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# **Towards Separate Waste Collection in Bucharest, Romania A Social Acceptability Approach**

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## **Foreword**

Before reading this research I think it is important to point out a few things related to my reasons for writing it.

I decided to make a research on which would be the best scheme of separate waste collection in Bucharest, from the perspective of social acceptability, quite early. At that time (January 2005), the idea seemed a very good one, of incredible urgency and importance for my career, and maybe even for Bucharest.

Later on, especially after being almost forced to write an assignment on pollution prevention, I understood that this is not the right direction. The right direction is that of asking first how can we reduce the total amount of waste produced, and coming next is how we can deal with the waste we have in the most sustainable way possible.

After beginning my research, I realised this once again, when noticing that the Netherlands, although managed to increase significantly the percentage of recycled waste, still did not succeed to stop the increase of the total waste generated, and this is seen as a failure.

In the same time, I think that if we really want to catch up with Western Europe, we should start by avoiding their mistakes and in terms of waste management this is one of them – emphasise on waste recycling and reuse started in the 70s and 80s, while waste reduction became a priority later and now it is so difficult to manage it.

In Romania, we started building ecological landfills, so that disposal can be done in a very secure way, we begin implementing separate waste collection schemes, but nobody considers waste reduction. Waste amounts increase almost according to the GDP increase, this is a well-known fact, and nobody questions it. It is almost like faith, we can not change it!

Considering that I am working in this environment, it is good that I specialised in separate waste collection and recycling.

Considering waste hierarchy, I hope my next research will be on how to promote waste prevention.

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## **Summary**

This research is meant to make waste managers aware of the fact that social acceptability is part of an Integrated and Sustainable Waste Management system and to offer them a method of work when addressing it. Its special focus is on Bucharest city, the capital of Romania, a city of over 2 million inhabitants, beginning now to deal with environmental problems in a sustainable way, but still struggling to do it in a proper manner. The Romanian legislation in the waste management field has been developed mainly in the last 10 years, according to the European Union one, and it imposes new and very demanding responsibilities for local authorities. For Bucharest, this means that a separate waste collection has to be developed and high targets have already been established.

While addressing social acceptability of waste management schemes it has been noticed that if a scheme is developed on the basis of current needs and characteristics of a community and it is also supported and used by that community this leads to certain behaviour, affecting the efficiency of the scheme. Therefore, a scheme should be developed only by taking into account which are the factors that influence waste behaviour and also by considering the characteristics of the targeted population (which is actually one of the influencing factors). Consequently, waste behaviour is a key aspect of social acceptability and in this research social acceptability is looked at only from the behaviour point of view.

Waste behaviour being the central element in influencing recycling, participation, contamination and illegal dumping rates in a waste collection scheme, it has been taken into consideration as the main important aspect to be targeted by waste managers in boosting separate waste collection results. As a result, waste behaviour determinants have been analysed, by developing a new integrative framework and using it within study-cases in the Netherlands (Rotterdam) and in Hungary (Budapest). Further, it was used for the assessment of the current situation in Romania in the waste management field, paying special attention to Bucharest city in this respect.

As a result of literature and practice, waste behaviour determinants can be divided into situational (related to the system characteristics) and personal (related to the residents characteristics). The situational determinants include: facilities, economic instruments, communication and institutional arrangements. Personal factors category includes environmental concern; perceptions, awareness and knowledge; and household socio-economic status and dwelling factors. However, the general conclusion is that there is no such thing as one best solution for organising a waste collection system, and a different mix of instruments and arrangements can lead to a new type of scheme.

From the point of view of social acceptability, the overall recommendation for Bucharest is that the system should offer convenient facilities, easy to use, supported by appropriate economic instruments and promoted by good communication campaigns. Furthermore, considering the size of Bucharest and the complexity of its residential, economical, functional characteristics, along with the diversity in social characteristics, local authorities in Bucharest should consider different solutions for different neighbourhoods with homogenous characteristics.

## **Acknowledgements**

There are a lot of people that I would like to thank to and here you will find just a few of them. However, I want to emphasise that after all this paper is a team work, considering how many persons helped me with data, information, contacts, support, and understanding, and I deeply thank to all of them.

Foremost, I express my gratitude to Marijk Huysman, my supervisor, who believed in me and helped me so much during the entire study and especially during the thesis preparation. I also want to thank to Jacko van Ast, for his support and advice.

With regard to the fieldwork and gathering of data, I must stress that I was totally amazed by the kindness and openness of most of the people that I interviewed, in all three countries that I have been to: the Netherlands, Hungary and Romania. Their names are given in Annex 6, and to them all I owe a great deal of information and understanding of the situation on field and I express my deepest appreciation.

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That's all, I guess. To mum and dad I will thank in Romanian.

Thank you once again,

Cristina



## **Chapter 1 Introduction**

### **1.1 Context and motivation**

Romania is one of the former Eastern European communist countries, which began the transition towards a democratic society and a market economy in 1990. Following the general trend and driven by the wish of the entire people to accelerate transition and become integral part of Europe, Romania started the process of accession into the European Union in February 2000. In the process of integration into the European Union, Romania has to comply with certain requirements, one of them being that of harmonizing the national legislation and standards with the European ones – the *acquis communautaire* (the European Union's body of Law).

Concerning legislation in the environmental sector, Romania opened the negotiation of Chapter 22 – Environmental protection, on 21<sup>st</sup> of March 2002 and closed it in December 2004. Therefore, full transposition of the environmental *acquis communautaire* was accomplished, meaning that Romanian legislation includes the obligatory EU regulations already, which brings it at almost the same level with that of EU member states. In the same time, Romania got a number of derogation periods for the implementation of the most expensive directives, such as the waste or drinking water quality related ones.

In the waste management sector, 16 EU regulations have been transposed in the Romanian legislation, including requirements with regard to packaging waste, landfills, electric and electronic waste, batteries, waste management planning etc. The most difficult task, that of implementing the new regulations, has already started, but progress is very slow.

Bucharest, the capital city, hosts about 15% of the national population (approximately 2 million inhabitants), and the process of waste legislation implementation is even slower, due to its size and to the complexity of its activities, social characteristics, housing characteristics, institutional arrangements etc.

Recently, the Bucharest General City Council has released by-laws with regard to household waste management and the necessity to implement separate household waste collection, and thus, recognises the urgency of this issue and tries to focus municipal efforts to the achievement of this goal. However, at this moment, household separate waste collection does not really exist and the pilot projects developed so far were not very successful. This is the reason for which background studies, on which to base the development of a Bucharest Waste Management Plan, have already started to be developed.

Within this research, the social acceptability approach has been chosen, as this is usually the least considered aspect in the planning and development of waste management systems. Social acceptability is one of the main components of Integrated Sustainable Waste Management schemes, as it refers to the fact that the scheme should be developed based on the current needs and characteristics of a community and, consequently, it should be supported and used by that community. In the same time, for Bucharest, a city with so many environmental and social problems, introducing for the first time a separate waste collection system is a difficult task, and taking into account that social acceptability issues leads to minimising risks and consolidating the premises for success.

The importance of considering population acceptance for new waste collection systems in the planning stage is also acknowledged by the Romanian Ministry of Environment and Waters' Management and stated as such in the National Waste Management Plan (2004). Despite this

fact, no studies have been undertaken so far in order to address this issue. Therefore, the study is one of novelty for Romania.

## **1.2 Problem statement**

As mentioned above, in order to become an EU member state, Romania has to comply with the common EU regulations and standards, including those in the waste management field. According to national, regional and local plans, Bucharest should have a fully working separate household waste management system by 2007 and it should also reach quite ambitious recycling targets by then and continue to have a very good progress in the years to come. This is the reason for which studies have to be done, in order to analyse the best options in terms of environmental efficiency, economic affordability and social acceptability (the three components of sustainable projects).

The current research answers to this need, by using the social acceptability approach, in order to assess which issues should be taken into account when designing an Integrated Sustainable Waste Management scheme, so that it meets the characteristics and the needs of the Bucharest residents and it leads to the desired waste behaviour.

## **1.3 Research objective and questions**

**Research objective:** Identify a set of recommendations for a separate waste collection scheme in Bucharest, from the perspective of social acceptability.

**Research questions:**

1. Which are the factors that influence household waste recycling behaviour?
2. In what way are these factors taken into account in household waste recycling programs/schemes in the Netherlands (with a special analysis of the Rotterdam case) and in Hungary (with a special analysis of the Budapest case)?
3. Which is the current situation in the waste management field in Bucharest?
4. Which are the personal factors that influence current waste behaviour of Bucharest residents and their preferences for future waste arrangements?

## **1.4 Methodology**

The study has been carried out within a period of two and a half months, during 15<sup>th</sup> of June and 12<sup>th</sup> of September 2005, and it was divided into three stages:

- 1<sup>st</sup> stage: literature review, regarding the concepts to base the research upon, research methodology with respect to the chosen theme (social study in Bucharest);
- 2<sup>nd</sup> stage: fieldwork in the Netherlands, Hungary and Romania, in order to get background information, analyse the two working schemes (in Rotterdam and Hungary) with regard to the waste behaviour determinants, get an overview of the situation in Bucharest, current initiatives and plans, and personal characteristics of the population in Bucharest related to waste management;
- 3<sup>rd</sup> stage: analyses of the data and concluding on the results of the study.

The sources used to collect the data are:

- Primary sources (the ones related to the case studies): unstructured and semi-structured interviews with specialists in different positions in various public organisations at

local and national level, representatives of waste management companies, NGO representatives (see Annex 6); and structured interviews with residents in Bucharest;

- Secondary sources (related to the theoretical framework and to the situation in the Netherlands, on which there are a lot of studies and reports): international academic literature, reports and studies released or financed by different national or international organisations (EU, UK Government, Dutch Government etc.), internet sources, presentations.

The structured interviews with residents in Bucharest were undertaken, in Bucharest, in August 2005, and they were targeted at getting information about people's perceptions, awareness, knowledge related to managing solid waste, and preferences for future arrangements with regard to separate waste management. The sample was composed of 30 people, including: 7 local public administration employees, 5 block administrators, 3 NGO representatives, 15 citizens (men and women, rich and poor, different age groups, 3 respondents between 10 and 18 years old). The survey is a qualitative one and it was meant to offer an insight into the personal characteristics of Bucharest residents. It does not claim to be representative for the entire city, but some of its findings are interesting for the scope of this research and they should be further investigated qualitatively (focus-groups could offer more in-depth information) and quantitatively (on a representative sample). Its results are presented in chapter 4.

## **1.5 Reasons for choosing the current approach**

The following line of thought stands at the basis of choosing the applied methodology and approach of this research.

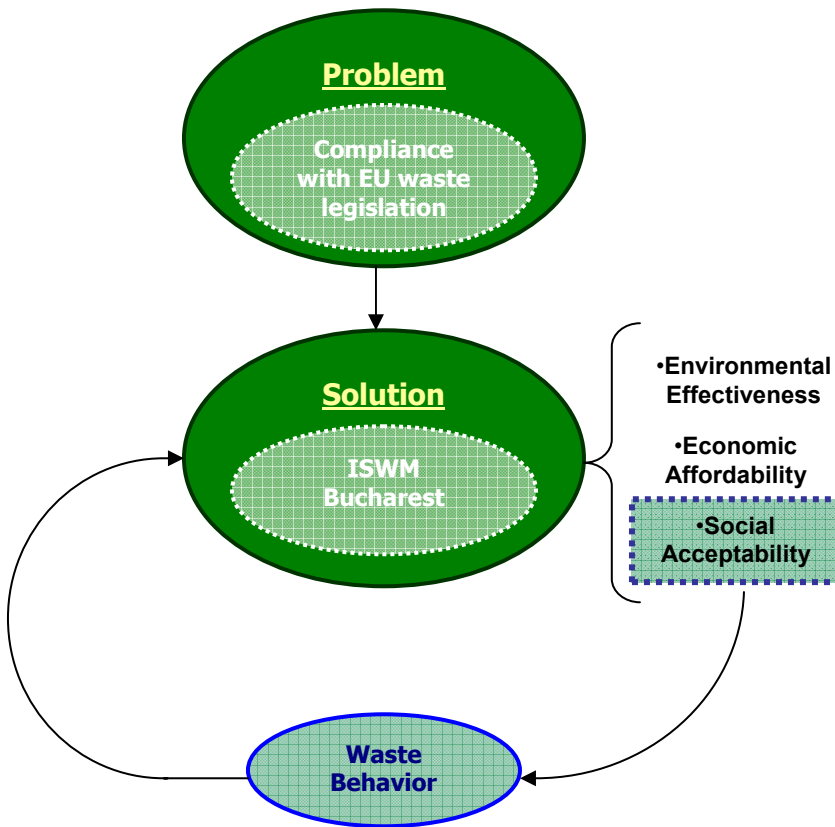
It started from the fact that a separate waste collection scheme heavily relies on the participation of the residents in the scheme. So, how can participation be achieved or increased? First, **participation** is ensured by a high **acceptance** of the public (part of the social acceptability principle), a trust in the system and in the fact that this is the best way to deal with one's daily waste (ensured by communication). These are the findings of studies focused on social acceptability. Second, participation is **behaviour** in itself, and this is the reason for which waste behaviour is connected to social acceptability. Therefore, studies on **waste behaviour** or recycling behaviour have been reviewed. When talking about behaviour, waste behaviour or environmental behaviour in general, the **social marketing** approach jumps in, as it is one of the methods currently used to change behaviours towards more sustainable ones, and it relies on the characteristics of the local community and the desired outcome. Thus, the research is theoretically grounded in social acceptability, waste behaviour and social marketing researches and practices, and this integrative approach is a new one. The links among the research problem, the solution and the conceptual framework is presented in Figure 1.1 below.

Basically, social acceptability of a waste management scheme leads to a certain behaviour, which affects the efficiency of the scheme. In turn, social acceptability relies on the characteristics of the scheme. Therefore, a scheme should be developed only by taking into account which are the factors that influence waste behaviour and also by considering the characteristics of the targeted population, which is actually one of the influencing factors.

Therefore, it was decided to make first a theoretical research of the factors influencing waste behaviour, secondly to try to assess how or whether these factors affect waste recycling strategies in two cities (Rotterdam and Budapest) and, thirdly, to evaluate which are the current waste perceptions, awareness, knowledge and preferences of Bucharest residents. Rotterdam has been chosen as a study case due to the fact that it has a separate waste

collecting scheme working already for a long time and it is one of the four largest cities in the Netherlands, the country where most of the research and study has been performed. Besides Rotterdam, if considered relevant, other information on the situation in the Netherlands has been introduced. The decision with respect to choosing Budapest as a study case was based on the assumption that Budapest is a city with a much similar situation compared to Bucharest and its recent experiences in implementing EU waste legislation could be more applicable to Romania.

**Figure 1.1 Illustration of the research problem, solution and conceptual approach used in this research**



## 1.6 The Waste management policy within the European Union

### a. Waste management policy development

During the last decades, waste generation has become a very serious problem for the European countries, and it continues to be, as waste volumes are persistently growing. Within the European Union, there are regulations released by EU structures, and also national, regional or local regulations. This overview regards strictly the policies and legislation at EU level, but there are countries that have adopted waste management decisions earlier than EU.

The first important step in shifting waste disposal to waste recycling was the European Community's First Environment Action Programme of 1973. Starting with the Second Action Programme, adopted in 1977, recycling, as well as reuse of waste, was also one of the priority actions. In the Community Strategy for Waste Management, published in 1989, the recovery of waste featured as the second strategic priority after the prevention and ahead of the

optimisation of final disposal. One of the ways of waste recovering was to recycle it, which was mentioned separately, alongside re-use, regeneration, recovery of feedstock and energy transformation.

The Fifth Environment Action Programme (1992-2000) set the target of at least 50% recycling/re-use for paper, glass and plastic.

In July 1996, the Communication (of the European Commission) reviewing the strategy asserted that the concept of recovery must be seen in its triple dimension of re-use, recycling and energy recovery, it being understood that only waste that cannot be avoided should be recovered using one of these methods, and that final disposal must be safe and limited to waste that cannot be recovered.

The new millennium brought the need for a change in waste management trends, by shifting towards the top of the waste hierarchy, meaning waste prevention, and for an integrated and sustainable approach, meaning looking at the entire resource using chain from “cradle to grave”. In respect to this, the European Council meeting in Goteborg (June 2001) concluded that “the relationship between economic growth, consumption of natural resources and the generation of waste must change. Strong economic performance must go hand in hand with sustainable use of natural resources and levels of waste...”

This theme is further developed in the Community’s 6<sup>th</sup> Environmental Action Programme (6EAP)<sup>1</sup>, with the overall aim of achieving “better resource efficiency and resource and waste management to bring about more sustainable production and consumption patterns, thereby decoupling the use of resources and the generation of waste from the rate of economic growth and aiming to ensure that the consumption of renewable and non-renewable resources does not exceed the carrying capacity of the environment”. This overall aim will be addressed in the context of the thematic strategy on the sustainable use and management of resources.

The European Commission’s Communication “Towards a Thematic Strategy on the Prevention and Recycling of Waste” (2003) states that the future strategy shall identify the most efficient combination of measures and targets necessary to promote more sustainable waste management. In relation to waste prevention, the objective of this Communication is to launch, for the first time, a consultation process leading up to the development of a comprehensive strategy, including a discussion on waste prevention targets and the instruments needed to achieve them. For waste recycling, this Communication investigates ways to promote recycling where potential exists for additional environmental benefits and analyses options to achieve recycling objectives in the most cost-effective way possible. At this moment, after intensive discussions, the strategy has not been released yet.

## **b. Overview of the European Community (EC) waste legislation**

The EC waste legislation can be divided into three main categories: horizontal legislation, legislation on waste treatment operations and legislation on specific waste streams. Considering that the focal point of this research is on household waste, only the main directives related to the management of this type of waste will be presented, focusing on their provisions that directly affect recycling.

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<sup>1</sup> Decision no 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme, OJ L 242, 10.9.2002, p.1

**Council directive 75/442/EEC of 15 July 1975 on waste<sup>2</sup>** (the "waste framework directive" or WFD) is part of the horizontal legislation, which establishes the overall framework for the management of waste, and it includes the main definitions and principles. It was comprehensively revised in 1991 and again in 1996 to update the lists of disposal and recovery operations. In essence, the WFD requires Member States to give priority to waste prevention and to encourage re-use and recovery of waste. Member States must also ensure that waste is recovered and disposed of without endangering human health and without using processes or methods which could harm the environment. The directive also requires Member States to draw-up waste management plans and to establish a system for the authorisation of waste management installations. The WFD defines waste as "any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard." Annex I of the WFD lists 16 categories of waste.

The second category of the legal framework on waste concerns waste treatment operations, including disposal. **Directive 1999/31/EC of 26 April 1999 on the landfill of waste<sup>3</sup>** ("the landfill directive") sets out a number of administrative requirements, including permit conditions, technical requirements and environmental standards applying to landfills accepting various categories of waste. Moreover, the directive contains a number of targets concerning the reduction of biodegradable waste disposed of in landfills, as it follows: a reduction to 75% by weight of 1995 levels by 2006, a reduction to 50% by weight of 1995 levels by 2009, and a reduction to 35% by weight of 1995 levels by 2016. Member States are obliged to define a strategy to achieve these objectives. The landfill directive also requires all costs relating to the establishment, operation and closure of a landfill are internalised into the price charged by the operator.

Regarding the legislation on specific waste streams, three waste streams produced by households are given special attention by the directives in force: packaging waste, electrical and electronic equipment and batteries.

**The European Parliament and Council directive 94/62/EC of 20 December 1994 on packaging and packaging waste<sup>4</sup>** sets quantitative targets for the recovery and recycling of various packaging materials. These targets are currently being revised, with a view to their substantial increase (European Commission 2003). The Commission initiated this review on the basis of studies of the environmental and economic costs and benefits of recycling, which aimed at identifying optimum recycling rates. This has led the Commission to propose differentiated recycling targets for each of the materials covered by the directive, taking into account the different environmental and economic costs/benefits of each material.

The targets for recovery and recycling introduced by the Directive are to be achieved within five years after the formal compliance date (June 2001), and require the Commission to propose new sets of targets every five years. Directive 2004/12/EC amending the Directive 94/62/EC on packaging and packaging waste has extended the deadline to December 2008 (see Table 1). A number of countries benefit of derogation periods for compliance, among which Ireland, Portugal and Greece, the new Member States (joining EU in 2004) and the accessioning countries (Bulgaria and Romania).

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<sup>2</sup> Council directive 75/442/EEC of 15 July 1975 on waste, OJ L 194, 25.7.1975, p. 39

<sup>3</sup> Council directive 1999/31/EC of 26 April 1999 on the landfill of waste, OJ L 182, 16.7.1999, p.1

<sup>4</sup> European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste, OJ L 365, 31.12.1994, p. 10

**Table 1.1 Recovery and recycling targets set by Directive 2004/12/EC amending the Directive 94/62/EC on packaging and packaging waste**

	2001	2008
Overall Recovery targets	50-65%	65%
Overall Recycling targets	25-45%	Min 55%-max 80%
Glass Recycling target	15%	60%
Paper/Cardboard Recycling targets	15%	60%
Metals Recycling targets	15%	50%
Plastics Recycling targets	15%	22.5%
Wood Recycling targets	15%	15%

Source: Directive 2004/12/EC amending the Directive 94/62/EC on packaging and packaging waste

The Packaging Directive is one of the first regulatory acts to set down the co-responsibility of producers in waste management, but it does not explicitly introduce any obligation. However, it has led for the first time to the dissemination in Europe of a form of **producer's responsibility** and has notably helped to the development of selective collection schemes (Radermaker 2002).

The **Directive on Batteries and Accumulators**<sup>5</sup> and its amendments (93/86/EEC, 98/101/EC) are intended to reduce the amount of pollution released from used batteries. Member States must draw up programmes aimed at reducing the heavy metal content of batteries and encouraging the separate collection of used batteries. The batteries and accumulators have to be marked to indicate separate collection and heavy metal content.

## 1.7 Limitations of the study

The review of the literature with regard to social acceptability and determinants of an environmentally friendly waste behaviour has mainly included literature from Western Europe and North America, due to the fact that in these areas sustainable waste management initiatives have a long history and, therefore, most of the literature originated here. The possible problem arising out of this situation is that results obtained here after the implementation of different strategies may be totally different if the same strategies are implemented somewhere else, mainly due to a different cultural background.

Most of the reviewed studies with regard to waste behaviour lack the integration of the effects of the different behavioural determinants. Therefore, in this study, they are also analysed separately, most of the times. This may have implications for the use of the findings in a local community scheme, which has to include all of them and to pay attention to how they interact one with each other.

An important limitation of this study is that, due to the short period of time assigned for this research, no social studies on Bucharest and Bucharest neighbourhoods have been reviewed.

Related to the case-studies, it was intended in the beginning to have more than one city as study case in the Netherlands and after the discussion with AOO, Utrecht has been identified as the city with the best recycling and participation rates among the four largest cities in the Netherlands. Unfortunately, due to time constraints the waste management scheme was not analysed.

<sup>5</sup> Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances, OJ L 78, 26.3.1991, p. 38

The short-time limitation also had implications for the study of personal behaviour factors and preferences for future waste management scheme in Bucharest. The survey had a much smaller sample group than envisaged and therefore it only offers an insight on the topic, not a comprehensive, reliable set of data.

Important limitations were those related to the language of the existing materials. Taking into consideration that the research analysis includes the Netherlands and Hungary as study-cases and a lot of the information related to these countries exists in their own languages, it is possible that valuable information has been missed. This was a constraint especially for the Hungarian situation.

## **1.8 Outline of the thesis**

This research is structured in five chapters, which answer each of them to one or two research questions.

Chapter 1 makes a short introduction to the context in which the study has been developed, the research objective and questions, it presents the methodology, it defines the field of research (household waste) and it makes clear which are its limitations. An important element is the short explanation of the chosen approach. In the context of problem definition and definition of the field of study, it was considered appropriate to introduce in this chapter a brief overview of the EU legislation and requirements related to waste management.

In chapter 2 the theoretical framework is presented in detail, including the main concepts used (Integrated Sustainable Waste Management, social acceptability, waste behaviour, social marketing) and the answer to the first research question. Thus, it analyses in detail waste behaviour determinants, looking at existing detailed studies on waste behaviour, technical reports, opinions of waste management companies, international organisations, etc.

Chapter 3 tries to answer to the second research question, which refers to how recycling behaviour have been taken into account in household waste recycling schemes in the Netherlands (with focus on Rotterdam) and in Hungary (with a special attention to Budapest). It provides, first, background information on the general context of waste management in the studied countries, and then an overview of the results achieved so far. The last part of the chapter focuses on the factors that led to the results, which are actually the waste determinants (facilities, economic instruments and communication).

Chapter 4 focuses on the situation in Bucharest with regard to waste management. It offers the answers to the last research questions. Consequently, it makes an analysis of the current situation in the waste management field in Bucharest, in terms of institutional and legislative context, results of waste collection, initiatives of separate waste collection and results. The preferences of local community with regard to the future separate waste collection schemes are also investigated. However, the chapter starts with a presentation of the Romanian situation and of the pilot projects.

Overall conclusions and recommendations are made in the last chapter, chapter 5. The main findings of the literature and practice with regard to waste behaviour determinants are presented. It also makes clear the implications for the theoretical framework. Recommendations for Bucharest and for further study are finally made.

## **1.9 Defining Household Waste**

Before developing the theoretical framework of this research it is necessary to define the category of household waste, which represents its targeted field.



The OECD Environmental Compendium 1995 includes the results from the 1994 survey and defines **household waste** as ‘waste generated by the domestic activity of households. It includes garbage, bulky waste and separately collected waste. National definitions may differ’ (page 161). A similar definition is used in the EURstat Environment Statistics 1996 (page 191).

Currently, household waste is a concept linked specifically to waste generation, consisting of waste from a unique type of source: households (EEA 2000). In the same time, municipal waste is defined as household-type waste collected by or on behalf of the municipalities and household-type waste collected by the private sector.

Considering the different behaviour of households compared to the other household-type waste generators (such as offices or shops), **within the space of this study by household waste it is meant only that waste resulting from household activities.**

Regarding the different streams of household waste, the three categories including garbage (residual waste or traditional waste), separately collected bulky waste, and other separately collected fractions seem to fit the general framework. However, the third category, which is the other separately collected fractions, should still be fragmented into: dry recyclables, organic waste (garden and kitchen waste), and small scale hazardous waste. The current research does not cover the bulky waste, as this is a waste stream with particular characteristics, it is often treated as a separate waste stream, and it requires a much larger debate and research.

It is to be mentioned that although these categorizations are useful and they are also important because in an integrated waste management system usually there are different solutions for the different waste streams, in the theoretical framework there have been specifically addressed only those types for which existing literature makes reference to.

Additional to these short remarks on definitions and area of research, in Annex 1 there is a comprehensive list of definitions and explanations of the terms used with regard to waste and waste management.

## **1.10 Abbreviations**

ACRR	Association of Cities and Regions for Recycling
AOO	Dutch Waste Management Council (in Dutch “Afval Overleg Orgaan”)
BCH	Bucharest City Hall
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEA	European Environment Agency
EIB	European Investment Bank
EPA	Environmental Protection Agency
EU	European Union
FKF	Fővárosi Közterület – Fenntartó RT (waste management company in Budapest)
GDP	Gross Domestic Product
ISPA	Instrument for Structural Policies for pre-Accession
ISWM	Integrated Sustainable Waste Management
MEWM	Ministry of Environment and Water Management
NIMBY	Not In My Back Yard
NWMP	National Waste Management Plan
NWMS	National Waste Management Strategy

OECD	Organisation for Economic Co-operation and Development
PAYT	Pay-As-You-Throw
PHARE	Poland Hungary Aid for Reconstruction of the Economy
REC	Regional Environmental Center for Central and Eastern Europe
SAM	Subsidy scheme for measures to reduce environmental pressure (in the Netherlands)
SAPARD	Special pre-Accession Programme for Agriculture and Rural Development
STAP	Incentive Programme for Separation and Prevention of Household Waste (in the Netherlands)
UK	United Kingdom
UN	United Nations
US	United States
VROM	Dutch Ministry for Housing, Spatial Planning and the Environment (Dutch: Ministerie van Ruimtelijke Ordening and Milieu)

## Chapter 2 Theoretical framework

### 2.1 Social acceptability

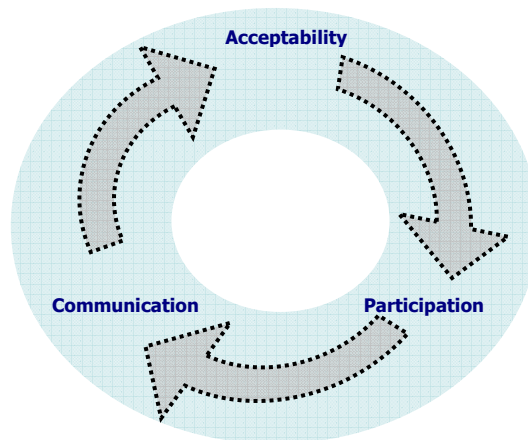
The structure of this research starts with the term “social acceptability”. Social acceptability requires that a waste management system meets the needs of the local community that will be served and reflects the values and priorities of that society (Nilsson-Djerf & McDougall 2000). For waste management, social acceptability defines the driving forces to have a stable structure, be socially functioning and subject for improvements.

Social acceptability is a key issue in current waste management and, although introduced long time ago, together with the sustainable development concept, it earned its place when waste managers and planners had realised that in order to be successful a waste management scheme relies heavily on people’s willingness to participate in it. Folz (1999) also argues that the cornerstone of any recycling program is the willingness of citizens to sustain this practice over time.

Current waste management schemes have as main goal reducing the amount of waste ending in a landfill (see waste hierarchy under chapter 2.2.). This is done by a series of alternative solutions, such as reducing the overall quantity of waste produced (through changes in consumption patterns), reusing and recycling as much as possible out of the recyclable waste. All these alternative solutions need a high involvement (participation) of the targeted population and, therefore, they require an adequate behaviour. Therefore, it can be argued that current waste management requires certain behaviours, which are reflected in the degree and performance of participation in the scheme.

Furthermore, participation in the scheme is considered to be an indicator of social acceptability (Nilsson-Djerf 1999), as it shows how and whether a waste management system fits the reality of the local community in which it operates.

**Figure 2.1 The reinforcing communication loop**



*Source: Nilsson-Djerf & McDougall 2000*

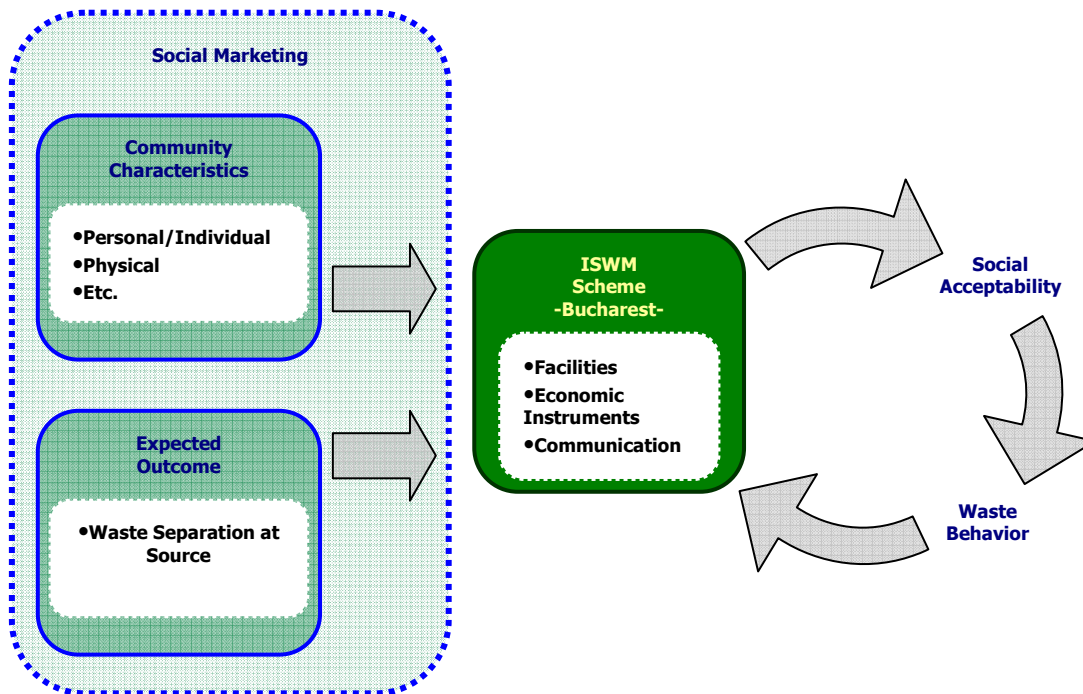
Since participation is an indicator of both the degree of acceptance of a waste management scheme and the type of behaviour, a relationship between social acceptance and behaviour has been sought. Starting from the reinforcing communication loop of Nilsson-Djerf and

McDougall (2000) – Figure 2.1, participation was identified to actually be an indicator of behaviour (as mentioned by most of the studies on waste behaviour). Therefore, it was replaced by behaviour in the scheme (Figure 2.2). Additionally, it was considered that communication is not the only factor leading to acceptability, but it is the entire waste management system, which includes, besides communication, facilities and economic instruments. The reason is that if facilities and economic instruments are not tailored according to the needs of the community where they operate, communication can only raise awareness and make a good start, but the results can not be long-term.

In an Integrated Sustainable Waste Management scheme (see chapter 2.2.) the loop is indeed closing by the fact that depending on the type of behaviour performed the system will continuously be optimised by changing different characteristics, in order to induce the desired behaviour.

The scheme was extended to include also the factors that should be taken into account when designing a sustainable waste management system, from the social marketing point of view (see chapter 2.3).

**Figure 2.2 Links among the different concepts used in this research**



## 2.2 Integrated and Sustainable Waste Management (ISWM)

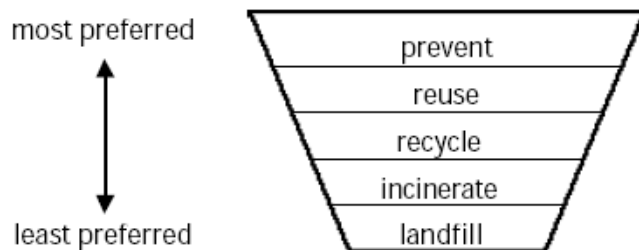
Starting with the rise of the sustainable development concept and “movement” in 1987, when it was first introduced by the Brundtland report, human activities should be considered from all the three points of view of sustainability: environmental effectiveness, economic affordability and social acceptability. This is the reason for which sustainable waste management has to take into account all three components of sustainability:

- *Environmental effectiveness*: requires that environmental burdens of managing waste are reduced, both in terms of consumption of resources and the production of emissions.

- *Economic affordability*: it requires that the costs of waste management systems are acceptable to all sectors of the community served.
- *Social acceptability*: requires that a waste management system meets the needs of the relevant local community, and reflects the values and priorities of that society.

An early response to sustainable waste management has been the “*waste hierarchy*” approach, first introduced into the European waste policy by the European Union’s Waste Framework Directive of 1975. In many countries in the world, the waste management hierarchy (see Figure 2.3) has been taken as a key element in waste management policy. The hierarchy, is based on environmental principles, and implies that waste, depending on its characteristics, should be handled by different methods: a certain amount should be prevented by either reducing the content of waste or by reusing the waste, another share of the waste stream needs to be converted into secondary raw materials, some parts can be composted or used as a source of energy, and the remaining may be landfilled (Beukering & Brander 2001).

**Figure 2.3 Waste hierarchy**



Source: Beukering & Brander 2001

There have been widely differing interpretations of the waste hierarchy. Some planners and commentators regard the pyramid as representing a strict order of preference in which recycling is always preferable to incineration, while incineration is always preferable to landfilling, regardless of factors such as cost or environmental outcomes. Emphasis in waste policies is placed on materials recovery at the expense of energy recovery and landfill.

Others have regarded the waste hierarchy as a general guiding principle, for a more flexible approach to strategy development. While recycling and recovery options are favoured over those that do not recover value in some form, options at the bottom of the hierarchy are viewed as essential ingredients for a balanced strategy. The term integrated waste management applies to this interpretation.

A more recent concept is that of Integrated Sustainable Waste Management (ISWM). White & McDougall (1999) define ISWM systems as systems that combine waste streams, waste collection, treatment and disposal methods, environmental benefits, economic optimisation and societal acceptability into a practical waste management system for any specific region. ISWM is not about promoting one type of waste treatment, although it takes into consideration the waste hierarchy, rather an adaptation to local conditions will determine the most appropriate tools.

However, the main issue related to the waste hierarchy is that it has been applied almost exclusively to the field of post-consumer waste management. In reality, the waste hierarchy is an expression of the broader concept of the sustainable use of resources, exemplified by the 3Rs at the apex of the pyramid (Reduce, Reuse and Recycle). End-of-pipe management strategies must be linked with strategies focused at the start of the value chain, where changes in product design and consumption patterns can prevent or reduce waste production. Waste

managers typically have little or no control over this aspect of resource management. ([www.sita.co.uk](http://www.sita.co.uk))

### 2.3 Determinants of a sustainable waste behaviour

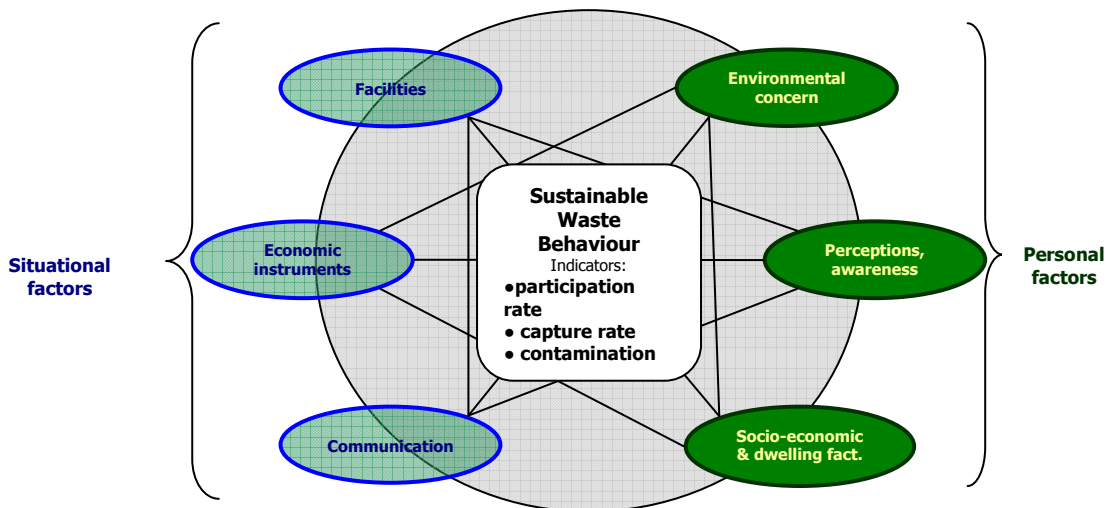
Behaviour is what people do. GreenCOM<sup>6</sup> defines behaviour as a single observable action performed by an individual (Day & Monroe 2000). Sustainable waste behaviour includes both the individual and the household waste behaviour patterns in terms of:

- prevention: by switching to products that pollute less, are made from recycled materials or can themselves be re-used or recycled;
- waste management: households are expected not only to reduce the waste they produce, but to dispose of it in an environmentally-friendly way and according to the collection systems available.

As emphasised earlier, despite procedural differences, most recycling programs have one thing in common – reliance on individual participation. In attempting to develop effective and sustainable ways to reduce the amount of trash being buried in landfills, scientists, policy-makers, and community leaders need to understand the factors that lead people to behave in a sustainable way with regard to waste.

Considering that the final goal of this research is to help local and national waste management stakeholders develop an ISWM system in Bucharest, the focus is on what can and should they do in this respect. Therefore, the waste behaviour mainly targeted here is reuse and recycling (translating into separation at source) and just marginally prevent waste production, as this is usually dealt with by different stakeholders. However, where considered appropriate, prevention measures were mentioned. Nevertheless, the first goal of ISWM is waste prevention and further study should be conducted on this issue.

Figure 2.4 Determinants of Waste Behaviour



<sup>6</sup> GreenCOM is the Environmental Education and Communication Project of USAID, started in 1994 to apply a set of social marketing and communication techniques that have proven successful in the field of health to the field of environment.

Regarding the indicators of success for a separate waste collection scheme, there have been identified three main important: amount of waste separately collected (that is actually the “capture” rate, directly related to the diversion rate, which is the amount of waste that does not go to the landfill), the **participation rate** (how many householders are part of the programme, as a percentage of those eligible to participate) and the **contamination rate** (or leakage, meaning the percentage of waste that is wrongly placed in the recycling containers/bins). Therefore, when assessing the effectiveness of certain instruments in changing people’s behaviour, data on all three indicators should be available, in order to get to an objective overall assessment.

In Figure 2.4 above, a synthetic scheme is drawn, showing which are the determinants of sustainable waste behaviour and how they interact one with each other. The determinants are selected based on the initial literature review, but their relevance is further assessed and the conclusions will synthesize which are the most relevant and which are the variables (for each of them) that actually influence behaviour and in what way they do it.

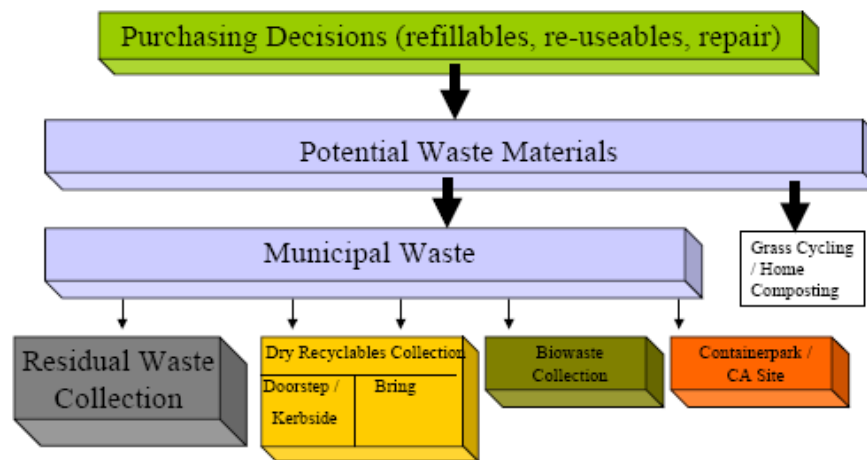
### Social Marketing

Social marketing is a commonly used concept in changing behaviours, including environmental behaviours, being one of the four approaches used by GreenCOM to encourage new (more environmental friendly) behaviours in groups of people. It relies on the idea that the type of intervention should be selected based on the desired outcome and the characteristics of the target population, including the assessment of why the people behave the way they do (see Figure 2.2). It provides an interactional approach to research, described as “market segmentation”, which means partitioning a potential market for the products (the intervention) into homogenous subgroups based on common characteristics. According to Geller (1989), this technique “provides a basis for selecting target markets and developing optimal promotional programs for individual target segments”.

## 2.4 Characteristics of the collection scheme / Situational factors

Waste collection should be considered as *a system* (EUNOMIA 2002). What happens in one part of the system affects not only what happens at the treatment end, but also, other components of waste collection. Consider a stylised representation of waste collection systems in Figure 2.5 below.

Figure 2.5 Stylised Representation of Collection System



Source: EUNOMIA 2002

After considering the literature available on factors influencing waste behaviour, and barriers to recycling, it was decided to divide the situational factors into the following categories: *facilities* (in terms of infrastructure available for the population to get rid of their waste), *economic instruments* (taxes, pricing and other instruments that can determine waste generators to thoroughly consider which is the most efficient way of dealing with their waste), and *communication* tools and strategies to be used in order to convince people to use a certain system, but also to educate them on how to use properly the existing facilities.

## 2.4.1 Facilities

There have been identified two main types of collection schemes: drop-off and door-to-door. Another term, very widely spread, is kerbside collection. Unfortunately, the understanding of what kerbside collection means varies from country to country and although sometimes it is assimilated to the door-to-door scheme (as in the case of the United Kingdom), other times it refers to neighbourhood containers (which is actually a drop-off scheme) or it includes them both. This is the reason for which the term of kerbside (or *curbside* in American English) collection is avoided in this research.

### a. Drop-off or Bring schemes

Existing experience and literature shows that there are two main types of organising drop-off or bring schemes, and these are:

- neighbourhood containers (also known as igloos, recycling islands, waste banks) and
- bring-in stations (or waste lots, recycling stations, or container parks).

Both of them rely on the willingness of the residents to separate their waste at home and bring it to the recycling point. The main difference between the two types of facilities is that the neighbourhood containers offer the possibility to capture separately just a few waste streams (usually glass, paper and cardboard, plastics, metal), while the bring-in stations offer alternatives for a much larger number of waste types, including the different categories of bulky waste, hazardous waste, and organic waste. This is also the reason for which most of the municipalities combine the two types of facilities, as by their combination they manage to achieve higher recycling targets and higher diversion rates from the landfill.

Considering their different characteristics, their locations are also different. Neighbourhood containers are usually located within residential areas, with a high density. Instead, the bring-in stations are located at the outskirts of the city, having in regard that they need a large surface and such big open areas are quite hard to find in cities nowadays.

In a study on 40 European cities, ACRR (2000) found out that neighbourhood containers are the most widely used, since, apart from one exception all the cities use this system for some materials. They are principally used to collect glass (29 cities), but many cities also use them to collect paper-cardboard (24), plastics and metals (6 and 5). Nineteen cities have neighbourhood containers (or eco-points) to collect several materials. In some cases, sorting is realised by the people who deposit their waste. In other cases, fractions are collected together before being sent to the sorting plant.

In relation with the drop-off schemes the main important element to be taken into consideration is **convenience** (including accessibility, distance of the collection location from the participant, appearance and cleanliness at the recycling points).

Convenience is considered to be the first motivator by residents in the Western Riverside area of central London, as it was revealed by a study done by Christine Thomas (2002).

Three studies in the US have experimentally examined the effect of increased bin proximity on recycling participation. They consistently indicated that the closer participants are to the



collection centre, the more likely they are to recycle. **Proximity** was shown to work in a variety of situations: apartment complexes, mobile home parks, and offices. (Schultz et al., 1995)

A Biffa Waste Services (UK) Report (Future Perfect, 2002/3) also argues that public participation is firmly linked to **container density**. This is the reason for which UK levels are miserable when compared to European best practices, as UK bring schemes densities are 1 per 10,000 households, chronically below the level suggested in research of 1 per 1,000 (with door-to-door schemes) or 1 per 500 households (without). Other studies (RDC Environment & PIRA International 2003) argue that glass should best be collected at bottle banks with a minimum density of 1 bottle bank per 1,000 inhabitants.

In the UK, the siting of neighbourhood containers are typically locations which are routinely visited by householders: civic amenity sites, large supermarket sites, recreation or community areas. The choosing of an adequate site is important in order to reach good collection rates and to avoid the degradation of the containers. Container design usually includes a clear indication, with pictogram if necessary, of the accepted materials. To avoid the deposit of undesirable materials, a careful design of the container's openings is needed.

The issue of the **container's opening design** is a very important one in reaching the targets with regard to the quality of waste. It is very important to reduce leakage from one category to another and securing this through the design is one of the options. Another one is that of having containers which can be locked up and thus become accessible only to the neighbourhood inhabitants who have the adequate key, as it is the case of Carpi (Italy).

Another important issue is that facilities should be **visible**. A study undertaken in Glasgow (Scotland) revealed that seeing the recycling banks was the source of initial awareness of the scheme, although the communication strategy included placing adverts in the local press (McDonald & Ball 1998).

Concerning the number of materials collected, ACRR (2004) argues that if the collection scheme is a multi-material system then collected quantities will be greater than in a mono-material collection scheme. Indeed, there is less hesitation by the householder in placing material into multi-material systems than selective collection schemes. However, a balance must be achieved, between the costs and benefits of these systems.

A study done in Scotland, comparing two different schemes in Falkirk and Glasgow, has shown that people are more likely to recycle two or three materials than just one (McDonald & Ball 1998). The collect-scheme in Falkirk, for paper and plastics, leads to the majority recycling mainly plastics and paper. In Glasgow, the pattern shows that the more materials a household recycles, the more likely they are to recycle plastics.

Schultz et al. (1995) have found that there is a correlation between different pro-environmental behaviours, as people recycling one material are more likely to recycle more materials.

### **Box 2.1 Separate waste collection scheme in Barcelona, Spain**

Barcelona is currently testing an original method of collection which enables notably to reduce the visual and sonorous impact of containers. The inhabitants of the two concerned streets can deposit their waste separated into organic waste, paper-cardboard, light recyclable (plastic, metals, multi-material) and other non recyclable waste in some "boxes" with circular openings situated along the streets and which open into containers situated underground. A lorry collects them by aspiration. This system is completely automated and can be controlled from a computer situated in a collection vehicle. (Source: ACRR 2000)

### **Bio-waste collection**

Separate bio-waste collection imposes several problems among which also that related to whether it should be collected in door-to-door schemes or in bring schemes or if better home composting should be promoted. However, there are examples for both situations, and solutions depend on the type of the residential area, on the composition of bio-waste, on how the other types of waste are usually collected, or on its quantity.

In Vienna, bio-waste is collected at collection points where amongst containers for paper, glass, plastic and textiles, bio-tonne containers are installed. The collection points are quite dense (every 50 to 100 meters), and this ensures good recycling rates.

#### **Box 2.2 Collection of organic waste in Germany**

In Germany, the collection of organic waste is handled in different ways. Mostly in the outskirts of town, separate waste containers (bio-tonne type) are provided. In the city centres the bio-tonne is often at the residents' disposal at the neighbourhood collection points. The size of the containers varies among 80 l, 120 l or 240 l. The collection vehicles are mostly equipped with rotating drum systems or pressing systems. In vehicles with rotating drum systems the bio-waste is homogenised, whereas in vehicles with pressing systems the structure of the bio-waste could be remained. The frequency of collection of bio-waste could be once a week or once in two weeks in addition to the collection of the waste for disposal or alternating. Due to the costs, in most collection schemes the bio-waste is collected once in two weeks alternating with the collection of waste for disposal. (Source: EUNOMIA 2002)

### **b. Door-to-door collection schemes**

A study of ACRR (2000) shows that, out of 40 cities considered in the study, 26 of them organise regular selective door-to-door collections for one or various materials. Paper and cardboard are most of the time collected this way (17 cities). The other dry recyclable materials, when collected this way, are subject, in half of the cases (13 cities), to a combined collection of several materials. It must further be pointed out that, in neighbourhoods with a high concentration of collective habitats, doorstep collection is regularly substituted by neighbourhood containers (mainly because of the lack of enough storage space).

#### **Frequency of collection**

The best doorstep recycling collections will be picked up on the same week as the refuse collection, to avoid confusing householders. A weekly recycling collection is better than a fortnight one, because households will not need to store their materials for long. Best practices from the UK suggest that the frequency of collection can significantly affect overall recycling capture rates. (Friends of the Earth, March 2004)

Schultz et. Al. (1995) also noticed that it seems likely that participation in recycling programs in US would be higher if both recyclables and other refuse were collected on the same day, and at frequent intervals.

#### **Sorting of recyclable materials**

Recyclable materials can be collected from the doorstep in two main ways:

- **Commingled collections** mean that materials are mixed up together and separated later, usually at a materials recycling facility, using both mechanical and manual techniques. Householders will usually be given a high-volume coloured plastic bag or wheelie bin. This method requires less effort by the participant.
- **Sorting one or more recyclable materials** either at home (door-to-door schemes) or at the recycling facility in the neighbourhood.

Biffa Waste Services (UK) has found that the earlier materials for recycling can be separated from the waste stream, the lower the likely cost and environmental impact of the collection

scheme (“Future Perfect”, Biffa 2002/3). Materials separated at the doorstep will be less contaminated than those sorted at a central material recycling facility (MRF) and will therefore require less treatment. Cleaner materials are more valuable to reprocessors and local authorities and a higher proportion of these can be recycled. Also, glass cannot easily be collected commingled and separated into different colours at a central facility because it is difficult to sort by hand when broken and the technology required for separating the different colours mechanically is only just becoming available.

Gamba and Oskamp (1994) examined household participation rates in a city-wide commingled door-to-door recycling program in the United States. They found out that over 90% of the households participated in the program at least once in five consecutive occasions – an amazingly high figure – whereas earlier, in a voluntary separated recycling program, less than 40% of city residents were estimated to take part.

Generalization on whether separate or commingled collections are the best is still questionable.

### **Box 2.3 Best Practice Code for Doorstep Recycling**

Friends of the Earth has developed a Best Practice Code for Doorstep Recycling which includes the features most likely to guarantee high take-up and set-out rates and high yields of materials (see Annex 4 for the entire document). In short the code sets out that best practice doorstep recycling should:

- Be frequent – because regular collections are more convenient for householders
- Be on the same day of the week as rubbish collection – to avoid any confusions
- Include a wide range of materials – because the greater the number of materials collected, the more people are likely to participate and the greater the amount of material people will put out for collection
- Include good customer care – with regular information about the service
- Provide an easily storable container – as yields of materials for recycling have been found to be higher in areas provided with a bag or box compared to similar areas without.
- Involve separation at the doorstep – because these materials will be less contaminated than those sorted at a central sorting facility. Cleaner materials are more valuable to re-processors and a higher proportion of these can be recycled.

(Source: Friends of the Earth 2004)

### **Bio-waste collection**

One of the main problems related to door-to-door bio-waste collection schemes appears when collection is of all bio-wastes. Practical experiences across Europe show that door-to-door collection of bio-waste may reduce grass-cycling and home composting whilst also reducing use of container parks. In the same time, it can lead to an increase in the waste quantity, because of the tendency to bring in this waste stream materials which otherwise might not have been collected at all (grass clippings, small soft pruning etc.). Increasingly, countries with bio-waste collections, notably Flanders (Belgium), Austria and Germany, recognise this and promote home composting quite strongly. In Italy, and also in parts of Catalonia (Spain), appreciation of this experience has led to the design of collection systems to specifically target kitchen waste only. (ACRR 2000)

These considerations are transferable to all countries. They suggest that those municipalities who embark upon strategies for the collection of garden (and kitchen waste) in the absence of measures to promote home composting might expect to see quantities of waste collected increasing considerably. This is precisely why many Italian systems target kitchen waste only in their door-to-door collection schemes. The objective should be to target the more problematic, fermentable food waste fractions.

In order to promote composting at home, Lille (France) launched a project involving 100 volunteer households. Families have been provided with a composter with a capacity of 300,

600 or 900 litres, along with directions for use. City officials are also available to provide any necessary information or advice to the public.

## **2.4.2 Economic instruments**

OECD (1997) has defined economic instruments as “those policy instruments which may influence environmental outcomes by changing the costs and benefits of alternative actions open to economic agents”. They aim to do so by making the environmentally preferred action financially more attractive.

Most of the existing literature mentions financial instruments as some of the most important and most efficient policy instruments in increasing recycling performances. The reason is simple: as the main obstacle to further recycling is the latter’s cost disadvantage compared to other waste treatment options, the costs of the different waste treatment have to be recalculated by taking into consideration also their environmental and social impacts. This actually means internalising external costs - making the polluter bear the cost of environmental damage. This is the practical application of the “polluter pays” principle (Roberts 2004).

Various types of economic instruments are used. OECD distinguishes five main categories: taxes and charges; deposit refund systems; tradable permits, liability; enforcement incentives (non-compliance fines, performance bonds); and subsidies.

For the scope of this research, when considering economic instruments, there have been taken into account all the existing ones that are believed to have direct effects (such as Pay-as-you-throw schemes, deposit refund schemes, eco-taxes for recycling, enforcement incentives) or indirect effects (landfill taxes, producers responsibility, VAT) on recycling behaviour, as drawn up from previous experiences or from in-depth studies and reports.

### **a. Pay-as-you-throw schemes (PAYT)**

Various municipalities have set up a system of variable fees linked to waste production while trying to apply the “polluter pays” principle. The aim is to shift individual and household behaviour patterns towards a so-called environmentally friendly waste behaviour (see chapter 2.3. for definition).

Having in regard that such schemes exist already for some time, and evidence on their effectiveness and secondary effects are quite controversial, a lot of studies have targeted these issues.

Hannequart and Radermaker (2003) point to the following effects, considering experiences in Belgium, Germany, Luxembourg and the Netherlands:

- a reduction of 15 to 50% in the quantity of residual household waste
- a 5 to 10% increase in selectively collected waste
- an appreciable (but rarely quantified) increase in home composting
- a reduction in the total volume of waste, thanks particularly to at source prevention and individual composting (3-12%). It is this later factor which seems to play a preponderant role.
- Perverse effects (illicit dumping, refuse disposal “tourism”, bonfires) are still present, but rarely quantified; it seems that they can be of 3 to 10%. It is possible to attenuate them via appropriate communication campaigns. The general context at the time of introduction of variable fee systems also play a very important role (taxes on waste, degree of satisfaction with infrastructure and collection services, level of public awareness, level of participation in selective collections, etc.).

Among the cities implementing PAYT schemes, there are also big cities that have begun to implement PAYT schemes, such as Munich, Oslo, Vienna, Warsaw (ACRR, 2000), but data is not available on the type of the implemented scheme.

Sterner and Bartelings (1999) found that the introduction of an unit-based pricing system for the collection of municipal solid waste combined with the launch of a “green” shopping campaign and the introduction of recycling centres had a dramatic effect on the quantity of municipal solid waste generated. This study focused on the attitudinal variables that influenced the quantity of municipal solid waste generated by households, and discovered that economic incentives, although important, are not the only driving force behind the observed reduction of municipal waste. Given a proper recycling structure, households are willing to invest more time in recycling and composting than can be purely motivated by savings on their waste management bill.

The same argument is emphasised by the findings of Fullerton & Kinnaman (1995) who found out that the introduction of user fees (unit-based fees) can lead to a substantial reduction in municipal solid waste generation, especially if they are combined with programs that increase the public awareness about the municipal solid waste problem.

PAYT schemes are also successful in the United States, where Porter & Leeming (1995) view Seattle as a model considering that it has reported dramatic changes in recycling behaviour. Seattle offers door-to-door recycling included in the cost of the weekly removal of one 30-gallon container of residual waste. However, residents pay a steep fee for each additional container of trash. This approach to increasing recycling was reported to result in 86% of residents having only one can of trash per week pickup as compared to three cans before the program was initiated.

A broader study undertaken in the United States, collecting data from 21 cities, over an 18-month period, has also analysed the effects of introducing a unit-based on waste disposal behaviour (Miranda *et al.* 1994). They ascertained that introducing unit pricing and recycling programs could have a very positive effect on the quantity of municipal solid waste generated.

#### **Box 2.4 Parameters for implementing a PAYT scheme**

**Volume** – the main criterion in all the countries concerned. Generally, the cost per unit of volume is on a sliding scale, i.e. the first units are charged at a higher rate than the following. In some cases, however, the charge can be constant or indeed increase progressively. In the latter case, this is a strong incentive to produce less waste.

**Frequency** – a widespread parameter. The charges linked to the frequency of collection are usually on a sliding scale. In some cases, however, their progressiveness is intended to promote waste reduction.

**Weight** – the least used parameter. This system is based on recent weighing technologies which, according to some, could cause problems and require improvements.

**Bag**-based systems rely on variable charges depending on the **size of the bags** (usually between 60 and 240 litres). Where electronic tagging devices are used, charges are based on the frequency of collection and/or the weight of waste materials.

Charges are often split into a fixed amount and a variable amount which, in most cases, correspond to coverage of fixed costs and variable costs. This division is intended to minimize perverse effects, particularly non-payment of fees.

(Source: Hannequart & Radermaker 2003)

A Pay-as-you-throw policy encourages households to separate waste, while costs may vary depending on the size of rubbish bins, their volume, their location, or the frequency of collection (See Box 2.4).

However, Helsinki has chosen another system, which is that of reducing the fee for the collection of organic waste to half of that for residual waste. (Media-Com project, 1999<sup>7</sup>)

Concerning the areas with a large share of the population living in high-rise buildings, it has been acknowledged that there is a problem with respect to storing the waste and recyclable material and a lack of responsibility and controlling mechanisms for waste deposition by the individual (Nilsson-Djerf 1999). In Pamplona (Spain) and Brescia (Italy), where most people live in apartments, there are large containers outside each house where everyone puts their waste. It is very difficult to determine who deposits and how much. It has been frequently argued (by for example Berger 1997) that this type of waste management deters recycling behaviour and waste reduction. Recycling activities and source separation decrease with the increase of multiple unit dwellings.

In order to solve this kind of problems more advanced technical solutions have been implemented, such as the one for waste collection in Einzkrises (Germany), which uses waste bins equipped with an electronic identification system that identifies the volume of waste collected. Inhabitants are charged according to the volume of waste and also the collection frequency. A similar example is that of Weert, in the Netherlands, where users are charged according to the weight of waste that they dispose of, based on an electronic measuring equipment incorporated in the street waste bins.

Another example of a variable collection charge system is that of Mouscron in Belgium. Household waste is collected for an annual charge but inhabitants are allocated a fixed number of collection bags. Additional bags can be purchased at a relatively high price (Bernhiem, 1998).

Although most of the studies agree that a flat fee-pricing system is not optimal, they differ on what the optimal policy to minimize cost of disposal should be. Studies like Miedema (1983), Jenkins (1993), Strathman *et al.* (1995), and Linderhof *et al.* (2001) propose the introduction of a "downstream" tax, for example a unit-based pricing system.

Other studies, such as Fullerton and Kinnaman (1995, 1996); Palmer and Walls (1997); Fullerton and Wu (1998) and Choe and Fraser (1999), favour an "upstream" tax, like a deposit refund system or an advanced disposal fee on price of the consumption good, to internalize the waste treatment costs in the price of the product. They fear that a "downstream" tax will be non-optimal due to huge implementation and enforcement costs.

## **b. Deposit-refund schemes**

Deposit-refund schemes add a surcharge to the price of the product. The surcharge is refunded when the product, its residual, or packaging is returned to a collection system instead of conventional disposal (Danish Environmental Protection Agency, 1999).

Deposit refund systems have been a widely used instrument in waste reduction, typically applied to beverage containers. Austria, Germany and the Netherlands have introduced deposit-refund schemes for plastic bottles (Wilson, 1995). Germany has established a mandatory deposit refund system for packaging materials that do not meet with recycling targets.

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<sup>7</sup> In 1999, the ACR-AVR (Association of Cities for Recycling), Energie-Cités and Consorzio Agrital Ricerche implemented the MEDIA-COM project with the support of the European Commission (DG Environment) and in partnership with ADEME (The French Agency for Environment and Energy Management). Its objective is to promote this methodological reference for the characterisation of household waste and more generally sound management of household waste.

The implementation of a deposit-refund scheme should be done in accordance with the status of the selective collection for the same materials. The example of Finland is relevant from this point of view. As Finland has focused its efforts mainly on re-use, the results were greatly reduced volumes of packaging waste, which do not justify the development of selective collections throughout the territory. Selective collection of light packaging waste is therefore only organised in certain urban areas and in grouped housing areas. (Hannequart & Radermaker 2003)

### **c. VAT and other Eco-taxes for recycling**

Some states have introduced regulatory measures to reduce VAT so as to foster recycling. In France, for example, a lower rate of VAT was levied on the collection, sorting and treatment of waste as part of an agreement with Eco-Emballage<sup>8</sup>.

A broader issue concerns eco-taxes or taxes on products having a direct environmental function, such as recycling.

In order to promote individual composting, the city of Salzburg (Germany) established a 15% reduction in the tax on household waste collection for everyone composting at home (Media-com Project 1999).

#### **Box 2.5 Ireland's experience with regard to eco-taxes**

Since March 2002, Ireland has introduced a tax of 0.15€ on the throw-away plastic bags distributed in shops. As early as the following August, the Ministry for the Environment estimated that this tax had been instrumental in reducing the quantities of packaging bags put onto the market by over 90% (i.e. a reduction of more than 1 billion bags out of the 1.2 billion marketed in Ireland each year), and had led to a significant increase in the use of re-usable bags. Given the success of the initiative, the United Kingdom is also planning to introduce such a measure. (Source: Cameron 2003)

### **d. Enforcement incentives**

According to the Danish Environmental Protection Agency (1999), enforcement incentives are at the border between administrative regulations and economic instruments. Enforcement incentives usually take the form of rewards and non-compliance fees.

#### **Rewards**

The rewards strategy is based on learning theory, which suggests that external rewards will make a behaviour more appealing and induce behaviour change (Geller, 1989).

Schultz et al. (1995) have found out that offering rewards (e.g. money, coupons, or lottery tickets) significantly increased the amount of material people will recycle. He also argues that comparisons of reward intervention with other interventions suggest that rewards can produce larger changes in behaviour.

In spite of the success of reward-based interventions, most of the studies identify major drawbacks related to rewards strategies (Schultz et al., 1995, Porter & Leeming, 1995). The first problem is that the change in behaviour produced by reward programs was short-lived, for after the termination of a reward program, recycling behaviour typically returned to baseline levels. The second involves the cost of reward-based interventions as compared to the actual value of the recyclables collected.

One of the questions related to reward strategies, which is related to the extent to which behaviour change produced for rewards of one material will generalize to other materials.

<sup>8</sup> Eco-Emballage is the organization of packaging producers in France, equivalent to the Green Dot organization in Germany.

Another issue to remind is that studies took into consideration only the amount of materials recycled, not the quality or the frequency of recycling, which might have led to different results.

### ***Non-compliance fees***

According to Clinch & Gooch (2001) who have analysed, in total, 811 instruments in 35 countries, non-compliance fees (financial penalties applied for misbehaviour) are widely implemented in Central and Eastern Europe countries as opposed to Western Europe. This can be explained by the tradition in the command and control system that is a common characteristic for former communist countries. Still, no studies related to their effectiveness were found, therefore the effects of this instrument are difficult to assess or envisage.

In Western Europe and the United States there are not too many studies related to penalty based strategies, maybe because of the ethical aspect of it. One of the few studies found, related to the United States, shows that maintaining recycling behaviour and encouraging other conservation activities may be more effective than forcing initial compliance (Vining and Ebreo 1992). In another study, however, individual education level and the time a recycling program has been in effect were found to significantly influence household choice to recycle, while penalties, convenience, and types of materials recycled were insignificant influences of choice (Duggal *et al.* 1991).

## **e. Landfill taxes**

Changing the relative costs of different waste management options, in particular so that they internalise external costs, can be a very powerful means to change waste management choices. The simplest means to achieve this is to increase the cost of alternative waste treatment methods, among which landfill disposal is the most environmentally damaging. This has led a number of EU Member States to adopt landfill taxes (Box 2.6).

### **Box 2.6 Landfill tax values**

However, landfill taxes need to be complemented by other instruments so as to avoid diverting mixed waste in bulk towards incineration (EC 2003). In particular, the effect of landfill taxes needs to be assessed taking into account the costs of alternative waste treatment operations.

Examples of landfill taxes in EU Member States:	
- Austria	29 – 87 EURs/tonne
- Belgium	4-23
- Denmark	45
- Finland	15
- France	6

(Source: Hannequart 2002)

In the same time, some Member States have also imposed taxes for incineration, in order to discourage the change from disposal to incineration and encourage recycling. For example, Belgium (Flanders) has an incineration tax of 12.7 EURs/tonne, while Denmark's tax is 44 EURs/tonne.

The European Environment Agency (EEA 2002), in its latest report on biodegradable municipal waste, calls for taxation to increase the cost of placing this type of waste in landfills to such an extent that it would no longer be a viable option.

With regard to the implications of the landfill tax for recycling targets and behaviour, EUROPEN<sup>9</sup> (2000) argues that a tax on final disposal is an appropriate and effective

<sup>9</sup> EUROPEN – *The Cross-Sectoral Voice for Packaging and Packaged Goods* - is a non-profit body composed of companies and national organizations with an economic interest in packaging. EUROPEN aims to present collective opinions of the packaging chain and does not represent the views of any single sector.



economic instrument for packaging waste management, provided it is coupled with an incentive to minimise waste and/or encourage recycling. This happens automatically when households are charged by weight for the collection and disposal of their waste; but there is no incentive if the waste collectors charge householder a flat rate for the waste collection service. Consequently, landfill taxes should be accompanied by Pay-as-you-through schemes.

#### **f. Producers Responsibility**

By requiring that producers bear the costs of recycling their products after these have been discarded by consumers, their specific role in the chain of producers, consumers and waste managers is used to finance recycling and to integrate waste management costs in the product price. This also aims to provide economic incentives for producers to reduce the cost of re-using and recycling their products, e.g. by improving design (EC 2003).

In the EU case, the Directive on packaging and packaging waste, although not explicitly introducing any obligation regarding the producers responsibility, it spread the principle throughout Europe and contributed to the development of selective collection schemes.

This instrument tackles the problem of final disposal of products after their sale and use by consumers, when the responsibility for post-consumption product waste is extended to the producer of the product — a responsibility that was traditionally held by municipalities and taxpayers. The aim of such an approach is to shift the physical and/or financial (full or partial) responsibility from municipalities to the producers.

Radermaker (2002) argues that the internalisation of costs of waste management in the purchasing price of products permits to institute the “true cost” supposed to reflect the environmental impact of a product all along the competition between products materials, while taking into account their environmental dimension. It also prompts progressively producers and consumers to opt for more environmental products.

This instrument does not bring a change on the recycling behaviour in a direct way, instead it influences it indirectly by the fact that separate waste collecting facilities are introduced and recycling becomes easier to perform and cheaper than alternative waste handling ways.

#### **2.4.3 Communication**

Communication is the key tool for public participation in waste management, and importantly it has to be simple, straight and transparent. Another important aspect is that communication implies feedback. In Box 2.7 several criteria for an effective environmental communication strategy are presented.

##### **Box 2.7 An effective communication strategy ...**

- Should educate, mobilise, and respond to the general public, enabling greater environmental awareness and protection.
- Should be presented in a format, style and language that is accessible and attractive to the general public. This will enable the public to become more familiar and enthusiastic with environmental concepts.
- Should stress concrete solutions and provide support to the general public. Providing practical tools and assistance should ideally empower the general public and highlight the positive contributions they can make to protect the environment.
- Requires a partnership between a numbers of key partners. This includes local/ regional government, NGOs, business, and the media. This partnership can work to ensure that the strengths of the media are used to the full in presenting relevant environmental issues, and ensuring that environment remains top of the agenda. Such a partnership can also increase the quality of environmental coverage.

(Source: Cameron 2003)

In order to maintain support for the waste management system of the future, Folz (1999) argues that the service has to be as convenient as possible and furthermore, it has to be communicated and included in educational programmes for the public.

Moloney (2002) emphasises that surveys done in 21 schemes, out of which just in six schemes promotion campaigns have been undertaken, showed that despite the differences in facilities those that had been promoted achieved a higher participation.

The scheme of Geller et al. (1990) classifies behavioural intervention strategies into two groups: antecedent and consequence interventions. Following this scheme, the communication strategies are divided into **antecedent** (prompting, commitment, goal-setting, normative influence) and **consequence** (feed-back). Antecedent strategies are designed to increase recycling behaviour by altering a variable prior to performance of the behaviour, while the consequence ones define any intervention that attempts to modify recycling behaviour by presenting a consequence (Schultz et al., 1995, Porter & Leeming, 1995). Additionally, attention is paid to partnership and communication among stakeholders, as pre-requisite for ISWM.

Another issue of interest is the relationship between local authorities and citizens, as it can greatly alter the results of communication campaign either positively or negatively. It is almost unavoidable the fact that many people, from all social backgrounds, are deeply distrustful of Local Councils, and that people's experiences of other local authority services and the council tax are important barriers to them being able to think rationally about waste issues (UK Resource Recovery Forum 2002). Therefore, within a communication campaign it should be considered also who should be the sender of the message.

#### **a. Prompting and information provision**

Prompting is one of the antecedent strategies. Prompting strategies consist of either written or verbal communication given to target individuals to encourage a subsequent behaviour. Information advocating recycling and explaining how to use existing recycling services is presented to potential participants before the recycling program begins (or continuing during the program). This information can be factual, persuasive, or merely reminders, and it can be delivered in writing (flyers, brochures, and newspaper ads) or verbal. Verbal prompts deliver the same type of information as written prompts but are given in face-to-face contacts.

It has been found out, in a study undertaken in the Western Riverside area of central London (Thomas 2002) that face-to-face and personalised approaches, such as doorstep campaigns, personal letters, personal contacts, spreading the word with neighbours, were liked more. In the same time, leaflets were ignored or thrown away. It has also been proven that low/non and young mid-recyclers wanted hard-hitting messages, while medium/high and young mid-recyclers felt schools should be targeted.

Another study, done also in the UK (Falkirk, Scotland), with regard to a door-to-door collection scheme, has proven that the policy of house-to-house leafleting has been highly successful (McDonald & Ball 1998). It created a high degree of awareness of the scheme, produced a low proportion of leakages, a good knowledge of the availability of local facilities.

Regular prompting also increased recycling: 20% of the household receiving prompts plus information were recycling regularly during the experiment, whereas none had been recycling during the 17 months prior (Hopper & McCarlNielsen 1991). This finding is consequent with other studies (Moloney 2002, UK Resource Recovery Forum 2002), thus it can be concluded that householder participation is maximised where there is effective and continuous promotion of the existing schemes.

Other studies show that combining prompts with proximity of the collection bin increased recycling (Schultz et al. 1995). Providing containers in convenient places and delivering written prompts encouraged more people to recycle than using prompts alone. Prompting strategies appeared to increase participation in both drop-off and doorstep programs. In the apartment complex study, the effects of prompts alone could not be disentangled from proximity effects (distance to the recycling bin area).

One of the indicators that Nilsson-Djerf (1999) considers, when assessing communication for several waste management system across Europe, is the number of school children approached. This is due to the fact that information provided to schools is seen as a fundamental tool for being able to seriously influence future environmental awareness, participation, and common understanding of waste management. Results of the school visits are difficult to measure. In some programmes differences, especially increasing participation rates for certain city areas, have been detected as children are likely to affect their parents behaviour. In Zurich the contamination rate of the Zuri-sack (i.e. non-compliance to the system of designated bags) was reduced from 5 to 3% due to effective targeting of information to children in the areas of the city with a particular bad record.

## **b. Commitment**

Commitment strategies are also antecedent, and involve obtaining promises or agreements from people to recycle for a specified time period. They are based on the principle that people become resistant to pressures to change their actions after making a decision to behave in a certain way (Oskamp 1991).

The different types of commitment studies include both formal signatures on promise cards and simple verbal promises. Commitments have most often been obtained from subjects contacted individually, but subjects in two experiments were contacted in group settings (Porter & Leeming 1995).

Written commitment strategies also were more successful at increasing recycling than were verbal reward-based strategies.

Commitment increased in both door-to-door and special drive participation – not only during treatment, but also during follow-up. (Schultz et al. 1995)

Burn and Oskamp (1986) found commitment increased recycling 42% over baseline.

Pardini and Katzev (1983-1984) noticed no significant difference between commitment and prompting. They also suggested that commitment strategies may work because people who make such pledges move beyond the external justification for recycling (signing or stating a pledge) and find their own additional reasons for recycling.

A competing explanation for the effectiveness of commitment interventions is that the changes are due to **social pressure** (see more on this topic under d. Normative influence), as putting the bin at the curb to be recycled can make both the participation and the amount of materials observable to other residents.

## **c. Goal-setting**

Goal-setting involves the specification of a set target of material to be recycled.

Studies undertaken on schools found significant effects in increasing the amount of materials collected. This may also be because students who spend many hours of the week together may develop a sense of cohesiveness that, in turn, may motivate efforts toward common goals (Schultz et al., 1995). Similar results have also been registered by Porter and Leeming (1995), who note that “giving a goal to groups for the amount of recycling desired also increased recycling above pre-treatment levels”.

Still, there is not enough data to clearly state that goal setting helps and in what degree, and whether it is suitable for individual households.

#### **d. Normative influence**

Normative influence refers to the use of social norms to encourage recycling behaviour (social pressure).

**A Model of Altruism** (Hopper & McCarl Nielsen, 1991)

Shalom H. Schwartz (1968a, 1968b, 1970, 1973, 1977) has developed a social-psychological model of altruistic behaviour. The feature of altruistic behaviour is that while most people would verbally endorse a norm governing a particular moral behaviour, not everyone acts in accordance with the norm. Indeed, this is true for recycling. We do not need to convince people that recycling is a good idea, rather we need to persuade them to behave accordingly.

According to Schwartz, the process begins with social norms regarding moral behaviour which people generally agree upon in a sort of abstract, detached way. These norms represent the values and attitudes of significant others; we expect others to act in the morally proper way, and they in turn expect the same of us. By themselves, however, these norms are far too general and detached to govern behaviour. Instead, the social norms are adopted by each of us on a personal level – and hence become personal norms. Though derived from socially shared norms, what distinguishes personal norms is that the consequences of violating or upholding them are tied to one's self-concept. To violate a personal norm engenders guilt, and to uphold a personal norm gives rise to pride. In short, social norms exist on the social structural level, whereas personal norms are strongly internalized moral attitudes.

The next crucial link in the model is between personal norms and behaviour, for individuals may internalize the norms and still not act in accordance with them. Unless the personal norms are defined as relevant and applicable to a situation, they will not be activated. Schwartz thus identifies two variables that influence whether or not personal norms translate into behaviour: the awareness of the consequences (AC) that action or inaction will have, and the ascription of responsibility (AR) for those consequences.

The research of Hopper and McCarl Nielsen (1991) extends the Schwartz model somewhat in order to explore the social processes that may influence altruistic behaviour. By definition, altruistic behaviour is normative behaviour, and norms are developed through social interaction. According to the results of this study, the **block-leader approach** can successfully promote the normative processes conceptualized in the altruism model. The block leader program achieved participation levels double that of the 10% to 15% typically reported in the applied behaviour analysis and recycling literature (Stern & Oskamp 1987).

The block leader approach has been studied in detail by Schultz et al. (1995) and they found two potential sources of influence: information and personal contact. It may be effective because they serve as initiators of social norms within their neighbourhoods. Although it still has to be thoroughly assessed, it appears to have the potential to produce long-term changes in recycling behaviour. The analysis of Porter and Leeming (1995) also proved that verbal prompts by block leaders reliably resulted in more recycling than prompts delivered in a written format.

Oskamp et al. (1991) reported that participation in a doorstep program was higher for people whose friends and neighbours recycled.

With regard to Schwartz's model, Bratt (1999) argues that the correlation between personal norm and behaviour is found not to fit in the context of recycling, but still assumed consequences (term replacing the "awareness of consequences") may exercise an effect on

the personal norm and behaviour. Assumed consequences may induce environmentally friendly personal norms and (subsequently) pro-environmental behaviour.

The successful use of social pressure to induce recycling may be largely contingent upon the extent to which residents see themselves as part of the community. (Schultz et al. 1995)

#### **e. Feed-back**

Communication has to be two-way if it is to be effective. Therefore, by feed-back it is understood that waste management communication campaigns should encompass also providing information on the performances of the system (in terms of the progress towards achieving their targets, what happens to the waste after it is collected etc.), and asking for people's opinions, checking their awareness and knowledge levels with regard to the way the scheme works, asking them to participate in the planning or design of the waste management plan, so that continuous improvement can be achieved.

In her study, Thomas (2002) has also asked people in the Western Riverside area of central London what they want to know and the results showed that low/non recyclers want to understand how to deal with waste *and* what it is most important to do, medium/high and young mid-recyclers want to know what happens to recycled materials, and 70% said they did not know what happens to materials once they have been collected.

The direct effects of feedback strategies on waste related behaviour have been assessed by few studies (Schultz et al. 1995). However, it is acknowledged that presenting people with feedback about their behaviour has been successful in decreasing energy and water consumption, typically by amounts of 10 to 15%. In the same time, recycling behaviour is positively correlated to energy conservation, water conservation, and "other" consumer behaviours, as Berger (1997) found out. Thus, feedback should also have positive results in waste communication campaigns.

Additionally, it has been proven that lack of feedback and not knowing what happens to the recyclables may act as a de-motivator for recycling (Moloney 2002).

In order for feedback to be successful, Seligman et al. (1981) stresses that people must be able to identify a relationship between their behaviour and the feedback, meaning that feedback should be provided immediately.

While analysing communication activities in waste management programmes, Nilsson-Djerf (1999) used as indicator the number of visits to the facilities. Visits are seen as an important method of transparency. In this way the public will receive practical knowledge and develop an understanding of both the treatment and disposal methods. Furthermore, they will receive it face to face, which is perceived important for establishing trust. Cities like Zurich and Brescia, which have experienced NIMBY (Not In My Back Yard) reaction among people living near the incineration plants, have encouraged the public to come and visit the facilities. Generally this has resulted in a good dialogue and a large reduction in the number of complaints, as the population gets familiar with the procedures and the benefits they provide, thus accepting them.

#### **Public participation**

Greater involvement creates ownership and long-term commitment. This is the reason for which ISWM schemes should promote public participation, which is actually a key characteristic of sustainable projects. However, in most of the cases, participation in the planning process does not exist or is very limited, and the planning is ruled by specialists and politicians.

Nilsson-Djerf (1999) found as a result of his study on nine European cities waste management schemes that direct public participation in decision-making is insignificant and the amount of feedback and possibilities to affect the system from a public level is somewhat limited. It was shown that no public participation occurs directly in decision-making in any of the programmes analysed by him – Brescia (Italy), Copenhagen (Denmark), Malmo (Sweden), Pamplona (Spain), Vienna (Austria), Hampshire (UK), Saarbrücken (Germany) and Prato (Italy). The empowerment of the public stated as one of the core principles of social sustainability is thus not directly occurring. Indirectly, the public is represented, by different consumer or housing associations and local politicians. Zurich (Switzerland) has a unique system of referendums where the public often vote in important issues. For instance, in 1992, 71% voted in favour of the new “Ecological Waste Management” system.

#### **f. Partnership and communication**

Stakeholders’ communication is not a factor with a direct effect on household waste behaviour and probably this is why it is not mentioned usually in relation to behaviour. However, in the different studies that have been reviewed for this research, building trust among the stakeholders and community, integrating efforts and initiatives of the different stakeholders, information sharing, all represent key elements in developing a sustainable and integrated waste management scheme. Therefore, they finally affect behaviour.

It is also considered important to be emphasised, due to the consideration that a chronic problem of communication characterizes Romanian administration and finally affects the quality of the services provided (among which waste management) and the sustainability of the different projects.

The previous statement is supported by the study of Edward Cameron (2003), regarding environmental communication practices, in which he concludes the following related to accession candidate countries in Eastern Europe: “While these countries have made considerable progress during the last ten years, there is no doubt that a soviet era approach to communication still persists, particularly at the municipal level. This approach is characterised by a guarded and secretive attitude to information. The net result of this is a lack of information sharing, and little if any communication between municipal departments.”

The same study also mentions as the first recommendation that initiatives should not take place in isolation and that connectedness is the prevailing scheme. Effective environmental communication demands partnerships with a number of key stakeholders. Partnership with the media in particular can help to ensure that the strengths of the media are used to the full in presenting the relevant information.

Partnerships not only provide support mechanisms but they also ensure suitable fora to test ideas. In order to support this argument, the project of the city of Charleroi (Belgium) offers a good experience. Authorities in Charleroi decided to tackle one of the principal sources of waste, namely the packaging waste, aiming mainly at avoiding the production of extra waste, reusing and recycling as much as possible. To achieve this, they set about building a partnership and systematic communication campaign with local citizens and with a network of major supermarkets. The coordination of the project was also done in partnership with regional authorities and with a local NGO. The net results, after the first two years, were a reduction of 7 kg of waste per inhabitant. In Annex 5, more details on this project have been inserted.

## **2.5 Personal types of determinants**

According to the Social Marketing concept (see chapter 2.3), personal types of determinants (characteristics of the target population) are the basis for selecting the type of behaviour to be promoted, along with the desired outcome. In this case, the desired outcome is separate household waste collection and there are a multitude of technical, economical and communicational solutions for achieving this. The personal types of variables that may be relevant for waste behaviour, according to the reviewed literature, are: environmental concern, perceptions, awareness and knowledge, and household socio-economic status and dwelling factors.

However, there are studies, such as that of Folz and Hazlett (1991), which conclude that “what explained large portions of variance in recycling performance among cities with different programs were the specific recycling policies adopted and other features related to the program’s operation”, not the social characteristics of the community.

### **a. Environmental concern**

Although environmental concern often is not a strong indicator of behaviour, it has frequently been found to be a significant predictor. Because more people are recycling today, and doing so for more reasons than just altruistic concern for the environment, the relationship between general environmental concern and recycling seems to have diminished or disappeared. Despite the decreasing trend in the relationship between environmental concern and recycling, concerns for specific related issues remain significant predictors of recycling (Schultz et al. 1995).

Tucker (2001) argues that, generally, it is found that general environmental knowledge do not correlate with recycling behaviour; with similar levels of concern being shared amongst recyclers and non-recyclers alike. The major discriminants between recyclers and non-recyclers appear to be the negative beliefs, or barriers held against recycling.

### **b. Perceptions, awareness and knowledge**

The perception of the relative harmfulness of the production processes and disposal of each material, that of the reasons for which they are requested to recycle, and also the perception of how difficult it is to recycle a certain item, they all influence the willingness of people to participate in recycling schemes.

Research in the field of environmental education and commercial marketing has shown that there is no cause-and-effect progression from knowledge to attitude to behaviour, as educators have long believed (Day & Monroe 2000). The relationship among these is puzzling.

McDonald and Ball (1998) have examined public **perceptions** of plastics in Scotland in order to discover whether there are beliefs which might prohibit the successful growth of plastics recycling. Some of the conclusions of their study are of great relevance for the current research. For example, they conclude that if communities feel that schemes are set up mainly for private profit then this may undermine their willingness to participate. Additionally, the reasons for which users of the recycling schemes thought that collection schemes for plastics were being set up are mainly environment related ones (environmental benefit, recycling, reduce waste, resource conservation, reduce litter, plastics not biodegradable). When it comes to ranking glass, metals, paper and plastics according to respondents’ perception of the relative harmfulness of the production processes and disposal of each material, over half the participants view plastics as the most environmentally damaging material. This negative public view could be turned into advantage. In the same time, the large majority believe that

plastics are the most difficult of the materials to recycle, belief that needs to be challenged if plastics' recycling is to be successful.

Regarding the **awareness** factor, Thomas (2002) argues that awareness is important because it allows people to feel they can make a difference, it tackles 'recycling myths' that recycling all ends up in landfill anyway - which as many as 20% in the Western Riverside area of central London believe, including some medium/high recyclers. It encourages people to make 'green' consumer choices in favour of recycled products - 54% are currently not informed about what recycled products they can buy.

**Knowledge** about recycling has been found to correlate with recycling. In general, the more information a person has about which materials are recyclable, or where recyclables are collected, the more likely that person is to recycle. The greatest difference between recyclers and non-recyclers is their knowledge of collectable materials (Schultz et al. 1995).

Concluding on this issue, a few remarks made by Cameron (2003) are quite relevant. He points out to the conclusions of environmental psychologists that people do not recycle more simply as a result of hearing about the adverse impact of their current behaviour. So, raising awareness is often not enough to change people's behaviour. Still, the same psychologists believe that an approach that is based on best-practice exchange, practical support, and rooted in real solutions can lead to that change. Thus, it seems that raising awareness is one thing (not enough though), and communicating solutions – actually skills required to perform the behaviour – is something different, but their joined effects could make a difference.

### **c. Household socio-economic status and dwelling factors**

The most important socio-economic factors that can influence sustainable waste behaviour, according to existing studies, are age, gender, the level of education of the head of the household, the level of income of household, the size of the residence area, and the type of dwelling (few units vs. many unit-apartments).

Berger (1997) argues that early studies reporting relationships between socioeconomic indicators such as income or education and environmentally conscious behaviours are in stark contrast to recent conclusions that socioeconomic variables have shown little association with environmentally responsible behaviour. His study is based on Statistics Canada cross-sectional data file consisting of 43,000 records including detailed information on household socioeconomic and demographic variables.

Past research findings have indicated that people with the highest level of environmental concern tend to be young, female, better educated, higher earners, urban dwellers, and ideologically liberal. However, their relationship to recycling behaviour has been less consistent. In studies on recycling behaviour, the four most often reported demographic variables are age, gender, income, and education. Still, studies are quite ambiguous regarding a possible relationship with age, and education, while gender also shows no significant relationship (Schultz et al. 1995).

In Glasgow (Scotland), it has been noticed a particularly high participation rate for the over 60 age group, which is consistent with other studies of bring schemes (McDonald & Ball 1998, Thomas 2002). The same study reveals a lack of differentiation in the case of the analysed door-to-door collection scheme (Falkirk, Scotland).

The greatest distinction seems to be between dwelling types of few units (single, double, row) and many units (apartment), according to the results on Berger (1997) on a study in Canada. This is directly related to an important barrier for recycling – as it was identified by different studies – which is the space for separate waste storage (Thomas 2002, Moloney 2002). These findings are also supported by studies focusing on recycling facilities and PAYT schemes.



## 2.6 Conclusions

The determinants of a sustainable waste behaviour are summarized below.

### Facilities

Conclusions regarding the parameters that were found to influence waste behaviour, according to the literature reviewed, are presented in Table 2.1. Additionally, conclusions that could not be introduced in that form are presented below.

Related to the **Bring-in stations** facilities, which are drop-off schemes, the following are to be considered:

- They are particularly important for bulky waste (including electric and electronic waste) and for the garden waste, as sometimes it is the only environmental-friendly disposal option for this waste stream. Thus, they mainly affect **capture rates**.

- Some of the parameters applying to the neighbourhood containers do not apply to the bring-in stations, because in the latter there is usually trained staff to explain people what they should do or where to put their materials. This leads also to **very low contamination rates**. Also convenience and location parameters do not usually apply in the same way, because these facilities are most of the times at the outskirts of cities, but they still count.

Regarding **bio-waste**, in door-to-door schemes, where separate collection of bio-waste includes both **garden** and **kitchen waste**, the total amount of waste collected is increasing because garden waste that was not included before in the scheme is now collected. Therefore, most countries, especially Southern countries (like Italy), started targeting only kitchen waste in their separate collection schemes and encourage home-composting of the garden waste.

Findings across studies indicate **increased recycling rates for households with door-to-door collection**.

**Table 2.1 Facilities-related parameters that influence waste behaviour**

Parameter	Indications found	Effects on the ...
<b>DROP-OFF SCHEMES</b>		
<b>Neighbourhood</b>	- recommended for high-density neighbourhoods and collective habitats	<b>Capture and participation rates</b>
<b>Convenience</b>	- measured as <b>distance to the collection point</b> (i.e. one every 50 to 100 metres in Vienna) or <b>container density</b> (1 to 500 households according to best-practices in Europe – BIFFA Waste Services UK).	<b>capture and participation rates</b>
<b>Location</b>	- next to important community facilities or on the way to school, work, shopping, etc. – this indication was found for schemes in the UK, which have the lowest densities of containers.	<b>capture and participation rates</b>
<b>Container design</b>	- clear indication of the accepted materials, with a pictogram even (this way misunderstandings can be avoided with regard to whether, for example, both glass bottles and jars are collected or just one category, or with regard to what kind of plastic containers are collected). - containers' opening design should not permit unwanted materials to be introduced - access to the container based on a key or card available only for the residents in the nearby area	<b>Contamination/leakage rate</b>
<b>Visibility and appearance</b>	- containers have to be visible and attractive for people to use them.	<b>Participation rate</b>
<b>Collected</b>	- multi-material collection (commingled) seems to have higher	<b>Capture and</b>

<b>materials</b>	capture rates but it also has a lot of disadvantages, therefore all aspects should be taken into consideration before deciding on a certain scheme. - recycling schemes should offer people the possibility to recycle more than one material, because people recycling one material are more likely to recycle more materials, when the system is convenient. - materials usually collected at neighbourhood containers: glass, paper-cardboard, plastics, metals, bio-waste, textiles.	<b>participation rates.</b>
<b>Bio-waste</b>	- neighbourhood containers are appropriate where the collection of other recyclables is done the same way or where it can not be done otherwise (such as in apartment buildings).	<b>Capture rates</b>
<b>DOOR-TO-DOOR SCHEMES</b>		
<b>Neighbourhood</b>	- recommended for low and medium density neighbourhoods (usually single or multi-family houses)	<b>Capture and participation rates</b>
<b>Frequency</b>	- a weekly recycling collection is better than a fortnight one (to avoid too long storage time). - it is better to collect both recyclables and the residual waste on the same day (to avoid misunderstandings).	<b>Participation and capture rates</b>
<b>Collected materials</b>	- commingled collection is mainly favoured in the US and it registers good results. - in Europe, doorstep schemes for paper and cardboard are widely spread. - other dry recyclable materials, when they are collected this way, are subject to a combined collection of several materials.	<b>Capture, participation and contamination rates</b>
<b>Bio-waste</b>	- when collecting bio-waste, these schemes should target only kitchen waste, as this is the most problematic fraction.	<b>Capture and participation rates</b>

### Economic instruments

#### **Direct effects:**

##### **a. PAYT schemes can lead to**

- Reduction of the total quantity of residual household waste (increasing the diversion rate), especially if accompanied by education and communication campaigns.
- Increase in the selectively collected waste (increasing the capture and participation rates)
- Increase in home composting
- Perverse effects, which are rarely quantified. This problem can be addressed through an appropriate communication campaign.
- Not to be introduced in large cities, as there the effects of leakage / contamination are too costly. Still, there are big cities that have begun the introduction of PAYT schemes, such as Munich, Oslo, Vienna, Warsaw.

Usually, PAYT schemes are organised based on volume (the most used), collection frequency (quite widespread), weight (the least used), size or number of bags collected (in case of bag-based systems).

PAYT schemes are a very effective instrument in reducing waste amounts, and therefore solutions should be found for implementing PAYT even in high-rise apartment buildings. A combination of the solutions above could work very well in combination with high tech solutions for weighing the garbage or accessing the garbage containers. A simple method is that of the city of Mouscron (Belgium), where household waste is collected for an annual

charge which includes the allocation of a fixed number of collection bags, while additional bags can be purchased at a relatively high price.

**b. Deposit-refund schemes:**

- lead to a reduction of the packaging waste amount

**c. VAT and Eco-taxes for recycling:**

- can have important direct effects in reducing waste quantities of the targeted materials, but they have to be accompanied by communication campaigns to ensure a good understanding and acceptability of the tax.

**d. Enforcement incentives:**

- **rewards** are not proven to have direct sustainable effects; most of the results are short-term;
- **non-compliance fees** are not working, according to the reviewed literature.

**Indirect effects**

**e. Landfill (and incineration) taxes:**

- are important and effective economic instruments in reducing the waste amount, provided it is coupled with an incentive to minimise waste and/or encourage recycling. Thus, they should be accompanied by PAYT schemes.

**f. Producers responsibility:**

- it mainly supports recycling by financing separate waste collection schemes and making it easier to perform and cheaper than alternative waste handling methods.

**Communication**

Communication is a key tool for public participation and it has been proven that collection schemes that include promotion campaigns achieve higher participation rates.

In an Education and Communication Campaign on the waste issue, the image of the Local Council, or of another institution coordinating the campaign, within the community could play an important role. Therefore, it is essential to acknowledge the image they have and then adapt the campaign to these findings.

Among the communication strategies, most of them seem to positively influence recycling behaviour. However, data on **goal-setting strategies** are not enough to clearly prove that they are effective. Additionally, the findings on **commitment strategies** mainly rely on the US situation, and they are working with good results. In Europe, results may be different, although in small communities they could also work, relying on normative influence.

While considering to implement new strategies, such as commitment for example, it is important to check whether the target population has been exposed to this kind of strategies before, because if it is totally new than reactions can not be predicted very well. In the same time, using ordinary tools, such as leaflets, may have no impact, in communities where promotion leaflets have already become annoying.

**Prompting and information provision**

- Different tools may lead to similar results in different communities. For example, in London, face-to-face and personalised approaches, such as personal letters, personal contacts, are liked more, while leaflets are ignored or thrown away. But in Falkirk (UK), a smaller community, the policy of house-to-house leafleting has been highly successful.

- Prompting and information provision has to be a **continuous process**.

- **School-based educational programs** are an important component of the waste educational campaign. Hence children seem to be successful as “agents” advocating environmental change in others, much like block leaders encouraging door-to-door recycling.

#### **Normative influence**

- **The block-leader approach** is seen as a good tool in implementing normative influence. Block-leaders may serve as initiators of social norms within their neighbourhoods. It also appears to have the potential to produce long-term changes in recycling behaviour.

- The use of **social pressure** may be largely dependent on the extent to which residents see themselves as part of the community.

#### **Feed-back**

- Communication has to be two-way if it is to be effective.
- Lack of feed-back and not knowing what happens to the recyclables may act as a demotivator for recycling.

- Providing either individuals or groups with feedback concerning their behaviour is a commonly used technique for increasing pro-environmental behaviour. Studies show significant effects of feedback.

- People need to know how to deal with waste and what is the most important thing to do, what is happening with the recycled materials, and which are the results of their efforts.

- **Visits to the facilities** can be a very good way of showing people how the system works and making them aware of the entire system they are part of. They can also be effective in reducing NIMBY reactions or preventing them.

- **Public Participation** is one of the key components of social sustainability and creates ownership and long-term commitment. This is the reason for which ISWM schemes should promote public participation.

#### **Partnership and communication**

- Communication among stakeholders does not have a direct effect on waste behaviour, but indirectly it can make a great difference.

- Building trust among stakeholders and community, integrating efforts and initiatives of the different stakeholders, information sharing, they all represent important elements in developing an ISWM scheme and therefore they should be promoted and performed.

#### **Personal types of determinants**

Among the personal determinants, general **environmental concern** seems not to correlate with waste behaviour anymore. The most important factors that are linked to it belong to the perceptions, awareness and knowledge category and to the household socio-economic status and dwelling one. The findings are summarised below.

- **Perceptions that can work against recycling:** schemes are set up mainly for private profit, recycling of different materials is difficult or dirty (related to compost), recycling all ends up in landfill anyway.

- **Perceptions that can be pro-recycling behaviour:** people see certain materials as being most harmful to the environment.

- **Awareness** is important because it allows people to feel that they can make a difference, it encourages people to make “green” consumer choices in favour of recycled products.

- A certain type of **knowledge** is extremely important: knowledge about how the waste scheme works, which are the different facilities offered and where are they placed, what

materials can be collected and how should they be collected, which is the schedule for waste collecting for door-to-door schemes. These are actually the skills required to perform the desired behaviour and most of the time non-recyclers were found with big gaps in this field.

- Apparently, out of the socio-economic factors only the **age** seems to matter, as higher participation rates are rated for the over 45-50 age group.
- Considering the **dwelling characteristics**, the greatest distinction is between few-unit dwellings (single, double, row) and many-unit type (apartment blocks), due to the lack of storage space for recyclables and to the lack of responsibility and controlling mechanisms for waste deposition by the individual.

It is important that all these factors are analysed before designing a new scheme or changing the existing one, and the findings are incorporated and taken into account.

### **Final remarks**

The application of different solutions and instruments should be previously assessed through an integrated approach, because some strategies complement each other, while others may contradict or lead to economic inefficiency or higher environmental impact. A clear conclusion can be made, though: the system has to offer convenient facilities, easy to use, supported by appropriate economic arrangements (PAYT schemes are the most recommended), and promoted by good communication campaigns. None of the three elements should be neglected and, additionally, they have to fit the community in which they operate.

Within a large city, different solutions should be considered for neighbourhoods with different characteristics (such as dwelling characteristics, current waste perceptions and habits, average age etc.). In social marketing this is called marketing segmentation, meaning partitioning a potential market for the services into homogeneous subgroups based on common characteristics.

With regard to which is the collection scheme that can lead to the highest diversion rates (from the landfill) and lowest contamination rates, there can not be such a conclusion for a general situation. Experiences from other places and results of existing studies are meant to show which mistakes are to be avoided (don'ts) and which elements work under certain conditions (do's).

## Chapter 3 Recycling behaviour determinants in practice

### 3.1 Introduction

This chapter tries to answer the second research question, which refers to how recycling behaviour factors have been taken into consideration household waste collection schemes in the Netherlands (with a special attention to the Rotterdam case) and in Hungary (with focus on Budapest). First, background information on the general context of the waste management field in the two countries will be presented. Then an overview of the results achieved so far with regard to separate waste collection will be provided. The last part of the chapter focuses on the analysis of the different factors that lead to the results, considering the three categories of factors outlined in the theoretical framework: facilities, economic instruments and communication.

### 3.2 Household waste management in the Netherlands

The Netherlands is one of the European countries with a long history in dealing with waste management issues and with quite a special approach to them, as a result of its specific economic and environmental awareness development, and of its local geographical conditions.

The main foundations of the Dutch Waste Management Policy were laid down during 1988-1991. Seminal developments during these years included the publication of the Memorandum of Prevention and Recycling, the introduction of producer responsibility, the creation of the Waste Management Council (AOO) and the signing of the packaging covenant. In the late 1980s waste management was still practiced on a small scale, with little regard for environmental protection. Following a number of incidents involving waste, a new waste management programme was drawn up. This was designed to reduce the undesired environmental impacts of waste management activities, promote recycling and limit the regeneration of waste through prevention. The current waste policy is still to a large extent grafted onto the basis laid in the period 1988-1991, emphasising the waste management hierarchy.

Household waste accounts for about 10% of all waste generated in the Netherlands. Under the Environmental Management Act<sup>10</sup>, local authorities are responsible for collecting household waste. Local authorities must ensure separate collection of household organic waste, glass, paper and cardboard, textiles, minor chemical waste and white and brown goods. Local authorities are also responsible for the collection of bulky household waste. In this context, among other things they must ensure that there is at least one place within the municipality, or within the municipalities with which it cooperates, where individuals can bring items of bulky waste.

The sub-streams tin, plastic waste and drink cartons do not have to be separated at the source. Tin is separated for recycling at the waste incineration plant either from the residual waste before incineration or from the incineration residues after incineration. Plastic and drink cartons are generally heterogeneous in composition and heavily contaminated. Consequently, separate collection and recycling is complex and expensive. Mechanical post-separation of

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<sup>10</sup> The Environmental Management Act is a framework act, which came into force in 1993. The act introduces an integrated approach to environmental issues, taking into account the interrelationships between all the different aspects of the environment.

household residual waste with a view to using these components as fuel is a more logical processing route and one that is increasingly being used (VROM 2003).

The Programme on Separate Collection of Household Waste (AOO 1995) established levels to be achieved by 2000 for each individual component, as it follows: *paper/cardboard*: the target is a collection response of 85%, with 90% purity; *glass*: 90% collection response at 90% purity; *textiles*: 50% collection response at 90% purity.

Currently, in the waste management field, the most important policy document is the National Waste Management Plan 2002-2012 (VROM 2003), NWMP, which keeps the main goal of past waste related policies to prevention and limiting environmental pressure through waste management. Waste prevention is encouraged with the aim that the relative decoupling<sup>11</sup> between GDP and total waste supply achieved in the period 1985-2000 is reinforced. As the plan mentions it, this primarily involves stepping-up prevention by consumers and the trade, services and government sector. The recycling targets for household waste have been revised by the NWMP and they refer to year 2006. For the categories mentioned above (paper/cardboard, glass and textiles) they remained the same, as progress was slower than envisaged, and targets for organic waste, white and brown goods and minor chemical waste have been added.

The aim of the policy targeting households is to reverse the growth of household waste between 2002 and 2012 and decouple it from economic growth in relative terms. This will be achieved by following and responding to the factors that drive consumer behaviour and motivate them, by developing alternative ways of behaving and by stressing the role of the consumer as an actor in the market chain. (VROM 2003)

Regarding the organisation of waste management activities, the amendment to the waste chapter of the Environmental Management Act, which came into force on 8 May 2002, has entailed a substantial change in the duties and responsibilities of central government, provincial authorities and municipal authorities. Central government has been given a key role in waste management. The duties of provincial and municipal authorities are chiefly aimed at prevention, waste separation, licensing and enforcement.

Local authorities still retain the scope to take their own initiatives with respect to the (separate) collection of household waste. For example, they can exempt parts of their territory from the separate collection of specific waste streams. Local authorities also have the possibility of replacing house-to-house collection by a system of collection from a central point. (VROM 2003)

### **3.2.1 Separate waste collection: results**

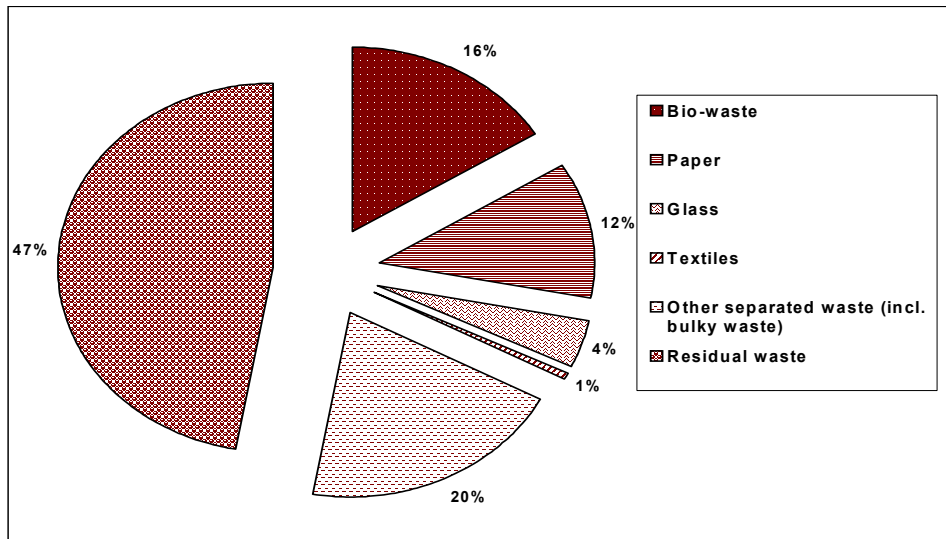
Household waste accounted for a major share of the waste that was disposed of in 2000 (almost 40%). In percentage terms the volume of household waste grew faster than the economy between 1985 and 2000. Additionally, although the total re-use and recycling in the Netherlands accounted for more than 77% in 2000, the target group of consumers (household waste) and the trade, services and government have done less well, with 45% and 52% reuse and recycling respectively. These are also the waste streams for which the level of recovery is lagging behind the targets. However, compared with the performances of other countries, the Dutch household recycling rates are among the highest and the system is one that offers a lot of good examples and lessons.

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<sup>11</sup> Relative decoupling refers to the phenomenon of the growth in the waste supply being less than the growth in GDP (VROM 2003)

It should be mentioned that Dutch authorities are not satisfied with present results, as for the last ten years they have been struggling to reduce household waste amounts, which are still rising. It has proved very difficult to make consumers sufficiently aware of the environmental consequences of their consumption and the alternatives to it that they realise the advantages of the alternatives and change their behaviour. Consumers are therefore an increasingly important target group and market actor in a chain-oriented approach. (VROM 2003)

**Figure 3.1 Results of separate waste collection in 2003**

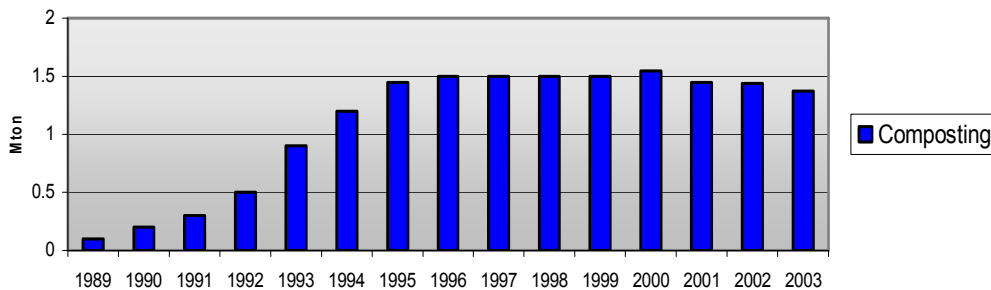


Source: Vlak 2005

The target of separate collection for household waste as a whole is 60% for year 2006, according to the NWMP, and by the end of 2003 the reached level was of 53%. In Figure 3.1 above, the composition of the separately collected waste is shown. In the same time, the composition of the residual waste includes high percentages of bio-waste and paper/cardboard waste, which shows that there is still space for improvement.

**Bio-waste separate collection**

**Figure 3.2 Success of bio-waste collection and composting**



Source: Huisman 2004

The introduction of **separate collection of household bio-waste** in the Netherlands was a great success. Introduced in 1994, even before the Landfill Directive, which lead to separate bio-waste collection all over EU, bio-waste collection and composting developed incredibly fast. On municipal level, it meant changes of the schemes in place (collection, bins,



behaviour). In Figure 3.2, the dynamic of bio-waste collection is represented. Nowadays, nearly 55% of the household bio-waste is processed to become fertiliser.

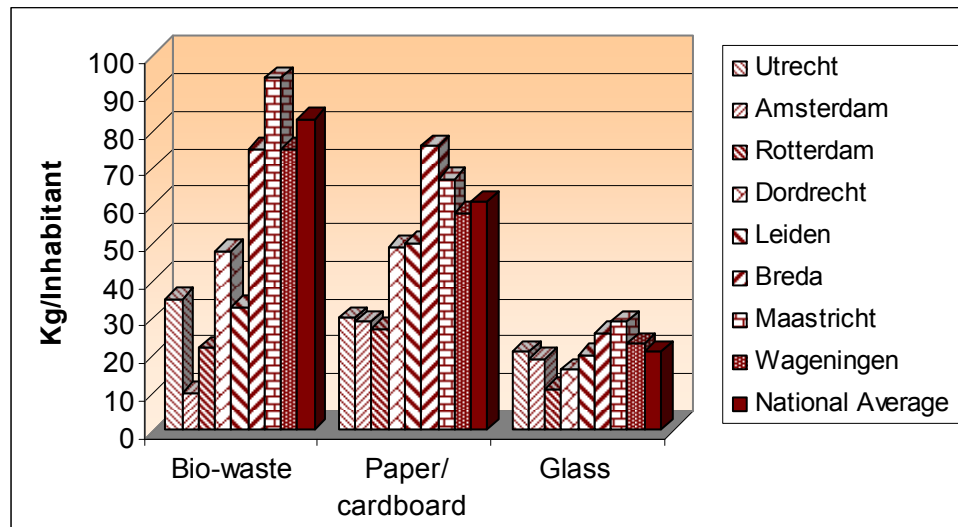
The recycling capacity was realised slower than the introduction of the separate collection. So there was an overflow. To prevent that public would loose confidence in separate collection this overflow was composted in open air facilities, which release quite the same methane emission as landfill. But landfill would have disturbed the confidence of the public (Huisman 2004). This is one of the Don'ts for a new scheme!

#### *Variation in separate collection at local level*

Regarding the **results of separate collection**, evaluations have shown that not all targets are feasible for all municipalities or parts of municipalities (VROM 2003). Consequently, the 'Incentive programme for waste separation and prevention of household waste (STAP)' formulated differentiated targets. This means that different targets apply for areas with varying degrees of urbanisation.

At this moment, for class I cities (including Rotterdam, Amsterdam, Utrecht, The Hague) the overall recycling target is 43% (going up to 60% for class III cities), while the other targets for class I are: paper and cardboard – 85%, bio-waste – 55%, glass – 90% and textiles - 50%. Differences in recycling rates of year 2003 can be noticed in Figure 3.3, which shows actually the different performances of the big cities (Amsterdam, Rotterdam, Utrecht) compared to the smaller ones (Breda, Maastricht, Wageningen), which are not the ones with the best performances in the Netherlands.

**Figure 3.3. Recycling rates in several municipalities compared to the national average rate, in 2003**



Source: adapted from the AOO web page (<http://www.senternovem.nl/uitvoeringafvalbeheer>)

The differences are due to a lot of reasons probably, but among the most important ones are the big differences in population and building density (which is much higher in large cities, leading to problems of storage, space available for containers etc.) and in social control (in smaller cities is much higher). Another difference could be the waste feeing system, as Maastricht has a PAYT system (expensive bag).

In Amsterdam, bio-waste is not collected separately anymore due to quality and quantity problems related to this waste stream, while Rotterdam will stop separate collection of bio-waste in 2006.

### ***Illegal dumping***

VROM (2003) defines illegal dumping as the situation when the discarder very consciously chooses not to dispose of the waste in the appropriate manner but rather leaves it behind unmanaged in a public place. This waste can be either household or commercial and institutional waste. Waste that is frequently illegally dumped includes household waste, garden waste, broken bicycles, batteries, furniture, and car tyres.

There has been an observed increase in illegal dumping of waste in recent years. Possible reasons for this are that the illegal dumpers feel that the collection structure does not meet their needs (frequency of collection, location and/or opening times of the municipal dump, etc.), ignorance among citizens about the possibilities for disposing of waste, the increase in the costs of processing waste, whether or not people have to pay to bring waste to the appropriate sites, systems of rate differentiation in the collection of household waste and less than optimal enforcement

## **3.2.2 Separate waste collection: factors of success and failure**

In 2004, a large scale investigation has been conducted in the Netherlands on waste behaviour. The results showed that it is very difficult to say which factors influence recycling behaviour of Dutch people (Boos 2005, pers. comm.), because situations in municipalities differ considerable.

The further analysis will take into consideration the factors that resulted to influence recycling behaviour (chapter 2), which are: facilities, economic instruments, and communication.

### **A. Facilities**

The type of scheme for separate household waste collection varies greatly from one municipality to another, and there are no guidelines on which is the most efficient scheme. The AOO advises municipalities which try to improve or to change a certain system that they should always consider: local circumstances, the type of waste which would be the most cost-effective to recycle and the arrangements that would bring the community the most important benefits (Daemen 2005, pers. comm.).

Regarding the **collection of bio-waste**, which is one of the most problematic waste streams, schemes include door-to-door collection once per week or at fortnight, neighbourhood containers and bring-in stations. More than 90% of the population in the Netherlands has access to facilities for separate collection of bio-waste.

Discussions with regard to which is the best way to deal with organic waste started very early in the Netherlands, as the legislation enforces separate collection since 1994. During the time, usually big municipalities encountered a lot of problems with separate collection arrangements and this has already led to exceptions from the obligation of separate bio-waste collection. Exceptions are stipulated for the following cases: costs are too high, the situation in the field does not provide the necessary conditions for separating bio-waste hygienically, or the collected bio-waste is so polluted that compost does not meet the quality standards. As it was already mentioned, cities like Amsterdam and Rotterdam already quit separate bio-waste collection. Recently (2003-2004) there have been discussions on whether separate bio-waste collection is the best way of waste separation, because of the important

problems occurring in big municipalities due to lack of storage space, poor quality, as well as in small municipalities as the garden waste is too bulky (Daemen 2005, pers. comm.).

## B. Economic instruments

The use of financial instruments in the Netherlands heavily relies on the following statement: *Just as water flows to the lowest point, waste tends to end up at the point where costs are lowest (VROM 2003)*. Therefore costs should be changed in order to make the most desirable behaviour become the cheapest one also. It has been acknowledged that economic incentives and the differentiation of waste fees (PAYT) helps in creating a more correct waste behaviour (Boos 2005, pers. comm.).

The number of economic instruments used in the Netherlands for waste management is quite large, targeting different waste streams and relying on regulatory provisions as well as on voluntary agreements.

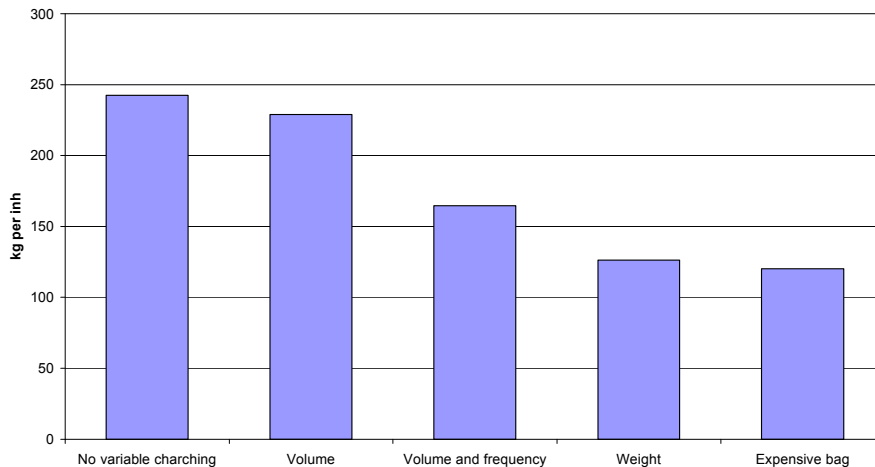
### *PAYT schemes*

A financial instrument applied by many local authorities is rate differentiation for the collection of household waste (Diftar – in Dutch). This means that households pay in proportion to the quantity of their waste arising. Currently, 89% of the Dutch municipalities have implemented a system of variable charging: 61% - on the number of persons in the household and 27% - on waste supply; the latter percentage refers to 140 municipalities (Vlak 2005). Actually, a differentiation of tariffs according to the number of persons in the household is not a PAYT scheme. The municipalities with PAYT schemes are relatively small (average size 25.000 inhabitants) and there are more rural municipalities than urban municipalities implementing this scheme.

In the Dutch municipalities, payment is determined based on one of the following systems:

- **Volume:** tariff based on the volume of the container (39 municipalities);
- **Weight:** tariff based on weight of the waste (19 municipalities);
- **Frequency:** tariff based on how often the container was put on the kerbside to be emptied (always in combination with the volume of the container (55 municipalities) or weight (4 municipalities);
- **Expensive bag:** Only special waste-bags are accepted which are sold by the municipality (20 municipalities).

**Figure 3.4 Supply of residual waste per type of PAYT scheme**



Source: *Vlak* 2005

The results of the variable charging system in the Netherlands are shown in Figure 3.4 above. However, it is not known whether results are due to the improvement of a system of separate collection, or to the introduction of rate differentiation, or to the simultaneous use of instruments such as communication (VROM 2003). Moreover, VROM (2003) argues that it is not easy to establish the extent to which the reduction of the residual waste is because of undesirable evasive behaviour, for example so-called waste tourism (taking waste elsewhere) or illegal dumping.

However, Dijkgraaf (2004) states the following, as a result of his PhD research: “Given the high population density of the Netherlands and the lack of anecdotal evidence, it seems implausible that a large part of the reduction in unsorted waste is due to illegal dumping. Therefore, it seems likely that the introduction of unit-based pricing results in a significant change in citizens’ behaviour”. In the same time, he considers that the effects of unit-based pricing (Diftar) in the reduction of the waste amounts may be even higher in “green” municipalities.

Bartelings (2003), who investigated the direct and indirect effects of introducing PAYT schemes in the Netherlands found out that it is not cost-effective to introduce unit-based pricing for waste collection in large municipalities, because of possible leakage and other adverse effects (illegal dumping).

Relate to the Dutch situation, VROM (2003) concludes that it is impossible to give any general advice on the introduction of rate differentiation, because local circumstances determine the effectiveness of such a system, the scale of the undesired side effects and the possibilities of limiting them. It is therefore up to the local authorities themselves to weigh up the advantages and disadvantages and to take a decision on rate differentiation.

#### ***Deposit-refund system***

In the Netherlands, a deposit-refund system is in place for some packaging materials (such as plastic bottles of over one litre, beer bottles) and it is quite efficient in achieving reuse.

***Non-compliance fees*** (penalties applied for misbehaviour) are applied in the Netherlands, and new arrangements have been introduced by the NWMP (VROM 2003), but an assessment of their effectiveness has not been undertaken.

#### ***Landfill tax***

The landfill tax has been introduced in order to make the tariffs in accordance with the waste hierarchy. The tax on the landfill of waste introduced in 1995 has an important controlling effect. The average charge for landfill is now approximately 115 EUR per tonne, while the incineration tax is 100 EUR per tonne for non-hazardous waste. Unlike a number of years ago, there is no longer any financial incentive to landfill many waste substances instead of incinerating them.

In addition to the landfill tax, there is also a landfill ban for 35 waste streams (including all combustible and recyclable materials). Thus, regulatory and economic instruments are both used to achieve less waste ending at the landfill.

In the communication campaign, the Dutch Government is also referring to economic instruments, since the message is that “if you recycle more, it costs you more!”

However, up to now, local waste taxes have more than doubled, in order to cover all the costs for separate collection, recovery and disposal capacity, and guarantee environmental protection.

### ***Producer responsibility***

At this moment, the Netherlands has implemented the producers' responsibility related to batteries, packaging and electric and electronic waste (out of the household waste category).

Regarding packaging waste, VROM has signed voluntary agreements with the industry, the so-called Covenants, and the last one is Packaging Covenant III in 2002. The agreements introduce targets for the reduction, recovery, and recycling of different types of packaging waste: paper fibre, glass, wood and plastics, for which the industry committed itself to achieve.

The Netherlands complied already with the recovery and recycling rates set by the Packaging and Packaging Waste Directive, except for the plastic waste, which is usually incinerated together with the residual waste.

### **C. Communication**

Communication is and remains one of the cornerstones of Dutch waste policy. For very large and/or heterogeneous target groups like consumers and small and medium-sized enterprises in particular, the realisation of the desired management of waste stands or falls by good communication (VROM 2003). The purpose of communication is to create a basis of support and to ensure that target groups are familiar with and come to understand policy and legislation that affect them. It is a question not only of communication during preparations, so as to allow for the wishes and possibilities of the target groups to be taken into account, but also following the establishment of policy and enactment of legislation.

More so than in the past, when designing information campaigns the question of who would be **the most effective 'broadcaster'** of the message is being asked. This means that the players in the field, e.g. the business community, environmental organisations, financial institutions and branch organisations can be asked to play a part in providing information. Proper coordination between these organisations and a common 'message' are important conditions for getting this approach to succeed. As an example, in 2005 a national communication campaign related to waste management has been launched by VROM, but its development has been done in partnership with municipalities, so that local and national initiatives complement each other and that the national campaign will fit the situation in the country.

Also, **the importance of the municipality's image in the community** has been acknowledged, for a communication campaign to be effective (Daemen 2005, pers. comm.). This issue is of high importance due to the fact that waste collecting is one of the only ways in which municipalities get in direct contact with their residents. As a consequence of the "image" issue Clean Holland (a foundation financed by the industry sector) conducted a national anonymous campaign concerning littering, during 2005, so that people would not relate it to any organisation and the waste problem would not be linked with anything else.

In the Dutch communication history regarding waste, the first step was to offer recycling facilities and information (late 80s & early 90s). At the same time, people being excited about recycling, as a new thing to do, separate waste collection rates registered a very good progress (as previously shown). In the after-phase there were not enough information and communication activities, and this is one of the factors that lead to stagnant recycling rates. Therefore, the lesson to be learned is that **communication has to be done continuously**, even though not with the same intensity. (Daemen 2005, pers. comm.)

In the field of communication tools, **mouth-to-mouth communication** and **direct contact** are considered very important (Boos 2005, pers. comm.). An interesting example is that of a municipality that invited all hair-dressers in the town to visit the recycling facilities and the landfill, so that they would understand and experience what recycling activities are all about and how they operate. It was considered that at the hair-dresser people discuss a lot about different things and therefore this direct exposure and then communication to the public could have important results.

**Surveys** are another tool quite often used in the Netherlands in order to get feedback from the public with regard to whether they are satisfied or not with the existing waste management scheme. They are also used in order to assess people's perceptions, beliefs or considerations, when changes are intended to take place. This is actually one of the recommendations that AOO gives to municipalities when they are trying to bring a change into the existing scheme (Boos 2005, pers. comm.). However, direct public participation in the planning phase, of the local community, is limited.

Introduced under the communication category of behaviour determinants, **partnership and communication among stakeholders is so well developed in the Netherlands, that it should be seen as a separate determinant in itself**. The entire Dutch waste management system is built on a very good partnership and cooperation among local, provincial and national authorities, and also on voluntary agreements with the industry. The existence of AOO as an intermediate organisation is essential in this respect.

Having in regard that here the sphere of cooperation overrides the limits of a community waste management scheme, it should be considered as a different factor, and perhaps it would be best to call this new category of factors "**institutional arrangements**". As already mentioned for the partnership and communication sub-category, it is not an instrument with direct effects on recycling behaviour, but it is one that contributes strongly to it (indirectly).

In 1990, the foundation of this partnership was formalised, as the Waste Management Council (AOO) was established as a governmental platform for consultation, co-ordination and co-operation between the national, provincial and municipal authorities on waste management policy in the Netherlands. The Council, with four representatives from each public administration level, is lead by an independent chairman. The Councils' tasks are settled in a co-operative agreement, without affecting the existing competence of these administrations. The Council brings together political representatives in a decision-making body, while the executive responsibilities of AOO are undertaken by the AOO Bureau, which is now part of SenterNovem agency (executive agency under the Economic Department).

In 2000, AOO was assigned the following primary tasks: advising the government on a sustainable, coherent and cohesive waste management policy; monitoring and evaluating progress on implementation of waste management policy; supporting the national government with drawing the NWMP and advising on interim amendments; supporting the provincial and national government with licensing issues; supporting local authorities to optimise prevention and separate collection of household waste; managing the executive office as a central information centre on waste.

One of the main projects of AOO, at this moment, related to household waste management, is the STAP Scheme, an "Incentive Programme for Waste Separation and Prevention of Household Waste", launched in 2001. The programme includes a large number of projects for encouraging waste segregation and waste prevention. Key concepts are customisation of the municipal services according to the needs and convenience of the local community,

monitoring in combination with benchmarking and communication. STAP offers the municipalities the instruments to achieve separation, as it provides best-practices examples, guidelines for the implementation of communication campaigns, recommendations for the different issues that they should take into account and also financial support to assist them in improving the separate collection. It is updated each year.

A special financial programme coordinated by AOO, for municipalities, is the “Subsidy scheme for measures to reduce environmental pressure” (SAM). SAM also started in 2001 and has a budget of 2,4 million EUR each year. Up to now 226 projects have been subsidized for plans design and execution related to the improvement of collection systems, communication and monitoring. In total, 289 municipalities participate (>60%). A new impulse for municipal waste separation has been achieved, but quantitative effects are not known yet. (Vlak 2005)

#### **D. Personal determinants**

Regarding personal determinants of waste behaviour of the Dutch people no specific study or detailed information has been found. Some remarks have been pointed out during the interview with Jo Daemen and Ageeth Boos (AOO, June 2005), and these are the following:

- A lot of people still believe that **although collected separately the waste gets to the landfill after that**. An incident happened in 1988, when a journalist noticed one of the plastic bags with organic waste being thrown together with the rest of the waste, was one of the events that lead to this negative belief. This shows that after people are asked to separate their waste, the authorities have no right to mistakes, as these mistakes could ruin the entire system.
- When **PAYT** schemes are introduced there is a **negative common belief that it will cost more**. This is why it is better to discuss with the community (maybe even with the most negative believers) and convince them of the positive effects, before the scheme is in place.
- The **general environmental concern in the Netherlands is lower nowadays** than it was in the 80s when separate waste collection began. This could be one of the reasons why recycling rates do not increase anymore and illegal dumping grows.
- The **children are the category of the population for which recycling is the easiest**. They are taught in school on what to do with their waste and this is the only way they know how to deal with it. For the other categories, behaviour varies greatly.

### **3.2.3 Study case: Rotterdam municipal waste management system<sup>12</sup>**

Rotterdam is one of the four large cities of the Netherlands and one of the largest harbours of the world. Always being an important city, Rotterdam has been an attraction for immigrants and nowadays more than 50% of the population is of a different origin than Dutch. This makes the job of urban managers in Rotterdam very difficult. The waste management sector is actually one of the most influenced by this situation. The total population of Rotterdam is now about 600.000 inhabitants, comprising 280.000 households.

Waste management in Rotterdam is done by a company owned 100% by the municipality, Roteb, which has the monopoly for the household waste collection in the city. Roteb started

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<sup>12</sup> The analysis of the waste management situation and system in Rotterdam has been done mainly based on the direct discussions held with Mr. Stephan van Hoorn, Head of the Communication Department within Roteb, and on the documents and data provided by him.

10 years ago a new programme targeted mainly at increasing recycling within the city, but also aiming to improve the general environmental quality in the city, to develop a more convenient scheme for the public, and to make the scheme more cost-effective.

The overall recycling target established back then was of 44% for household waste, but they only managed to reach a rate of 22% at present. Currently, Roteb provides facilities for the separate collection of paper/cardboard, glass, bio-waste and textiles door-to-door or by neighbourhood containers, and for 25 other different waste streams by bring-in stations.

Regarding the other indicators of success for the separate waste collection scheme, participation rate is believed to be around 50-60%, but it is very difficult to find out the real value, because “when asked about it people answer positively anyway” (van Hoorn 2005, pers. comm.). However, the contamination rates of the dry recycled materials are very low, and last year Rotterdam had the cleanest collected glass in the Netherlands. In the last years, the situation has also improved very much for the textiles, as in the beginning recycling rates were very low. The contamination of the bio-waste is the highest among the different waste streams and it leads to a very low compost quality.

Another indicator that could be used is illegal dumping, and in the case of Rotterdam this can be quantified by the number of complaints received by phone, which is around 80.000 per year and most of them relate to illegal waste dumping or to bulky waste dumping.

## A. Scheme characteristics

### Facilities

Currently the waste management scheme in Rotterdam includes the following:

a) **Underground containers** (4.700) for residual waste, paper/cardboard and glass. These containers can be categorised as neighbourhood containers and their distribution is planned to ensure that the closest container is at maximum 75 metres from the door (distance established by law). This kind of system is characteristic for most of the city, with the exception of high-rise buildings neighbourhoods and residential areas. However, in these areas, underground containers exist for the dry-recyclables, but their distribution is not as dense. The underground container scheme has been introduced because it makes the job easier for the Roteb personnel, it improves the image of the city and in order to improve waste separation.

It is believed that the recycling rate is so low because the scheme is a very recent one, and people had to get used to it first. The next step, on which the future communication strategy relies upon, is stimulating waste separation. Still, it is believed that so far this system is quite a success (van Hoorn 2005, pers. comm.).

One of the facilities-related parameters identified in chapter 2 as influencing behaviour is visibility and appearance of the neighbourhood containers. In Rotterdam, this fact has been taken into account and a lot of containers have been painted with very colourful drawings, which increase their visibility and makes them much attractive. Another parameter was the design of the containers' opening, which should be in such a way that it would not allow the introduction of other waste than the desired one. Rotterdam is also a good example in this respect. Exemplifying photos are attached in Annex 7.

b) **Door-to-door collection** of the residual waste and bio-waste, collected separately in wheel-bins, in residential areas with low density (houses with gardens – around 70.000



households). Bio-waste and residual waste are collected once in two weeks, alternatively. In these areas, Roteb also rents composting bins, for those who want to compost at home.

Bio-waste is now collected only in these areas, but contamination rates are very high, possibly because people do not like handling the bio-waste separately, due to the smell, dirtiness, the fact that it attracts insects, especially in the summer. The period between the collection times is also considered too long (two weeks). In 2006, Roteb will stop collecting bio-waste separately, due to all the difficulties (low quality, low quantity, high costs and almost the same environmental impact), and instead it will use the same bin for paper/cardboard waste. Residual waste will be collected once per week.

c) In the hot-spots of the city (comprising about 20.000 houses in high-rise buildings – usually from two to many-storey buildings) the collection of the residual waste is organised by means of **collection containers placed on the street**, because there is not enough space to place underground containers there. In the same time, the containers can not be too big and the residents can not keep their waste for too long inside their houses also because of the lack of storage space, therefore collection is done twice a week.

d) **Bring-in stations** (five) for 25 different waste streams, including types of bulky waste (electric and electronic waste, furniture, garden waste etc.), types of hazardous waste, and the other types of waste regularly collected in the underground containers. Out of the total bulky waste in Rotterdam, 50% is collected through the bring-in stations. Therefore, it is very successful.

e) **Containers for textiles**, usually placed in transit places, so that people see and use them easier.

### **Economic instruments**

In Rotterdam, residents pay a flat waste fee per year (223,20 EUR in 2005), without taking into consideration the number of persons in a household or other characteristics. This is caused by the high percentage of immigrants, as there are not exact data with regard to each family and its members.

Producers' responsibility is applied locally through a project developed in partnership by Roteb and the packaging industry, which is targeted towards separate collection of PET bottles of 0.5 litres, in bins placed in public places (schools, university, shops etc.).

### **Communication**

In terms of communication, the following are to be mentioned:

- Prompting and information provision has to be done **continuously**, so that people are informed on what is happening and they trust the system. In the case of Rotterdam, having in regard that Roteb will not collect separately the bio-waste anymore, it is important that people understand why they took this decision.

- With regard to prompting, Roteb considers that the most important thing is to use **diverse communication tools** (leaflets, media, advertisements, face-to-face meetings). The **personal contact** through meetings is extremely helpful; especially in communicating to the immigrants (it is important also to speak their language). The story-teller type of brochures or materials is also considered useful.

- The Communication Department of Roteb has 16 employees, while seven years ago there were just three. This shows the importance Roteb gives to their communication

activities and the recognition that waste management schemes need proper communication strategies and campaigns.

- Public participation does not exist in the waste planning process or when deciding what scheme to choose.
- It is acknowledged that providing feedback to the participants in the scheme is an important aspect of the communication strategy and in the next campaign it is much better integrated.
- Surveys among the public are continuously being done and depending on their results Roteb adjusts the communication strategy or develops new ones.
- The local communication campaign is developed taking into account the national one, developed by VROM, so that their results are strengthened.
- Roteb undertook a survey in March-April 2004 (Right Marktonderzoek 2004), on 19 persons, through focus-groups and in-depth interviews, with regard to how can communication stimulate citizens of Rotterdam to separate their waste and what approach and what tone of voice should be used. The survey has revealed the following: the communication campaign has to increase the knowledge of the participants and to emphasise the positive attitudes by trying to change mentality (increasing the coolness of separating waste); the messenger should be a famous person from Rotterdam (not a famous Dutch person in general), for the children it can be made more recognisable by using a cartoon character; the tone of voice should not be a reproach and it should not include something abstract.

## B. Personal characteristics of the community

- The **negative belief that everything goes to the incinerator**, even though it is collected separately still exists in Rotterdam also. It is a strong belief and it is very difficult to change it. Current campaign tries to point out that a lot of things are made of recycled material, which means that recycled materials are not going to the incinerator.
- With regard to **socio-economic factors**, Roteb does surveys each year in order to analyse the composition of waste collected from different neighbourhoods and results show no difference between the different income-level neighbourhoods.
- The same survey (Right Marktonderzoek 2004) has also pointed out some interesting issues with regard to the personal factors:
  - **Lack of knowledge** regarding what happens if they separate the waste and what happens if they do not, which are the types of waste to be collected separately, locations of the bring-in stations and how to use the existing facilities.
  - **Perceptions that can be pro separate collection behaviour:** separate collection is part of your basic education, duty, automatism, it improves the living environment, it takes a small effort and it is useful.
  - **Perceptions that can work against waste separation:** waste separation is useless, not possible in many neighbourhoods, a dirty job (flushing the bottles or composting), too much effort, it is the responsibility of Roteb not theirs, it is not hygienically if containers are not picked up regularly.
  - **Barriers of separate waste collection** – lack of time, questioning the use of waste separation, lack of knowledge about the different types of waste to be separated, lack of

space in the house, full containers on the street, lack of means of transportation, part of a subculture – not caring or not being really into waste separation.

### **3.3. Household waste management in Hungary**

“In the field of **waste management**, legislation in Hungary is in line with the *acquis*. Administrative capacities are in place and function. The setting up of local waste management plans needs to be completed. The establishment of collection systems and recovery and disposal facilities needs to continue.” These were the conclusions of the European Commission in 2003, having in regard the accession of Hungary on May 2004 in the European Union.

Although the waste related legislation has been transposed, the main challenge for Hungary, as well as for Romania, is its implementation. Considering the huge costs accompanying the development of waste management infrastructure, a set of transition periods has been granted (i.e. for complying with the Landfill Directive, with the Packaging and Packaging Waste Directive).

With regard to household waste management, according to the legislation in force, municipalities are responsible for the collection and incineration of municipal waste, while local dwellers are obliged by law to use these services.

The Hungarian Waste Management Act determines three stages of creating waste management plans:

- The **National Waste Management Plan** was prepared by the Ministry of Environment and Water; it was accepted by the Parliament in November 2002.
- The **Regional Waste Management Plans** were prepared by the environmental inspectorates, the plans were officially announced in November 2003.
- As a last stage of planning, municipalities prepared the **Local Waste Management Plans** in 2004.

These plans are valid until 2008 and they will be revised in every second year. The significance of these plans is to determine all the professional requirements, which have to be taken into account by the initiators of the waste management investments. After the acceptance of these plans only those investments can be financed in Hungary, which are in concordance with the above mentioned Waste Management Plans.

#### **3.3.1 Separate waste collection: results**

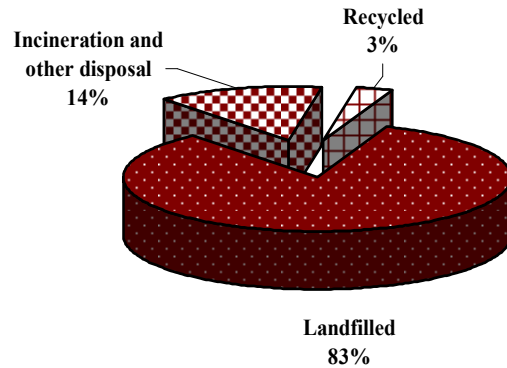
In 2001, only 86.5% of the households had regular access to organised waste collection (UN 2004). The same source mentions that there are some local initiatives for separate waste collection, but the results are rarely satisfactory.

According to the NWMP, until 2005 the selective waste collection has to be extended, reaching 40% of total population. By 2008, 60% of the country's total population has to be involved in selective waste collection.

Municipal waste includes about 4.6 million tons of municipal solid waste; about 62% of this comes from households. Only 3% of municipal wastes collected in the scope of public utility service is recovered (see Figure 3.5 below). In total, excluding the recirculation of agricultural crop remains, the ratio of recovery falls short of 30%. The achievement of this performance was made possible only by the introduction of the product charges system, as a

result of which about 35% of packaging wastes, about 95% of waste batteries (although abroad) and 40% of spent oils are recovered.

**Figure 3.5 Distribution of municipal waste treatment in Hungary in 2001**



Source: NWMP 2002

Regarding bio-waste, it represents about 35% of the total solid urban waste fraction and until now several pilot projects have been running with successful results (97% purity), according to the Hungarian Compost Association ([www.compostnetwork.info](http://www.compostnetwork.info)). According to the derogation period from complying with the Directive on Landfills, Hungary has to reduce the biodegradable organic matter content disposed of in municipal landfills as compared to the quantity generated in 1995, to 75% by July 1, 2004, to 50% by July 1, 2007, and to 35% by July 1, 2014. Of wastes containing biodegradable organic materials, primarily the landfilling of bio-waste found in municipal waste (organic kitchen waste, green wastes from gardens and public areas) and of paper should be gradually decreased. In the first period mainly home composting and home use of waste should be promoted. (Hungarian NWMP 2002)

### 3.3.2 Separate waste collection: factors of success and failure

#### A. Facilities

The Hungarian Ministry of Environment and Water (2002) plans to introduce, within the complex waste management system, selective collection by means of:

- Waste paper, plastic, glass and other waste accumulated on collection islands and the waste of kerbside collection is transported to sorting facilities where after its separation and preparation to meet the demands of industry, the waste is transferred to a recovery plant.
- The separately collected bio and green waste is transported to composting sites where the produced compost, according to its quality, can be used as low grade fertiliser or for various land recultivation purposes.

Details on concrete separate waste collection schemes have not been found, excepting Budapest, which is presented in the next chapter.

#### B. Economic instruments

Regarding the economic instruments used in Hungary in order to achieve the Government's objectives related to waste management, most of the instruments identified in Chapter 2 are present here. Moreover, a new economic instrument has been identified: subsidies, grants and loans.

### **Pay-as-you-Throw schemes**

From January 1, 2003, under Government Decree no. 242/2000 (XII. 23) Korm every municipality has to use a fee system which is proportional to the quantity of the service (in all likelihood fees based on the number of discharges) and fees which cover the expenses of the service, and the fees must provide coverage also for the costs of landfill after-care.

### **Deposit refund**

The Hungarian National Waste Management Plan states that, among the most important measures to be taken in the field of packaging and packaging waste, the use of reuse systems shall be encouraged and effective regulations shall be provided for placing the products on the market with deposit on returnable packaging.

### **Producer's responsibility**

In order to achieve the targets established by the Directive for Packaging and Packaging Material, a system of selective collection from the population shall be established covering at least 4 million people in 2005 and at least 6 million people in 2008, relying mainly on co-ordinating organisations built on manufacturer's responsibility. Its operation shall be achieved through the involvement of the public utility service and the waste trade and the retail trade, by avoiding the double collection system and using cost reimbursement from the payment made by the manufacturers. The complex system developing in the course of the implementation of the municipal waste treatment programs shall provide facilities that guarantee the separate collection of packaging waste (waste collection islands, container yards, sorting stations, perhaps house-to-house collection).

The *Waste Management Act*, which came into force in January 2001, authorises the Hungarian government and also local authorities to issue decrees requiring producers to collect waste selectively and to mark the product to facilitate waste management. The Act also provides a timeframe of Hungary's implementation of the EU packaging recovery and recycling targets. All parties covered by the obligation are to ensure that not less than 50% of packaging waste is recovered and at least 25% recycled, with at least 15% of each material recycled, by 30 June 2005. This was the date envisaged for complete implementation of the *Packaging and Packaging Waste Directive's* provisions, which has been delayed till 31 December 2012 ([www.euractiv.org](http://www.euractiv.org)).

The *Decree on Packaging and Packaging Waste* was adopted in May 2002 and came into effect on 1 January 2003. Packaging which does not comply with the Decree must be withdrawn from circulation by 1 January 2004. Take-back, recycling and recovery will be the responsibility of the packer or filler. In the future, this might be extended to include the distributor. Within this scheme the waste producers and traders in order to meet their responsibilities, establish an independent body. This takes over their responsibility in exchange for paying a fee according to conditions laid down in a contract; organises and co-ordinates the collection, recovery or disposal of all waste flows, covered by its activity.

### **Subsidies, grants and loans**

In Hungary there is a high need for new infrastructure if it is to achieve the obligations set when joining EU, and, therefore, huge financial resources are needed to finance it. The answer to this problem was governmental subsidies and financing schemes, EU pre-accession funds, EU Cohesion and Structural Funds, loans from international banks (EBRD, EIB), grants from different other international organisations. This type of instrument does not have direct effects on waste behaviour, but indirectly it does, as it provides the resources for

facilities and communication campaigns to be developed. An important element related to this instrument is that usually the financing rules ask for integrated and sustainable waste management measures, so that sound waste management initiatives are financed.

In Hungary with the beginning of the applications for the ISPA pre-accession fund, the establishment of complex waste management systems has started. 12 waste management ISPA projects have been accepted, these involved 3.6 million inhabitants of 1247 municipalities. The aim was to provide up-to-date waste management in all settlements of the country. In order to achieve this, after the closing of ISPA funding, further investments are planned for the 2004-2006 period using the financial resources of the Cohesion Fund.

In addition to the subsidies of the European Union, the Government also provides Hungarian financing possibilities to develop waste management schemes. Within the programme, the following types of projects may receive support in case of successful application: waste management planning and activities being in connection with this task; collection of abandoned waste; handling of green waste, organizing the selective waste collection; closure and recultivation of landfills; prevention and recovery of waste. In the period 1996-2000, it provided a total of 5812 million HUF (approximately 2,5 million EUR, for an exchange rate of 1 EUR = 240 HUF) support to the municipalities for the establishment of 48 municipal solid waste landfills, amounting to 45% of the total investment amount.

#### **Landfill tax**

There is not a landfill tax in Hungary, which makes landfilling the cheapest alternative for waste disposal. In the same time, it makes the waste fees paid by the population also very low (average waste fee per year in 2002 was about 37 EUR), and therefore the public is not encouraged to reduce or recycle their waste.

#### **C. Communication**

Within the complex waste management programmes (financed by Government subsidies, EU funds etc.) significant resources are planned to ensure the public acceptance of the establishments to be built and creating the bases for their use in broader range. (NWMP 2002)

In a study of OECD (2003) it is mentioned that considering the fact that the waste management problem can be solved via public participation, the most important task is to increase the environmental awareness of people, especially of the younger generation. Several programs started already on environmental education.

#### **3.3.3 Study case: Budapest municipal waste management system<sup>13</sup>**

Budapest is the capital city of Hungary and has a population of over 1,8 million inhabitants and more than 2 million visitors yearly. Budapest has only a recent history in separate waste collection, but its experiences are valuable for the case of Bucharest.

Budapest is administratively divided into 23 districts, each of them with its local city hall and city council. The district city councils are the owners of the public space within their districts.

At Budapest municipality level, the policy documents in the waste management field are the Waste Management Plan, which is reviewed each three years, The Local Law and the Local Action Plan. The municipality has the role of developing and promoting them.

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<sup>13</sup> The information and data on the waste management scheme in Budapest mainly rely on the interviews held with Mrs. Dorottya Nick , Ms. Annamaria Battari, and Mr. Peter Szanto

The waste management company dealing with household waste in Budapest - Fővárosi Közterület – Fenntartó RT (FKF RT) - is owned 100% by the municipality, as waste collection is a public service to be provided by the municipality. FKF RT has a long history in this field, as waste collection started in Budapest before 1900. The company has a contract for 10 years, up to 2008, and has the monopoly for the collection of household waste. The investments in separate waste collection and other facilities are financed by the municipality, while the operational costs are covered by the waste management tax, which is paid by consumers.

Budapest started quite late, compared to Rotterdam, separate waste collection, and this is the reason for which their results are much modest in this respect. The important thing is that although separate collection was widely spread in the entire city only in the last two years, they already managed to reach a recycling rate of about 5%. In the same time, Budapest is now in the middle of the developing process, as the number of facilities is foreseen to double by the end of 2009, the communication campaign is under going and authorities learn by doing how they can improve the scheme.

## **A. Scheme characteristics**

### **Facilities**

Selective collection of recyclables started in 1993 when they began collecting dry batteries. 1000 special boxes (see Annex 7) have been placed in public institutions (schools, universities, municipality offices etc.). Meantime, the number of boxes increased and better locations for them have been found (more easily accessible to more people). The improvements lead to an increase in the total quantity of dry batteries collected from 16,86 tonnes to 41,05 tonnes.

The selective household waste collection scheme also includes the following types of facilities:

- **“Waste islands”**, which are actually neighbourhood containers type. The separate collection in the waste islands started in 2003 in 100 locations. The second stage was in December 2004, when 250 more waste islands were installed. There are about 350 waste islands at this moment and the plans envisage a total of 600 by the end of this year, and a total increase up to 1.100 by 2009. At the waste island there are separate containers for collecting white glass, coloured glass, paper, PET and metal can waste. Participation and recycling rates are still very low, but they are considered to be quite good, considering the recent implementation of the scheme. Contamination rate is also quite low (around 7%).

Illegal dumping is very common in the near-by of the waste islands. Each morning there is dumped waste next to the recycling points, meaning other types of waste than those that are collected at the waste islands. In the beginning there were a lot of complaints from the population about this, and therefore FKF decided that it is better to make a tour of the waste islands each morning, in order to collect this waste.

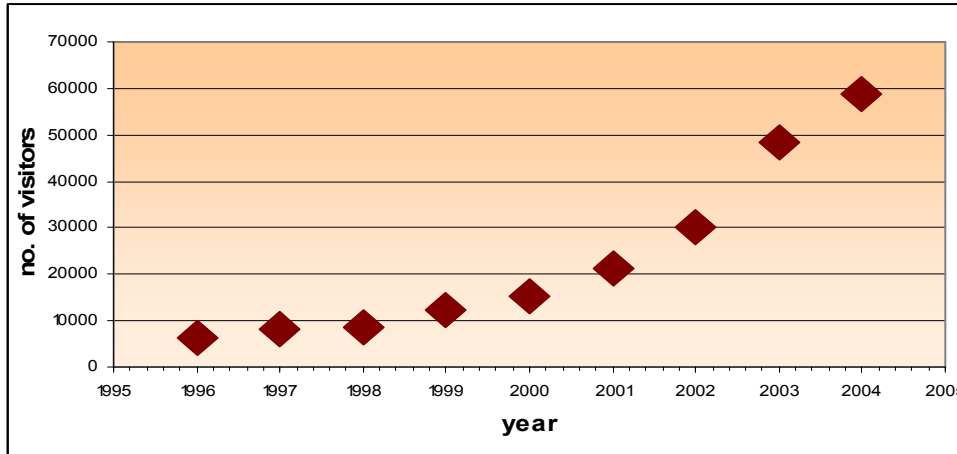
Other problems related to the containers is that they are made of plastic and sometimes people throw burning materials inside, which leads to damages of the containers (especially of the paper containers).

- **Waste yards** have been opened in 1996 and now they count 14 such places. Here people can dispose of more waste types than at the waste islands, including electric and electronic waste, oil waste, tetra-pack, dry batteries, accumulators etc. Regarding the settlement of the waste yards, there have been strong opinions against their locations, as NIMBY reactions. In the next 5-6 years their number will increase to about 45 waste yards.

At the waste yards, **contamination rates are very low**, because there is personnel helping residents to put the materials in the right container.

The acceptance and use by the public of the waste yards was not very good from the beginning, but it improved quite significantly in the last two years. This could be correlated also with the efficacy of the communication campaign. The evolution of the participation rates for the waste yards is shown in Figure 3.6, below.

**Figure 3.6 Evolution of the number of visitors at the waste yards**



Source (FKF 2005)

Bio-waste is not collected separately yet. There are pre-contracts with the districts at the edges of Budapest (with a low housing density and gardens) for beginning a scheme under which FKF would provide small composting facilities to each house.

### **Economic instruments**

The waste fee that has to be paid by households for their waste is based on the volume of the container they owe and on the frequency of collection. So, it is a PAYT scheme. Maybe this is the reason for which illegal dumping in the neighbourhood of the waste islands is so frequent.

On the other hand, in Budapest, at least in the central part, the housing buildings are collective, not individual, therefore households do not feel the consequences of their individual behaviour if producing more or less waste. Consequently, this PAYT arrangement does not affect waste behaviour although it translates in practice the *producer pays principle*.

### **Communication**

The communication (PR) campaign is the responsibility of the waste management company, but the funds are secured by the municipality.

The Communication campaign relies greatly on leaflets but it also includes TV advertisements. It started in December 2004, when the system got to have 350 waste islands in total. There are two different types of leaflets, put twice a year in all mailboxes in the city. The first leaflet explains how the system works, which type of waste should be placed in each container and what should not be placed there. The second one is particularised for each district and it provides the map of the district with marks on where the waste islands are placed.



Contact details are considered an important element for their communication materials. It is important that people have a number or a web page for more information or answers to particular questions. It also offers more trust in the scheme and its managers (Szanto 2005, pers. comm.).

Communication among the Budapest municipality, the district city halls and the local Environmental Protection Agency is very difficult. The misunderstandings with some of the local city halls have important implications for the waste collection scheme, as sometimes they can not reach an agreement on the location of the “waste islands” or those of the bring-in stations.

During the discussions it was noticed that also communication between central government and local authorities is not very good, and the role of the central government is limited to preparing legislation and policy documents, but the implementation of the legislation is actually the job of local authorities and they would need more support in achieving this. Related to the communication issue, the study of the Austrian Association of Cities (2002) on countries in Central and Eastern Europe argues that “the most striking problem is the failure to communicate. Local authorities rarely communicate with each other, have poor internal co-ordination between municipal departments, and have insufficient systems of consultation with local stakeholder groups.” Considering the issue of communication within the municipality, the personal experiences with the Budapest municipality have proven quite the contrary.

## **B. Personal characteristics of the community**

With regard to the socio-economic characteristics, it was noticed that illegal dumping appears in all neighbourhoods, but the amount of waste dumped next to the waste islands is less in the higher income ones.

No information could be found in relation to the other personal factors of waste behaviour.

## **3.4 Conclusions**

The main conclusions of this chapter are summarised below. Important findings are the identification of a new indicator for waste behaviour (illegal dumping), of a new determinant of waste behaviour (institutional arrangements) and of a new type of economic instrument (subsidies, grants, and loans).

**Illegal dumping** was found to be an important problem of municipalities in the Netherlands and in Hungary. It is defined by VROM (2003) as the situation when the discarder very consciously chooses not to dispose of the waste in the appropriate manner but rather leaves it behind, unmanaged, in a public place. It could be measured by the number of complaints regarding illegal dumping, by the number of incidents reported by the employees of waste management companies, or by the quantity of dumped waste.

Regarding **facilities**, the fact that there is no definition for a “best waste management scheme”, as local circumstances must be taken into account, has been confirmed by AOO. **Bring-in stations achieve very good recycling and participation rates**, especially for the bulky waste. **Bio-waste is very difficult to collect separately in large cities** where the costs, the environmental impact and the produced nuisance are too high, while the quality of the compost is too low (Amsterdam and Rotterdam serve as examples).

Considering **economic instruments**, it has been acknowledged, both in the Netherlands and in Hungary, that economic instruments have an important role in creating a more sustainable waste behaviour. Thus, in both countries, the use of economic instruments is widely spread

and most of the findings of the literature (chapter 2) are confirmed. Landfill and incineration taxes are important in creating incentives for municipalities and waste management companies to improve their separate waste collection schemes. There is still not enough information of the effectiveness of enforcement incentives, although they exist both in Hungary and in the Netherlands.

**PAYT** schemes have been used in the Netherlands for some years now and opinions about their effectiveness and their direct and indirect effects are still not entirely known. However, it is commonly agreed that they are one of the most effective policy tools in reducing generation of household waste. They may also lead to adverse effects.

One more economic instrument that may influence waste behaviour has been identified: **subsidies, grants and loans**. Hungary needed and used (and it is still using) this type of instrument in order to upgrade and develop their waste management infrastructure, because this action requires huge amounts of funding. As a result, special financing instruments have been created at national and EU level to help the country to comply with the EU directives (PHARE, ISPA, SAPARD, Cohesion Fund). The same thing is true also for the Netherlands (STAP, SAM), although in this case, probably more funding was provided by the national government, and the projects are targeting more the improvement of the existing schemes.

**Communication** is one of the cornerstones of the Dutch waste policy and it is probably one of the factors of its success. Some of the findings, confirming the theory, are: the need for continuous communication campaigns, important communication tools are direct contact communication and surveying people (for getting feedback, assessing the reaction to changes, base for developing communication strategies), on printed materials there should always be provided the contacts for the public. Direct public participation in the planning process is either very low (the Netherlands) or inexistent (Hungary).

Identified as a new determinant for waste behaviour, **institutional arrangements** refer to the co-operation and co-ordination among the different decision-making levels and the other stakeholders in the waste management field. It also refers to the exchange of information and experiences, and to the support offered by central level bodies to local authorities. The example of AOO in the Netherlands is a very good example and it certainly brought an integrated approach to waste management at national level and it boosted recycling rates. On the other hand, the example of Hungary shows that if communication among the different administrative levels and stakeholders is not good the entire system goes much slower (i.e. the deadline for Hungary to comply with the Directive on Packaging and Packaging Waste has been postponed with seven years, till December 2012).

Some of the main characteristics of the personal factors, in the Netherlands, are the following: strong anti-recycling perception is that separated waste gets at the landfill or incinerator anyway; the weaker recycling results in the Netherlands can be linked with a lower environmental concern; children are the category of the population the easiest to reach through education programs, who can act as intermediaries for their families; socio-economic characteristics are not found to correlate with waste behaviour.

However, it is still very difficult to assess which are the factors that influence waste behaviour the most. This fact is confirmed by VROM (2003), which states that “the relative decoupling which has taken place is the result of a combination of factors: government policy, technological developments, more efficient production, disposal costs etc. These factors cannot be viewed separately from each other.”

## **Chapter 4 Situation of Bucharest city with regard to household waste management**

### **4.1 Introduction**

This chapter tries to answer the last two research questions, namely: which is the current situation in the waste management field in Bucharest and which are the personal factors that influence current waste behaviour of Bucharest residents and their preferences for future waste arrangements. The analysis starts with the general Romanian situation, as the background of the issue is national and presents also some experiences related to how behaviour determinants are dealt with in several projects across the country. Then, the situation in Bucharest is described, considering the legislative and the institutional set-up, the current situation with regard to waste management facilities and coverage, and pilot projects of separate waste collection (behaviour determinants are also taken into consideration). The last sub-chapter is dedicated to the personal characteristics of the residents of Bucharest and their preferences for a future ISWM scheme.

### **4.2 Household waste management in Romania**

Romania is one of the two countries to join EU in 2007 and most of the developments of last years in the environmental protection and sustainability fields have been undertaken starting from this objective. In the waste management field, the entire package of EU legislation has been transposed into the national legislation, but compliance is still going very slowly.

At central level, with regard to household waste management, the Ministry of Environment and Waters' Management (MEWM) has the responsibility of developing the framework legislation, standards and guidelines, together with the National Waste Management Strategy (NWMS) and the National Waste Management Plan (NWMP). At regional and county level, the EPAs are in charge of the regional and county level waste management plans. The current NWMS is in force since 2003 and it covers the period between 2003 and 2013.

At local level, municipalities are in charge of organising municipal waste collection, transport and treatment. They can do this by their own departments, by a company publicly owned or by outsourcing this service to a private company. Moreover, according to the existing legislation<sup>14</sup>, they should ensure the sorting and recycling of the recyclable waste fractions.

Regarding legislation requirements concerning the household waste streams that should be collected separately and recycled, the provisions are the same with the EU directives. So, municipalities in Romania should collect separately packaging materials, dry batteries, electric and electronic waste and bio-waste. For each of these categories there are precise implementation timetables or deadlines (such as achieving an overall recycling rate of 25% by the end of year 2006 for the packaging materials!), but most of the separate collection initiatives are just in the pilot stage.

A big challenge for Romania is that of complying in a short time with an amount of European legislation developed in the last 30 years, which was implemented in steps by most of the

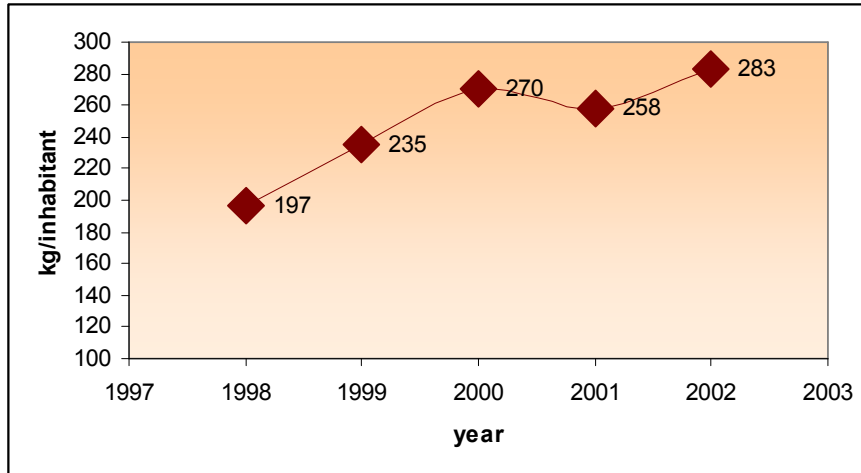
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<sup>14</sup> Law no. 515/2002 approving Governmental Ordinance no. 21/2002 regarding public services in cities and villages

Member States. This implies huge efforts, and probably, as the situation of the other recently joined countries showed<sup>15</sup>, the established implementation timeframes will be delayed.

While legislative provisions are tougher than ever, household waste amounts increase (Figure 4.1). This happens although population decreases, as a result of an increase in consumption and in the percentage of the population covered by the waste collection municipal service. The NWMP (2004) mentions that the percentage of the urban population benefiting of municipal waste collection services increased from 73% to 90% in 2002.

**Figure 4.1 Dynamic of the amount of waste produced per inhabitant, in Romania**



Source: MEWM 2004

### 4.3 Separate household waste collection schemes in Romania

#### 4.3.1 Facilities

Currently, there is no city with a active separate waste collection system in Romania, as discussions with the MEWM revealed. There are pilot projects in several municipalities, but there is not too much evidence on how they work and on their results.

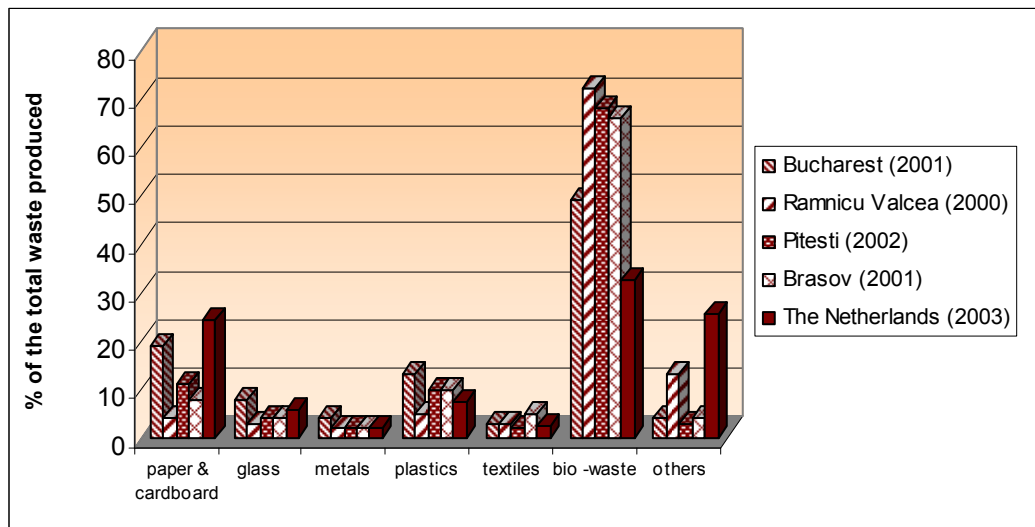
However, the recycling rate was 2% in 2001 and 7% in 2002. This situation could possibly be devoted to the pilot projects on separate collection, but most importantly it is probably due to recycling activities undertaken by private companies that buy recyclable materials from the population and the private sector (i.e. business). By this system, the following waste types are recycled: paper and cardboard, plastics, glass, and metals.

An important element related to waste management facilities is that a lot of cities are now changing their systems, either through EU funds or local and national funds, and all new investments have to be based on the integrated sustainable waste management principles. Moreover, they have to integrate local, regional and national systems with each other so that the best choice is made. Therefore, all new investments in this field involve separate waste collection schemes.

<sup>15</sup> In February 2005, all new accessioned EU Member States and Cyprus got a postponement of their deadlines of complying with the Directive for Packaging and Packaging Waste ([www.euractiv.org](http://www.euractiv.org))

According to the NWMP (2004), in the stage of planning new waste collection systems, one should take into account the following: types of residential structures, dwelling types, accessibility for collection trucks, and acceptance of the new systems by the public. Another element to add, though, is waste composition. As it can be noticed, in Figure 4.2 below, waste composition in Romania is quite different from the one in the Netherlands. This can be explained by the difference in consumption patterns, but it makes clear the fact that when trying to design an ISWM scheme for Bucharest more than just technical solutions should be taken into account. The big percentage of bio-waste in household waste also leads to low potential for incineration and to many difficulties in implementing a sorting system after collection, as all the other waste is highly contaminated.

**Figure 4.2 Waste composition in several cities in Romania, compared to the Netherlands average composition**



Source: Romanian NWMP 2004, Vlcek 2005

Related to the choice of sorting after collection, the town of Slobozia offers a good example and quite good performances. The waste management company (Vivani) was forced to separate recyclables before landfilling (by the EPA, during the Environmental Impact Assessment procedure) and they first tried separation at source. Unfortunately, they could not succeed to achieve this, as the containers were destroyed or used for regular waste (Gangan 2005, pers. comm.). Now, they operate a manual sorting station after collection, and their results are quite good, especially related to the plastics waste (PET and PE).

Another good project for separate waste collection of household waste seems to be that for Brasov city, one of the large Romanian cities (about 280,000 inhabitants). The project is proposed by URBAN, a waste management company with some experience already in separate waste collection (in Ramnicu Valcea, Otopeni, and Bucharest). It provides separate waste collection of the following streams: kitchen bio-waste, plastics and glass packaging, paper and cardboard, small scale hazardous waste (batteries, chemical substances, medicines) and residual waste. In blocks of flats areas, the system relies on neighbourhood containers, each recycling point being meant to serve about 50 households. Each recycling point will be placed on cemented platforms, with cemented access paths, well illuminated during the night (Constantinescu 2005, pers. comm.). These are the plans and they show that a lot of the parameters have been taken into consideration, such as visibility and appearance of the containers, convenience, and the type of neighbourhood.

Concerning the areas with multi-storey blocks of flats, it is important to mention the existing system of waste collection. In a lot of the blocks of flats, especially in the ones with over five floors, in the traditional collection systems, people place their garbage in the waste collector on their floor (which is a long collecting tube with exits on all floors) and from that point the garbage gets down gravitationally, in a container. This system is very convenient, especially for the people living on the higher storeys, but it makes separate waste collection very difficult, because it would require much more effort from the population. URBAN's intention is to close down these waste collection tubes in the areas where it operates (Constantinescu 2005, pers. comm.), in order to make the neighbourhood containers system work.

Some of the ISPA projects include both types of separate waste collection facilities: neighbourhood containers for the usual dry recyclables (paper and cardboard, glass, plastics packaging) and bring-in stations for the hazardous and bulky waste (i.e. Galati, Bacau). With regard to bio-waste collection, the project in Bacau relies exclusively on home composting, where 2,000 individual composting units will be offered to individual households for home-composting.

Considering separate bio-waste collection, the NWMP (2004) recommends that it should only be done in less dense urban areas, such as areas with low-rise buildings and gardens.

Related to the moment when a separate waste collection system should start working, the Public Relations Strategy for Piatra Neamt emphasises that the entire system should be functional when separate waste collection starts, because if only the separate collection is done, but after that it gets into the landfill because the recycling facilities are not in place, people will lose trust in the system and it is very difficult to change that belief.

### 4.3.2 Economic Instruments

At this moment there is no reference with regard to municipalities that implement **PAYT** schemes.

A **Deposit refund** system is in place for some types of glass packaging (such as beer bottles) and the NWMP (2004) includes among its objectives, derived from the current legislative framework, an increase in the percentage of returnable packaging.

Among the **Enforcement incentives** the most "popular" ones in Romania are **non-compliance fees**. Most of the legislation includes non-compliance fees, and in the waste management sector they are also widespread. However, their effectiveness has not been proven yet, as illegal dumping is still a serious problem in Romania. With regard to whether proper behaviour can be enforced, Hill International (2005) argues that waste collection services differ from energy or water services, which as a sanction can be cut, and therefore enforcement alone would not work.

There is no **Landfill tax** in Romania at this moment and the national policies and plans do not mention an intention in this respect.

**Producers' responsibility** is implemented in Romania by two main instruments: Environmental Fund and ECO-ROM Ambalaje. The **Environmental Fund** is created by the amounts paid by the producers and importers of packaging materials or packed goods for the packaging they introduce on the national market, except for those used for medical drugs. This sum is only paid if the annual objectives for packaging recovery and recycling are not met. The Environmental Fund is used after that for financing packaging materials collection by post-consumer recycling companies. It was also used for financing education and communication programs with regard to waste.

**ECO-ROM Ambalaje** is an organisation that took over the responsibilities of packaging waste producers and importers with regard to recovering the packaging waste. It was established in October 2004 and it is the official representative of the Green Dot organisation in Romania. ECO-ROM develops partnerships with local authorities and waste management companies for separate collection and recycling of the packaging waste. For example, a lot of the projects developed by URBAN waste management company are financially supported by ECO-ROM.

#### **Subsidies, grants and loans**

In the last 15 years, there have been a lot of projects with international financing in Romania and some of them targeted the waste management sector. However, a lot more remains to be done and a lot more funding is necessary.

With regard to the EU financial instruments, the main important ones are PHARE, ISPA and SAPARD. It is important to mention also that Romania has to partly co-finance these projects and this is done through national and local sources or international loans (EIB, EBRD).

The NWMP was developed, for example, within a PHARE twinning project and there were several other projects dealing with the development of legislation or policies and plans. In the same time, this year, through the PHARE 2003 Programme for Social and Economic Cohesion, 5.33 million EUR are given to small and medium municipalities (<50,000 inhabitants) in the Central Development Region, for waste management activities incorporated into the Regional Waste Management Plan. A lot of PHARE funds have also been directed towards the NGO sector development, but their activity in the waste management field is still quite limited to cleaning up and raising awareness activities.

With regard to ISPA funds, so far, only five waste management projects received ISPA financing (Ramnicu Valcea, Piatra Neamt, Dambovita, Teleorman and Galati). By the end of this year, six more financing proposals will be submitted for approval, for ISPA funds as well. The tendency is to develop ISWM systems at county level. In the same time, other five projects will be prepared to be financed through the Cohesion Fund.

### **4.3.3 Communication**

In the communication field, Romania has still to recover a lot. In the last 15 years there was no national scale environmental communication campaign and even in the national curricula for schools environmental education is not a compulsory subject. In the last year, there were signals from the Ministry of Environment and Waters Management that more importance will be given to education and communication activities, but results are lagging behind.

At local level, communication campaigns were mainly developed by NGOs, but there was an obvious lack of communication and coordination with local authorities. These projects were mainly targeted at increasing the awareness of the population, but considering the lack of facilities, their final results are not long-term ones.

Important results with regard to recycling activities have been achieved through national school recycling contests such as “Clean Romania”, “Eco-schools Programme” (in Romanian: “Romania Curata”, respectively “Programul Eco-scoala”). Eco-schools Programme is coordinated by an NGO and, in 2002, it led to the collection of 243.3 tones of paper and cardboard waste, from 33 schools, in six months (an average result of 9.29 kg/student).

The existence of the numerous blocks of flats in cities brings an advantage on the communication’s side: the fact that in each block there is an association of the dwellers or owners of the flats, functioning as an NGO, with an internal organisation, including an

administrator and a president. These people can be used as intermediaries and normative influence enablers and they are actually, as most of the pilot projects rely on partnerships with these associations.

Considering communication strategies within local waste management schemes, among the first ones is the Public Relations Strategy for the Piatra Neamt ISPA Project, developed by Hill International (2005), consultant company assisting the municipality in the project management. The Strategy includes a lot of issues that are generally applicable in Romanian municipalities, therefore, several of them will be emphasised below:

- It acknowledges the different communication needs of the residents according to their **residence area** and **type of dwelling** (i.e. different target groups are: households in multi storey buildings, households in low storey buildings, households in single houses).
- **Communication has to be continuous** and even after the project is implemented the efforts with respect to public awareness have to be continued, in order to keep them motivated!
- Especially after making the systems work, people might have questions about waste separation. These questions have to be answered e.g. via a **special telephone number** (with easy access).
- **Intermediaries** can influence the acceptance of the measure in a positive way and their involvement is sometimes a *sine qua non*. The representatives of owner associations are an example, but it is recommended to carefully look if there are other intermediaries. (E.g. representatives of the health sector can be involved in talk-shows, linking waste separation to the increase of hygiene and healthier living conditions).
- Other important intermediaries are **schools**. It is recommended to investigate how teachers and schoolchildren can give attention to the subject of waste recycling. In addition they will have a positive influence at home at the behaviour with respect to waste separation (“correcting” their parents).
- **Public participation in the scheme design phase is very important.** The strategy emphasise the following: “consulting has to be understood here as a form of interpersonal communication. It does not mean asking for approval, but it means involving people in the process in a way that immediate reaction and discussion is possible. Choices for the location of collection points made at the drawing board will not always be the best.”

**Partnership and communication** among public authorities at different levels does not exactly work. In general, there is a top-down approach in implementing the legislation, as the Ministry prepares the legislation and the policy documents, and municipalities have to implement it. In the same time, municipalities usually have limited resources and capacity, and thus the task of separate waste collection may be too big for them to carry on. They need detailed guidelines and more support from the national level.

However, communication regarding the waste management project in Ramnicu Valcea was very good and it represents a good example. The project is still under development, but they were the first municipality to try to collect separately the household waste and they also released a waste management manual and organised training courses for other local authority organisations.

## 4.4 Separate waste management in Bucharest

### 4.4.1 Legislative and institutional context

Bucharest city is the capital of Romania and it not only gathers the most important political, economic, administrative and cultural organisations and activities, but it also brings



altogether a lot of environmental and social problems. Bucharest's population is about 2 million inhabitants and it is divided into six sectors. The divided Bucharest looks like a pie, so no consideration with respect to the neighbourhood characteristics have been taken into account when the division was made.

The current administrative structure includes a General City Council and a General Mayor (leading the Bucharest City Hall), which are elected, a Prefect (leading the Prefecture), which is appointed by the Prime Minister, and Sector City Councils and Mayors, also elected. There are also a number of other public institutions – decentralised representatives of the Ministries or other Government bodies at local level (i.e. Bucharest EPA, Public Health Direction, Statistics Direction).

Regarding the planning and policy making process at city level, the work on the PLAM (Local Environmental Protection Plan) brought at the same table the representatives of most of these institutions, along with education, private companies, and NGO representatives. The PLAM mentions as Strong Points related to waste management: the fact that there are post-consumer recycling companies for the dry recyclables that should be collected separately; the pilot projects for separate household waste, the existent locations for bring-in stations. Among the Weak Points the following are the most important: illegal dumping, the lack of an ISWM scheme, limited educational campaigns.

Regarding waste management, at Bucharest level there is a Local Waste Management Plan, but this is more a principle document, as it does not offer concrete solutions or actions.

In the field of by-laws, the first one directly targeting separate waste collection is Decision no. 195/26.06.2003 of the General Council of Bucharest, which stipulates in art. 1 that: no later than 30 days since the enactment of this regulation, the authorized waste collecting companies that develop their activities in Bucharest will realize/conclude measures' plans regarding separate recyclable waste collecting. However, it was not respected.

Recently (July 2005), a new set of by-laws was enforced in relation to the waste management activities. The most important one is that referring to separate collection of the packaging materials<sup>16</sup>, which requires that, by the end of 2006, 25% of the total weight of the packaging waste materials should be recycled. However, it does not provide either a detailed timeframe of achieving this objective or a budget for this plan, and responsibilities are not precise.

The activities of household waste collection are run by four companies: REBU for sectors 1, 4 and 5, SUPERCOM for sector 2, ROSAL GRUP for sector 3, URBAN for sector 6. They are private companies and their selection was done through public procurement by the BCH.

#### **4.4.2 Current situation with regard to separate household waste collection**

Figures on waste management activities and results are summarised bellow:

- about 26% of the households were not covered by the municipal waste collection service, in 2000 (BCH 2004).
- Illegal dumping is a very serious problem. In 2002, 45 illegal waste deposits were identified (Bucharest EPA 2003).
- Average composition of household waste can be noticed in Figure 4.2. However, the most important fractions are: paper & cardboard with 19%, glass - 9%, and bio-waste - 41% (Bucharest EPA 2004).

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<sup>16</sup> Decision no. 148/14.07.2005 of the General Council of Bucharest with regard to separate collection of the packaging materials ([www.pmb.ro](http://www.pmb.ro))

- Total household type (from households and companies) waste quantity for Bucharest, in 2001, was 289,579 tonnes, out of a total of 366 951, 85 tonnes.

### **a. Facilities**

Traditional waste collection is currently done in specific containers / bins (called Eurobins / *Europubela*) which have a capacity of 120 litres or 240 litres, but also in Eurocontainers of 1, 1 m<sup>3</sup> capacity.

With regard to separate waste collection, the waste management companies have already established the types of bins they are going to use for separate collection, and these are metal or plastic wheel-bins of 1,1 m<sup>3</sup>. The differences appear in the bins' colours, as they did not agree on a certain colour for each material, no matter the company, instead the colours for one material vary very much from one company to another. In the perspective of organising an integrated waste management scheme, an agreement for the colours to be used all over Bucharest for the different waste materials should be reached.

Pilot projects of separate waste collection have been developed in all the sectors of Bucharest, usually by local authorities in partnership with waste management companies, and information has been found regarding the experiences of sectors 3 and 6. Usually, pilot projects targeted at certain dwelling areas have been developed based on partnerships with the dwellers' or owners' associations.

URBAN organised several projects in **sector 6**, for separate collection of plastics, paper and cardboard and glass, in partnership with the City Hall of sector 6. A successful project is the one developed in a new residential area, consisting of blocks of flats (141 Calea Plevnei), with a total population of 400 inhabitants, started in February 2005. They succeeded to reach a recycling rate of 9.15% (meaning 40% of the total packaging materials in the regular waste), which is still increasing (Constantinescu 2005, pers. comm.). Another project will start this autumn in one of the big neighbourhoods in Bucharest (Crangasi), with a population of about 9,000 people.

In **sector 3**, the pilot projects were developed by ROSAL and the City Hall of sector 3. Initially, containers were placed in busy/commercial areas and in residential neighbourhoods, for paper and cardboard, plastics and glass. In both types of areas, the results of separate collection show very high contamination of the collected materials, leading sometimes to valueless paper waste. It has also been noticed that the degree of contamination increased in time, which shows the lack of information and trust that the system is actually for separate waste collection. The conclusions were that media should also be involved in these projects, by informing people. Another decision was to try another system: collecting dry recyclables in plastic bags, only from voluntary blocks of flats. This type of system was tested during July and August 2005 and it has already led to very good results: 3,500 kg, from 51 dwellers' associations.

*Non-organised* activities of separately collecting waste are run by gypsies or poor people, who usually collect cardboard, glass and ferrous metals waste from shops or households.

### **b. Economic instruments**

**Non-compliance fees** for households not complying with the provisions of Decision no. 148/14.07.2005 are quite high (varying between around 140 and 280 EUR<sup>17</sup>). However, their effectiveness is still to be proved.

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<sup>17</sup> Average exchange rate used is: 1 EUR = 35,000 ROL

### **c. Communication**

Decision no. 148/14.07.2005 requires that information and education campaigns are organised, targeting the general public, and the Bucharest City Hall, the sector city halls and the waste management companies are in charge with this activity. However, besides the lack of responsibilities division and budget, it requires that this type of activities are only organised in the first six months of the programme, while it is an 18 month length programme and it has to continue after that anyway.

Communication among the different local authorities in Bucharest with regard to waste management is quite poor.

Education and communication activities started in all sectors of Bucharest, targeting mainly the schools and the dwellers' associations. In sector 4, they started having public meetings with the representatives of the city hall, of the waste management company and of the dwellers' associations (Bucharest EPA 2004). Most of the pilot projects have been developed in partnership with dwellers' associations.

Waste management companies and local authorities have already understood that communication is a key issue, as recently they started also posters' campaigns (ROSAL) and leaflet campaigns (URBAN) in the pilot areas. It is also important that in sector 3 they also acknowledged the need to involve media.

Actually, most of the interviewed stakeholders' representatives mentioned that the lack of education is one of the causes for poor results in separate waste management, but these activities still lag behind.

#### **4.4.3 Personal characteristics of the residents of Bucharest and their preferences for a future ISWM scheme**

The data and information presented in this sub-chapter mainly relies on two important sources. First, it is a survey undertaken as part of this research, in Bucharest, in August 2005, targeted at getting information about people's perceptions, awareness, knowledge related to managing solid waste, and preferences for future arrangements with regard to separate waste management. Some of the survey's main findings are summarised below, and the questionnaire is presented in Annex 8.

The second source is a survey conducted by University of Moncton, Canada (Littoral et vie Research Group), in 2004, with regard to the relationships of citizens of Bucharest with their town and with the problem of solid waste (Pruneau et al. 2004). This study offers valuable information with regard to the reasons for littering, as it resulted that people throw solid waste on the ground for social, political and organisational reasons. Among the social reasons lack of education, the absence of environmental education at school, the state of poverty, the feeling of injustice felt by the population, the lack of time for parents and teachers to teach about citizenship etc. The period of transition following the fall of communism, during which a relaxation of civic values can be noticed is the main political reason. The organisational reasons or the reasons linked with solid waste management are the following: the insufficiency and non visibility of garbage cans and the poor citizens 'absence of contracts with garbage collectors.

##### **a. Perceptions**

When asked which environmental problem they think is the most bothering one, respondents reveal that litter all over the place and the unhygienic collection of solid waste, along with traffic congestion, air and noise pollution, and bad conditions of the green areas are the most

striking. According to the literature, this is one of the pro-recycling beliefs, since people who already acknowledge the waste problem can easier be convinced to participate in solving it.

With regard to the reasons why Bucharest city will soon adopt a separate household collection scheme, some positive opinions include: it is “because EU requires us to do it”, it is the initiative of the authorities (general or sector city halls or mayors), or because “it should be this way”. A strong negative opinion, which can work against recycling is the statement that “the waste management company wishes to increase its profits”. This view should be tackled, by emphasizing the real reasons.

An important perception against recycling, noticed also in Bucharest, is believe that the waste collected in the separate collection bins in the city (through pilot projects, food markets, institutions) is all disposed of to the landfill, because “it is not really separated waste” or because they saw the waste collection truck mixing all the waste. This shows partly why the pilot projects were not successful, because people do not believe that the system actually works.

The last finding could also be linked with results of a public opinion survey undertaken by the Bucharest EPA (2001), which revealed that residents consider the activity of the local authorities in Bucharest (sector city halls, Bucharest city hall, Bucharest EPA) as unsatisfactory with regard to environmental protection, therefore they also do not trust them.

### **b. Awareness**

Concerning the effects of not recycling, respondents mentioned air and water pollution, soil degradation, increase of the cleaning costs, disastrous, health diseases spreading, but there were also a lot of people that could not name at least one.

As regards the most harmful materials for the environment taking into consideration production and disposal processes, the most often mentioned one were batteries and plastics (which is good because batteries are hazardous waste and they should be collected separately), but also metals, glass and paper & cardboard were pointed out.

It results that general awareness regarding the effects of recycling and non-recycling should be provided, but the awareness for specific waste types exists and it can be emphasised and used as a motivator.

### **c. Knowledge**

With regard to knowledge, a striking answer was that related to composting, as most of the people could not give an approximately correct answer. Therefore, a lot of communication work is needed for bio-waste to be tackled.

When asked which types of waste they think that could be recycled, most of the recyclables were mentioned, except for bio-waste (of course, as proven by the answers on compost).

### **d. Dwelling characteristics**

According to existing statistic information (Suditu 2004), 85% of the housing in Bucharest is in blocks of flats. In most of the areas, the blocks are quite dense, and this leads to incredible densities: in five of the six sectors in Bucharest population density is between 8,000 and 11,000 inhabitants/km<sup>2</sup> (Bucharest EPA 2004). Therefore, separate waste collection is not an easy task to accomplish and specific characteristics for each neighbourhood should be taken into consideration.

Social characteristics of neighbourhoods in Bucharest should also be taken into account, as some neighbourhoods have quite a strong “label” or “personality”.

### **e. Preferences of a future ISWM scheme**

In the survey undertaken by the University of Moncton, most of the interrogated residents answered that they are ready to make efforts and to involve themselves in collective and individual improvement actions, such as: cleaning the ground, environmental education for all (students and citizens), solid waste recycling scheme.

The results of the survey undertaken this research are summarised below:

- Some of the reasons for which they would separate waste in the future are: the existence of separate containers, information about the system, “it should be easy” (convenient), their children (because they already learnt about this at school).
- Some of the reasons for which they would not recycle are: containers are too far, not enough time, not enough space for separating waste inside their dwellings, not wishing to.
- Regarding the collection method that they would prefer the most, six choices of answers were offered: sorting at home in different colour bags and place it in the same place as regular waste, sort dry recyclables in one plastic bag and the residual waste in another (only two bags in total), take recyclables to a neighbourhood container, and other (to be mentioned by the respondent), none and I don't know. As expected, no other method was mentioned, because people are not used to this kind of systems. The interesting result is that the answers are almost half divided between the first and the third option.
- Considering the initiative of URBAN of closing down the waste collecting tubes within the blocks when separate collection containers will be placed outside the block, people were asked if they would agree to this, and most of the respondents do not agree, as “it is a convenient way of getting rid of the other waste”. So, if this solution is considered the best, residents should be well informed in advance of the reasons and they should be convinced that this is the best way to organise the scheme.
- The answers regarding the most appropriate person or organisation to be involved in promoting the separate collection schemes include: the block-administrator, schools, the General Mayor, the Sector Mayor, NGOs and local or national VIPs.

With regard to the recycling message broadcaster, maybe it would be good to link it to the Power Distances index, which shows how power is used and distributed and for Romania it takes a very high value (IHS 2005). This explains why Romanians have always had charismatic and powerful leaders and it shows that Romanians appreciate in the public life this kind of persons. Based on these considerations, a good messenger would be an important political figure or a well-known public person.

## **4.5 Conclusions**

This chapter tried to answer to the last two research questions, respectively which is current situation in the waste management field in Bucharest and which are the personal factors that shape current waste behaviour of Bucharest residents and their preferences for future waste arrangements.

When trying to answer to the first question, an overview of the national situation in Romania was given first, and second, the situation in Bucharest was presented with regard to legislative and institutional context, current practices in waste management and pilot projects developed so far and their results.

In terms of legislation in waste management field, Romania complies with the EU requirements and during the last two years efforts have been done in order to progress towards its implementation. Huge responsibilities belong to the local authorities and they do not always have the necessary resources or knowledge to deal with their new responsibilities.

The analysis of the pilot projects or plans for ISWM schemes to be implemented across the country shows that most of the behaviour determinants found out in chapter 2 are quite well integrated and taken into account. Moreover, local conditions are also incorporated in the analysis and there are valuable ideas in each project. Unfortunately, most of them do not have any results yet, so no information on their effectiveness could be found so far.

Related to **facilities**, the most striking problems identified in the Romanian practice are **the existence of very high density areas in most of the big cities**, making recycling a difficult task to be achieved and leading to a more specific approach. One of the solutions in dealing with the high blocks of flats having the waste collection tube crossing vertically the building and making the way of handling so easy for the public is to close them down, because they are strong barriers against waste separation at neighbourhood containers. Or maybe other solutions should be sought. Another important obstacle for reducing waste amounts is the **high bio-waste percentage in the total waste** coupled with **almost inexistent previous knowledge about composting**.

Facilities already in place, in the pilot projects, are the neighbourhood containers and there is one important mistake that has been done, which is the **lack of a common colour system for the separate waste collection containers**. It is important that the system is a user-friendly one and the use of a common system in this respect would contribute to this.

The range of **economic instruments** is not as wide as in the other analysed countries, as in Romania neither PAYT nor landfill taxes exist. This makes the economic incentives of reducing the waste amounts very weak or almost inexistent. In the same time, it should be acknowledged that PAYT schemes are very difficult to be implemented in high density urban areas, and this is the case for most of the large Romanian cities. Additionally, there are still households that do not pay any waste tax because they are not covered by the municipal waste collection services, but situation is improving.

Important economic instruments are producers' responsibility, non-compliance fees, deposit-refund schemes for some materials, and subsidies, grants and loans. The last type of instruments contributes greatly to the development of ISWM schemes in Romania.

Considering **communication**, there are still a lot of things to improve and develop, but there are also good examples of communication strategies, which show that things are changing (i.e. Piatra Neamt Public Relations Strategy developed by Hill International in 2005). In this strategy, most of the waste behaviour determinants identified so far in this research are taken into account.

However, one of the big problems of the Romanian system in terms of communication is the **poor cooperation among public organisations** (on vertical and horizontal levels). Within Bucharest, the Bucharest City Hall did not have accurate information about the pilot projects developed by sector city halls. It would be important for local authorities and waste management companies in Bucharest to realise that they have a very difficult task to accomplish in a very short time and relying on each other's experiences could help them all. In the same time, communication with national level structures is difficult, although their support is highly needed.

In the context of the most appropriate communication tools, **the block-leader approach** seems to be quite a good one, due to the housing situation (high reliance on the blocks of flats). It is a tool already used by most of the pilot projects in the blocks neighbourhoods, as partnerships were established with dwellers' or owners' associations.

With regard to the **personal factors that influence the current waste behaviour of Bucharest residents**, an insight has been gained based on the sources available and the following conclusions can be drawn:

- Solid waste management is perceived as one of the most bothering environmental problems in Bucharest.
- People believe that the reasons for starting a separate waste collection scheme are a requirement of the EU, an initiative of the local authorities (general or sector), “it should be like this”, profit increase of the waste management company.
- Respondents do not trust in the existence of the separate waste collection arrangements even where they are in their pilot phases, either because it looks too good to be true, or because they do not trust the system in general, or because of bad practices.
- The general awareness regarding the effects of recycling and non-recycling is very low, but awareness concerning the fact that specific waste types are harmful for the environment exists to a certain extent.
- Most of the respondents were not able to give an approximately correct definition of composting.
- The recyclable materials are known (except for the bio-waste stream).
- 85% of the housing in Bucharest is in blocks of flats, and average density in Bucharest is above 8,000 inhabitants / km<sup>2</sup>.
- Social characteristics of the different neighbourhoods should be taken into account.

As a general impression, **respondents’ preferences for a future ISWM** are the following:

- Residents are ready to make efforts and to involve themselves in collective and individual improvement actions, such as solid waste recycling schemes.
- Some of the reasons for which they would collect waste separately in the future are: existence of facilities and information about the system, convenience, children’s influence.
- Some of the reasons for which they would not collect waste separately in the future are: big distance to the containers, lack of time, lack of storage space in their dwelling for separating the waste, not wishing to.
- Sorting at home in different colour bags and sorting at the neighbourhood container seem to be the most preferable types of schemes.
- People are reluctant to the closing down of the waste collecting system within the blocks of flats.
- The most appropriate person or organisation for broadcasting the recycling message could be the block-administrators (face-to-face communication), schools, the General Mayor, the Sector Mayor, NGOs and the local or national VIPs (Very Important Persons).

## **Chapter 5: Conclusions and recommendations**

### **5.1 Introduction**

The main objective of this research is to identify a set of recommendations for a separate waste collection scheme in Bucharest, from the perspective of social acceptability.

The social acceptability approach has been chosen, as this is usually the least considered aspect in the planning and development of waste management systems. Social acceptability is one of the main components of Integrated Sustainable Waste Management schemes, as it refers to the fact that the scheme should be developed based on the current needs and characteristics of a community and, consequently, it should be supported and used by that community. Social acceptability of a waste management scheme leads to a certain behaviour, which affects the efficiency of the scheme. In turn, social acceptability relies on the characteristics of the scheme. Therefore, a scheme should be developed only by taking into account which are the factors that influence waste behaviour and also by considering the characteristics of the targeted population, which is actually one of the influencing factors. These are the links between social acceptability of a waste management scheme and residents' waste behaviour.

Taking into account the links between social acceptability and waste behaviour and in order to achieve the research objective, several questions were drawn. First, the determinants of waste behaviour, as reported by existing literature, reports, experiences, have been identified (in Chapter 2). These can be divided into two main categories: situational and personal. The situational determinants refer to the scheme's characteristics, namely: facilities, economic instruments and communication. All the three of them may influence recycling behaviour, depending on their characteristics and on the community's characteristics. The personal factors include, according to the literature, the following: environmental concern; perceptions, awareness and knowledge; and household socio-economic status and dwelling factors. Additionally, indicators of success for measuring waste behaviour have been identified and these are: recycling/capture rate (amount of waste separately collected), participation rate (how many households are part of the programme, as a percentage of those eligible to participate) and contamination/leakage rate (the percentage of waste that was wrongly placed in the recycling containers/bins).

Secondly, it has been tried to assess in what way waste behaviour determinants are taken into account in practice, by analysing the Dutch and the Hungarian waste management systems, including two local waste management schemes (those of Rotterdam and Budapest). This analysis led to the confirmation of most of the behaviour factors and to the conclusion that they are taken into account quite seriously by Dutch authorities, while local waste management organisations in Budapest begin acknowledging them as well. In the same time, several other important indicators or sub-indicators were identified, along with a new indicator for waste behaviour (more details on this issue are included below under heading 5.2 Implications for the theoretical framework). A compilation of the findings in Chapter 2 and Chapter 3 is presented further (under heading 5.3 Main findings of the study).

Thirdly, an analysis of waste management in Bucharest city has been pursued in order to provide the answers to the last two research questions, with regard to which is the situation of waste management in Bucharest (in terms of organisational, institutional, legislative arrangements and performance results) and which are the personal factors that influence waste behaviour of Bucharest residents and their preferences for future arrangements. The



analysis started with an overview of waste management in Romania, including legislative requirements, policy documents provisions, institutional set-up, waste behaviour factors (how are they taken into account in separate waste collection the pilot projects). The presentation of the actual situation in Bucharest city has taken into account the pilot projects developed so far and their results, as well as how waste behaviour factors have been dealt with. The answer to the last question, related to personal factors in Bucharest, is actually just an insight on this issue, it is not a comprehensive assessment, and it mainly offers the basis for further study. It should also make stakeholders in Bucharest understand that how people think and what they believe in can influence very much the performance of a waste collection scheme and these issues have to be thoroughly analysed and addressed.

This chapter includes an overview of the results of the study, with respect to their implications for the theoretical framework and their practical usefulness. Then, recommendations for a separate waste collection scheme are made, along with recommendations for future study.

## **5.2 Implications for the theoretical framework**

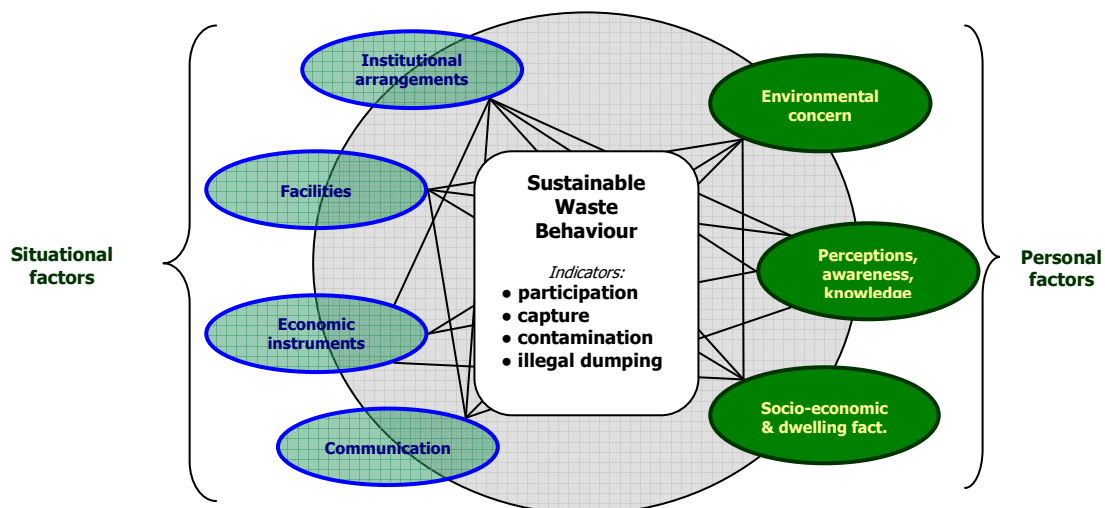
The research did not try to bring new definitions or new concepts. It rather aimed at making use of the existing research (on Integrated and Sustainable Waste Management, social acceptability, waste behaviour and social marketing) and practices in developing a holistic approach to the analysis of sustainable waste behaviour determinants. The theoretical framework brought together different types of studies and resources (behavioural studies, official reports, policy documents, consultancy assessments, professional associations' points of view). Although behavioural studies mention some of the behavioural determinants, it was considered useful to analyse all aspects of a separate waste collection scheme and try to see which other factors could influence waste behaviour. This is the case of the partnership and communication sub-determinant (within the communication category), which is not mentioned by existing studies on waste behaviour, but while analysing other sources its relevance appeared obvious.

In the same time, although it might have appeared strange to some the fact that each analysis of the waste management in practice (Dutch, Hungarian, Romanian systems) starts with a lengthy analysis of the national institutional, legislative and policy set-up, although this was not discussed at all in the theoretical framework (Chapter 2), it proved to be an essential step in the identification of a new waste determinant: institutional arrangements. Institutional arrangements refer to how partnerships, communication and coordination among the different stakeholders in the waste management field are organised (formally – the case of the Waste Management Council in the Netherlands or informally). They proved to have an important impact on the waste collection scheme development and, therefore, on behaviour (positive: AOO, and negative: the Hungarian situation).

Additional to the initial theoretical framework, under the economic instruments category, a new instrument has been added: subsidies, grants and loans. It is a frequently used instrument in all the three analysed countries (The Netherlands, Hungary and Romania) and it is very useful in helping municipalities cope with their new responsibilities in the waste management field. Consequently, a new indicator for waste behaviour has been identified as well and this is illegal dumping. The unit of measurement for illegal dumping has not been established yet, but perhaps this should be done in order to ensure comparability of data.

In Figure 5.1, the situational and personal factors influencing waste behaviour are shown, and the current scheme is an adaptation of the first one (page 22), after the analysis of the literature findings and of the Dutch, Hungarian and Romanian situations.

**Figure 5.1 Determinants of Waste Behaviour (adaptation)**



A general appreciation on the theoretical framework is that it offers a new framework for analysing waste behaviour factors in an integrative way and it makes waste managers aware of all the dimensions of a waste management that could possibly affect household' behaviour.

### 5.3 Main findings of the study

Both, the reviewed literature and the findings in the field, disclose that there is no such thing as a best solution for organising a waste collection system, and a different mix of instruments and arrangements can lead to a new type of scheme. Moreover, it is always important to take into account local circumstances and resources in order to ensure that the most appropriate scheme is designed. However, several general conclusions with regard to waste behaviour determinants can be drawn from this research. They rely both on literature and practical experiences in the Dutch and Hungarian systems, trying to emphasise those factors on which the strongest evidences have been found. They are summarised below.

#### 1. Facilities

In relation to facilities that encourage waste recycling behaviour there re two elements to be taken into consideration: the type of scheme and the type of waste to be collected separately. Bring-in stations achieve very good recycling and participation rates and low contamination rates for bulky waste.

In the same time, neighbourhood containers are widely spread and they are recommended for high-density neighbourhoods and collective habitats. Related to this type of facilities, a few other elements are important as well: convenience (distance to the container, density of containers), location (busy places), container design (the type of materials collected should be indicated also through a pictogram, containers' opening design should not permit unwanted materials to be introduced), visibility and appearance, collected materials (materials usually collected this way: glass, paper and cardboard, plastics, metals, bio-waste, textiles).

Door-to-door schemes are recommended to low and medium density neighbourhoods. The following issues are important in relation to this scheme: frequency of collection (weekly frequency is better than a fortnight one), collected materials (dry recyclables could be collected commingled; types of waste collected separately: bio-waste, paper and cardboard –

usually the largest fractions in the total amount of waste). This scheme leads to increased recycling rates if compared to neighbourhood containers.

Regarding bio-waste, discussions on which way is the best in collecting this type of waste are under going. However, a lot of cities began active campaigns of promoting home-composting, as the most advantageous solution.

For small scale hazardous waste (such as batteries, chemical substances, etc.) specific solutions can be developed, such as the boxes for battery collection in Budapest.

Recycling schemes should offer people the possibility to recycle more than one material, because people recycling one material are more likely to recycle more materials.

## **2. Economic instruments**

In the field of waste management, there is a considerable number of economic instruments that have been developed and there are different approaches for the same indicator, sometimes, in different countries (such as the case of producers' responsibility or that of PAYT schemes).

Pay-as-you-throw schemes lead to a reduction in the total waste amounts; increase recycling rates for separate collection; may have adverse effects (such as illegal dumping and waste tourism); are difficult to introduce in large cities and in high-density areas because of low social control and higher chances for adverse effects, as results in the Netherlands have shown. They should be introduced for individual households, not for collective housing buildings such as blocks of flats (a lesson learnt from the Budapest situation).

Deposit-refund schemes usually lead to a reduction of the packaging waste amount.

Eco-taxes for recycling have been proved to have important direct effects in reducing waste quantities of the targeted materials, but they have to be accompanied by communication campaigns to ensure a good understanding and acceptability of the tax.

Non-compliance fees are widely spread, but there is little information on their effectiveness.

Landfill and incineration taxes can lead to increased recycling rates (the Netherlands case).

Producers responsibility mainly supports recycling by financing separate waste collection schemes and making it easier to perform and cheaper than alternative waste handling methods.

Subsidies, grants and loans represent effective instruments in improving or setting up separate waste collection schemes. Additionally, they highly promote integrated and sustainable solutions.

## **3. Communication**

With regard to communication tools, strategies and effects, the most important conclusion is that there should not be separate waste collection schemes without active communication campaigns. It has been proven that collection schemes that include promotion campaigns achieve higher participation rates. Moreover, communication has to be a continuous process, as Dutch authorities have already acknowledged. The experience of Roteb (in Rotterdam) has shown that a multitude of communication tools should be used. In large cities (London, Rotterdam), direct contact and face-to-face communication is better preferred.

Considering the most efficient communication tools, it has been noticed that "intermediaries" (school children and block-leaders) can be used with very good results for communicating waste management messages and practices to the community. Visits to the facilities can be a very good way of showing people how the system works and making them aware of the

entire system they are part of. They can also be effective in reducing NIMBY reactions or preventing them.

In terms of knowledge needs, households should be provided with information on how to deal with waste and what is the most important thing to do, what is happening with the recycled materials, and which are the results of their efforts (i.e. London, Glasgow, Rotterdam). Related to the results, providing feedback to either individuals or groups concerning their behaviour is a commonly used technique for increasing pro-environmental behaviour. Studies show significant effects of feedback.

The broadcaster of the message in a communication campaign is very important and, in this context, the image of the municipality or of the waste management company can play an important role in the effectiveness of a communication campaign.

Public Participation is one of the key components of social sustainability and creates ownership and long-term commitment. This is the reason for which ISWM schemes should promote public participation.

#### **4. Institutional arrangements**

There is a high need for co-operation and coordination among different decision-making levels and the other stakeholders in the waste management field. Exchange of information and experiences and support from the central government organisations can become factors of success for municipalities activities related to waste segregation and recycling (AOO example).

#### **5. Personal types of determinants**

The public turns out to have perceptions that can have a negative influence on recycling behaviour. Some of them are the following: schemes are set up mainly for private profit, recycling of different materials is difficult, time-consuming or dirty (related to compost), recycling all ends up in landfill or incinerator anyway, not enough space for waste storage, waste separation is the job of the waste management company, it is not hygienically if it is not picked up regularly.

Moreover, there are also perceptions that can be pro-recycling behaviour, such as: people see certain materials as being most harmful to the environment; recycling is a duty; recycling improves the living environment; recycling is useful; recycling is part of one's basic education.

Awareness is important because it allows people to feel that they can make a difference, it encourages people to make "green" consumer choices in favour of recycled products.

The community has to be provided with knowledge related to: how the waste scheme works, which are the different facilities offered and where they are placed, what materials can be collected and how they should be collected, which is the schedule for waste collecting in case of door-to-door schemes.

With regard to dwelling characteristics the greatest distinction is between few-unit dwellings (single, double, row) and many-unit type (apartment blocks), due to the lack of storage space for recyclables and to the lack of responsibility and controlling mechanisms for waste deposition by the individual.

It is advisable for municipalities to take into account the above indicated factors before designing a new scheme or changing the existing one. In Social Marketing, inducing a desired behaviour starts with analysing the existing personal characteristics of the population and comparing them with the objective (target). This should be a logical start for all major

changes or developments in waste collection services, as they rely on their participants' behaviour.

## **5.4 Recommendations for a separate waste collection scheme in Bucharest**

From the point of view of social acceptability, an overall recommendation for Bucharest is that the system should offer convenient facilities, easy to use, supported by appropriate economic instruments and promoted by good communication campaigns. None of the three elements should be neglected, and, additionally they should fit the personal characteristics of Bucharest citizens. Several more specific recommendations are given below. Personal characteristics have been taken into account as well.

Considering the size of the city (over 2 million inhabitants) and the diversity of dwelling characteristics, social characteristics, income groups, age groups, local authorities in Bucharest should consider different solutions for different neighbourhoods with homogenous characteristics.

### **1. Facilities**

Neighbourhood containers are recommended for the blocks of flats, but special attention should be paid to the distance, visibility, appearance and safety elements. To ensure a user-friendly character to the system of neighbourhood containers, a common-colour system for the containers in all districts in Bucharest should be considered. Further attention should be paid to the use of bags for selective collection, as initial experience in sector 3 show good results. With regard to the bulky waste, bring-in stations should be offered to the residents for its collection.

For the blocks of flats, further investigation is needed on whether it is good or not to close down the waste collecting tube, which is the current traditional method of waste collection.

In low-rise building areas (individual houses), door-to-door schemes should be considered.

Taking into account the high percentage of bio-waste in the total waste generated in Bucharest and the low level of knowledge regarding composting, solutions should be sought for bio-waste reduction and collection.

### **2. Economic instruments**

PAYT schemes should be considered in Bucharest, after setting up good control and monitoring instruments, and only in combination with active communication campaigns. Additionally, landfill taxes should be considered. Special attention should be paid to the existence of the private recycling companies that buy recyclables from the population, as their simultaneous activity with that of a selective waste collection scheme, for the same type of materials, could lead to overlaps and lower participation in the selective scheme, as financial rewards can also act as an important incentive.

### **3. Communication**

Separate collection projects should be accompanied by communication campaigns! This is a message that needs to be emphasised when discussing separate waste collection in Bucharest, as so far, even in the pilot projects, communication was an overlooked aspect. With respect to communication instruments, in Bucharest intermediaries should also be used, as block administrators could act as “block-leaders” and the children are the most accessible group for educational programmes. However, in the future education and communication campaigns the focus should be placed on providing useful information about the system in place, thus giving people the information they need in order to properly use the system. General messages, without a clear specification of the behaviour to be performed, should be avoided.

Additionally, in the recycling message pro-recycling perceptions have to be emphasised, while perceptions against recycling should be addressed with counter arguments.

A good promotion of the deposit-refund system may lead to important results of the scheme.

Appropriate budget should be allocated by city councils for communication activities and additional sources of funding should be identified.

#### **4. Institutional arrangements**

A framework for co-operation and experience exchange should be set up at Bucharest level. It is important for local authorities and waste management companies in Bucharest to understand that they have a very difficult task to accomplish in a very short time and relying on each other's experiences and competences could help them all. Furthermore, there is a high need for clear responsibilities setting among waste management companies, sector city halls and general city hall.

NGOs should be involved, as their expertise with regard to communication and partnership with the community may be an asset that the other organisations usually miss. Besides, NGOs have a good public image.

### **5.5 Recommendations for future study**

Further in-depth qualitative and quantitative analysis of waste behaviour personal determinants of the Bucharest residents is needed, in order to get objective, reliable and complete information on how people deal with their waste and what they want in terms of future facilities. This element should play a central role in establishing an Integrated and Sustainable Waste Management Scheme in Bucharest, especially because since it has been underestimated so far.

The effectiveness of non-compliance fees in Romania and elsewhere should be studied, as it is one of the common economic instruments in all the three analysed countries, but hardly any research has been conducted on its actual impact so far.

There is a real lack of recent studies on social acceptability and what it means or what it should mean for waste management schemes. Most of the times, studies assess the costs or the environmental impact of separate waste collection schemes, but very few studies take waste behaviour as a point of focus. Behaviour is actually the main important aspect to address in order to achieve the highest target in the waste hierarchy – waste prevention, by trying to change consumption patterns and lifestyle.

Environmental concern is one of the personal determinants taken into account by existing literature, but most of the studies reveal no direct connection between general environmental concern and waste behaviour. However, this research has thrown light on the fact that environmental concern is considered to influence waste behaviour in the Netherlands. It is therefore important for more research to be conducted on this topic.

Research should also be carried out on the integrated effects of different waste behaviour factors. So far, most of the studies have analysed the effects of one type of factors or of some of them, but comprehensive analysis of their integrated effects is missing. Special attention should be paid to the link between the situational and the personal factors.

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With the hope that this study has thrown new useful insights on which are those things that make us all behave in a certain way when it comes to dealing with our own daily waste, and that these findings will be used by authorities in Bucharest, and not only, in their efforts of improving the waste collection system in the city, the floor is open for further discussions.

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Bucharest City Hall

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SITA UK (waste management company in the UK)

[www.sita.co.uk](http://www.sita.co.uk)

URBAN SA (waste management company in Bucharest)

[www.salubritate.ro](http://www.salubritate.ro)

VROM (Dutch Ministry for Housing, Spatial Planning and Environment)

[www.vrom.nl](http://www.vrom.nl)

Waste Management Council (the Netherlands)

[www.aoo.nl](http://www.aoo.nl)

## Annex 1. Definitions and brief explanation of the used terms

**Waste** = any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard (*Waste Framework Directive - 75/442/EEC*)

**Household waste** = a concept linked specifically to waste **generation**, consisting of waste from a unique type of source: households (*EEA 2000*)

**Municipal waste** = household-type waste collected by or on the behalf of the municipalities and household-type waste collected by the private sector (*EEA 2000*)

**Recycling** = the reprocessing of waste, in a production process, for the original purpose or for other purposes, including organic recycling, but excluding energy recovery. (*Directive 94/62/EEC for packaging and packaging waste*)

**Recovery** = operations provided for I Annex II, B to the Framework Directive on Waste, the so-called R operations. These involve in particular operations that are performed after the waste has been collected and transported and that result in waste being reused. The operations related to product reuse, material recycling and the use of a waste substance primarily as fuel. (VROM 2003)

**Diversion rate** = waste diverted away from landfilling, due to recycling, reuse, incineration (energy recovery) or composting. (*Nilsson-Djerf 1999*)

Waste categories included in the household waste stream (generated by the domestic activity of households):

**1. Traditional collection (bagged waste):** mixed garbage collected door-to-door from private individuals on a regular basis (every day, every week, every two weeks, etc).

**Separately collected household waste:** any collection to separate one or several homogenous waste fractions from the household waste.

**2. Bulky household waste:** waste from private individuals that is too large or too heavy to be submitted to the collection service in the same way as bagged waste. It includes:

- Electric and electronic household waste (e.g. refrigerators, washing machines, televisions, computers etc)
- Construction and demolition waste originating from households
- Other bulky waste (e.g. furniture, mattresses, mixed bulky waste, etc)

**3. Food waste and garden waste:**

- Food waste (meat, vegetables, etc)
- Garden waste (e.g. leaves, grass clippings, branches, etc)

**4. Paper and cardboard**

**5. Glass**

**6. Metals (ferrous and non-ferrous)**

**7. Small scale hazardous waste** (e.g. medicines, batteries, paint residues, photo chemicals, solvents etc)

**8. Other separately collected household waste (e.g. plastics, textiles etc)**

## **Annex 2. List of EU waste related legislation**

### *Directives*

- 75/439/EEC Directive on the disposal of waste oils
- 75/442/EEC Waste Framework Directive
- 78/176/EEC Directive on waste from the titanium dioxide industry
- 86/278/EEC Directive on sewage sludge
- 91/156/EEC Directive amending Waste Framework Directive (75/442/EEC)
- 91/692/EEC Directive amending Waste Framework Directive (75/442/EEC)
- 91/157/EEC Directive on batteries and accumulators containing certain dangerous substances
- 91/689/EEC Directive on hazardous waste
- 91/692/EEC Directive standardising and rationalising reports on the implementation of certain Directives relating to the environment
- 94/62/EC Directive on packaging and packaging waste
- 94/67/EC Directive on the incineration of hazardous waste
- 96/59/EC Directive on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)
- 96/61/EC Directive concerning integrated pollution prevention and control
- 97/138/EC Decision establishing formats relating to the database system pursuant to the Directive on packaging and packaging waste (94/62/EC)
- 99/31/EC Directive on the landfill of waste
- 2000/53/EC Directive on end-of-life vehicles
- 2000/76/EC Directive on the incineration of waste
- 2000/59/EC Directive on port reception facilities for ship-generated waste and cargo residues
- 2002/95/EC Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- 2002/96/EC Directive of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)
- 2004/12/EC Directive amending Directive 94/62/EC on packaging and packaging waste

### *Proposals*

- Proposal (as of 2 June 2003) for a Directive of the European Parliament and of the Council on the management of waste from the extractive industries (mining waste), COM(2003) 319 final
  - Proposal (as of 7 December 2001) for a Directive of the European Parliament and of the Council amending Directive 94/62/EC on packaging and packaging waste (recovery and recycling targets) COM(2001) 729 final
  - Proposal (as of 29 April 2003) for a Directive of the European Parliament and of the Council amending Directive 2002/96/EC on waste electrical and electronic equipment (historical waste from non-household sources), COM(2003) 219 final
  - Expected proposal for a Directive on sewage sludge (sewage sludge)
  - Expected proposal for a Directive on batteries and accumulators (batteries and accumulators)
  - Expected proposal for a Directive on biodegradable waste (biodegradable waste)
  - Expected proposal for a Directive on waste oil (waste oil)
- (source: Institute for International and European Environmental Policy 2003)*

### Annex 3. The six indicators of social sustainability, their parameters and data availability

	Indicator	Data	Reason	Pros/Cons
<b>1. Social Acceptability</b>	Population participation, Public perception	-No of people participating (in relation to diversion rate) -No of complaints, no of queries. Main areas? -Public perception of the organisation -Public participation in the system -Public view on the limitations of the system. No of public meeting (%). How important are they (scale). What is the discussion level?	Social acceptability of waste management systems are essential for high participation rates	Much information and data exist or can be retrieved.
<b>2. Communication &amp; Societal responsibility</b>	Communication Education. Societal responsibility	-Communication budget compared to total. Also on municipal level. -Trend past 6 months. -Focus of communication (check-list) -No of school Information meetings -No of visits to the facility -Information in other languages -Information, PR, Goodwill, Feedback (two-way communication)	Communication – Acceptability – Participation	Data exists.
<b>3. Social Equity</b>	Payment, Farness to Access	-Waste management budget compared to other Municipal areas (Health, Employment, Education, Roads & Traffic) -Who pays? Service offered – payment demanded. Is it fair? -Variable rates -Discount for smaller bins – incentives? -Low income support -Rural vs. Urban differences -Existing Surveys on perceived fairness? -Extended Producers Responsibility	Is the payment system fair? Should everyone pay the same rates? Variable vs. flat rates.	Difficult to measure. Interesting aspect and trends related to fairness and democracy.
<b>4. Social Function</b>	Employment and training Agenda 21	-Employment per tonne waste managed - 5 year trend -Training and Education -Hiring unemployed, ex-offenders and adults with learning difficulties -Market Driven Factors (Competition and waste treatment specialisation) -Agenda 21	What other roles does the waste management play in society. Does it contribute with other positive social aspects? Agenda 21 incorporated.	Important viewpoint towards social sustainability. A broader focus.
<b>5. Management of Health, Safety and Risk</b>	Rating Issue, Importance of Policy and Planning	-How do you manage the health and safety issues (dealing with population attitudes) -NIMBY (Not In My Back Yard) -Current local debate and discussion – no of meetings, documents	The risk, health, safety and NIMBY debate	NIMBY and how to approach it is important, not only for waste management
<b>6. Public Policy &amp; Level of Incentive</b>	Agenda Priority, Public Meetings, Waste minimisation	-Scale of priority on municipal policy level -Reporting results to authorities, why and how? (for ex. Env. effects) - Frequency of reporting -Meetings with council -Level of Incentive given for waste reduction	Importance of Waste management policy. How does waste management approach waste reduction?	“weak” measuring tool

(Source: Nilsson-Djerf 1999)

## **Annex 4. Friends of the Earth's Best Practice Code for Doorstep Recycling**

### **Weekly collection**

Weekly collections are more convenient for householders than fortnightly collections. Some local authorities, such as Daventry, have been able to reduce the refuse collection to fortnightly by running a weekly dry recyclables collection and a fortnightly food and garden waste collection, which has increased participation in the scheme and the overall recycling rate. However, the frequency of refuse collections should only be reduced to fortnightly where a comprehensive recycling and composting scheme has been established and good promotion of the change has taken place.

### **Collection of recycling and residual waste on the same day of the week**

The recycling and refuse collections should both take place on the same day of the week to avoid confusion, i.e. both collections should take place on Mondays, whether or not those collections happen weekly or fortnightly.

### **Wide range of materials collected**

The greater the number of materials that are collected the more people are likely to participate and the greater the amount of material people will put out for collection. For example, Recoup has reported that when plastic bottle collection is added to existing recycling schemes, capture rates of other materials typically increase by 10-30%. Collecting food waste for composting has also been found to have great potential for increasing overall recycling rates ('Maximising recycling rates – tackling residuals', CRN, 2002). If certain materials are excluded from the collection then an explanation for this should be given to householders and advice on the nearest bring sites should be offered.

### **Good customer care including regular information**

Customer care can take many forms including operating a telephone hotline service, having a dedicated web page for information, delivering leaflets or newsletters or doing face-to-face education about the service. A combination of measures is the best way to reach a wide audience. Letting the public know about what happens to the materials once after they have been collected also helps to reinforce the 'feel-good' factor and encourages participation.

### **Provision of an easily storable container**

Trials in Bath in 1993 found that yields of materials for recycling were over 50% higher in areas provided with a bag or box compared to similar areas without ('The Loop' magazine, LARAC, Spring 2003). There is a wide variety of containers available for collections and it is important to recognize that different shapes and sizes will suit different households. Certain materials will require specific containers, for example, glass needs to be stored in a sturdy container to prevent it from being broken, but paper may be better kept in bags as these can be stored more easily. Multi-material collections with kerbside sorting will require a basket or box to be provided rather than a bag and it may be beneficial to consult with residents to find the most appropriate container for their needs.

### **Collection of separated rather than commingled recyclables**

Biffa Waste Services has found that the earlier materials for recycling can be separated from the waste stream, the lower the likely cost and environmental impact of the collection scheme ('Future Perfect', Biffa, 2002/3). Materials separated at the doorstep will be less contaminated than those sorted at a central material recycling facility (MRF) and will therefore require less treatment. Cleaner materials are more valuable to reprocessors and local authorities and a higher proportion of these can be recycled. Also, glass cannot easily be collected commingled and separated into different colours at a central facility because it is

difficult to sort by hand when broken and the technology required for separating the different colours mechanically is only just becoming available.

**Incentives to increase participation**

Reducing the size of the refuse container and charging more for a larger bin or extra bin bags can help to encourage people to take part in the recycling scheme. Other ways to involve residents include offering a free or reduced rate home compost bin and developing a reward scheme for high recyclers. Where possible, it is preferable for people to home compost rather than take part in collection schemes for green waste.

*(Source: Friends of the Earth 2004)*



## **Annex 5. Charleroi (Belgium) experiences in planning and implementing a sustainable and integrated waste management scheme**

### **Background information**

Located in the southwest of Belgium, the city of Charleroi is the biggest city in the Walloon Region (the French-speaking part of Belgium) and the third-biggest city in Belgium. In the last decade, environmental improvements have transformed Charleroi from a post-industrial environmental time bomb into one of Belgium's best examples of a progressive sustainable city.

In fact, since 1991, Charleroi has been devoted to a city project defining its strategy for sustainable development. Additionally, in 1994 it passed the "Charleroi 21" charter, which defines the essential qualities of a sustainable city. In this Charter, Charleroi outlines its plans to be a metropolitan city, a place to live well, mobile, with low pollution and good health, a city of learning, one that works and innovates.

### **The Analysis - To define a concrete waste management information plan.**

To accompany the sustainable development of the City, the Charleroi district (ICDI - 416.000 inhabitants – 14 municipalities- 1999) has included among its policies a waste management information plan. This Plan has been developed in concert with the Brabant-Wallon county council district (365.000 inhabitants – 27 municipalities - 2001) and a local NGO specialising in environmental management - "Espace Environnement".

Waste issues are traditionally among the most pressing concerns for the general public as the effects of waste management are often strongest at the local level. The pollution caused by illegal deposits, the unsightliness of landfill sites, and the concern over emissions from incineration plants, these are debated in local areas on a daily basis. When one also considers that the costs of collection, treatment, and final disposal are borne by local taxpayers the importance of waste management becomes clear for all to see.

With this in mind the authorities in Charleroi decided to tackle one of the principal sources of waste, namely packaging waste. To do this they set about building a partnership and systematic communications campaign with local citizens, and most interestingly, with a network of major supermarkets.

The aim of this partnership was twofold. First, the authorities wanted a reduction in the environmental impact of the waste burden. Secondly, they realised that a decrease in the costs of waste management, and in their own expenditure, was only possible if they could also reduce the amount of household waste. This in turn required a change in the local consumption patterns. For the plan to be successful the authorities needed to persuade the public to:

- Avoid extra waste production;
- Reuse products and materials;
- Compost and recycle as much as possible.

### **The Results**

#### *Fulfilling the Objectives and Overcoming the Barriers to Communication*

Given that persuasion requires subtlety, and also recognising that the public can be mistrustful of information that comes solely from official sources, the authorities in Charleroi developed a communication plan involving the supermarkets and the environmental NGO – "Espace-Environnement". Together they launched a communication initiative that addressed waste prevention from both the top-down and bottom-up. Their first step involved compiling a proper overview of the true state of waste production in Charleroi. The resulting

comprehensive waste audit provided them with the data they needed to develop the right tools and target the campaign. The results highlighted:

- A lack of knowledge on the basic elements of waste management policy. This was addressed by providing a detailed explanation of the general principles of waste management, both at the regional level in Wallonia, and also emanating from the European level. (from prevention to final disposal);
- A lack of understanding of the true costs of waste management. The authorities sought to address this by outlining the direct cost to every citizen, via municipal and regional taxes, for the collection and treatment of waste;
- A lack of dialogue and participation. This was addressed by developing a dynamic system of citizens groups or fora to facilitate dialogue and to involve the population in discussions on waste prevention. Participants in these citizens' fora included representatives from the public authorities, the private sector, schools, and environmental NGOs.
- An awareness of the problems caused by the waste burden but a lack of information on the solutions. This was addressed by providing more information on measures designed to reduce the amount of waste production;

In addition the waste audit highlighted the need to change the behaviour of producers in order to reduce the growth of the waste burden.

Based on these results the authorities in Charleroi determined that the best way to reduce waste was to target consumers in the shops as they were making their choices. While they recognised the importance of providing general information to households, they discovered that much of this information is forgotten when the purchasing choices were actually being made.

The ensuing partnership with supermarkets enabled the waste programme to operate in more than 170 supermarkets in both the city and the province. Shoppers were actively invited to think about the environmental impact of their purchases, particularly the impact of packaging. In addition shoppers were encouraged to buy goods with less packaging.

The promotional work undertaken by the supermarkets was varied. It involved:

- The distribution of information leaflets on waste minimisation and packaging. These information leaflets were made available at the checkout counters in each participating supermarket. In an attempt to maximise visibility, the leaflets were promoted actively for one week at a time on a total of three different occasions in one year. Unused leaflets were taken back for recycling and those that were distributed were counted to monitor their impact.
- A new system of product labelling was introduced, which provided information on products with minimal packaging. The "Less waste" labels were applied for a period of two months under each product that was deemed to generate less direct packaging waste. The decision on which articles to label was a collaborative venture between supermarket managers and their staff. This ensured that the workers themselves also benefited from environmental education. The labelling was checked on a bi-weekly basis to ensure that all of the information remained correct and relevant. The in-house public address systems were used every half hour to guide consumers to the low impact products and to offer them advice on their purchasing choices.
- "Minimisation week" was used to launch and spearhead the campaign. During this week the labelling and leaflets were backed-up by articles and posters in shop windows around Charleroi.
- Supermarket visits were organised with adult groups. During these visits, members of the general public were taken through the supermarkets step by step and provided with detailed information on the available low-impact products.
- A product sales analysis was carried out to evaluate the impact of all of this promotional work.

The active and honest participation of the supermarkets was crucial to the success of this project, partly because the customers were responding to their advice and guidance, and partly because the ongoing evaluation of the project depended on figures provided by the supermarkets themselves.

When all of the data was finally collected the results seemed very encouraging. A significant increase in the sales of products with less packaging and so less environmental impact was the first positive sign. This project is now entering its third year and so far the net result has been a reduction of 7kg of waste per inhabitant for the year 2001. A similar figure is expected for 2002.

This action in supermarkets is intended as a long-term initiative with constant evaluation. Of course it is not designed to be the main pillar of the waste management strategy but rather a complementary way to stimulate the involvement of citizens. Having said that there is no doubt that the reduction in packaging waste in Charleroi is directly related to the twin approach of direct communication at the point of purchase coupled with the information campaign on posters throughout the city and the province. Their combined impact was to educate the general public, thus enabling greater environmental awareness and protection. In addition, by providing ready-made solutions to the general public, this project highlights the positive contributions they can make to protect the environment.

*(Source: Cameron 2003)*

## Annex 6. List with the interviews held in the Netherlands, Hungary and Romania

Date and location of the interview	Interviewee	Organization	Position within the organization
10.06.2005 Rotterdam, the Netherlands	Stephan van Hoorn	Roteb, waste collection company in Rotterdam	Head of the Communications Department
27.06.2005 Utrecht, the Netherlands	J.F.M. Daemen (Jo) & Ageeth Boos	SenterNovem, Secretariat of the AOO	Senior adviser Expert
27.07.2005 Budapest, Hungary	Dorottya Nick	Municipality of Budapest	Head of Department of Public Utility Works
27.07.2005 Budapest, Hungary	Annamaria Batari	Municipality of Budapest	EU integration official in charge
27.07.2005 Budapest, Hungary	Peter Szanto	FKF RT, the waste management company in Budapest	Senior consultant
28.07.2005 Szentendre, Hungary	Robert Nemersky	Regional Environmental Center of Central and Eastern Europe (REC)	Head Department Business and Environment
29.07.2005 Budapest, Hungary	Szigeti Geza Tamas	Ministry of Environment	Staff from the Waste management department
03.08.2005 Bucharest, Romania	Brandusa Petroaica, Corina Filip	National Agency for Environmental Protection (ARPM)	Staff of the Waste Management Department, Head of the Monitoring Department
04 & 10.08.2005 Bucharest, Romania	Cerasela Lungu, Silviu Stoica, Venera Vlad, Cristina Zecheru	Ministry of Environment and Waters Management, European Structural Funds Management Department	Councillor, General Director, Director Councillor
04.08.2005, Bucharest, Romania	Elena Dumitru	Ministry of Environment and Waters Management	Head of the Waste Hazardous Chemical Substances Department
09.08.2005 Bucharest, Romania	Bogdan Constantinescu	URBAN, the waste management company in Bucharest, 6 <sup>th</sup> district	Marketing Manager
10.08.2005 Bucharest, Romania	Magda Iuga	Bucharest City Hall	Head of the Public Utilities Department
09.08.2005 Slobozia, Romania	Doina Gangan	Slobozia Environmental Protection Agency (APM)	Director
04.08.2005 Contact by e-mail	Olimpia Adam	Piatra Neamt City Hall	Head of the Waste Management ISPA Project Implementation Unit
03.08.2005 Contact by e-mail	Silvia Padurariu	Ramnicu Valcea Environmental Protection Agency	Head of the Monitoring Department, working on the ISPA Waste Management Project
16.08.2005 Contact by e-mail	Daniela Dumitrascu	Ministry of Public Finance	Staff of the ISPA and Cohesion Fund Management Department
06.09.2005 Contact by e-mail	Laura Calin	City Hall of the 3 <sup>rd</sup> district, Bucharest	Staff of the Department for Programs and Development
07.09.2005 Contact by e-mail	Ioana Unteanu	Hill International	Coordinator of the PR campaign for the Piatra Neamt ISPA Project

## **Annex 7. Types of separate waste collection facilities used in Budapest and Rotterdam**

### **“Waste island” in Budapest (neighbourhood containers type of scheme)**



### **Dry Batteries collection bin (in public buildings in Budapest)**





**Colourful containers for separate waste collection in Rotterdam**

**a) underground neighbourhood containers**



**b) neighbourhood containers (partly underground)**





**Underground containers for separate waste collection in a new neighbourhood in Capelle aan den IJssel**

**a) Glass container**



**b) Underground neighbourhood containers for glass, paper, bio-waste, and residual waste**





**Container for the collection of residual waste** (in one of the high-rise areas in Rotterdam, where the lack of space does not allow the placement of underground containers)



**Textiles' collection containers in Rotterdam**





**Annex 8. Questionnaire used for the Survey on the personal factors that influence current waste behaviour of Bucharest residents and their preferences for future waste arrangements (August 2005, Bucharest)**

**Personal characteristics and habits**

1. Age: .....
2. Social status: Married  Single  It doesn't matter
3. Income per household: different categories to tick (to be established in Bucharest)
4. Highest level of education per household achieved: .....
5. Size of the residence area: .....
6. Type of dwelling:  
House  Apartment in a multi-storey flat
7. Owned or rented status of the dwelling:  
Owned  Rented

**KNOWLEDGE, PERCEPTIONS AND BELIEFS**

8. In your opinion, which are the three main bothering environmental problems in Bucharest?  
.....  
.....
9. Have you heard of or taken part to a recycling program in the last few years?
  - 9.1. Yes
  - 9.2. No
  - 9.3. I don't know
10. Why do you think a recycling program will be introduced in Bucharest?  
.....  
.....
11. Which do you think are the effects on the environment of not recycling?  
.....  
.....
12. Which materials do you think are the most harmful for the environment considering production processes and disposal?  
.....  
.....

13. Which types of waste do you think can be recycled?

.....  
.....

14. When a recycling system will be in place, do you expect your neighbours to separate their garbage?

- 14.1.       yes
- 14.2.       no
- 14.3.       I don't know

15. What about your friends?

- 15.1.       yes
- 15.2.       no
- 15.3.       I don't know

16. Have you noticed separate waste collection containers in the city?

- 16.1.       yes
- 16.2.       no
- 16.3.       I don't know

17. What do you think it happens with the waste collected in those containers?

.....  
.....

18. Can you tell us in short what compost is?

Yes  .....

No

### **WILLINGNESS FOR FUTURE ACTION**

19. What do you believe that would make you separate your garbage in the future?

.....  
.....

20. What do you think that would make you not to separate your garbage in the future?

.....  
.....

21. What method of collection do you consider the easiest to do?

- 21.1.       sort it at home in different colour bags and place it in the same place with regular waste
- 21.2.       separate recyclable materials from the regular waste (just two bags)
- 21.3.       take recyclable materials to a community bin / yard
- 21.4.       others.....
- 21.5.       none
- 21.6.       I don't know

22. When separate waste collection containers will be available in the neighbourhood, would you agree to the closing down of the current waste collecting tube existing within the block?

.....  
.....

23. Who do you is the most appropriate person or organisation to be involved in promoting the separate waste collection scheme?

.....  
.....

**Thank you!**