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Influence of recycling programmes on waste separation behaviour

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ABSTRACT

To achieve high rates of waste reuse and recycling, waste separation in households is essential. This study aimed to reveal how recycling programmes in Sweden and Bulgaria influenced inhabitants' participation in separation of household waste. The waste separation behaviour of 111 university students from Kalmar, Sweden and 112 students from Plovdiv, Bulgaria was studied using the Theory of Planned Behaviour framework. The results showed that a lack of proper conditions for waste separation can prevent individuals from participating in this process, regardless of their positive attitudes. When respondents were satisfied with the local conditions for waste separation their behaviour instead depended on their personal attitudes towards waste separation and recycling.

1. Introduction

The efficiency of waste management is more important than ever. Urbanisation and industrialisation have led to a linear approach in human consumption. Resources taken from nature are used in the production of goods which are consequently consumed, and finally discarded. This linear approach causes a shortage of natural resources, as well as increased environmental pressure. Furthermore, economic growth and improved living standards at the global level result in overall increased consumption, which induces the rapid expansion of waste generation, both from industry and households (Grazhdani, 2016). In an attempt to minimise these adverse effects of economic growth on the environment, making development sustainable, i.e. the idea of using waste as a resource, has been adopted in waste management (Ghisellinia et al., 2016).

Presented in the Waste Framework Directive of the European Commission (Directive 2008/98/EC), the waste hierarchy (Gharfalkar et al., 2015) ranks waste treatment activities regarding their environmental impacts. From this, the European Union's (EU) member states are promoted to set priority targets on waste prevention in the ascending order of reuse, recycle and energy recovery; the deposition of waste in landfill and incineration without energy recovery as the most undesirable options. Nevertheless, for some waste streams, the best environmental option may differ from this framework. Yet, the preferred treatment should always be the one best for human health, as well as the environment (Manfredi et al., 2011). Whenever possible, the treatment of waste should comply with the established hierarchy in aim to avoid landfill material deposits, and reuse materials that could, in fact, have further uses (Gharfalkar et al., 2015).

Harmonised waste management legislation in the EU and national waste legislations of its member states define the responsibilities of stakeholders in the waste sector. Governments must develop and implement national waste management strategies, as well as waste prevention programmes. Municipalities are obliged to facilitate waste collection and treatment. Producers of goods and the packaging industry are responsible for waste minimisation and recycling, from product design to the collection of packaging waste and product residuals (Bezzina and Dimech, 2011; Ferreira da Cruz et al., 2014). With these services provided, citizens are then asked to separate their household waste and either dispose of it at drop-off stations or prepare it for kerbside collection. Inhabitant participation in the household separation of waste is essential for the recyclable waste fractions and their further utilisation as raw materials for new production. Material recovery is a basic issue in the concept of the circular economy, which includes circular consumption, sustainable markets and the protection of natural resources (Singh and Ordonez, 2015). Achievement of a circular economy is therefore highly dependent on the proper separation of the domestic waste at the household level where the key roles of citizens are recognised by the European Commission in its adopted Circular Economy Package (European Commission, 2015).

Despite the fact that all EU member states must achieve the same goals, the respective waste sector performance varies between countries in their differing capabilities to meet the

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common waste regulations and targets. Differences in economic, social and cultural factors require the development of specific strategies which fluctuate between member states, and even between different regions in the same state. In many East European countries, landfill rates are still too high, while waste prevention and recycling rates are low (Eurostat, 2016). Lack of resources (social, administrative etc.) undermines the ecological modernisation in these countries (O'Brien, 2013) which can be considered detrimental as poor waste management can cause serious ecological, health and urban problems (Antanasijevič et al., 2013). The choice of the waste management elements (e.g. recycling programmes) at the local level must therefore take into consideration the specific features of the place and its inhabitants (Ordoñez et al., 2015). Moreover, the inclusion of households in waste separation requires individual effort (Karim Ghani et al., 2013). Thus, the increase of participation rates could therefore be a serious challenge to the stakeholders of waste management in the various nation states.

Four types of measures could be applied to motivate citizens to perform active pro-environmental behaviours: administrative measures (legal obligations), economic measures (fees and taxes), physical measures (e.g. placement of recycle bins and frequency of waste collection) and information (e.g. campaigns and prompts) (Lindén and Carlsson-Kanyama, 2003). These tools should be combined to make waste separation at home more convenient, which would increase citizen participation rates (Bernstad, 2014; Martin et al., 2006). However, various research reports that inefficient waste management practices on national, regional and local levels could prevent residents from participation in waste separation at home (Karim Ghani et al., 2013; Latif et al., 2012; Tonglet et al., 2004a). Thus, instead of being a motivator, a recycling programme could function as a barrier for recycling.

The aim of the current study was to show if and how recycling programmes in two EU-member states with different performance levels in the waste sector influence the waste separation behaviour of inhabitants. In this purpose, waste separation behaviour of university students from Kalmar, Sweden and Plovdiv, Bulgaria was analysed in the framework of The Theory of Planned Behaviour. The perception of the effectiveness of the local recycling programmes in the respondents' home areas was assessed.

1.1. Management of household waste in Sweden and Bulgaria

Sweden is situated in Northern Europe on the Scandinavian Peninsula, and has 9.7 million inhabitants. Bulgaria is located in South East Europe on the Balkan Peninsula, and has 7.2 million inhabitants. Both countries are members of the EU.

Waste collection in Sweden and Bulgaria includes kerbside collection, recycle bins for the separate collection of packages and drop-off stations. Common to both countries is that the collection and treatment of packaging waste, tyres, batteries, electronics and electrical devices are the responsibility of producers and packaging industry, not the consumers. These streams, as well as hazardous and bulk waste, are collected at drop-off stations. Packaging waste is collected in recycle bins near the residences and at drop-off stations, and the municipalities are responsible for the rest of the household waste streams. Citizens in both countries have the legal obligation to separate household waste (MEW, 2012; SWMA, 2013).

Waste collection coverage in Sweden is 100%, including the kerbside collection of waste, recycle bins and drop-off stations (EC, 2012). In some Swedish municipalities, there are bins for separate collection of bio-waste and the organised collection of electronics, hazardous waste and non-hazardous bulk waste (e.g. furniture) near the residences (Dahlén and Lagerkvist, 2010; SWMA, 2013).

Polluter Pays Principle (PPP) was introduced in Sweden in 1993. Producers of goods and packages formed Packaging Recovery Organisations (PRO) after industrial sector – organisations of producers of plastics, glass, metal, paper, cardboard and newspapers. These organisations, with exception of Svensk Glasåtervinning (PRO of glass producers), formed FTI (Förpacknings- och Tidnings Insamlingen) to carry out their responsibilities in recycling of packaging waste. Each municipality is free to manage the waste as preferred, with a minimum of collecting household waste from all citizens.

The waste collection fee paid by households to municipality covers collection and processing of general waste, but not of packaging waste. The system for kerbside collection normally includes containers for general waste only. In single family homes each house has its own smaller waste container for general waste. In some municipalities, citizens are also provided with waste containers for food waste.

The waste collection coverage in Bulgaria is approximately 99% as approximately 1% of the population have not yet been provided with waste collection services (MEW, 2012). At the place of waste generation, the separate collection of waste is applied to packaging waste, but 15% of the Bulgarian population have not been supplied with bins for separate waste collection (MEW, 2012). Containers for separate collection of bio-waste are, however, being implemented (MEW, 2013).

Municipality and producers in Bulgaria have common responsibilities for the management of packaging waste since 2004. Municipalities are responsible for managing the general waste and packaging waste. Producers are required to handle the packaging waste streams. Colour coded containers are used for separate collection of recyclables from households. The waste collection fee, paid by the citizens to the municipality they live in, covers collection and processing of both general and packaging waste. Calculation of this fee is based on the tax evaluation of the property (Plovdiv Municipality) The amount of generated municipal waste in both countries as per 2013 was comparable – 458 kg per capita in Sweden versus 432 kg per capita in Bulgaria (EU, 2016) – however its treatment differed. In Sweden, waste to landfill was less than 1% of the total treatment, whereas in Bulgaria it composed a 70% share. Moreover, 50% of the treated municipal waste in Sweden went to incineration (energy recovery), compared to only 2% in Bulgaria. Composting and digestion rates were 16% in Sweden versus 3% in Bulgaria, and the overall share of recycling was 33% for Sweden and 25% for Bulgaria (EU, 2016). These statistics show that waste treatment in Sweden complied, to a higher degree, with the waste hierarchy than in Bulgaria. Lack of capacity (technical, administrative, etc.), lack of funding and low prioritizing of waste management by authorities and stakeholders in Bulgaria resulted in lack of engagement of institutions towards development of efficient management of waste (O'Brien, 2013). Sometimes subcontractors take all the garbage in one truck, including the separated fractions (Nenova, 2012). Presence of scavengers in the waste collection system is another major problem, causing littering and losses for the packaging recovery organisations (Ecopack Bulgaria, 2012). All of these issues lead to mistrust and lack of understanding of the meaning with recycling from households (Nenova, 2012).

1.2. Recycling programmes in Kalmar, Sweden and Plovdiv, Bulgaria

The town of Kalmar is situated in the southeast of Sweden. There are about 65 000 residents in the town and about 50% of them live in single-family houses, which are provided smaller waste containers for general household waste (for incineration) and food waste (for biogas production). The collection frequency is between 1 and 2 weeks.

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