2010 Municipal Recycling Rates

EU average 39%

Reported 0%

Others:

Sweden 49%	Estonia 20%
Luxembourg 47%	Cyprus 20%
Denmark 42%	Portugal 19%
Norway 42%	Greece 18%
United Kingdom 39%	Czech Republic 16%
Ireland 36%	Malta 13%
Italy 36%	Latvia 9%
France 35%	Slovakia 9%
Spain 33%	Lithuania 5%
Finland 33%	Croatia 4%
Slovenia 31%	Romania 1%
Iceland 23%	Turkey 1%
Hungary 21%	
Poland 21%	

Recycling of municipal waste stated in percentage of the generated amount (European Environment Agency 2013)

Effects of Target-Based Municipal Waste Management Policy in the EU: Assessment of Reporting Practices in Bulgaria

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Abstract:

At present, variety in practices concerning the reporting of municipal waste recycling rates is a given for European Union Member States. Arguably, however, this phenomenon is potent enough to have a negative effect on the overall robustness of target-based recycling and reuse policy in the EU. Therefore, research is necessary to inform national and EU policy makers how to improve present reporting rules and procedures.

This paper provides a case study of Bulgarian reporting practices in an effort to reveal the substantive effects of target-based EU policy related to municipal waste recycling. Further, the study explores why these effects are taking place and how the negative effects can be overcome. Finally, an effort is made to extend the scope of case study findings to other Member States with the help of 'analytic generalisation'.

Preface

This study has been conducted as a Dissertation project for the degree "Master of Science in Environmental Management and Sustainability Science" (EMSS), at Aalborg University in the period between 1st February 2017 and 2nd June 2017. The project supervisor is Henrik Riisgaard.

Abbreviations are listed in the glossary. References with "pc" preceding the institution (pc…2017) refer to "personal communication" and data obtained through interviews. The identity of interviewees is not disclosed due to ethical considerations; however, it is available for peer review purposes.

First and foremost, I would like to extend a word of gratitude to the outstanding professionals who agreed to have a word with me on this topic. I could not thank you enough for your warm welcome in the world of European resource management.

Second, I would like to thank those who made this effort worthwhile – my father, Alex and my friends. Your support is the backbone of anything I do.

Finally, I would like to express my heartfelt appreciation for my supervisor's guiding support; which has practically extended over the past two years.

Table of Contents

List of figures

Abbreviations

CA – Competent Authority

CAS – Civic Amenity Centre

DG ENV – Directorate-General for Environment (European Commission)

EU – European Union

EPR – Extended Producer Responsibility

ExEA – Executive Environment Agency of Bulgaria

LoW – List of Waste

NSI – National Statistical Institute of Bulgaria

MBT – Mechanical-Biological Treatment

MS – Member States

MSW – Municipal Solid Waste

MoEW – Ministry of Environment and Water of Bulgaria

SF MUN – Sofia Municipality

WFD – Waste Framework Directive

WMA – Waste Management Act of Bulgaria

1. Introduction

This chapter introduces the topic and main features of the study.

Without a doubt, waste and resource management policy is one of the European Union (EU)'s flagship initiatives. The essence of this policy is the reduction of waste disposal and the shift to waste prevention, reuse, recycling and recovery. The ultimate goal is to close the loop of product lifecycles and thus establish a 'Circular economy' which is practically not dependent on the extraction of raw materials.

As conceived by the EU, shifting the economy from a linear to a circular model of operation requires taking specific, measurable, attainable, realistic and time-bound steps in that direction. Therefore, SMART targets invariably play an important role in tracking the progress towards established Circular economy objectives. In this regard, the Waste Framework Directive (WFD) (European Parliament and Council 2008) determines that all Member States (MS) are obligated to recycle or reuse at least 50% of their municipal waste by 2020[1]. Unproblematic as it may seem at first glance, reporting national recycling rates is an elaborate process regulated by complicated EU and national rules and procedures. Notably, the process usually involves thousands of stakeholders contributing data and only a limited number of highly specialized professionals processing it. Expert driven as it is, this process arguably obscures the mechanics of recycling rate calculation not only to the general public but also to a number of waste management experts. Thus, driven by the conviction that peer review is central to ensuring better resource management practices, this Dissertation affords a glimpse into the 'black box' of recycling rate reporting for municipal waste.

In line with Aalborg University's code of practice, the research behind this paper has unfolded as a problem-oriented process of realization rather than a form of structured knowledge acquisition (Kirchner et al. 2005). Notably, the process of problem realization comprised two key elements:

The first part was based on a lack of knowledge in relation to the author's research interests. To be specific, the author had expected that 'more ambitious' resource efficiency targets set out by EU Directives directly led to improved outcomes in all MS. However, a preliminary investigation into this matter served to reveal the limitations of this understanding (Mihaylov 2017). It has to be noted that the research conducted in relation to understanding the process of calculating recycling rates for Sofia Municipality served to elucidate the problem which is to be dealt with in the following Dissertation. In essence, the issue is that there seem to be numerous reporting inconsistencies,

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[1] To ensure simplicity the 50% recycling/preparation for reuse target in the Waste Framework Directive is referred to as the '50% recycling target'.

especially with regards to municipal solid waste (MSW) recycling rates calculation, affecting the overall robustness of target-based recycling and reuse policy in the EU (SOENECS 2015; Hogg et al. 2014). Therefore, further research efforts need to be devoted to improving the knowledge base and providing the necessary background in order to investigate the problem in greater depth.

This study presents the second part of the process of realization which involves going through the steps required to investigate and potentially 'solve' the problem (Kirchner et al. 2005). The study's key purpose is to conduct an in-depth case study investigation of recycling rate reporting issues in a single MS in order to reveal the substantive effects of target-based EU policy related to MSW recycling. Crucially, this approach also contributes to understanding 'how' and 'why' various MS authorities might be incentivised to report in a manner which only nominally meets EU requirements. Ultimately, the perspective gained from the examination of those practical issues aims to contribute towards expanding the knowledge base necessary to reform current EU and national policy in this area.

Thus, following the latter aspect of the process of problem realization, a case study of Bulgaria is conducted. Case choice is based on Flyvbjerg's (2006, p 229) extreme (atypical) case choice rationale, i.e. extreme cases often "reveal more information because they activate more actors and more basic mechanisms in the situation studied". Fundamentally, the selected case study – Bulgaria – is 'atypical' in the sense that in 2010 the country reported a MSW recycling rate of 0% (European Environment Agency 2013). This is practically unparalleled in the EU, yet potentially indicative of major recycling rate reporting inconsistencies in this MS. Therefore, an in-depth examination of reporting problems faced by various Bulgarian authorities is seen having the potential to illuminate a number of causal relationships manifested in other MS. In view of that, the following research statement and sub-questions are addressed:

Utilizing extreme case study choice rationale to explore the effects of current EU policy regarding the setting of a broad definition of municipal waste, a binding 50% recycling rate target and a range of optional methods for its calculation in Bulgaria.

- What are those effects?
- Why are they taking place?
- How can the negative effects be overcome?

8

Initially, the the choice of research methodology will be presented and substantiated. After that, an overview of waste reporting regulations, procedures and practices under the auspices of the EU will be provided. Next, Bulgarian reporting regulations will be explored and evidence collected from interviewed officials will be considered. Subsequently, the scientific validity of research findings will be ensured and answers to the research questions will be provided. Finally, the main findings will be summarized and the meta-purpose of the case study will be discussed.

2. Methodology

The following chapter seeks to present and substantiate the choice of research methodology

2.1 Introduction

Over the past fifty years, case study research has grown in reputation as an effective methodology allowing the exploration and understanding of complex issues in real world settings (Zainal 2007). Indeed, a great portion of what is known about the empirical world has been produced by case study research, while many of the most treasured classics in each discipline are, again, case studies (Flyvbjerg 2011, p 302).

Arguably, the rise in academic prominence of case study approaches is due to the substantial development they have undergone. Broadly speaking, progress in this field of enquiry has come as a result of both historical transformations in approaches to research as well as individual researcher's preferences, perspectives and interpretations of design (Harrison et al. 2017). As a result of the diverse disciplinary and philosophical background of those researchers, various designs for conducting case study research are now in place. That is why the variation in definition, application, validity and purposefulness could create a confusing platform for the use of case study approaches (ibid). In view of that, the literature on case study approaches is examined in order to set up the research apparatus necessary to conduct a robust case study.

Figure 1, originally conceived by Johansson (2003) and adapted for the purposes of this discussion, depicts the historical evolution of theories of science and case study approaches since ca. 1600. Notably, the Figure incorporates certain contextual influences on case study research as well as some of the key contributors to this field of inquiry. As pointed out by Johansson, by early 20th century, Chicago School of Sociology proto case studies made use of research methods derived from the Social Sciences, rather than the Humanities. Yet, irrespective of its scientific credentials, case study research tended to be viewed with a high degree of scepticism(Johansson 2003). That attitude was especially widespread in the ensuing era of logical positivism, approximately spanning from the nineteen forties through to the nineteen sixties. Tables turned with the ascendance of "grounded theory" in the 1960's. Grounded theory research was inductive in nature yet still based on using detailed procedures to analyse data (ibid). That theory helped merge qualitative field study methods from the Chicago School of Sociology with established quantitative methods of data analysis (Johansson 2003, p 7). As a result of this intellectual cross-pollination, a new methodology emerged. Seminal authors such as Robert Yin, Robert Stake and Bent Flyvbjerg have since been able to establish case study research practice as a viable alternative to exclusive Hermeneutic and Positivist

approaches. It is primarily these three renowned authors who inform the remainder of this discussion.
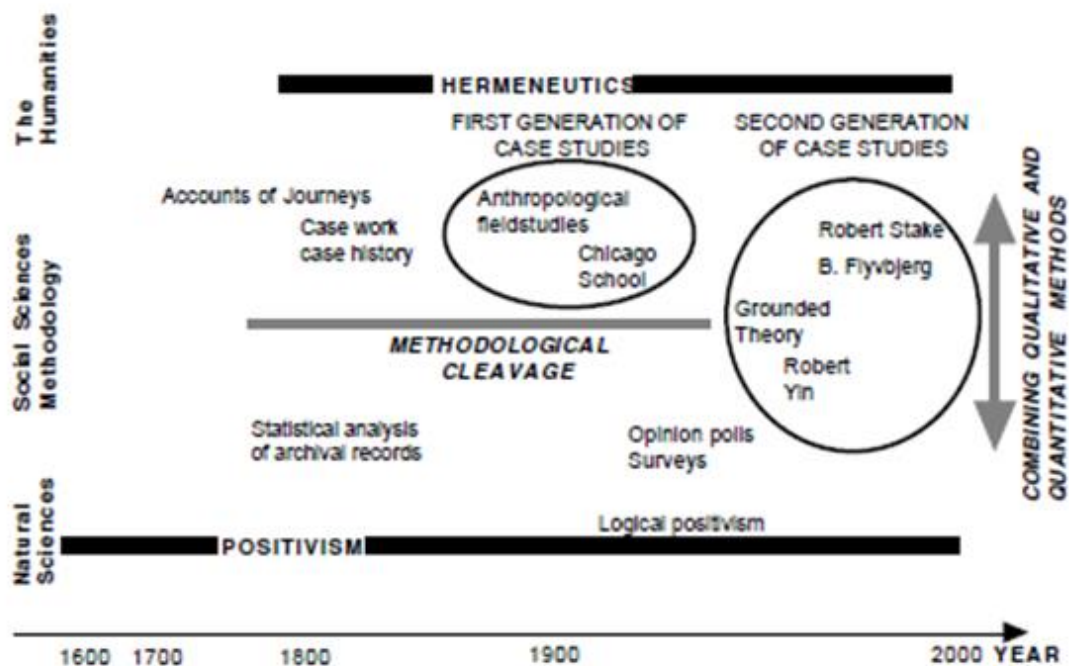

FIGURE 1 Evolution of case study research, adapted from Johansson (2003)

2.2 Definitions

Bent Flyvbjerg (2011) perceptively notes that definitions of case studies abound. That is why he inventively picks the Merriam-Webster Dictionary's definition:

"Case Study. An intensive analysis of an individual unit (as a person or community) stressing developmental factors in relation to environment."

(Flyvbjerg 2011, p 301)

Crucially, Flyvbjerg (2011) argues that first and foremost, a case study is defined by "the choice of the individual unit of study and the setting of its boundaries" (ibid.). In other words, he argues that choosing a case study approach is "not so much about making a choice of methodology, as a choice of what is to be studied" (ibid). The individual unit can be studied in a number of ways, qualitatively or quantitatively, analytically or hermeneutically, however, the feature that really defines a case study is the "demarcation of the unit's boundaries". Second, he argues that case studies are "intensive" – they encompass a degree of detail, richness and completeness, unmatched by any cross-unit analysis. Third, he focuses on the evolution of case study phenomena in time, which helps to account for "developmental factors". Finally, Flyvbjerg stresses that case studies pay particular

attention to context, i.e. "relation to the environment". This is why the drawing of the boundaries for the individual unit of study is seen as critical. It determines what counts as case and what becomes context to the case (ibid).

Echoing Flyvbjeg in some respects, Robert Yin focuses more on the scope, process and methodological characteristics of case study research (Yin 2014). While emphasizing the empirical nature of inquiry, Yin also stresses the importance of context to the process. Thus his seminal definition of case study research methodology:

"...an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used."

(Yin 2014, p 23)

Historically acknowledged for drawing on scientific approaches to strengthen the methodological quality of case study research, Yin proposes a highly structured research process (Johansson 2003). In his understanding, the research proposes is guided by formal propositions which are ultimately tested over the course of research (Yin 2014).

Robert Stake (1995), on the other hand, adopts a more flexible approach. While still being concerned with rigour in the research process, Stake keeps his focus on what is being studied (the case), rather than how it is studied (the method) (Harrison et al. 2017). In the opinion of Stake,

"… case study is defined by interest in individual cases, not by the methods of inquiry used."

(Stake 2003, p 134)

Thus Stake (1995, 2003) arguably stresses an important feature of case study research: how to choose what type of case to be studied.

2.3 Case study choice and typology

As expected, various authors categorize case studies in different ways. Yin (2014) distinguishes three types of case study – exploratory, descriptive and explanatory. First, exploratory studies are meant to provide some initial conclusions and provide a framework for further research, e.g. pilot projects (ibid). Second, descriptive case studies seek to describe data as it occurs. For example, longitudinal studies, used in psychology, to study developmental trends across the human life span can be categorized as descriptive (ibid). Unlike the first two categories which only seek to provide hypotheses, Yin's (2014) third category involves a close examination of the data in an attempt to

identify causal relationships. The so called explanatory case study, normally seeks to develop and validate a theory with the help of a thorough set of analytical steps (ibid).

Stake (1995) also considers case studies in three groups – intrinsic, instrumental and collective. First, intrinsic studies involve exploration of a particular case because the case itself is of interest (ibid). Importantly, there is no expectation that research results will have any implications for other case studies. Second, instrumental studies normally aim to provide insight into a particular problem (ibid). This type of study explicitly seeks to generalise or to develop and test a theory on the basis of a predetermined question or criteria. In this instance, understanding the complexities of the case is only secondary to understanding causal relationships inherent to other cases. Third, collective or multiple-case studies are adopted when a number of instrumental case studies are combined to draw comparisons related to a particular problem (ibid).

On that note, Flyvbjerg (2006, 2011) argues that when generalizability is required, it can be increased by the strategic selection of cases. In his view, a representative case or a random sample may not be the most suitable strategy when the objective is to achieve the greatest possible amount of information on a given problem (ibid). This is due to the fact the typical cases are may not be as rich in information. Atypical or extreme cases, on the other hand, often reveal more information primarily because they tend to activate more actors and more basic mechanisms in the situation studied. In addition, Flyvbjerg argues that it is often more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and the frequency of their occurrence (ibid).

Stake (2003) offers a similar set of case selection criteria. However, in his view, typicality and representativeness could be unachievable with respect to the single case. For Stake, the determining selection criteria should be the 'opportunity to learn' (ibid). In essence, that means identifying a case where there is good access and a willingness to participate. In that manner, the researcher could potentially maximise the learning opportunities available.

2.4 Means of Analysis

Using a single case study to make generalisations invariably raises questions about the validity of conclusions. Indeed, this is a common critique normally levelled by adherents of large N statistical approaches. They point out that choosing to study one or few cases often poses the issue of having more rival explanations to assess than cases to observe, otherwise known as "the quandary of many variables, small N" (Lijphart 1971). In essence, the logic of statistical approaches stipulates that when the number of explanatory factors is similar to the number of cases, the capacity to establish which

explanation is correct becomes limited. Thus, generalisation of causal inferences is a major issue dividing small-N and large-N research approaches. Fundamentally, the former utilize "analytic generalisation" (Yin 2014) to offer theoretically substantiated propositions beyond the level of any particular case, whereas the latter seek to use "statistical generalisation" to establish universally valid claims. Yin (2011) defines analytic generalization as a two-step process:

"The first involves a conceptual claim whereby investigators show how their study's findings are likely to inform a particular set of concepts, theoretical constructs, or hypothesized sequence of events. The second involves applying the same theory to implicate other similar situations where similar concepts might be relevant."

(Yin 2011, p 100)

In addition to proposing a highly theoretical blueprint for making analytic generalisations, Yin (2014) proposes four practical tests to ensure scientific validity. First, "construct validity" involves defining the concepts to be used in the case study and relating them to the objectives of the study. Second, "internal validity" is seeking to establish a causal relationship among various conditions, as distinguished from spurious relationships. Third, "external validity" has to do with defining the extent to which case study findings can be analytically generalised to places and events which were not part of the original case study. Fourth, "reliability" is about demonstrating that the case study operations can be repeated with the same result.

2.5 Case study critiques and related considerations

Case studies are also often accused of lack of rigour. Yin (2014, p 21) remarks that "too many times the case study investigator has been sloppy, and has allowed equivocal evidence or biased views to influence the direction of the findings and conclusions". In response to this observation, Stake (1995) identifies triangulation as an effective quality assurance tactic. Triangulation can help ensure that case study research is based on a disciplined approach and not simply a matter of intuition, good intention and common sense (ibid). Essentially, triangulation involves using multiple data points to establish and verify meaning. In this way the researcher actively seeks different perspectives on the case study topic to cross-check interpretation and to acknowledge alternative meanings. For example, triangulation could involve employing both primary and secondary data collection methods to view the same question. Also, collecting primary data from sources which are not directly associated with the case study could be an effective means to verify meaning (ibid).

Another critique levelled at case study research has to do with the practical difficulties of conducting numerous types of research activities and managing the resulting data effectively (Zainal 2007).

14

Essentially, the key peril lies in failing to collect and document relevant information systemically. Developing a 'case study protocol' is one of the tactics, suggested by Yin (2014), to ensure systemic quality in the conduct of research. A case study protocol is practically an overview of the whole research process as far it presents the instrument of analysis used, the adopted rules and procedures as well as the nature of presentation of final results. The provision of a clear research programme through a case study protocol thus ensures that the case study remains focussed (ibid). The protocol could take the form of a research road map, e.g.: determining and defining the research questions; selecting the cases and determining data gathering and analysis techniques; preparing to collect the data; collecting data in the field; evaluating and analyzing the data; preparing the report.

Finally, Stake (2003) pays attention to an aspect of case study research which should not be neglected - ethical considerations. In short, the key ethical consideration in case study research is to protect the confidentiality as well as anonymity of interviewees if they so desire. In Stake's view, case study researchers are in a privileged position insofar as they are "guests in the private spaces of the world. Their manners should be good and their code of ethics strict." (Stake 2003, p 154) He further stresses the importance of going beyond standard ethics requirements and exercising caution so as to minimise the risk of exposing research participants. That involves maintaining an active dialogue with them, providing feedback, and listening carefully for any signs of concern (ibid).

3. Case study context – reporting rules in the EU

This chapter provides an overview of waste reporting regulations, procedures and practices under the auspices of the EU.

3.1 Contextual evidence

3.1.1 Municipal waste definition and reporting methods

European resource efficiency policy is based on a number of legal, e.g. Waste Framework Directive (European Parliament and Council 2008), and strategic, e.g. Roadmap on a Resource Efficient Europe (European Commission 2011), documents establishing waste management targets and other objectives for the years to 2020. Beyond that, a wide-ranging legislative initiative known as the 'Circular Economy Package' is seeking to bring tangible improvement in EU's resource efficiency by 2030 (European Commission 2015). Notably, one of the key objectives of the CEP is to improve definitions and harmonize calculation methods for recycling rates throughout the EU (pc DG ENV 2017). Unsurprisingly, this drive is due to the fact that there are numerous issues associated with poor definitions and ambiguities which allow for a variety of interpretations by MS (Hogg et al. 2014, p. v). For example, the most comprehensive definition of 'Municipal waste' in EU legislation is:

"'Municipal waste' means waste from households, as well as other waste which, because of its nature or composition, is similar to waste from households."

Landfill Directive 1999/31/EC

In addition, it is crucial to indicate that under Commission Decision 2011/753/EU, MS are free to choose among four methods to calculate their recycling rates. Arguably, these methods are worth elaborating in some length, as they "imply quite substantial differences in the levels of effort required to meet the 50% recycling /preparation for reuse target" (Hogg et al. 2014, p. 47). To start with, Method 1 involves "the preparation for reuse and the recycling of paper, metal, plastic and glass household waste in %". Due to the fact that this method takes into account only the most widely collected recyclable materials, comprising ca. 50% of the total municipal waste stream (Hogg et al. 2014, p 45), it appears to be the least challenging for MS. Method 2 adopts an expanded definition by adding "other single waste streams from households or similar waste stream". That could include, for example, kitchen and garden waste or wastes covered by Extended Producer Responsibility (EPR) Schemes. Out of those waste streams, kitchen and garden waste are estimated

to cover ca. 30% of the total municipal waste (Hogg et al. 2014, p 47), thus taking the total amount of waste reported for recycling to well over 80%. In other words, using Method 2 essentially requires a whole range of additional waste to be managed with recycling in mind. Method 3 considers "total household waste amounts excluding certain waste categories". This time, due to varying definitions of household waste among MS it is unclear whether selecting Method 3 leads to an increase or decrease of municipal waste streams reported for recycling purposes. Finally, Method 4 has simply been designed to account for the entirety of generated municipal waste and its recycling. Even though, 'municipal waste' is interpreted in a number of ways in various MS, the term is generally agreed to refer to non-production and non-construction waste generated by households and companies functioning on the territory of a municipality (pc NSI 2017).

Ostensibly, the reasoning behind Commission Decision 2011/753/EU was to allow MS the reporting flexibility necessary to avoid additional administration and other compliance costs (pc DG ENV 2017). However, as it has been recognized by at least two authoritative studies (Hogg et al. 2014; SOENECS 2015) lack of harmonized definitions and calculation methods has had a negative effect on the capacity to compare recycling rates among MS. To be more specific, having examined nine municipalities in various MS, SOENECS (2015) emphasise the calculated difference in outcomes, depending on the selected method. All in all, SOENECS conclude that the validity of reported recycling rates is 'undermined' (2015, p. 3). Further, Hogg et al. (2014) infer that:

"In short, the four calculation methods imply quite substantial differences in the levels of effort required to meet the [municipal recycling rate] target. The different methods effectively invite countries to choose a method which may allow them to meet the target with minimum effort [...]. The four methods [...] have effectively diminished any transformative potential of the recycling rate specified under the Directive"

Hogg et al. (2014, p 47)

Without a doubt, Hogg et al. (2014) and SOENECS (2015) clearly expose the surface effects of 'disharmonised' waste definitions and reporting practices among MS. Arguably, however, they fail to provide an in-depth analysis of the causes and contributing factors which lead to these effects. The remainder of this paper is thus devoted to exploring the factors affecting the ethical calculation of recycling rates.

17

3.1.2 Point of reporting recycled quantities and institutional reporting procedures

Hogg et al. (2014) note that there are various stages at which losses can occur in the processing of materials, ranging from the point at which they are collected to the point at which they are actually recycled. Explanatory factors include, for example, the rejection of non-target materials, or the mis-sorting of materials into the wrong waste stream. Therefore it is crucial to establish the point at which MS report the quantity of recycled municipal waste. As things stand, that point varies widely across MS and waste streams (ibid), however, typical approaches include:

- Material collected for recycling;
- Input to sorting plants;
- Output from sorting plants;
- Materials received at recycling plants.

In this regard, it also has to be noted that Commission Decision 2011/753/EU sought to harmonize reporting practice by introducing the requirement that:

"The weight of the waste prepared for reuse, recycled or materially recovered shall be determined by calculating the input waste used in the preparation for reuse or the final recycling or other final material recovery processes. A preparatory operation prior to the submission of the waste to a recovery or disposal operation is not a final recycling or other final material recovery operation. Where waste is collected separately or the output of a sorting plant is sent to recycling or other material recovery processes without significant losses, that waste may be considered the weight of the waste which is prepared for reuse, recycled or has undergone other material recovery."

Article 2, Par. 2, Commission Decision 2011/753/EU

In other words, Commission Decision 2011/753/EU stipulates that only materials received at recycling plants shall be directly reported as recycled. Conspicuously, the output of sorting plants is also an admissible reporting point so long as there are no 'significant losses'. Needless to say, this legal definition leaves a lot to be desired. To be specific, potentially any losses could be justified as 'insignificant'.

18

In addition to considering the point of reporting recycled quantities, understanding the nature and operation of EU and national reporting procedures is critical, insofar as it lays the foundation for an exploration of the underlying causes affecting recycling rate calculation. As confirmed with DG ENV, it is the responsibility of the Competent Authority (CA) in each MS (e.g. the National Statistical Institute in Bulgaria) to report to EUROSTAT. Subsequently, EUROSTAT has to verify the data and publish it. It is important to note that there are two separate and parallel processes of MSW recycling rate reporting to EUROSTAT (pc DG ENV 2017).

The first procedure involves reporting under the Waste Framework Directive. Member States report their progress with regards to meeting the targets set out in Article 11(2) of the WFD, following the rules and calculation methods established by Commission Decision 2011/753/EU. To this end EUROSTAT uses a standard reporting and transmission tool for the collection of data from the Member States called EDAMIS. Reporting under the WFD is conducted every 3 years and it is obligatory for all MS (pc DG ENV 2017).

The second procedure, on the other hand, is not obligatory for MS. It involves the annual reporting of municipal waste statistics under the OECD/Eurostat Joint Questionnaire. Therefore, since guidelines for reporting under the Joint Questionnaire correspond to Method 4 of Commission Decision 2011/753/EU, MS could limit their administrative burden by using the same method for both procedures. It is also important to note that municipal waste reporting under the Joint Questionnaire is a gentleman's agreement, i.e. it is neither verified nor actively monitored (pc DG ENV 2017).

3.2 Case study evidence

A Policy Officer in the Waste Management Unit of DG Environment was interviewed with the aim of confirming and expanding the evidence generated through desktop research. For triangulation purposes, the interview questions replicated those asked to Bulgarian representatives.

3.2.1 Effects of adopting recycling rate target and their causes

In the opinion of the Officer, the 50% recycling target has served its fundamental purpose well – it has influenced MS to shift municipal waste away from landfill and focus a lot more on recycling (pc DG ENV 2017). This goal has primarily been achieved through the provision of regulatory certainty; encouraging both Government and private investments in modern waste management enterprises. In this manner EU legislation and structural funds have helped introduce the necessary physical and business infrastructure to establish a viable market for waste management enterprises (pc DG ENV 2017).

19

On the downside, the Officer reckons that the calculation rules, set out in Commission Decision 2011/753/EU, do not provide for "a level playing field" (pc DG ENV 2017). In other words, the flexibility inherent in the calculation methodology effectively renders reported rates incomparable among various MS. In addition, current calculation rules are not considered to provide enough of a focus on the recycling of biodegradable waste. This is a key problem as it affects a significant proportion of the municipal waste stream (pc DG ENV 2017).

Notably, the lack of agreement among various EU law-making bodies is seen an important factor contributing to the adoption of flexible definitions and calculation rules (pc DG ENV 2017). To be specific, the 2020 MSW recycling rate target and the methods to calculate its acquisition are the result of a carefully crafted compromise between the European Parliament and the Council. Imperfect as that compromise might be, the 2020 target has achieved its primary purpose – to increase recycling rates among all EU states (pc DG ENV 2017).

3.2.2 Reporting inconsistencies and options for improvement

The officer has observed that the scope of wastes included in the definition of 'generated municipal waste' varies considerably among MS. This could potentially have a significant effect on the recycling rate achieved as wastes which are not readily recycled (e.g. biodegradable waste) are excluded from the definition. For instance, Denmark and Belgium – two countries of comparable standards of living – report 740kg and 430kg of generated municipal waste per capita respectively. Essentially, the more inclusive the definition of generated municipal waste is, the more comprehensive the calculated recycling rate can be (pc DG ENV 2017). Another important problem has to do with the measurement point used to report waste quantities as recycled. For example, in some MS, there are instances of reporting waste quantities as recycled upon the input of Mechanical-Biological Treatment (MBT) plants. Instead, a more suitable point to report these quantities should be either the output of sorting plants or the input to recycling plants (pc DG ENV 2017). Also, imposing recycling rate targets on MS, without devoting significant resources to ensuring reporting compliance involves certain moral hazards. In other words, MS could thus be motivated to overstate recycling rates (pc DG ENV 2017).

Regarding the most fitting point to report recycled quantities, both the output of sorting plants and the input to recycling plants are deemed suitable options, depending on the waste stream and waste management practice (pc DG ENV 2017). Significantly, that also applies to the reporting of source

separated municipal waste, as the percentage of clean recyclables collected by respective municipal systems varies considerably (ibid).

In the officer's opinion, the most convenient and administratively efficient way to improve municipal waste recycling reporting would be to introduce average loss rates for various waste streams and treatment technologies. In that manner, waste could be measured at the input of sorting facilities and any potential losses would be estimated via dedicated calculation mechanisms. A more sophisticated means to estimate loss rates in MBT plants, for example, would be to calculate the adjusted input to output depending on the waste morphology. For instance, higher MBT losses would be expected if input waste was predominantly composed of biodegradable waste. Finally, ensuring the traceability of waste is also a suitable means to improve the reporting process. That would help to avoid malpractices such as double-counting (pc DG ENV 2017).

That being said, the Officer views the adoption of necessary EU legislation as a step of critical importance (pc DG ENV 2017). Specifically, the scope of municipal waste as well as the procedures to measure, calculate and report it need to be better defined by the EU. In that vein, it is worth noting that CEP envisages only one method for future calculation. The definition for municipal waste is also elaborated in a more comprehensive manner. In addition, national electronic systems for waste data collection could be put in place. They would allow for better traceability and verification of data. Finally, third party verification could also be an option, in case inconsistent reporting is a regular feature. Naturally, the costs involved in hiring private auditing companies need to kept in mind at all times (pc DG ENV 2017).

To sum up, the target and the methods to calculate its acquisition are seen as having served their purpose, i.e. they have boosted recycling while allowing MS a significant degree of reporting flexibility. However, that flexible approach has generally led to a lack of recycling performance comparability among MS (pc DG ENV 2017).

4. Case study – reporting practices in Bulgaria

This chapter explores Bulgarian reporting regulations and presents the evidence collected from interviewed officials.

4.1 Contextual evidence

4.1.1 Municipal waste definition and selected reporting method

As referred to previously, the definition of 'municipal waste' varies among MS, in order to better reflect diverse waste management practices (European Environment Agency 2013). In this regard, the Bulgarian Waste Management Act[2] (WMA) reiterates the definition provided by Commission Decision 2011/753/EU: "municipal waste means household waste and similar waste". Without a doubt, this definition is found wanting in terms of making clear which waste streams shall be accounted for in recycling rate calculations. That being said, Article 31, Par. 1 of WMA stipulates that:

"By 1st January 2020, the preparation for reuse and recycling of waste materials, including paper, metal, plastic, glass household waste and similar waste shall be no less than 50% of their total weight"

Waste Management Act (last revised 07.02.2017)

Thus WMA clearly echoes Method 2 of Commission Decision 2011/753/EU, while delegating detailed calculation rules to a separate legal document – the Ordinance on Separate Collection and Treatment of Biodegradable Waste (last revised 25.01.2017)[3]. According to Article 13 of the Ordinance, it is up to the Executive Director of Executive Environmental Agency (ExEA) to issue an Order determining the applicable Method. Historically speaking, this 'executive' approach has had a notable effect on the determination of the calculation rate method. To be specific, Method 2 was adopted in 2014, as stipulated in the version of the Ordinance applicable at the time. However, at that time, neither the Government, nor most of the 265 Municipalities in the country realized that a morphological analysis had been necessary in order to apply calculation Methods 1, 2 or 3. Upon realization, the incumbent

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[2] Waste Management Act, last accessed from http://www.lex.bg/bg/laws/ldoc/2135802037 on 27.05.2017
[3] For the sake of simplicity the Ordinance on Separate Collection and Treatment of Biodegradable Waste shall be referred to as 'the Ordinance' (last accessed from http://www.lex.bg/bg/laws/ldoc/2137012090 on 28.05.2017)

Minister of Environment and Water simply issued an Executive Order (РД-884)[4] determining Method 4 as the legally binding calculation method. It is worth noting that as far as the author is aware the Order is still in force. However, the current calculation method for reporting municipal recycling rates under WFD in Bulgaria is reportedly Method 3 (pc NSI 2017).

4.1.2 Point of reporting recycled quantities and institutional reporting procedures

4.1.1.1 Point of reporting recycled quantities in Bulgaria

For triangulation purposes, all interviewees in Bulgaria were asked to elaborate at which stage of the waste management process (e.g. output of first sorting operation, output of last sorting operation, input to the final recycler, etc.) quantities are measured and reported as recycled. Interviewees confirmed that all waste streams, apart from biodegradable waste, are reported as recycled at the output of first sorting operation. Biodegradable waste, on the other hand, is reported at the input of treatment plants, due to the naturally occurring loss of weight during biological degradation. It is also worth noting that privately operated Civic Amenity Centres (CAS) report nationally significant amounts of materials sent for recycling (pc ExEA 2017). They also report at the output of their premises (ibid).

Aside from considering the point of reporting recycled quantities, it is also worth examining reporting procedures from the perspective of several institutions. Arguably, that would provide the necessary contextual knowledge for an in-depth understanding of their role in the reporting process.

4.2.1.2 Reporting procedure in the Ministry of Environment and Water

From the perspective of the Ministry of Environment and Water, the reporting procedure is fully described in Article 12 of the Ordinance. According to it, all legal persons carrying out business activities related to municipal waste, including bio-waste, are obligated to keep records and provide annual reports to the ExEA. Annually, by 30th September, the Executive Director of ExEA has to aggregate and publish available data, regarding the meeting of yearly recycling targets for the previous calendar year. Subsequently, by 20th November, the Minister of Environment and Water verifies all reports regarding achieved recycling rates, submitted by ExEA and the municipalities, and issues an Order determining which municipality has met the respective target and which has not (pc SF MUN 2017).

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[4] Ministry of Environment and Waters, National Waste Management Plan, last accessed from http://www5.moew.government.bg/wp-content/uploads/filebase/Waste/NACIONALEN_PLAN/_/NPUO_2014-2020.pdf on 09.01.2017

4.2.1.3 Reporting procedure in Sofia Municipality

All waste management companies contracted by Sofia Municipality are obligated to report the quantities of municipal waste they have collected, transported, treated and recycled. Subsequently, the Municipality presents that data in a report to ExEA. ExEA aggregates and verifies received data and publishes it on its website. On the basis of that data, municipalities prepare an annual report detailing the progress towards meeting the MSW recycling rate target. This report is sent to the Ministry of Environment where a specialised commission in the Ministry verifies all data received. Having rectified any potential reporting inconsistencies, the Ministry issues the Order, mentioned above (pc SF MUN 2017).

4.2.1.4 Reporting procedure in the Executive Environment Agency

The Executive Environment Agency is obligated to collect data from all legal persons certified to execute waste management activities in Bulgaria. Private separate waste collection centres as well as sorting plants – both public and private are seen as key stakeholders in this process. Once those entities report to the Agency, it conducts a three-stage verification procedure including:

1. Ensuring compliance with necessary Registration documents, Treatment certification and List of Waste codes licence;
2. Comparison of current quantities to those reported in previous 2 years. In case of inconsistencies, relevant parties are called. Should doubts persist, the Regional Environmental Inspectorate is alerted;
3. Extensive verification of obligatory annual environmental reports for 500-600 companies, producing waste on a large scale.

After verification and conversion into a specifically requested format the data is forwarded to NSI (pc ExEA 2017).

4.2.1.5 Reporting procedure in the National Statistical Institute

The key role of the National Statistical Institute is to aggregate and compile the information received from ExEA and produce the necessary annual reports on recycled quantities of MSW in Bulgaria. Once every three years NSI reports Bulgarian progress with regards to meeting the targets set out in Article 11(2) of the WFD. As previously referred to, reporting to EUROSTAT is based on specialised a system called EDAMIS. What is more, EUROSTAT also requires NSI to compile quality reports on the collection and aggregation of data. In addition to reporting under the WFD, NSI also reports under the OECD/Eurostat Joint Questionnaire. It is worth mentioning that the Joint Questionnaire practically only allows for reporting under Method 4, whereas reporting under the WFD takes place under Method 3 thus creating additional administrative burden for NSI (pc NSI 2017).

4.2 Case study evidence

4.2.1 Effects of adopting recycling rate target and their causes

For analytical purposes, the effects resulting from target-based EU policy on municipal waste recycling can usefully be split into positive and negative. This section considers each of them from the perspective of the Bulgarian institutions in control of developing, implementing and reporting the results of municipal waste recycling policy in the country. Further, the perceived causes for both kinds of effects are presented. Finally, the perceived overall effect of EU target-based policy in the field of recycling municipal waste is also considered.

4.2.1.1 Positive effects

According to MoEW (2017) and SF MUN (2017) the 50% recycling target has definitely provided a stimulus for municipalities in Bulgaria to shift MSW away from landfill. This is a notable achievement because landfilling had practically been the universal municipal waste management practice before the accession of Bulgaria into the EU. As confirmed by all interviewees, the landfilling of municipal waste has dropped significantly in the past 10 years (ExEA 2017, pc NSI 2017, pc MoEW 2017, SF MUN 2017). The other side of the coin with regards to landfill diversion is the recent development of sophisticated waste treatment and recycling capacity. In addition, municipalities have actively sought to enhance separate collection systems, thus improving overall recycling outcomes (pc ExEA 2017). Last but not least, Bulgarian reporting methodology has changed so as to account for all MSW which has been generated and recycled. Currently, all wastes in categories 15 (packaging) and 20 (MSW) are accounted for. It is according to these categories that MSW is functionally defined in the country (pc NSI 2017).

4.2.1.2 Negative effects

The perceived negative effects of the 50% recycling/reuse target can generally be classified in two categories. The first category has to do with developing suboptimal waste treatment systems and facilities (pc ExEA 2017, pc NSI 2017, pc MoEW 2017). Specific examples of that are readily available, however, interviewees specifically asked not to be quoted on them. The second category concerns perceived reporting difficulties as well as the lack of comparability of recycling rates among MS (ExEA 2017, pc NSI 2017, pc MoEW 2017, SF MUN 2017). For example, NSI (2017) perceives the MSW recycling target as so high as to make it 'physically' impossible for MS to reach it. As a result, certain MS could be incentivised to find alternative ways of meeting it (pc NSI 2017).

25

4.2.1.3 Perceived factors determining positive effects

According to ExEA (2017), EU mandated targets, supported by potential action by the Commission and the European Court of Justice, have served as an effective means to nudge Government authorities into taking timely and tangible measures. Also, funds secured under Operational Programme "Environment", have been absolutely pivotal to developing the necessary waste treatment capacity. Significantly, it is perceived that if no targets had been set by the EU, the Government would probably not have taken action in this area. In that case, landfilling would have remained a preferred waste management option (pc ExEA 2017).

4.2.1.4 Perceived factors determining negative effects

Factors determining negative effects are analogous to the types of negative effects established earlier – suboptimal waste treatment systems as well as reporting difficulties and incomparability of calculated recycling rates among MS.

As previously referred to, EU money provide a powerful incentive for all stakeholders in the waste management sector. Due to the fact that the EU funds sponsor up to 85% of new infrastructure developments, Municipalities are financially incentivized to apply for as much 'co-financing' as they can get. As a result, municipalities often choose to design waste management systems applying the most sophisticated and expensive engineering solutions on the market. Inevitably, deploying those expensive technological systems does not always constitute the most efficient way of meeting the MSW recycling target. That being said, it has to be borne in mind that EU funds are practically the single most reliable source of capital investment for most Bulgarian municipalities. In other words, local administrations tend to perceive securing the maximum available EU financing, rather than efficiently increasing recycling rates, as a sign of successful local government (pc ExEA 2017).

It also needs to be borne in mind that Bulgaria has not yet been able to fully develop the necessary recycling infrastructure. For example, it is only now that some smaller municipalities are applying for EU financing related to waste management. Other municipalities have only recently finished the construction of their facilities. Due to the fact that these facilities take time to become fully operational and meet their technical specifications, a delay of the planned increase in recycling rates is expected. Significantly, it is estimated that the national waste management infrastructure will only be sufficiently developed so as to meet the 50% recycling target by ca. 2024 (pc NSI 2017).

According to NSI (2017) a key reporting difficulty, faced by Bulgarian authorities lies in an apparent lack of administrative capacity to conduct a waste composition analysis for all 265 municipalities in the country. That development results in the fact that wastes which cannot be utilized with current technology and/or business models cannot be established. As a corollary, authorities are forced to

rely on Method 4 irrespective of what they would prefer (pc NSI 2017). In this regard, it has to be noted that Sofia Municipality has developed a detailed waste morphology. Arguably, this is one of the key reasons SF MUN is very much in favour of the reporting flexibility allowed by the four calculation methods, while also recognizing that it doesn't allow for meaningful comparison among MS (pc SF MUN 2017).

4.2.1.5 Perceived overall effect of EU target-based policy in the field of recycling municipal waste

Overall, it is perceived that EU funds combined with concrete recycling rate obligations have served to increase municipal waste recycling rates (pc ExEA 2017). Representatives from NSI (2017) and ExEA (2017) even suggest the EU targets have successfully *forced* the Bulgarian Government to take action in this area. While generally recognizing that target-based approach has mostly achieved its goals, Government authorities still perceive the 50% target as too ambitious for Bulgaria. As previously recognized, this is seen as being due to the delay in developing the municipal waste management infrastructure needed for separate collection and treatment of biodegradable waste (pc MoEW 2017). In this respect, it is worth noting Sofia Municipality's perspective that the only way for all MS to meet the 50% recycling rate target is by applying varying calculation methods and MSW definitions (pc SF MUN 2017).

4.2.2 Reporting inconsistencies and options for improvement

4.2.2.1 Reporting inconsistencies and contributing factors

Overall, the reporting system is perceived to be operating well in Bulgaria (pc NSI 2017). That being said, a number of references to the so-called 'human factor' are made (pc ExEA 2017, pc NSI 2017, pc SF MUN 2017). To elaborate, human beings are notorious for making mistakes – conscious and unconscious ones. In most instances, those mistakes are due to time constraints, unsuitable procedures or even sheer incompetence and lack of responsibility (pc ExEA 2017). However, those professionals who are capable of managing figures well could also be tempted to 'massage' the data they provide or compile (pc ExEA 2017). The same logic applies to organizations - certain waste management companies could be manipulating the data they report (pc SF MUN 2017). Therefore, unless adequate monitoring and verification measures are put in place, bad reporting practice is likely to occur (pc NSI 2017).

ExEA present an amusing case to support their point of view: After many years of reporting consistently low amounts of hazardous waste, a few hospitals in the same region suddenly increase reported amounts. A number of verification calls are made and the high waste arising figures are consistently confirmed by all responsible hospital representatives. Notably, this development

happens to coincide with the set up of a large new incineration plant for hazardous hospital waste in the area. From the point of view of the ExEA, little more can be done to confirm any potential misdemeanours (pc ExEA 2017).

Privately operated Civic Amenity Centres (CAS) are also recognized as 'imperfect' with regards to accurate reporting. For example, they are responsible for inaccurate classification of waste. Specifically, they often receive large quantities of MSW classified under LoW groups 15 and 20 which they can easily reclassify as having been derived from industrial processes. In that manner, the origin of waste is effectively lost (pc MoEW 2017).

On a slightly different note, it has to be mentioned that the practical application of the Waste Framework Directive 2008/98/EU and the Waste Statistics Regulation 2150/2002 in Bulgaria has led to a significant change in the local reporting process. For example, until 2011, the only waste quantities reported as recycled to EUROSTAT were those originating from landfills. Due to the fact that there had been zero treatment facilities established at landfills at the time, the percentage of reported recycled waste was (unsurprisingly) 0%. This explains the European Environmental Agency's claim that Bulgaria recycled 0% of its MSW in 2010 (see Title Page) (pc NSI 2017).

4.2.2.2 Perceived effects of reporting flexibility with respect to selecting a calculation method

According to all interviewees, current reporting rules do not allow for a realistic comparison of recycling rates among various MS. Just the opposite, rules are perceived to be easily twisted in order to "optimize" national reporting procedures and thus achieve better results. Also, allowing each MS to select a reporting method is perceived to lead to results which are impossible to compare (pc NSI 2017). The specific purpose of the common recycling target is thus perceived as defeated (pc MoEW 2017, pc ExEA 2017, pc NSI 2017, pc SF MUN 2017). However, it is worth noting that the attitude towards optional methods of recycling rate calculation is not universally negative. For example, NSI and Sofia Municipality recognize 'flexible reporting' as the only means to meet the 50% recycling target as early as 2020.

ExEA also acknowledges that allowing choice of methodology options in combination with a vague definition of municipal waste provides for great flexibility in reporting practices. However, ExEA notes that those MS choosing to report in accordance with the most stringent rules (e.g. Method 4, reporting at input to recycling plants) are inevitably penalised when their performance is compared to MS selecting more lenient options. This is not seen as fair. In this regard, Bulgaria's current reporting approach is qualified as "more Catholic than the Pope", because the state wants to prove itself as following the best European practice (pc ExEA 2017). That stance is reflected in the MoEW's categorical stance against optional methods due to lack of data comparability. MoEW note that

28

optional calculation methods allow MS to select a reporting approach, which not only reflects local data and waste management practices, but also one which is consciously designed to boost reported recycling rates (pc MoEW 2017).

Notably a common critique levelled at the reporting authorities of MS in Old Europe is present in the narratives of NSI, MoEW and ExEA. It is claimed that certain MS, such as Germany and Denmark, tend to report quantities at the input of MBT plants (pc NSI 2017). It is argued that reporting at the output of MBT plants would reveal the low percentage of recycled waste in those systems and lead to the premature closure of local MBT and WtE plants.

4.2.2.3 Perceived means to overcome reporting inconsistencies

ExEA (2017) argue that from an economic point of view, the cheapest option is to report recycled quantities at the input of treatment facilities. Should this approach be adopted, the effectiveness of all further waste activities can be monitored and improved in time. From an environmental point of view, however, the input to recycling plants would reveal the 'actual' extent of recycling (pc ExEA 2017). Yet, if the reporting is executed professionally, the figures for most Member States are likely to be much lower than the recycling targets which have been set (ibid). MoEW are rather blunt in affirming the latter position. In their view, documented input to final recycler is certainly the most suitable point to report recycled quantities. In that manner, the effectiveness of municipally operated waste management systems is best measured, without taking into account the recycling effectiveness of privately operated plants (pc MoEW 2017). In sum, MoEW assert that EU regulation needs to change so as to incorporate a single calculation method, a clearer definition of municipal waste as well as explicit guidance with regards to reporting points for various recycled material waste streams (ibid).

Based on several years of practical application experience, NSI and ExEA argue that Method 4 should be universally applied in the EU, along with a definition of municipal waste incorporating LoW categories 15 and 20. In addition, target setting should be based on the morphological analyses of each MS, so as to establish the practical feasibility of seemingly admirable goals (pc NSI 2017). MoEW agree insofar as they argue that better monitoring and control of waste generators in Bulgaria would lead to developing a more accurate waste morphology. In their opinion, once a national waste morphology is in place, the denominator in recycling rate calculation will no longer be a "black box". In other words, being aware of the composition of waste would allow for developing a recycling-oriented waste management system, dealing with the prevalent types of waste in a given region. Finally, ExEA (2017) assert that the introduction of electronic scales, purposefully equipped to

establish a direct real-time link to the ExEA, to the input and output of every waste treatment facility is likely to lead to better monitoring outcomes.

5. Analysis

This chapter addresses two issues. First, it seeks to ensure the scientific validity of research findings by considering their construct, internal and external validity as well as their reliability. The second part of this chapter seeks to provide answers to the research questions posed at the outset of this study.

5.1 Ensuring scientific validity

5.1.1 Construct validity

It is a truism that subjectivity reigns in the social sciences and most constructs (concepts) have no real unit of measurement. Therefore, Construct validity has been designed to define the concepts used in a given case study and determine whether the study measured the intended attribute (Yin 2014). This study, in specific, considers construct validity as an intellectual tool assessing the validity of its selected measurement procedure, i.e. the questionnaire, which was used to measure the selected construct, i.e. the 'effect(s)'. In the context of this case study, the concept 'effect(s)' refers to observable phenomena in Bulgaria directly resulting from EU's target-based recycling policies and regulations regarding municipal waste. The concept is informed by relevant desktop research and semi-structured interviews. The interview questions were designed to be relevant and representative of the construct – particular EU policy effects in Bulgaria. In addition, questions also sought to uncover the mechanics of reporting practices resulting from the application of relevant EU policy. The latter goal was operationalized as the ability to establish direct causal relationships between observed phenomena.

5.1.2 Internal validity

Internal validity is seeking to establish a causal relationship among various conditions, as distinguished from spurious relationships (Yin 2014). In essence, internal validity refers to how well an experiment is conducted, especially whether it is able to avoid more than one possible independent cause acting at the same time. Thus, internal validity is mostly relevant in studies, like the present one, which try to establish a causal relationship. What is more, when it comes to studies assessing the effects of public policy programs or interventions, internal validity is perhaps the primary consideration (Yin 2014). Needless to say, a high degree of internal validity is of particular importance to this study. As stipulated in the title, the effects of relevant EU policy in Bulgaria were examined in detail and a number of causal relationships were identified as a result.

To start with, evidence suggests that the 50% recycling target has certainly provided some stimulus for municipalities in Bulgaria to shift municipal waste away from landfill and recycle more. However, a direct causal relationship cannot be established since EU funds and the 'landfill tax' reportedly also had an effect. Second, available data indicates that selecting calculation Method 4 presupposes reporting a much lower recycling rate than any other Method. This is due to the fact that only economically valuable waste such as plastic, paper and metal is collected and treated separately, whereas most other waste is not. A recent case study of Sofia Municipality provides quantitative evidence in support of these causal relationships (Mihaylov 2017). Third, the adoption of calculation Method 4 is the direct result of a lack of waste composition analysis in all municipalities. Fourth, even robust verification practices on behalf of authorities cannot overcome conscious attempts to manipulate data. Finally, verbatim transposition of EU reporting rules leads to absurd outcomes. The infamous 0% recycling rate reported in 2010 is the direct result of reporting recycled quantities derived from... landfills.

5.1.3 External validity

Third, External validity has to do with defining the extent to which case study findings can be analytically generalised to places and events which were not part of the original case study. In this regard, the choice of Bulgaria as case study was based on Flyvbjerg's extreme (atypical) case choice rationale. The principal goal behind this choice was the theoretically justified potential to generalise case study research findings to other MS (Flyvbjerg 2006). However, following Yin (2014) generalisation of causal inferences established in this case study will also be based on meeting external validity and reliability principles.

Regarding external validity, SOENECS' (2015) report is worth examining in some detail. To start with, it confirms the case study finding that the four calculation Methods are not equivalent (ibid). However, SOENECS do not validate the aforementioned causal relationship stating that "Method 4 presupposes reporting a much lower recycling rate than any other Method". Just the opposite, their study of 9 municipalities indicates that Method 4 ranks the highest in terms of achieved recycling rates. No additional relevant studies have been identified in order to validate other causal relationships established in this case study.

5.1.4 Reliability

Fourth, Reliability is about demonstrating that the case study operations can be repeated with the same result. This reinforces the findings and ensures that the wider scientific community accepts the causal inferences which have been established. In view of that, it is important to describe in some detail how the case study was conducted. This will take the form of a brief case study protocol presenting the research process as well as the rules and procedures which have been adopted. To start with, the research statement and questions were developed as a result of a literature review which pointed to Hogg et al. 2014 and SOENECS 2015 as the most applicable related studies. As previously discussed, case study choice was informed not only by Flyvbjerg (2006) but also by Stake (2003) who stresses that case study should be "defined by interest in individual cases" (p 134). Further review of literature helped inform the writing of interview questions. As result, 20 questions were developed. Upon request, these questions are fully available for peer review purposes. Interviewees were contacted via email and through professional contacts. In this respect, it has to be noted that the author is employed by Sofia Municipality which may have caused certain bias in the collection and interpretation of associated data.

Due to the sensitive nature of research, strict ethical procedures were observed with respect to interviews. Significantly, none of the participants was recorded (as was their express wish). Extra care was taken to jot down only comments explicitly defined as "on the record". In addition, the identity of interviewees is concealed for the general reader. Again, it is available for peer review purposes. As expected, most interviews were conducted in Bulgarian. Immediately after the interviews, notes were translated and significantly expanded. The expanded interview notes were subsequently emailed to interviewees for confirmation. The remainder of the process involved an extensive literature review of case study approaches and the writing of this paper.

5.2 Addressing research questions

5.2.1 Effects of target-based policy in Bulgaria and their causes

As confirmed by EUROSTAT[5], Bulgaria has slowly been increasing the recycling rate of municipal waste since the introduction of the 50% recycling target. Landfilling of waste has also been in decline ever since[6]. However, case study participants point to the fact that the 50% recycling target is only partially responsible for this development. Therefore, due to the influence of EU funds and the newly introduced 'landfill tax', a direct causal link between recycling targets and increases in recycling rates cannot be established.

It is intriguing to note, that Bulgaria has practically been forced to report in accordance with Method 4. This is essentially due to a lack of administrative capacity allowing it to conduct a waste composition analysis for all municipalities in the country (as discussed previously, waste composition is the basis of calculation for Methods 1, 2 and 3). As a result, state authorities are bound to refer to Method 4, which is not what they would necessarily prefer. To be specific, the Competent Authority in Bulgaria (CA) notes that applying Method 4 generates a lower recycling rate compared to other Methods (pc NSI 2017). The Bulgarian Environment Agency supports that view and points out that other MS may place themselves in a privileged position by selecting a calculation method which better reflects their recycling strengths (pc ExEA 2017). An independent observer from DG ENV also confirms that claim (pc DG ENV 2017).

Another provocative effect which has probably resulted from the application of target-based waste management in Bulgaria has to do with the setup of robust verification procedures on behalf of authorities. It is uncertain whether EU policy caused this development since both public institutions and private waste management companies had long been suspected of manipulating the data they provide. Yet, as things stand, practically all government institutions involved in the process of waste data collection have developed detailed procedures in order to counteract any conscious or unconscious reporting mistakes. That being said, high costs of direct inspections tend to prohibit the efficient application of some of those procedures (pc ExEA 2017).

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[5] EUROSTAT, Recycling rate of municipal waste:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_rt120&plugin=1 ,
last accessed 31.05.2017
[6] EUROSTAT, Landfill rate of waste excluding major mineral wastes:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_rt110&plugin=1,
last accessed 31.05.2017

Finally, there are indications that the application of EU reporting rules in Bulgaria has led to reporting inconsistent results. Even though direct causal links have not been established through this case study, the recent volatility of Bulgarian municipal recycling rates presents evidence in support of this view[7]. In this regard, it is worth noting that similar inconsistent results are achieved by the majority of Southern and Eastern MS which could arguably validate the problem on an EU scale. On slightly different note, it is worth considering that the European Environment Agency (2013) reported a 0% municipal recycling rate for Bulgaria. Concrete investigation into this matter revealed that this development was simply the result of a misunderstanding between EUROSTAT and Bulgarian authorities (pc NSI 2017).

5.2.2 Overcoming observed negative effects

Practically all interviewees agree that current rules do not allow for realistic comparison of recycling rates among MS. This study identified three key reasons for this development: lack of suitable definitions for household and municipal waste, optional methods for recycling rate calculation which are not equivalent and lack of sufficient clarity with respect to the point at which waste should be reported as recycled. In terms of solutions, DG ENV's (2017) view that adopting improved EU legislation needs to be adopted first and foremost is shared among Bulgarian participants. Specifically, interviewed professionals agree that the scope of municipal waste as well as the procedures to measure, calculate and report it need to be better defined by the EU. In that vein, it is worth noting that the proposed Circular Economy Package envisages taking measures in all of those areas. In addition, introducing national electronic systems for waste data collection and third party verification is also seen as allowing for better traceability and verification of data.

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[7] EUROSTAT, Recycling rate of municipal waste:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_rt120&plugin=1 ,
last accessed 31.05.2017

6. Conclusion

The following chapter summarizes the main findings of the case study.

Fundamentally, this Dissertation sought to examine the effects of target-based municipal waste management policy in the EU through the prism of reporting practices in a single MS - Bulgaria. The study first sought to explore why these effects are taking place and how the negative effects can be overcome.

Evidence suggested that the 50% recycling rate target is only partially responsible for what is a rather modest recent increase in the municipal recycling rate. More notably, it was established that the selection of calculation Methods 1, 2 and 3 is dependent on a certain degree of administrative capacity which is spread evenly around the country. The lack of such capacity in Bulgaria resulted in the selection of Method 4 which was universally recognized as the most difficult way to meet the 50% recycling target. Further, the deployment of robust verification procedures for reported waste quantities was not sufficient to prevent conscious manipulation of data. Also, the effective adaptation of EU reporting rules took a few years' time as well as a reporting blunder or two.

In addition to allowing for nationally relevant observations, collected evidence indicated three key reasons why current EU rules do not allow for realistic comparison of recycling rates among MS: lack of suitable definitions for household and municipal waste, optional methods for recycling rate calculation which are not equivalent and lack of sufficient clarity with respect to the point at which waste should be reported as recycled. The proposed solutions were not original per se, yet their significance lied in the fact that practically all case study participants referred to them in some way. First, it was suggested that the scope of municipal waste as well as the procedures to measure, calculate and report it need to be better defined by the EU. Second, it was suggested that introducing national electronic systems for waste data collection and third party verification would allow for better traceability and verification of data.

Finally, an effort was made to extend the scope of case study findings to other Member States with the help of 'analytic generalisation'. The construct, internal and external validity of the case study as well as its reliability were 'tested'. The results were encouraging – the main problem seemed to lie in the lack of related research. That did not allow for external validation of causal inferences to take place.

7. Perspectives

The following paragraphs explore alternative ways of conducting the research as well as its higher purpose.

Considering available studies examining the quantitative effects of flexible reporting methodologies in the EU (SOENECS 2015; Hogg et al. 2014; Mihaylov 2017), it could have been theorized that target-based EU municipal waste recycling policy promotes unethical albeit legal reporting practices in MS. The case study could have examined this 'formal proposition' (Yin 2014) in-depth. However, due to the fact that the empirical findings do not tend to support the proposition in question, this paper would probably not have been able to identify unethical reporting practices and generalise them to other MS.

From a slightly different perspective, the present case study ultimately sought to transform the complex issue of MS recycling rate reporting practices into something that can be understood by non-specialists. The numerous examples provided in the evidence base chapters arguably allow the reader to question and examine the case study and reach an understanding independent of the researcher. Since the case study is going to be made publically available, readers could readily develop such understanding and enhance their own professional lives.

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