Sea (in the southern part, less than 20 km long). The inlands have moderate continental climate, while the southern tip, Herzegovina, has a Mediterranean climate. Major natural resources of Bosnia and Herzegovina are coal, iron ore, bauxite, copper, cobalt, salt, zinc, clay, gypsum, forests and hydropower. The country has a rich flora and fauna, and around half of it is forested. It has many natural beauties, and the most significant ones are the four national parks, two nature parks, and one strict nature reserve.

Picture 7. National Park Sutjeska in Bosnia and Herzegovina.
(www.ourlifeourtravel.com, 2018)

According to the World Bank, Bosnia and Herzegovina has the population of around 3,7 million. Agency for Statistics of Bosnia and Herzegovina states that Bosnians constitute about 50% of the population, while Serbs constitute around 30% and Croats around 15%. Others, mainly Jews and Roma people add to the rest. The writing systems are Latin and Cyrillic, and official languages are Bosnian, Serbian, and Croatian.

When it comes to economy, according to Eurostat, Bosnia and Herzegovina's GDP per capita was at 29% of the EU average in 2010. World Bank (2018) states that Bosnia and Herzegovina's GDP grew from 1995 to 2005 and then it started to fluctuate. The World Bank claims it stood at 18,17 billion dollars in 2017, which is shown in color blue in Figure 9. The country's economy is still facing consequences of the 90's war. The economy is dominated by industry and agriculture, and lately tourism. Bosnia and Herzegovina is a potential EU candidate since 2016 and it is a member of other organizations too (UN, OSCE, CEFTA…).

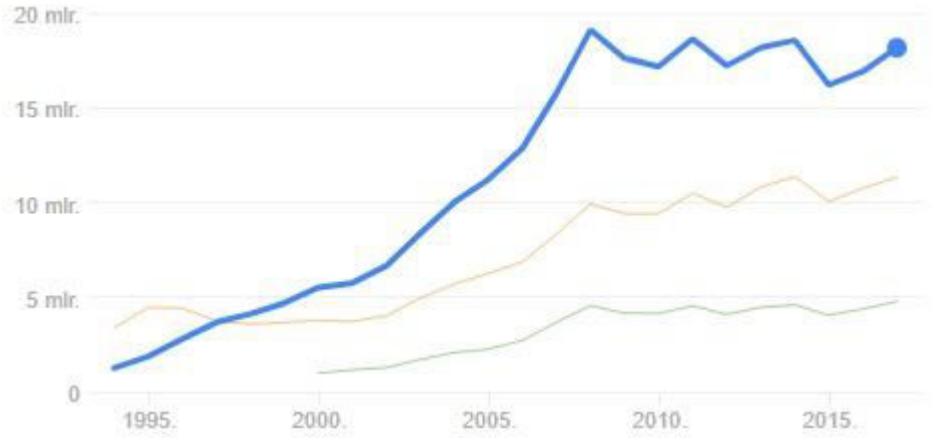


Figure 9: Bosnia and Herzegovina's GDP 1995-2017.
(World Bank, 2018)

Country's capital, Sarajevo, is located in The Federation of Bosnia and Herzegovina. The Federation is one of the two political entities in Bosnia and Herzegovina, and it consists of 10 cantons. According to the Statistics Agency of Bosnia and Herzegovina (2016), the Federation of Bosnia and Herzegovina has a population of 2,2 million people and it covers 26 110 km^2. Sarajevo has a population of almost half a million in its urban area, and the city covers an urban area of 489 km^2. Sarajevo is surrounded by the Dinaric Alps, and it is often referred to as ''the

heart of the Balkan'' by many authors. Because it has a long and rich history of cultural diversity, it is also called ''the Jerusalem of Europe'' by many publications. The city is governed by a mayor and it is the political, social, cultural and financial center of Bosnia and Herzegovina. The city is rather rich in museums and cultural and educational institutions. According to the city website, Sarajevo's economy is dominated by manufacturing and tourism, and the Sarajevo Canton generates around 25% of the country's GDP.

Picture 8: City of Sarajevo.
(telegraph.co.uk, 2017)

Finally, when it comes to waste management in the cities of Zagreb and Sarajevo, they are both doing poorly. Different reports state both cities are suffocating in uncollected garbage. Residents are reporting buildings being surrounded with piles of trash. There are no adequate systems of waste collection in either of the cities. There are no functional landfills and waste management centres that can tackle current amounts of waste in Zagreb, and the situation is almost the same in Sarajevo - with the exception of Sarajevo's landfill Smiljevići, which is almost fully operational. This study will define the current waste governance factors and outcomes, using the framework for analysing resource-use problems.

3.2. Methods and models related to each objective

This qualitative research uses a comparative design. According to Bryman (2016), since I am comparing two countries and their capitals, this research can be categorized as a cross-national comparative research. Furthermore, as Bryman (2016, p65) stated: ''Hantrais (1996) suggested that this term is used "when individuals or teams set out to examine particular issues or

phenomena in two or more countries with the express intention of comparing their manifestations in different socio-cultural settings (institutions, customs, traditions, value systems, life styles, language, thought patterns), using the same research instruments either to carry out secondary analysis of national data or to conduct new empirical work. The aim may be to seek explanations for similarities and differences or to gain greater awareness and a deeper understanding of social reality in different national contexts".

In answering the three objectives I will use both primary and secondary data sources. Primary data sources (first-hand information) will include interviews and research articles. Secondary data sources (information presented in another source) will include different publications (textbooks, magazine articles).

To answer the objectives I will use comparative research. I will answer my first objective (What are the EU policy measures on waste?) and my second objective (According to the framework for analysing resource-use problems, what is the current state of waste management in Zagreb and in Sarajevo?) by literature overviews and by using both descriptive methods and analytical methods. In order to answer my third objective (What are the most likely future scenarios for these two cities when it comes to waste managing?) I will also use mentioned methods. Additionally, I will conduct interviews in order to get a deeper insight in these issues and use it to answer my questions. My interviewees will come from both countries and all of them belong to different levels of society - academics, government officials, public companies that handle waste in the two capitals.

OBJECTIVE	THEORY	METHOD
1. What are the EU policy measures on waste?	**- Waste and waste management definitions and theories.** **- EU's waste management policies, plans and strategies.** **- Waste management policies, plans and strategies from Croatia and Bosnia and Herzegovina.**	**- Literature overview/descriptive methods.** **- Interviews.**
2. According to the framework for analysing resource-use problems, what is the current state of waste management in Zagreb and in Sarajevo?	**- Environmental governance definitions and theories.**	**- Literature overview/descriptive methods.** **- Interviews.**
3. What are the most likely future scenarios for these two cities when it comes to waste managing?	**- Theory based on World Bank's reports on waste predictions.** **- Theory based on academics' research and predictions.**	**- Literature overview/descriptive methods.** **- Interviews.**

Table 4: Objectives, theory and methods for this study.

(the author)

When it comes to models, there are different frameworks that are of interest in environmental governance. The main model used to present and organize all relevant waste management factors and their connections is the framework for analysing resource-use problems. It is defined and explained in the theory chapter.

3.3. Reliability, replication, validity and generalisations of findings

According to Bryman (2016), there are three most important factors when it comes to evaluating social research, and those factors are reliability, replication and validity.

Bryman (2016) claims reliability refers to whether if we would get the same quality results again if this study was repeated, with the same methods used. In this case, it is my opinion that the methods used here are reliable for getting the results I needed. Therefore, this study is reliable. However, it is important to point out that the laws and politics are changing every once in a while, in each country. With the change of laws and politics and the shifts of government officials, waste management policy implementation changes too. Also, according to Wilson (2010), if a researcher has a subjective approach towards the issues that are being researched, the study is no longer compromised. I present all the facts and results in a clear and objective way, so this study is not a product of my subjective views. Therefore, this study is reliable, until there is a governance shift that might change the situation with waste, and then maybe some other research methods would be more appropriate.

As Bryman (2016) states, replication or replicability is another criterion of research. The study is replicable only if the researcher wrote in detail about every segment of the thesis. The study has to have all of the terms correctly defined, the study area described, research questions and objectives well structured, background and perspectives presented, methods and results well explained… Only in that way another researcher will be able to replicate the study. It is my belief that this study has enough details to be considered replicable, if someone wanted to look at the exact same aspects of waste management as me.

Bryman (2016, p41) writes validity is ‘’concerned with the integrity of the conclusions that are generated from apiece of research’’. It is the most relevant criterion of every research. Also, Oliver (2010) claims validity is a compulsory factor of any type of study. It shows if a used indicator measures the concept appropriately. There are different forms of validity, they are defined by various authors and describing them is beyond the scope of this chapter. Therefore, I will focus on the most common measures that ensure validity of a research. Firstly, appropriate time scale for the study has to be selected. I consider I chose the right time scale, since I am only researching a current situation with waste management and since there are no significant shifts in

governance during the writing of this thesis. Secondly, in order for a study to be valid, I needed to use appropriate methods that will help me to show the real state of the issue. I used various literatures on waste and environmental governance and I conducted interviews with necessary questions and I am confident my results are valid. Furthermore, it is of crucial importance that the interviewees were not pressured in any way. I made sure to explain to all of my interviewees they should not be under any pressure while answering my questions – I made it very clear I just need their insights for a simple master thesis research and offered anonymity as option. As far as I know, there were no external pressures on the interviewees either, so from this point of view my results are also valid. Additionally, for my research I had to choose appropriate interviewees. I have chosen interviewees from both countries, both capitals, and from different spheres of society and therefore I can say this criteria led to valid results. As explained here, I did my best to prevent any threats to the validity of this research.

When it comes to generalization, Bryman (2016) claims it is important that the ‘’findings can be generalized beyond the confines of the particular context in which the research was conducted’’. This means that we want to choose a sample that is the most representative for getting our results. As mentioned before, my sample consisted of academics, government officials, public companies that handle waste, coming from both countries, both capitals. It was important for my results to interview all the most relevant stakeholders (government officials and public companies) and to get a perspective from the experts (academics that deal with waste/environmental governance research). Therefore, this research can be generalized for waste management in both cities.

3.4. Potential limitations and challenges

I have come across certain limitations and challenges while gathering the literature and data needed to start my writing process. The most significant issues I have encountered are:

1. Lack of data (some statistical data on waste is missing for both Croatia and Bosnia and Herzegovina);
2. Outdated data (for example, when looking through existing data, I did not find all the statistical data for the current decade; some of the information was from 2002),

3. Existing data for one state/entity and not for the other,
4. Unreliable sources with incomplete data (some news reports on waste management situation were untrue or incomplete).

Additionally, at the beginning of this proposal I wanted to focus on waste management systems in general, for both countries. After I spent some time gathering data, I have realized I will not be able to take Bosnia and Herzegovina as a whole and compare it to Croatia, because of the complicated constitution of Bosnia and Herzegovina and because of the lack of time. After speaking to my mentor, I have decided to focus on the Federation of Bosnia and Herzegovina as an entity, and compare it to Croatia. Also, since comparing waste management systems in detail on the state level is too much work for a master thesis, I have chosen to focus on looking at the capital cities' waste management.

4. RESULTS

This chapter provides the data I obtained through interviews. As previously mentioned, my interviewees came from Croatia and Bosnia and Herzegovina. The structure is shown in the table below. There were 8 interviewees in total from Croatia and they came from different spheres of society. Three Croatian interviewees were government officials, 2 were from companies that handle waste in the capital (both wanted to stay anonymous), and 3 from academic society or NGO's (1 wanted to stay anonymous). Similarly, there were 8 interviewees in total from The Federation of Bosnia and Herzegovina. Three were government officials, 2 were from companies that handle waste in the capital (1 wanted to stay anonymous), and 3 came as a part of the academic society or NGO's (civil society). The first focus group, government officials, was used to answer my first objective on EU policies on waste – What are the EU policy measures on waste?

The second focus group, representatives of companies that handle waste in Zagreb and Sarajevo, were used to provide info on my second objective - According to the framework for analyzing resource-use problems, what is the current state of waste management in Zagreb and in Sarajevo?

The third group, academic society and members of NGO's, provided needed info to answer my third objective - What are the most likely future scenarios for these two cities when it comes to waste management?

Below the table I present the results in accordance with my research questions.

INTERVIEWEES STRUCTURE	CROATIA	BOSNIA AND HERZEGOVINA	RELATION TO THE OBJECTIVES
GOVERNMENT OFFICIALS	**1. Lukić** **2. Matak** **3. Čilić**	**1. Herceg** **2. Lukić** **3. Marušić**	**Objective 1: EU policy measures on waste.**
PUBLIC COMPANIES THAT HANDLE WASTE	**1. Anonymous** **2. Anonymous**	**1. Omanović** **2. Anonymous**	**Objective 2: What is the current state of waste management in Zagreb and in Sarajevo (framework)?**
ACADEMICS AND NGO'S	**1. Vučković** **2. Vidaković** **3. Anonymous**	**1. Omanović** **2. Hubanić** **3. Ballian**	**Objective 3: What are the most likely future scenarios for these two cities when it comes to waste management?**

Table 5: Interviewees structure.

(the author)

4.1. Objective 1: EU policy measures on waste

RQ 1: Which EU institutions and governance structures play the biggest role in defining the current waste management policies and legislations?

All interviewees, 6 in total, from both Croatia and Bosnia and Herzegovina said that the main EU institutions and governance structures that deal with deciding on overall waste policies and legislations are the European Parliament and the Council of the European Union. Also, 2 respondents from Croatia and 2 respondents from Bosnia and Herzegovina pointed out that the

European Commission gives suggestions for the policies and legislations too. Lukić stated: *"The European Commission, the EU Council and the European Parliament are the main actors for adapting waste management policies and legislations".* Also, Čilić claimed: *''At the EU level, European Commission suggests the laws and regulations, while the European Parliament and the Council of the European Union adopt them''.*

RQ 2: What obligations and targets come from the current EU policy packages and strategies on waste?

When it comes to respondents from Croatia, all 3 mentioned various EU policies and strategies on waste. All 3 responds consisted of naming the Waste Strategy Communication, the Waste Framework Directive and the Circular Economy Strategy (2 respondents mentioned the years of origin, 1996 for the Communication, 2008 for the Directive, and 2014 for the Circular Economy). 2 respondents included naming the 2008 Directive goals on aiming to have 50% of household waste and 70% on construction waste prepared for recycling and re-use by 2020. All 3 respondents mentioned the recycling targets for municipal waste by 2025, 2030 and 2035. 2 respondents pointed out what is the hazardous household waste target by 2022, bio-waste target by 2023, and textiles collection target by 2025. All three responds mentioned the waste hierarchy and that the waste prevention has to be the main focus. Čilić stated: *''As of July 4th 2018, new EU rules came to force, with legally binding targets for waste recycling and reduction of waste disposal, with fixed deadlines. In order to achieve the transition to a more circular economy, all member states must make the national legislation adjustments in the next two years''.* Also, Čilić pointed out that *''the EU goals for household waste recycling are as following: 55% until 2025, 60% until 2030, 65% until 2035. However, because of the difficulties that Croatia has with implementing EU waste practices, it has gotten a 5 year delay when it comes to these goals. The biggest reason for this is that in the year when it became an EU member, Croatia was recycling a very small share of total household waste. All the EU laws and regulations apply, but Croatia must recycle the mentioned amounts of household waste until the following years: 55% until 2030, 60% until 2035, 65% until 2040''.*

Respondents from Bosnia and Herzegovina were aware of various policies and strategies in place. All 3 respondents pointed out the Waste Framework Directive from 2008 and its goals and

the Circular Economy Strategy from 2014 and its targets. As Herceg stated: *"The most important EU targets and obligations come from the Waste Framework Directive, adapted in 2008, and, of course, from the Circular Economy Strategy, adapted in 2014".* Furthermore, all 3 respondents pointed out the importance of the waste hierarchy. 1 respondent included naming other EU regulations. Marušić mentioned the Directive on packaging and packaging waste, Waste Incineration Directive, the Landfill Directive and Regulation on shipments of waste.

RQ 3: What are the EU waste management policies/strategies for Croatia and for Bosnia and Herzegovina?

All three respondents from Croatia pointed out that the adoption of the EU waste management policies and strategies helped waste management become more organized and efficient. One of the respondents pointed out how important it is to *''have the access to various EU funds that support environmental protection''.* All three respondents stated that Croatia went a long way before fully harmonizing its laws and regulations on waste with those of the EU. Also, all three respondents mentioned general waste management goals that, according to the EU laws and regulations Croatia needs to achieve until 2022. Two respondents named them all:

- Improve the municipal waste management system;
- Improve the management of special categories of waste;
- Improve the hazardous waste management;
- Rehabilitate all sites polluted by waste;
- Continuously implement educational and informative activities on waste;
- Improve the information system for waste management;
- Improve the oversight of the whole waste management system;
- Improve administrative procedures related to waste management.

Respondents from Bosnia and Herzegovina gave the following information. All three respondents agreed in saying that Bosnia and Herzegovina is in the process of achieving full accordance with the EU waste policies and strategies. All three respondents also agreed on the fact that Bosnia and Herzegovina still has a long way to go until achieving full accordance with the EU waste policy and strategies. Herceg stated that: *"In the Federation of Bosnia and Herzegovina, the regulations and plans are being adapted, but without fully detailed*

instructions, or with solutions that are not practically possible, due to various reasons, which means we need to work more on implementing all European Union`s laws and regulations". Also, 2 respondents pointed out that before Bosnia and Herzegovina became a potential EU candidate, laws and regulations on waste practically did not exist.

4.2. Objective 2: According to the framework for analyzing resource-use problems, what is the current state of waste management in Zagreb and in Sarajevo?

RQ 1: What are the attributes of the resource and what technology is available for its utilization in Zagreb and in Sarajevo?

Both interviewees from Croatia that answered to my questions wanted to stay anonymous. They both stated that the household waste collected in Zagreb mostly consists of bio-waste from kitchen-use, paper and cardboard. Both stated that this waste is collected in the marked bins and containers placed all over the city. Also, when it comes to technologies available for processing household waste, both interviewees stated there are 10 recycling yards in the city, landfill Prudinec and two composting sites - one at Prudinec and the other one called Jankomir. One of the two respondents mentioned CE-ZA-R Recycling centre, which is recycling different metal waste. They both agreed in saying that Zagreb desperately needs more recycling sites and improved technologies for waste treatment, that will help deal with the *''problematic amounts of waste Zagreb is covered with''.* Both respondents also stated that the city has an approved plan to establish Waste Management Center. As one of them claimed: the center would *''take the waste management of this city to a higher level, which is urgently needed''.*

Of the two respondents from the Federation of Bosnia and Herzegovina, one wanted to stay anonymous. However, both respondents stated that the household waste collected in Sarajevo consists of paper and cardboard, plastics, glass and bio-waste from kitchen use. Both said that the recycling yards and bins for separate disposal do exist, in fair amounts, but the citizens are not sorting or recycling almost anything at all. Omanović stated this is due to *''the lack of recycling habits and lack of regulative rules''.* Also, he stated it is his opinion that *''there are no recycling technologies that are available in the city of Sarajevo, there are just sites/bins that collect the waste that can be recycled''.* Both respondents stated that all the waste is being taken to the

Smiljevići landfill, which is suffering from serious capacity issues and soon it will not be able to receive more waste. The anonymous respondents stated that *''landfill Smiljevići is not fully operational and that is the main problem because it is the only waste treatment facility in this city, and it is named the Regional Waste Management Center''*. Both respondents said Sarajevo is missing a fully operational waste management site that will have all technologies needed for proper waste treatment. When asked which technologies are those, the anonymous respondent laughed and said *''all of them''*. Omanović stated that *''current problems with waste are not just about lacking technology, but mostly about the lack of strict regulations''.*

RQ 2: Which institutions/regimes are currently affecting waste management and who are the agents that affect the waste management situation in Zagreb and Sarajevo?

Both the anonymous Croatian respondents stated that the waste management in Zagreb is regulated by relevant EU institutions, laws and regulations. Also, both of them agreed that the role of the EU is positive, but the implementation and control have to become better. One of the respondents also pointed out that *''Croatia adapted its laws and regulations with those of the EU's, but it still has a lot of trouble with the adequate implementation of all the EU laws and regulations on waste''.* When asked about the main agents, both respondents replied there is one main agent - Zagreb City Holding Ltd, Subsidiary Čistoća.

When it comes to the Federation of Bosnia and Herzegovina, both respondents said that the state and the city of Sarajevo are in the process of adjusting all the laws and regulations on waste with the EU laws and regulations. *Omanović stated ''the adjustment process is undergoing but it is very slow and there are still no clear directions on how to deal with our waste issue''.* Additionally, both respondents agreed there is an urgent need for the improvement of the waste legislations. Both respondents stated there are two main agents who currently manage waste in Sarajevo - Cantonal Public Utility Companies ''Rad'' and ''Park''. Omanović pointed out that both of the companies have the same problem: *''...they cannot apply adequate waste management measures because of the constant government issues and poor waste legislatives''.* Furthermore, he stated that *''the politics dictates the whole situation - there are many government shifts and that means many beginnings and no end when it comes to adjusting and implementing waste management measures''.*

RQ 3: How much garbage is generated, collected and sorted in Zagreb and Sarajevo?

Both respondents from Croatia said that an average citizen in Zagreb generates more than 1kg of household waste daily (but less than 2kg). For the collection, one respondent did not know the exact information, but the other respondent said that *''there are approximately 350 000 tonnes of household waste collected yearly in Zagreb''.* Neither knew how much is being sorted.

When it comes to Sarajevo, neither of the respondents held the information I was looking for. However, the anonymous source stated that the amount of household waste generated yearly would be approximately 200 000 tonnes, and that *''around ¾ of that amount is collected on a yearly basis''.* I did not get any data on sorting.

Since the interviews did not provide enough data on the generation, collection and separation of household waste in Zagreb and Sarajevo, I used secondary sources to provide more information on this matter. I found the most data from 2015, while some data from other years was incomplete. This is why I mostly used the 2015 data - to make it possible and simple to compare the data for both cities. It is indicated if the data is from another year.

As far as the waste generation, collection and sorting in Zagreb (and Croatia) are concerned I used the data from the Croatian National Waste Management Plan (2017), the Waste Management Plan for the City of Zagreb (2017), HAOP (Croatian Agency for the Environment and Nature).

	ZAGREB	CROATIA
Total generated household waste (t) (2015)	**308 473**	**1 653 918**
Generated per capita daily (kg) (2015)	**1,06**	**1,00 (average)**
Generated per capita yearly (kg) (2015)	**386**	**416**
Total collected household waste (t) (2015)	**215 380**	**x**
Total sorted household waste (t) (2015)	**4 883**	**391 074**
Disposed at Prudinec (t) (2015)	**231 000 in total, 215 318 from Zagreb; the rest from the closeby town of Samobor**	**-**
Recycling rate (2018)	**1%**	**18%**

Table 6: Research results for Zagreb and Croatia.

(the author)

Furthermore, when it comes to Sarajevo (and the Federation of Bosnia and Herzegovina), I used the data I obtained from the Waste Management Plan for the Federation of Bosnia and Herzegovina (2012), the Waste Management Plan for the City of Sarajevo (2013) and the Environmental Protection Plan for the Canton of Sarajevo (2017). The results are shown in the table below.

	SARAJEVO	FEDERATION OF BOSNIA AND HERZEGOVINA
Total generated household waste (t) (2015)	**201 684 (average)**	**635 640**
Generated per capita daily (kg) (2015)	**1,23**	**0,87**
Generated per capita yearly (kg) (2015)	**450**	***332 (data from 2010 for Bosnia and Herzegovina)**
Total collected household waste (t) (2015)	**181 842**	**x**
Total sorted household waste (t) (2017)	***1 286 (2017)**	**45 369 (amount for Bosnia and Herzegovina)**
Disposed at Smiljevići (t) (2015)	**192 218**	**-**
Recycling rate (2018)	**x**	**1% (Bosnia and Herzegovina rate)**

Table 7: Research results for Sarajevo and Bosnia and Herzegovina.

(the author)

RQ 4: What are the outcomes for the two capitals created by the patterns of interaction between the attributes and technology, institutions/regimes and agents and their choices?

Both Croatian respondents said the final outcome of the current waste management in Zagreb is not good and both agreed there is a need for action on this matter. One interviewee stated that *''Zagreb has to put the waste management under control and take necessary measures to ensure better implementation and control of the EU laws and regulations. If we do not put our waste management under control, piled up garbage will severely endanger population's health and the environment''.* Another respondent stated that *''more funding is needed on the waste management''* and *''the consequences of the current waste management are as following:*

- *Poor waste management planning,*
- *Waste is not separated at its source,*

- Unclear regulations on who does what exactly,

- Poor institutional and administrative coordination,

- Enforcement capacities are not good enough''.

Interviewees from Bosnia and Herzegovina stated that the outcomes of the current waste management are not positive. Anonymous respondent stated that *''because of the problem with unclear legislations, and due to lack of investments, the current waste management system cannot sustain the amount of waste in the city of Sarajevo''.* Omanović stated that the outcome is as following: *''Smiljevići landfill is becoming too full''*, and *''The perception of the city is that there is too much waste around, although this is not completely true - for now the waste goes to this landfill, but soon the city might be drowning in trash, if appropriate management strategies are not implemented''.* Both respondents pointed out that the consequence of the current situation is an urgent need for selective disposal and collection and resolving the problem with the capacity of the Smiljevići landfill, as well as for more funding of different waste management research projects and documentation.

4.3. Objective 3: What are the most likely future scenarios for these two cities when it comes to waste management?

RQ 1: What are the most likely future scenarios for Zagreb?

As far as the future scenarios are concerned, all three respondents from Croatia agreed that if the city government stays the same, waste management system will not improve in any way. Anonymous source stated that the people in Zagreb *"cannot have the authorities that does not care enough about the waste problem"*. Vučković stated that the incompetent city leadership is the biggest obstacle for a better waste management. Vidaković pointed out that *''future scenarios do not seem worse than the current situation, but only if the city authorities change and a adequate waste management measures start being applied. With new authorities, who would work more on the waste problem and implement more strict rules, the citizens would do much better with waste separation and re-use''.* Besides the city government shift, all sources stated that more education for the citizens on waste and waste separation is needed right now, in order to have a better situation with waste in the future. The anonymous source pointed out that the city will be covered in garbage in the next decade, if proper measurements are not taken now:

''In the next 5-10 years, I see Zagreb drowning in trash. The only way to avoid this is to get a government that cares and knows the issue, provide better education on waste, apply useful marketing strategies, implement fees for those not respecting the rules, make all one-time use materials more expensive and do more research and control on waste in Zagreb''. Also, when asked about their opinion if people would agree to pay bigger fees for waste management, Vučković and Vidaković replied no, because they are already struggling with funding, while the anonymous source said *''yes, if there is a better system, then the people would understand what they are paying for''.*

RQ 2: What are the most likely future scenarios for Sarajevo?

All three interviewees from Bosnia and Herzegovina stated that the current situation can get better only if a new fully functional waste management center is established. Ballian also stated that *''functional recycling centers must be built, and there are already some plans in motion''*. Two respondents claimed that the future of the waste management in this city depends on the rising the awareness among the citizens. Omanović pointed out that there should be a ban on plastic bags in the future. Ballian and Hubanić both stated that in the future people will use more recycling materials, if they become available, which will make the city cleaner. Hubanić said that in the future *''the waste has to be regulated on the state level, and not on the entity level''* and *''different waste management projects have to be financed because that would contribute to more efficient solutions''.* All three respondents agreed that the current negative situation could change in the future, if the negative picture that the public has on waste changes. For the future, Omanović thought people would not agree to pay more for waste services, Hubanić also agreed, while Ballian stated that with proper education on waste, people would agree to pay more for the management. All three interviewees agreed that the future of waste management in this city relies on more research and monitoring. Ballian stated that for the future scenarios to look better than the current situation *''constant monitoring is needed, as well as three months' or 6 months' period reports on the situation with waste, maybe even on a regional level''.* Hubanić pointed out that *''in the future the situation could be better if more experts on waste were hired to deal with waste problems and more money was invested into education on waste and waste centers''.*

RQ 3: Can sustainable waste management be seen as a tool that can change the negative perceptions people in these cities have on waste?

Interviewees from Croatia all agreed that sustainable waste management can serve as a tool for changing people's negative perceptions on waste. All three agreed that waste can be seen as an ''engine for society change''. Vučković stated that *''proper waste management can serve as an engine of change for the society, because everyone would like to have a nice and clean environment''.* Vidaković stated that *''waste management is indeed an engine of change because it provides new jobs for the community and it would show everyone how useful waste can be as a resource''.* Anonymous source pointed out that sustainable waste management *''can and must be seen as the tool that will change people's perceptions on waste''. This person also stated that ''sustainable waste management involves a society that cares about the environment, separates waste, recycles, regularly pays for waste services… This society is using waste as a resource and it is considered to be more developed and more modern than others who do not care about waste in that way''.*

Respondents from Bosnia and Herzegovina also all agreed that sustainable waste management can be seen as a tool that changes people's negative perceptions on waste. Hubanić enthusiastically stated that sustainable waste management *''can definitely be said to power the change in the society because it would improve life standard in the whole country. As a simple example, I can point out that organic waste can be used as an energy resource. If we started doing this, imagine how much would our society's perception on waste change!''.* Omanović stated that sustainable waste management can serve as this tool, but only *''in case of a true activism. Sustainable waste management can be an engine of change if it is not misused and corrupted.''* Furthermore, Ballian pointed out that *''of course sustainable waste management would change people's perceptions on waste. This new effective system would show our society how clean our living space can be, and once when the people would realize that, they would stop with the bad waste use and waste disposal practices''.*

Table 8 sums up my results on Zagreb and Sarajevo, presenting the most important findings in a simple way. It is good to point out that the outcomes are the same for both cities, based on summing up all points from my interviews.

	ZAGREB	SARAJEVO
INTERVIEWEES' KNOWLEDGE ON THE EU WASTE POLICIES, STRATEGIES, GOALS	The main policies, strategies and goals were mentioned.	The main policies, strategies and goals were mentioned.
ATTRIBUTES OF WASTE	Paper and cardboard, plastics, kitchen biowaste.	Paper and cardboard, plastics, glass, kitchen biowaste.
INSTITUTIONS/REGIMES	EU	Federal (in process of accordance with the EU).
WASTE GENERATION, COLLECTION AND SORTING (2015)	Generation (tonnes/year): 308 473. Collection (tonnes/year): 215 380. Sorting (tonnes) 4 883.	Generation (tonnes/year): 201 684 (average). Collection (tonnes/year): 181 842. Sorting (tonnes): 1 286* (2017).
DISPOSED AT LANDFILL (tonnes in 2015)	Prudinec: 231 000 in total (215 318 from Zagreb; the rest from the closeby town of Samobor).	Smiljevići: 192 218.
MAIN OUTCOMES	- a degraded environment, - inappropriate waste disposal as an endangerment to human health, - loss of the potential financial gains, - negative public's perception on waste, - desperate need for establishing selective disposal and collection, as well as the fully operational waste management facilities, - insufficient funding, - waste treated as garbage…	
CONDITIONS FOR POSITIVE FUTURE SCENARIOS	- more competent government, - stricter laws and regulations, - more expensive fees for mishandling of waste, - making one-time use materials more expensive, - more research and control, - education, - efficient marketing.	- establishment of a fully functional landfill, - raising public awareness, - banning plastic bags, - regulation on a state level (not entity), - changing public's negative perceptions, - more monitoring and control.
CAN WASTE SERVE AS A TOOL FOR SOCIETY CHANGE	YES.	YES.

Table 8: Comparison of my most important findings on Zagreb and Sarajevo.

(the author)

To sum up, the responses I got provided data only for some parts of my research. I found most of the data I was missing in my secondary sources. Some information I did not find, like the amount of total sorted household waste in Sarajevo in 2015, and the amount of total collected household waste in Croatia in 2015. Despite that, I have enough data to proceed with the analysis and discussion.

5. ANALYSIS AND DISCUSSION

My analysis and discussion are organized around interpreting the results I got from the objectives and related research questions. To start with, I briefly present my key findings. Overall, my key findings indicate that the waste management situations in both Zagreb and Sarajevo are poor and therefore need to be improved. Furthermore, the results indicate that the interviewees who are government officials seem to know all the main EU policies on waste quite well. Moreover, the data suggests that the outcomes in terms of the current waste management, policies and practice in both cities are not positive. The findings thus confirmed an urgent need for changes in these cities' waste management, policies and practice, so that the possible future situation can be more optimistic. Detailed analysis and discussion are presented below.

5.1. The EU waste authority bodies and waste policies and strategies

5.1.1. The main EU authority bodies concerning waste

According to the results of the interviews from Croatia, all of my interviewees provided brief but accurate information on who is responsible for adapting the current waste policies and legislations at the EU level. I got the same responses from my interviewees that came from the Federation of Bosnia and Herzegovina. As it is stated by the European Commission, the European Council and the European Parliament adopt all relative waste policies and legislation for the EU members, while the European Commission suggests them to the Parliament. The answers I got from all six respondents were very short and to the point. No interviewee offered any further information on the role that these authority bodies have in the EU. I expected brief answers, because I asked this question in a way that a simple statement of the main bodies will do. Although the responses were brief, I got the answers I was looking for. These results are in line with the current EU documents and reports on waste. Also, in relation to my study topic and areas, the results are in accordance with the Croatian National Waste Management Plan (2017) and the Waste Management Plan for the City of Zagreb (2017), as well as with the Waste Management Plan for the Federation of Bosnia and Herzegovina (2012) and the Waste Management Plan for the City of Sarajevo (2013).

5.1.2. Targets of the current EU waste policies and strategies

The results show that respondents from Croatia had knowledge and awareness about all most important EU waste policies and strategies. All responses confirm the European Commission policies and statements I provided in previous chapters - those of the Waste Strategy Communication from 1996, the Waste Framework Directive from 2008, the Circular Economy Strategy from 2014, and the concepts of waste hierarchies. Only one respondent did not concretely point out all of the main goals, but only the recycling targets for municipal waste by 2025, 2030, 2035. The other two respondents gave more detailed answers. This can be interpreted in two ways: this respondent either did not know all of the main goals and targets (or could not remember it at the moment), or this respondent considered these three recycling targets to be the most important ones to point out. In the case of the former, this could mean not all government officials have the same amount of knowledge about the details on EU waste policies and strategies. Anyway, knowing that the one respondent did name the main policies and strategies, I would say these results suggest Croatian government officials know all the main EU policies and strategies on waste, with relatively good basic knowledge about concrete goals and targets for waste. Again, these results are in line with my assumptions from the problem statement chapter.

The results from my interviewees from the Federation of Bosnia and Herzegovina were somewhat different. Neither mentioned the Waste Strategy Communication, which, again, could mean that they simply did not find it worthy of mention, or they did not know about it (or did not remember it at the moment). The results indicated that the importance of the Waste Framework Directive from 2008 and the Circular Economy Strategy from 2014, as well as the waste hierarchy concept, and their concrete goals and targets. The results showed that one of the respondents knew other Directives and Regulation too. Overall, the results from these interviewees also fit my mentioned assumptions that the government officials should have basic knowledge on the relevant EU policies and strategies on waste.

5.1.3. Current EU waste management policies for Croatia and Bosnia and Herzegovina

When it comes to the interviewees from Croatia, it is interesting that the first thing all three respondents mentioned was that the EU policies and strategies on waste generally had improved the waste management in Croatia. This finding is in line with various reports and studies that

advocate the efficiency of the EU waste management framework: Mazzanti and Zoboli (2009), Mazzanti and Montini (2009), Fischer (2011), various European Commission reports, etc. Furthermore, the results also indicate that it took Croatia a long time to adjust its policies with the EU policies. This is in accordance with the data I presented in the justification chapter - Croatia joined the EU in 2013, but it took until 2019 until the Commission finally concluded that all Croatia's laws, regulations and policies are now completely adjusted to the EU standards. Moreover, all three respondents knew most of the general goals that were set for Croatia by the European Commission. Two of the three knew them all.

The respondents from Bosnia and Herzegovina agree with the European Commission reports and many media (like the BBC) on the progress of Bosnia and Herzegovina on its way to finalize the negotiations about becoming an EU candidate. In accordance with the European Commission and the Council of Europe claims, the results also show all three interviewees agree on the fact that the EU membership will not come soon for this country. Also, since I have citizenship from both Croatia and Bosnia and Herzegovina, from my own perspective I can claim that these results are fully in line with the public's opinion on Bosnia and Herzegovina (from both Croatian public and Bosnian public). In my opinion, and as evidenced in the Commission reports, some of the main reasons for these views is that Bosnia and Herzegovina has one of the most complicated government structures in the world, with frequent and abrupt government shifts and insufficient funding (in every field). Interestingly, not one respondent addressed the actual and concrete waste management policies/strategies I asked about. To me it seemed that this was not due to their lack of knowledge, but because they rather wanted to point out this current progress on the Bosnia's path to the EU. In addition to the above results, one had the need to point out that there are more detailed instructions needed when it comes to applying EU regulations and plans, and this claim is supported again by various reports and the public opinion. Also, the results from the other two respondents confirm existing reports and studies conducted by the public opinion, and different organizations and groups, like the World Bank, the UN and, again, the European Commission, on slow but essential change Bosnia and Herzegovina is going through since it turned towards joining the EU.

Finally, the comparison indicates that both the Croatian and Bosnian-Herzegovinian government officials have most of the important knowledge on the main authority bodies of the EU, EU obligations and targets and the main EU waste policies and strategies. Furthermore, the interviews results alone should not be generalized. This is mostly due to the small number of interviewees I got the results from. Even though my results confirm existing research as mentioned above, only three respondents from a certain country cannot be representative of a bigger and more accurate picture. Although, it is my opinion that these results can be generalized after all the secondary data is taken into consideration. Also, in my opinion, these results fit with a general thought on the education certain people must have if they do certain jobs. It is only logical and expected that educated people who hold certain government positions in an EU member country, or a potential candidate country, know about the main authority bodies that adopt waste management policies and legislation at the EU level, and about the EU waste goals, policies and strategies. In addition, the comparison shows that Croatia has different policies and regulation on waste, since it is an EU member, than Bosnia and Herzegovina, which is still in the process of adjusting its laws with the EU ones.

5.2. Waste attributes, utilization technology, institutions/regimes and agents, amounts and outcomes

5.2.1. Attributes of waste and the technology available for its utilization in Zagreb and Sarajevo

Both the anonymous respondents involved from Croatia agreed I could state they belong to a public company that handles the waste in Zagreb. The result from their interviews defines the types of household waste that are the resource within the framework for analysing resource-use problems. Their responses to my question about the waste attributes are in line both with the claims of the Waste Management Plan for the City of Zagreb (2018) and with Ribić et al. (2016), as well as with the Environmental Protection Agency reports from 2014/2015. This shows that the existing research on the most common types of household waste in the city of Zagreb has corresponding data. This result indicates that this specific data on the waste management in this area can be relied on. When it comes to the technologies, the results do not entirely fit with the data from the Waste Management Plan for the City of Zagreb (2017). This is due to these

respondents mentioning only two composting sites (Prudinec and Jankomir), while the Plan states there are three (Prudinec, Jankomir and Markuševec), and that Jankomir serves (only) as a compost packaging site. Furthermore, results that refer to the available technologies do not correspond with the technologies stated in the Plan. Only one source named both technologies, related to the landfill gas treatment and wastewater treatment. Since the other respondent named only landfill gas treatment, I reckon these results indicate a clear need on adjusting the current plan with the data on the actual situation. Also, one of the two respondents mentioned CE-ZA-R Recycling centre, which is recycling different metal waste, and it does not seem relevant for the category of household waste I am looking at. The results show that Zagreb does not have enough technologies for waste treatment. The results indicate the both interviewees agreed in saying that Zagreb desperately needs more recycling sites and more technologies for waste treatment. That could help tackle the current problems with waste. Both respondents also stated that the city has an approved plan to establish Waste Management Centre, and this finding is backed up by the same claim in the Plan. It would significantly change the situation with waste in Zagreb, because new modern technologies would be available for the treatment of waste.

The results from the Bosnian-Herzegovinian interviewees suggest that the main types of household waste that I will use to show the attributes of the resource within the framework for analysing resource-use problems are: paper and cardboard, plastics, glass and the biodegradable waste from kitchens and gardens. The collected data implies there are four main types of household waste collected in Sarajevo, and it corresponds to the data from the Waste Management Plan of the Sarajevo Canton (2015). Therefore, this data shows a high level of reliability. Further results indicate there is no sorting or recycling at all in this city. These results are again confirmed by the Plan and if there is no recycling, this means that there are no recycling technologies in Sarajevo. The collected data suggests Sarajevo does not have a fully operational landfill, or any type of fully operational waste treatment site that has technologies needed for treating waste. Moreover, these results show correlation with the claims of the Plan, the media and the public in Bosnia and Herzegovina - one non-fully functional landfill that has no technologies for waste treatment, cannot deal with all the city waste. Backing up this existing evidence, my results show that the landfill Smiljevići has to either be renewed, modernized and expanded, or a new fully operational centre must be built. However, my data concludes that the

landfill Smiljevići currently cannot serve as a Regional Waste Management Centre. In my opinion, the results I got fit with all the assumptions that the current waste management system in Sarajevo is in a devastating condition. Also, from my results I can state that stricter measures and regulative on waste management are desperately needed, I would say as much as the operational waste management center and treatment technologies.

The comparison shows there are three main types of collected household waste in Zagreb (paper and cardboard, plastics and bio-waste from kitchens), while there are three main ones in Sarajevo (paper and cardboard, plastics and bio-waste from kitchens). Furthermore, this comparison shows that Zagreb has three composting sites, while Sarajevo has none. Also, the technologies available in Zagreb are landfill gas treatment and wastewater treatment, while there are none available in Sarajevo. This tells us Zagreb has better conditions for waste management.

5.2.2. Institutions/regimes and agents affecting the waste management in Zagreb and Sarajevo

Results from interviewing both anonymous Croatian respondents do not fully support the theories I presented in the previous chapters of this study. Since Croatia is a member of the EU, the main policies, institutions and regimes currently affecting waste management in Zagreb are those of the EU. However, the Plan states that the state Parliament and the Ministry of Environmental Protection, Physical Planning and Construction, both play important institutional roles. According to the results, I can state that there is a need for better application of all of the EU laws, regulations and norms. This means that there are problems with the performance of all necessary policies and strategies on waste. The results suggest that it is not sufficient to simply adjust the state regulations with those of the EU, without their adequate utilization in reality. These results fit with the assumptions that Croatia cannot have an efficient waste management system, until it starts properly applying all the obligatory measures from the EU legislative. Furthermore, according to the rest of the data gathered from these respondents, only one agent is recognized as the key actor - Zagreb City Holding Ltd, Subsidiary Čistoća. However, this is not completely fit with the Plan, because the Plan states that there are four more agents involved in waste management in Zagreb (Subsidiary Zrinjevac, Subsidiary Zagrebačke ceste, Subsidiary ZGOS and ZCGO). It is not clear from the results why only Čistoća was mentioned. It is possible

that my respondents consider that Subsidiary the main one in the city or that their role is not as crucial as the one of Subsidiary Čistoća.

Results from the interviewees from Bosnia and Herzegovina once again pointed out that the country is at the beginning of a very slow process of adjustment to the all EU regulative on waste. However, the results are not in accordance with the Plan that says that the Canton of Sarajevo is one of the institutions/regimes affecting the current waste management. The data shows that the main problem is the lack of detailed measures, policies and strategies on waste. This means that until there is a clear perspective on how the management should be, there will be no efficient waste management in the Federation of Bosnia and Herzegovina. Additionally, here comes into focus already mentioned problem with the Smiljevići landfill. Without efficient waste management, the landfill will become full in the next couple of decades, and there will not be any other adequate site for waste disposal in the city of Sarajevo. Furthermore, the gathered data points out two main agents that handle waste in the city of Sarajevo (KJKP Rad and KJKP Park). However, this is not in line with the data from the Plan, which states the only agent in the city area is KJKP Rad. This shows a serious inconsistency in the official data on waste in Sarajevo. Clearly there is a need for more research and monitoring of the waste management situation in this city. Again, it is visible from this data that we cannot fully rely on it. Also, the data shows that these agents' choices are dictated by the city politics, referring to the often government shifts that preventing development and progress of agents' proper waste management implementation. This means that with every new government regime, new officials propose new ways of dealing with waste, but by the time these ways are implemented, a different government comes to power, and everything starts all over again. It is like a never ending process which results in harming the environment. Unfortunately, the ultimate price is paid by the citizens, whose health is endangered.

When we compare the institutions/regimes and agents currently affecting the waste management in the two capitals, we can see that there is a need for more adequate application of the waste laws and regulatives in both capitals. Croatia and Zagreb have to implement all of the EU measures in a more efficient way, while the Federation of Bosnia and Herzegovina and Sarajevo first need to fully adjust all of the laws and regulations on waste with those of the EU's (in case

of becoming a member country), and then find ways to actually implement all of them efficiently. When it comes to the agents handling the waste in these capitals, Zagreb has five while Sarajevo has two. Both of the comparisons again show that Zagreb should have better conditions for implementing an efficient waste management. We will see if this is real in the following chapters.

5.2.3. Waste generation, collection and sorting in Zagreb and Sarajevo

The results gathered from Zagreb ware in line with the stated daily amounts of household waste presented in the Plan (according to the Plan there is 1,23kg of household waste generated daily per inhabitant in Zagreb in 2015). Furthermore, the obtained data on the yearly total household waste collection in Zagreb is not completely in line with the same data presented in the Plan, but it is close enough (the Plan states that the total amount is slightly over 300 000 tonnes). The results indicate that the sorting rates are at devastating 1%, which shows the seriousness of the waste management problem in this city.

When it comes to Sarajevo, gathered data stated on the total yearly amount on generated household waste is significantly different from the official data presented in the Plan, but not highly significantly - Plan states the yearly amount is approximately 180 000 tonnes. Furthermore, the results implied that the collected amount of the household waste on a yearly basis is around 150 000 tonnes. This data is significantly different that the official data on collected yearly amount of household waste, presented in the Plan (around 327 000). Furthermore, the data on sorting amounts was not obtained. Also, I include in the table the population size for the both capitals from 2015 (Eurostat), so that the outcomes are easier to compare.

Comparison	SARAJEVO	ZAGREB
Population (2015)	350 000	799 000
Total generated household waste (t) (2015)	201 684 (average)	308 473
Generated per capita daily (kg) (2015)	1,23	1,06
Generated per capita yearly (kg) (2015)	450	386
Total collected household waste (t) (2015)	181 842 (around 85-90%)	215 380 (around 70%)
Total sorted household waste (t)	*1 286 (2017)	4 883 (2015)
Disposed at landfill (2015)	192 218 (around 95%)	231 000 in total (215 318 from Zagreb; around 70%; the rest from the nearby town of Samobor)
Recycling rate (2018)	x	1%

Table 9: Comparison of the waste data for Zagreb and Sarajevo. (authors' research and multiple publications)

The results from both cities must be analysed from the population size angle. The results indicate that, although Zagreb has almost twice as many inhabitants as Sarajevo, it does not produce almost twice as much waste. Also, the 799 000 people in Zagreb yearly generate 308 473 tonnes, while the 350 000 people in Sarajevo generate 201 684 tonnes yearly. This tells us that people in Sarajevo generate more waste than people in Zagreb. This is also evident from the amount of waste generated per capita on a daily basis and per capita on a yearly basis – an average citizen of Sarajevo generates more waste than an average citizen of Zagreb. Furthermore, when it comes to the collection of household waste in these cities, the results show that the collected amount is smaller in Zagreb – 70% of the generated waste is collected in Zagreb, while 85-90% is collected in Sarajevo. This would imply that Sarajevo has a better collection system, but this cannot be taken for granted (because Sarajevo has fewer inhabitants, and it also covers a smaller area). In addition, we can see that Zagreb sorts a lot more than Sarajevo (especially because we can

assume sorted amounts were even lower in Sarajevo in 2015). When it comes to landfilling, Sarajevo landfills about 20-25% more waste than Zagreb. This means that Sarajevo is currently doing the best it can, considering that landfilling is the only option there (there is no recycling). Also, when it comes to landfilling, Zagreb landfills about 70% of its household waste. If we look at the recycling rates, it recycles only 1%.

All of this data indicates that Zagreb, despite better conditions (clear waste policies, the EU funds, and some waste treatment technologies available…), does not have a more efficient waste management than Sarajevo. To say the least, it manages waste almost at the same efficiency rates as Sarajevo. This is a surprising result, since one would expect that Zagreb, as an EU country capital, would manage waste more adequately than Sarajevo, a non-EU country capital (and as the capital of a country that is considered to be much less politically and economically developed than Croatia).

5.2.4. Outcomes for Zagreb and Sarajevo

As it has been stated through this chapter, the results indicate that both Zagreb and Sarajevo should improve their waste management. This suggests some significant changes are needed, so that the negative future outcomes can be avoided. The obtained results build on all of the previously mentioned evidence on current state of the household waste management in Zagreb. According to my results, the potential that household waste has as a secondary raw material is barely used. The data indicates that the outcomes of the current waste management in both capitals are:

- A degraded environment,
- Inappropriate waste disposal as an endangerment to human health,
- Loss of the potential financial gains,
- Negative public's perception on waste,
- Desperate need for establishing selective disposal and collection, as well as the fully operational waste management centres,
- Waste treated as garbage.

Finally, the results analysed for both capitals are presented in the framework for analysing resource-use problems at the very end of this chapter.

5.3. Possible future scenarios

5.3.1. Future scenarios for Zagreb

This part of the study provides some general opinions of the academics/NGO's (public society). Possible future projections are of vital importance for an adequate use of any resource, in this case - waste.

The results suggest that for the improvement of the waste management, the city government's appreciation and application of waste policies needs to shift. The findings indicate that for the more adequate waste management in the future, new authorities that are more competent and willing to impose stricter laws on waste are needed. These changes have to happen in order to avoid having the capital city that drowns in garbage. Implementation of more expensive fees for mishandling waste, putting a higher price on one-time use materials and more research and control on waste management in Zagreb seem like proper actions to avoid negative future situations. Additionally, a combination of different elements, like education and marketing strategies, are needed too. In the line with my findings, it is unknown if people would agree to pay bigger fees in the future for a more efficient waste management. This is either due to low incomes or the generally bad perception and awareness on waste.

5.3.2. Future scenarios for Sarajevo

Results from Bosnian-Herzegovinian respondents suggested that future waste scenarios for Sarajevo are negative if the current situation continues. Firstly, a fully functional waste management centre has to be established. Secondly, public awareness on the potentials that waste has needs to rise. In addition, the ban on the use of plastic bags would serve as a great way forward. Furthermore, my results suggest that solutions that are more efficient would come from changes in the levels of regulation and the increase in the amounts of money invested in waste management projects. Additionally, changing the negative perceptions that the public has on waste would inspire more positive future scenarios, as well as more constant monitoring and control on the state of waste. My results show the respondents not agreeing on answering the

question on willingness of people to pay more for waste services, so it is inconclusive if people would pay more for waste services.

5.3.3. Sustainable waste management as a tool for society change

My results indicate that sustainable waste management can serve as a certain engine for starting society change in these two capitals. This indicates that people are able to recognize the value waste has and the ways its potentials can be used. My findings are in line with Irvine (2019, p1), who stated: "Solid waste is often seen as an environmental problem to be solved through change of behaviour and recycling". Moreover, Moore (2012, p1) claimed: "Understanding when, how and why waste matters provide a fruitful lens for examining cotemporary socio-spatial processes". People have to stop looking at waste as a non-useful material that should be thrown away. Only when everybody perceives the capacity for its utilization, waste will trigger crucial changes across societies. My findings state all the positive changes waste could bring as a resource. Furthermore, sustainable waste management is crucially important for all cities and states' future scenarios, because it has the possibility of creating a balance between the nature and humans. In reference to the concept of the Circular Economy, this would mean that nature resources would be less exploited for human needs. Our environment would be cleaner and it would be more beneficial for human health.

5.4. Waste problems in Zagreb and Sarajevo analysed through the Framework for analysing resource-use problems

The only data missing to present in the framework is the part on the patterns of interaction and patterns relate to political economy. Most of the problems that my respondents mentioned, related to current waste system management in Zagreb and in Sarajevo, concern political economy. Since none of my interviewees pointed out this concept, here I will use secondary data to explain how it fits into the framework. Irvine (2019, p2) stated that the political economy can: ''…substantially sharpen our analysis of the politics of waste, the uneven distribution of benefits and burdens, the already ongoing conflicts over the valorization of waste as a resource, as well as wasteful, feckless, residual". Although there are various definitions of political economy, most of them commonly point out that it integrates ecological and social sciences with political economy and topics such as environmental conflict, degradation, conservation and control, etc., and it is

clear that the concept of political ecology is drawn from different academic disciplines like geography, political science, sociology, development studies and others.

Therefore, we can relate to the political ecology concept in explaining that the state of a particular resource is affected by different political and social relations. According to Vatn (2005, p283), if ‘’resources are (unintendedly) depleted, the problem is foremost that the regime does not fit well to the characteristics of the resource involved and/or the values of the society involved’’. This indicates that the cause for the current problems with waste management in the capitals of Croatia and the Federation of Bosnia and Herzegovina can be found in the interactions between the following:

1. Institutions/regimes that affect the waste in these countries/cities (current policies, laws and regulations),
2. Agents and the choices they make concerning waste in these countries/cities (those responsible for providing different waste services – collection, transport…),
3. Technology (refers to the technology that is available for utilizing waste),
4. Attributes of waste (waste characteristics, types of waste, how much is generated/collected/separated…),
5. Patterns of interaction (how interactions between the above elements affect the outcome and state of the waste).

The interaction between the mentioned elements leads to a specific outcome and state of the waste in Zagreb and Sarajevo. Their standards, communication and coordination form the political economy that shapes the final situation and state of the waste management. If one of the elements is not acceptable in quality or quantity, there is a serious chance that the situation with waste will not be optimal – as it is the case in both Zagreb and Sarajevo. For example, if the waste policies are not clear enough (which is the case in Sarajevo) – waste management could be inefficient. Or, if there are no available technologies, and if the technologies available are not sufficient for adequate waste treatment (cases in Sarajevo and Zagreb), there is no chance that the waste can be used as a resource. This is why the framework for analysing resource-use problems is extremely useful in exploring problems with waste – it helps to identify which elements have to be improved to optimize the waste management.

The framework, as defined in the Theory chapter, uses all necessary elements to show how all of them are connected and how their interactions lead to certain outcomes. The cases for Zagreb and Sarajevo are presented in the framework below. The framework shows that the quality and coordination of the elements and their interaction result in the negative situation and many problems with waste management both in Zagreb and Sarajevo.

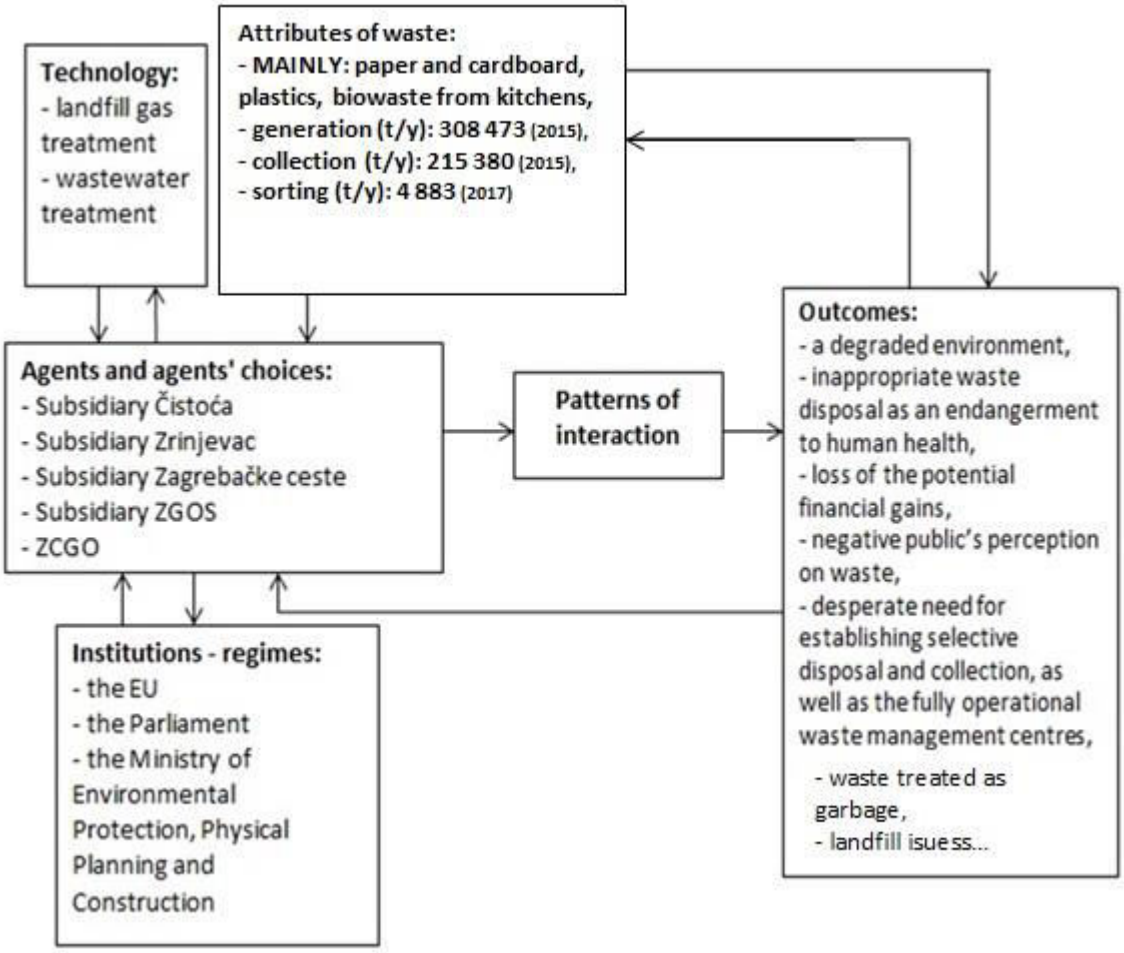


Figure 10: Zagreb - Framework for analysing waste-use problems.
(based on Vatn, Institutions and the Environment, 2005)

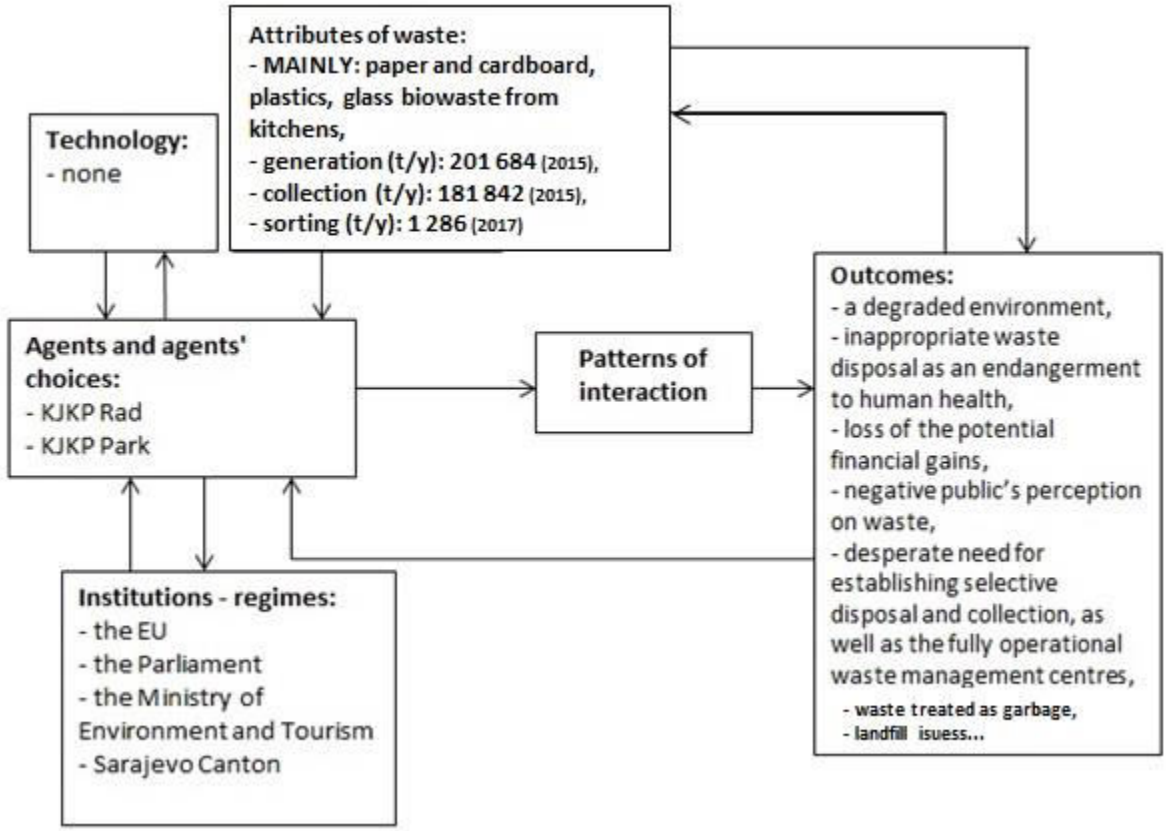


Figure 11: Sarajevo - Framework for analysing waste-use problems.
(based on Vatn, Institutions and the Environment, 2005)

6. TIMELINE AND BUDGET

As far as the timeline for conducting my research and writing this thesis is concerned, the process began in March 2019. After me and my mentor decided on the topic, I started gathering relevant literature and writing the proposal. The proposal was submitted in August 2019. I have spent some of August, and then September and October writing the first three chapters and conducting my interviews. Despite previous planning to have all the interviews done by the beginning of November, that was delayed because I had to wait for some of my interviewees to make time for me in their busy schedules. I finished with all my interviews at the end of November and spent all the time I had left writing the Results and the Analysis. After my mentor had provided relevant comments and after I have revised the thesis, I finally submitted on December the 15th.

When it comes to the budget used to conduct this study, it consisted of my own money and I did not get any funding. I travelled to Croatia and Bosnia and Herzegovina at the end of August, which included the plane ticket cost (2 500NOK). Other costs of that trip are not significant (because I have stayed at home). That trip helped my research a lot in the way that I have managed to collect some documents I was missing and I have sorted out who could be my informants.

7. CONCLUSION

Waste disposal is a significant global issue. It has serious impacts on the environment and human health. Waste volumes are increasing as the global population and living standards rise. Besides its impact on the environment and human health, waste is also a significant secondary raw material. If properly managed (recycled and reused) we will have to use less other resources and energy to create new materials and products. Therefore, adequate waste management should be one of the priorities of every country and society.

This study aimed to compare the current waste management situation in the city of Zagreb (Croatia), and the city of Sarajevo (Bosnia and Herzegovina). The overall aim was to see if Zagreb, as an EU country capital, manages waste efficiently than Sarajevo, the capital of Bosnia and Herzegovina, and a non-EU country that is less politically and economically developed than its neighbour Croatia. The research results were obtained through interviews and secondary sources.

The results indicate that Zagreb clearly has better conditions for waste management – clear EU waste policies and regulatives, access to the EU funds, waste management Plans and Strategies in accordance to all of the EU waste plans and (at least) some technologies for waste treatments. However, despite the strict EU regulatives, Zagreb does not properly manage its waste. Recycling practically does not exist, and since only around 70% of the generated household waste gets collected and ends up at the landfill, we can only conclude that the rest ends up at the illegal dump sites. On the other hand, when it comes to Sarajevo, we can say it is in a similar situation with poor waste management in general. However, perhaps due to the fewer inhabitants and a smaller area, Sarajevo is not doing significantly worse than Zagreb. Although it generates more waste than Zagreb per capita on a yearly and daily basis, almost 90% of all the generated household waste gets collected and landfilled. Although landfilling is not a modern and desirable option for waste management, it is the only way for Sarajevo to deal with waste, at least for now. In these circumstances, we can conclude Sarajevo is actually performing good. This leads us to the most striking result of this research.

The most striking result that this research provided is that the quality and the level of waste treatment are about the same in these two capitals, despite the fact that Croatia has introduced the EU directives and policies. How can Sarajevo be almost at the same level as Zagreb? This is explained by the fact that the theory and practice sometimes can mean two different things. This is one of those cases. In theory, as the EU dictates, Croatia and Zagreb should recycle 50% of its municipal waste by 2020, and 55% until 2030. In order to make this EU goal happen, adequate institutions and regimes, technologies, waste agents and their interaction and coordination should have been on a much higher level by now. Since Zagreb, as the largest and most developed Croatian city, recycled only 1% of its municipal waste in 2015 (and that rate is about the same today) it is obvious that Croatia will not reach the EU 2020 goal. According to the European Court of Justice, it will have to start paying penalties to the European Union for the waste mismanagement.

Furthermore, various essential changes need to happen in both capitals in order to secure positive future waste scenarios. For instance, Zagreb needs to get a more aware and capable city government and Sarajevo needs to establish a fully operational waste management center. Also, waste management can serve as a tool of societal change. Changing the negative perception people in both cities have on waste is one of prerequisites for a more adequate waste management. Such waste management leads to a cleaner environment and a modern society that recognizes the gains that waste and its proper management can bring.

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Statistics Agency of Bosnia and Herzegovina: http://www.bhas.ba/

European Commission: https://ec.europa.eu/

News Channel of the EEB: https://meta.eeb.org/?s=waste+definitions

City of Zagreb: https://zagreb.hr/

City of Sarajevo: https://vlada.ks.gov.ba/

Cantonal Public Utility Company ‘’Rad’’: http://www.rad.com.ba/

Subsidiary Čistoća: https://www.cistoca.hr/

Appendix – List of informants

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Anamarija Matak
Aleksandra Čilić
Nevenko Herceg
Niko Marušić
Mersad Omanović
Ivan Vučković
Iva Vidaković
Lejla Hubanić
Dalibor Ballian
Anonymous
Anonymous
Anonymous