



# How does place matter in circular/waste management transition? Comparison of five European peri-urban regions from the view of stakeholders' perspective

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## ARTICLE INFO

Handling Editor: Prof. Andy Pratt

## 1. Introduction

The transition towards a circular economy (CE) has gained importance at multiple levels in the past decade (Varjú, 2020). The notion of CE is often depicted as the set of activities that reduce, reuse and recycle (Kirchherr, Reike, & Hekkert, 2017) and relies on effective waste management (as a first step). As the way out of 'the source trap' (Reike, Vermeulen, & Witjes, 2018), out of locked-in or path-dependent systems (Geels, 2018), the transition from the linear economy to CE requires broader engagement, empowerment, and breakthrough strategies. Both the transition of management (Wittmayer & Loorbach, 2016) and technology are important elements of a sustainability transition that includes 'changes in user practices, regulation, industrial networks, infrastructure, and symbolic meaning or culture' (Geels, 2002, p. 1257; in Williams & Robinson, 2020, p. 58).

Embedding sustainable behaviour in practice, routine, and cultural norms in institutions and other collectives is an essential element of the transition to sustainability. Changes in norms and values represent newly created peculiarities of a system and are captured by assessing and examining the changes in (collective) practices (Moore, King, Dale, & Newell, 2018; O'Brien, Sygna, Datchoua, Pettersen, & Rada, 2018), and examining actors' roles, relationships, and agency (Avelino & Wittmayer, 2017; Schot & Kanger, 2018; in Williams & Robinson, 2020, p. 61). As numerous authors have pointed out, transitions are inherently boundary-spanning and affect multiple domains (e.g. social, political, cultural and technical) (Hölscher, Wittmayer, & Loorbach, 2018; in Williams & Robinson, 2020, p. 58).

This paper focuses on one important segment of this socio-technical system, the stakeholders and their engagements in waste management transition towards CE with a focus on peri-urban regions, as this is the scale where (public) waste management usually takes place, and where the circular transition can be realised (Tonini et al., 2020). To reveal these stakeholders and the engagements they have, the authors elaborated a comprehensive questionnaire survey to help identify the most important aspects of the potential barriers and permissive transition factors. Hence, this tested questionnaire is also a novel method that helps the understanding of the factors that drive stakeholders' opinion.

Accordingly, the examined stakeholder perceptions and interpretations about the relevance of certain aspects of improved waste/resource management also shed light on the socio-spatial context that constrains these individual ideas. The empirical investigation was performed in the REPAiR H2020 project's framework to examine the perceptions and interpretations of the relevant stakeholders (as agenda-setters, opinion-leaders, veto-players, and experience-holders who may have different approaches), i.e., the ideational substance about which institutional, policy-related, socio-cultural, and socio-moral features could be crucial pre-conditions or initiatives for improved waste/resource management in the five urban regions specified below. Accordingly, in this paper, the authors show that socio-spatial context has an impact on stakeholder perception, but not in terms of 'what to achieve', but instead in connection with aspects of 'how to achieve' a transition. The policy goal of this research and paper is to emphasise the importance of the cultural embeddedness of the circular transition.

Considering the above, this paper aims to assess, through the

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perspectives of stakeholders in five different urban areas, the social dimension of waste management transition from five main aspects: financing, legislation, implementation factor, infrastructure and technology, and policy design. The latter aspect sheds light on strategy formulation and collaboration in decision-making and the preferred procedural aspect of governance.

Following this introduction, the paper gives a brief overview of the theoretical framework used during the investigation. In the third part, the methods and materials are presented, which are followed by the presentation of the results. Subsequently, the final part emphasises the role of cultural embeddedness and territorial differences, where the authors conclude by arguing that a tailor-made approach to the regional scale is needed for the improvement of waste management towards the circular transition.

## 2. Background

### 2.1. Circular economy

The CE approach, introduced by the Ellen MacArthur Foundation over a decade ago, is widely used as a starting point (Remøy, Wandl, Ceric, & Timmeren, 2019) for the discussion and visualisation of how to shift an economy from linear to circular. According to the systemic literature review performed by Reike et al. (2018), the first CE article was recorded in 2007, however, as they also pointed out, the concept dates back much further (Reike et al., 2018; Varjú, 2020).

Besides the interest shown by the scientific community, meta-governance institutions (e.g. OECD, UNEP, EU) have also promoted CE (Varjú, 2020), and recently, with the introduction of the Circular Economy Action Plans (COM/2020/98), under the umbrella of the Green Deal, the EU has started forcing the implementation of this transition. Additionally, many CE initiatives have also been launched by legislative bodies, NGOs, and consultancy firms (Kalmykova, Sadogopan, & Rosado, 2018).

The 3R principle (reduce, reuse, recycle) was the initial practical framework of CE (Yang, Xia, Thompson, & Flower, 2017), which was primarily aimed at the waste management system, with the 'R' concept being supplemented with other principles, too, such as recover, redesign, and remanufacturing (Jawahir & Bradley, 2016; Yang et al., 2017). However, as Ghisellini and Ulgiati (2020a) pointed out, these extensions of the '3R' framework generate partial overlaps among the different aspects and do create some confusion (Ghisellini & Ulgiati, 2020a).

In the EU, the Circular Economy, in addition to being seen as a new business model, is promoted as a tool for designing bottom-up environmental and waste management policies (Ghisellini, Cialani, & Ulgiati, 2016). It is based on an immense multidisciplinary theoretical background and clear principles related to the use of resources and also provides a new concept for waste (Ghisellini & Ulgiati, 2020b). CE, as Papargyropoulou et al. (2014) pointed out, has most often been considered only as an approach to more appropriate waste management. An explanation for this might be that most of the agents are at the beginning of the CE transition. Furthermore, the most easily modified sector may be the waste management sector, as it is basically a public service, hence it can be easily modified via governing legislative tools before the business sector is addressed.

The CE transition entails radical changes in the entire multilevel socio-technological system and its subsystems as well, including the social system that consists of the economic, cultural and political subsystems (Ghisellini & Ulgiati, 2020b). This transition requires the 'involvement of a large variety of actors, and it depends on the ability to foster collaboration and exchange of knowledge' (Heurkens & Dąbrowski, 2020, p. 12). Furthermore, both the current state of technology and the social subsystems are influencing the transition (as seen in Geels's (2002) model, for example). Therefore, the CE transition is a reflexive process.

There is also a gap in knowledge regarding the role of institutions in

CE transitions in cities. Research to date has highlighted the institutional barriers to a CE transition and the need for new rules governing interactions in actor involvements, including the need to consider political tensions (Fischer & Pascucci, 2017; Fratini, Georg, & Jørgensen, 2019; Heurkens & Dąbrowski, 2020; Korhonen, Honkasalo, & Seppälä, 2018; Marin & De Meulder, 2018; Moreau, Sahakian, Griethuysen, & Vuille, 2017).

Moving towards CE in urban regions requires a multi-disciplinary and multifaceted approach, and the involvement of stakeholders from multiple levels (Taelman, Tonini, Wandl, & Dewulf, 2018). The concept of the mobilisation of diverse stakeholder networks has gained a central role in recent decades both in the European (Somlyódiné Pfeil, 2020) and worldwide policy agenda (e.g. Pimentel Walker & Friendly, 2021). In addition, in the context of globalisation, the importance of places has increased. This is because localised institutions and investments are needed to implement a place-based regional development policy. This is linked to the premise that territorial capacities lie in the local social, institutional and economic fabric, which fabric can make the economy a success (Pike et al., 2006; Lengyel, 2014; Rechnitzer, 2016; Pálné Kovács, 2019 in Somlyódiné Pfeil (2020) pp. 22–23). Hence, the involvement of local stakeholders may ensure not only the success of the economy but its transition as well.

The concept of stakeholder involvement is prevalent in debates on (urban) planning (Bajmócy, Gébert, Elekes, & Páli-Dombi, 2016; Fernandes, Lopes, & Sargento, 2021) and preparation for decision-making in many topics and collaborations (e.g. in branding (Li & Feng, 2021) including transportation (Shibayama, Pungillo, Lemmerer, & Nocera, 2020). Andersen, Hansen, and Selin (2021) argue that the role of stakeholders and their involvement in planning-related actions can be 'viewed as instrumentally necessary to gather and synthesize the knowledge and perspective required to make sense of many societal challenges' (Andersen et al., 2021).

### 2.2. Sustainability transition

The use of the notion of transition is increasing in scientific theoretical frameworks both in natural, technical/technological or social sciences. The current transition to a more sustainable world emerged in the past decades (Ghisellini & Ulgiati, 2020b; Loorbach, 2007) and scholars frequently use - as a starting point of their argumentation - Geels's technological transition models where Geels argues that technological transitions do not only involve changes in technology, but also changes in user practices, regulation, industrial networks, infrastructure, and symbolic meaning or culture (Geels, 2002, p. 1257). Transitions or trajectories are situated in a 'socio-technical landscape' that has a set of heterogeneous factors, including cultural and normative values, and (place-based) environmental problems, among others. This landscape is also a context for interaction where change can occur (Geels, 2002). In this interaction, it is important that how actors adapt/translate national and international factors to the local context (Truffer & Coenen, 2012).

In CE transition, governance aspects are often discussed (e.g. Loorbach, 2007; Wittmayer & Loorbach, 2016). Additionally, Burch, Shaw, Dale, and Robinson (2014) suggest the desirability of integration of economic aspects, social dimensions, technology, and environment, among others (Burch et al., 2014).

CE highly relies on effective waste management (Ranjbari et al., 2021). CE and waste management are each very complex processes whose take-off (from linear to CE) is hampered by several barriers (Ghisellini & Ulgiati, 2020b; Gupta & Gupta, 2015). This paper aims to assess the social dimension of waste management transition through the lenses of stakeholders in five different urban areas from five main aspects: Financing, Regulation, Implementation, Infrastructure And Technology and Policy Design. This latter reflects to the aspects of strategy formulation and collaboration in decision-making and the preferred procedural aspect of governance.

### 2.3. Peri-urbanism

A significant part of Europe's territory does not fit in the classic 'urban-rural' classification system. These 'in-between' or 'in the middle' areas cannot be understood as simply places of interaction between urban and rural territories. Their specific characteristics do not fit in the classic urban-rural dichotomy (Garreau, 1991; Hall & Pain, 2006; Wandl, Nadin, Zonneveld, & Rooij, 2014). There are several definitions for this kind of dispersed area in several national languages, and the precise form and meaning of these terms vary (Wandl et al., 2014). Territories-in-between is an umbrella term, introduced by Wandl et al. (2014) to describe and map dispersed settlement patterns that do not fit in the dichotomic urban-rural classification. Wandl (2019) cross-compared different dispersed urban areas in Europe, however, the phenomenon is not just European. Castells (2010), for example, analysed such areas in metropolitan regions, and described metropolitan regions as a new form, including urbanised areas and agricultural land, open space and high-density residential areas in the same spatial unit. As Wandl et al. (2014) argue, territories-in-between in Europe are of specific interest as they have also emerged independently and outside of the metropolitan regions.

Additionally, the term has several definitions. Peri-urban is used to identify the wide territory of urban diffusion around urban centres, and as a common feature, similar to territories-in-between, it is described as a transition space 'with some degree of intermingling of urban and rural uses ...'. Peri-urban areas may be predominantly large green open spaces, such as urban woodlands, farmland and nature reserves in the urban periphery with a lower population density but belonging functionally to the urban area (Wandl & Magoni, 2017, p. 1). Peri-urban areas usually remain as a discontinuous developed area with larger green open spaces, with a lower population density but belonging functionally to the urban area (Nilsson et al., 2013; Wandl, Rooij, & Rocco, 2017; Wandl & Magoni, 2017). On the one hand, these territories include green areas, which provide a higher quality of life for residents, however, on the other hand, they are often affected by strong expansion processes from the city, causing challenges for planners and sustainable development.

The REPAiR project focused on the peri-urban part of six urban regions (Amsterdam, Hamburg, Ghent, Naples, Łódź, and Pécs). For the identification of these areas project members used the GIS-based mapping method described in Wandl et al. (2014) with consideration of population density, land use, and urban fabric.

### 3. The five regions

As mentioned above, we analysed six European peri-urban regions in the REPAiR project (grant agreement number: 688,920). However, in our empirical study, we did not receive a sufficient response from Hamburg, therefore we focus on the following five regions in this paper (Fig. 1).

#### 3.1. Amsterdam

The Amsterdam Metropolitan Area (AMA) is located in the Randstad, in the north wing of this polycentric region. The city of Amsterdam has more than 1 million inhabitants (2021 – Eurostat), and around 2.5 million people, more than 14 per cent of the Dutch population, live within the AMA (<https://www.metropoolregioamsterdam.nl/about-mra/>). The golden age of the city was in the 16th and 17th centuries when it was a European financial and trade centre. The relative importance of Amsterdam decreased from the 18th century in parallel with the increase in the size of ships. Kahn and van der Plas (1999) depicted Amsterdam as a patchwork of large-scale development projects and infrastructural improvements. Amsterdam's city development model displays continuity with its mid-90s policies, as well as certain peculiar and unexpected discontinuities as a result of experimental



Fig. 1. Own contribution.

approaches to urban development, housing and regional politics. In addition, economic growth led to increasing demand for space for residential, business, recreational, and infrastructural uses, with a consequential shrinkage of natural and rural open spaces (Geldermans et al., 2019; Kahn & van der Plas, 1999; Savini, Boterman, van Gent, & Majoor, 2016, p. 103). This process is a challenge for urban planning, not least regarding the quality and quantity of housing, and has resulted in the designation of expansion areas for AMA. The issue of construction could lead to a certain CE-related initiation as well. From the vantage point of 'circularity', the building stock represents materials that can be capitalised on in the years to come. The current building stock can thus be unlocked as an 'urban mine'. In the AMA case, this notion of 'urban mining' has been integrated in recent policy strategies and explorative studies, against the backdrop of regional circular economy ambitions (Geldermans et al., 2019).

#### 3.2. Naples

With a population of slightly less than 3 million (2021- Eurostat), the main city of South Italy, Naples is the third largest in the country and is integrated into a much larger urban zone where 4.2 million people live (Eurostat). While the importance of Naples in maritime commerce is in decline, the city remains the centre of the nation's meridional commerce and culture (Geldermans et al., 2019). The urbanisation process occurring in the second half of the 18th century was intense and chaotic, transforming a rural reality into a metropolitan conurbation without any shared institutional vision. After WWII, urbanisation was encouraged by the industrialisation process and by the infrastructure instigated by the 'Cassa per il Mezzogiorno' scheme, which resulted in a dense conurbation around the old towns with many urban fringes, characterised by the coexistence of non-built fragments as well as discontinuous and low-density built environments. After the recent 2008-9 economic crisis, large productive areas became underused and were abandoned. The REPAiR project study area is characterised by the presence of large infrastructure networks fortuitously overlapping the historical structure of the territory, contributing to changing its former rural character into a peri-urban area (Formato, 2015; Geldermans et al., 2019; Russo, 2011). An outstanding 'waste management' problem in the region may be traced back to the 1980s when the Camorra criminal organisation

illegally dumped waste and toxic materials, which then caught fire and covered the area with toxic smoke, hence the area was named: 'Land of Fire' (Deitche, 2020).

### 3.3. Ghent

Ghent is the capital of the province of East Flanders. With more than 260 thousand inhabitants (Eurostat - 2021), it is the third largest city in Belgium. Ghent is part of a dense urban metropolitan region, the so-called 'Flemish Diamond'. A less dense ring was formed around the compact city core during the 20th century characterised by detached houses, a few village centres, and a more rural environment. The districts of the metropolitan region can be divided into three categories. The northern part, which was originally very rural, later industrialised. The eastern part has a typical suburban character, while the southern and western parts have a more residential character. The Ghent-Destelbergen area was identified as the focus area for the REPAiR project, which includes two municipalities. The area is characterised by a high population density, with there being a considerable difference between the densely populated inner city and more remote areas. Destelbergen is particularly eager to safeguard its 'open space', however, it is very much affected by mobility, and urban development due to the proximity of the inner city (Acke, Taelman, & Dewulf, 2020; Taelman, Acke, et al., 2018). Since organic waste still represents a considerable amount of residual waste from households, this contributes to the policy objective to further reduce the amount of residual household waste.

### 3.4. Łódź

The Łódź Metropolitan Area (ŁMA), with a population of over 1.1 million people, is located in central Poland and constitutes the country's main north-south and east-west communication hub. The spatial distribution of its 12 urban centres is relatively polycentric with a clear demographic and functional domination of the city of Łódź (with around 700 thousand inhabitants (Eurostat)). The region has been intensely transformed by industrialisation, the associated urbanisation processes, and by the development of the communication network since the 19th century. Although, after the communist regime, the majority of the clothing and textile sector collapsed, it still has a major role in the region, employing around 25% of the population of the metropolitan area. In addition, agriculture still plays an important role in the area. Suburbanisation in the metropolitan area intensified after the systemic change (post-1989), which was accompanied by degradation processes in rural areas. The outcome of the uncontrolled residential development here is the fragmentation of the ecosystem and the reduction of agricultural land. The allocation of agricultural and forested areas for the development of logistics infrastructure is a part of the municipal development strategy in the area. Besides, it has to be mentioned that the amount of municipal waste collected per inhabitant per year is strongly correlated with the economic status of individual regions of the country. The analysis performed in the REPAiR project focused on the 28 municipalities in ŁMA (Czapiewski et al., 2018).

### 3.5. Pécs

The Pécs metropolitan area has more than 180 thousand inhabitants (Hidas, 2014), with the city of Pécs having a population of around 140 thousand (Eurostat, 2021). Pécs is situated in the southwestern part of Hungary, in Baranya County, one of the most peripheral regions in Hungary (Pénczes & Demeter, 2021; Varjú, Óvári, Mezei, Suvák, & Vér, 2022). The unfavourable economic situation here is a result of the structural transformation following the end of the communist era and is also due to the collapse of more than 150 years of coal and 40 years of uranium mining (Pirisi et al., n.d.). The changes in economic position, the lack of rational strategies and renewed infrastructure made the city under-urbanised (c.f. Sailer-Fliege, 1999). However, two important

strategies in terms of urban development appeared in the 2000s. One was partly brought about by mining reclamation, and the environmental economy and green thinking gave birth to many initiatives (e.g. Eco-city, eco-region concept (Kiss, 2004), which are still among the foundations of urban development to this day. In addition, there is an emphasis on the 'cultural economy' built on higher education, cultural infrastructure and the cultural heritage of the region (Trócsányi, 2011; Varjú et al., 2018, p. 1). The REPAiR project focused on the whole metropolitan area including the former mining-related sites.

## 4. Methods and materials

The empirical material of this article is based on the H2020 REPAiR project. The analysis draws on primary data from five (out of the six) peri-urban regions of this project, and a first version of the preliminary results are presented in the D3.8 deliverable of the project (Varjú, Lovász, Grünhut, Bodor, & Pirmajer, 2020), which are used and extensively elaborated in this article.

The following four groups of stakeholders were involved in the project: (1) regional and local authorities, (2) industry stakeholders in the waste management sector and related fields, (3) actors from research and higher education, and (4) civil actors (NGOs, citizens). Participation, throughout the 52-month project, took place via Living Laboratories (LL). The concept of LL came to the forefront in Europe around 2000 and since then they have become widespread in planning processes (Acke et al., 2020; Dąbrowski, Varjú, & Amenta, 2019; Kris & Ellen, 2017; Lepik, Krigul, & Terk, 2010). This public-private-people partnership allows the iterative development of innovations (Pallot et al., 2010). In LL, different areas of expertise from diverse agents are needed to improve innovation capabilities (Acke et al., 2020), and to shift a space towards transition. Nowadays, LLs are widely used, for instance for the co-creation processes in peri-urban regions shifting them towards more circular land use and functioning (c.f. Amenta et al., 2019). In the course of the (peri-urban) LLs, the key challenges of the given peri-urban regions were co-identified, and then eco-innovative solutions (<https://h2020repair.eu/eco-innovative-solutions/>) were co-created with the LL stakeholders. Co-creation meant not only the innovation of new solutions but also the analysis of the adaptability of solutions co-created in other regions. We surveyed these stakeholders to conduct the empirical data collection, the results of which is the subject of this paper.

The leaders of the living labs in the urban regions were asked to invite these stakeholders to respond to the questions in the survey. The survey was performed online in the stakeholders' language in each of the urban regions between March and November 2018. The number of full responses ranged from 8 to 18. However, only two people from Hamburg completed the questionnaire, therefore Hamburg was eventually left out of this analysis. Although the most important stakeholders (companies, NGOs, academics) in the waste management sector appear among the respondents, the number of respondents varies from case to case, which represents a sampling limitation. At the same time, our goal is not to be representative, but to explore the most important drivers and to test the questionnaire methodology in exploring the drivers. One of the great advantages of this survey is that the selection of the stakeholders and their commitment was already established in the REPAiR project, thus the reliability of the responses (despite their small number) can be considered high, as the stakeholders were committed to both the project objectives and their urban region.

Addressing waste-conscious behaviour based on values, norms, customs, codes, and conventions by asking about the stakeholders' perceptions and interpretations, the survey aimed to reveal the socio-spatial and cultural embeddedness of relevant stakeholders in the field of waste/resource management. Presumably, agents in these sectors have both adequate awareness and the right intent to contribute to sustainable waste/resource management in their urban regions. It is much more interesting, thus, to reveal that, as agenda-setters, opinion-leaders, veto-players, and experience-holders, what forms of approach



these agents have to this desired outcome.

The whole survey, which took around 30 min, contained three major blocks, as the original stakeholder survey aimed to provide information about various tasks within the REPAiR project. For this present analysis, we used some of the questions from the first and the pairwise section of the survey.

In the first block, questions focused on how the respondents perceived the relevance of the factors from institutional aspects. These factors were: financial factors, regulations, implementation, infrastructure, and new technologies. Respondents gave their answers on a 0–10 Likert scale, where 0 was ‘not important’ and 10 was ‘important’.

The second analysed section used the pairwise comparison method to more accurately determine the preferences of stakeholders about theoretically interlinked aspects posed as oppositional alternatives. This method aimed to reveal stakeholders’ preferences about basic institutional (organisational, legal, and financial) frameworks, policy designs, and governance modes. The question posed to the respondents was the following: ‘*Finally, we are interested in how you perceive the relevance of the following factors compared to each other in connection with sustainable waste/resource management. 1 means you completely agree with the statement on the left, and 10 means you completely agree with the statement on the right. If your answer falls between 1 and 10, select the number that correctly reflects your perception.*’

#### 4.1. Findings

In the following, the results of the survey are presented question by question and grouped according to the analytical dimensions mentioned in the theoretical chapter.

##### 4.1.1. Financing

In general, waste management is financed from three sources: public money, service fees, and the contribution of the corporate sector (which is ultimately incorporated into the price of products). With the transformation of the waste stream, the service structure is also changing. In Europe, the collection service is typically the responsibility of municipalities (which may be outsourced). The conditions for collection are set out in national (or pan-European) legislation, but the technical conditions are also set down in the local/regional plans (Antonioli & Masarutto, 2012).

Here, the survey focused on the perspective of stakeholders who come from the waste management sector, for-profit companies, and local/regional governments, who are, ultimately, responsible for a major proportion of waste flows, including the household waste flow.

Regarding the *financial aspects*, the survey asked the stakeholders about the relevance of budget stability, obtaining additional financial resources, dealing with loss-making services, and securing equal accessibility even if this increases the costs (The answers to each question can be found in Tables 1–5 in the supplementary materials. In all the following tables: MV = Mean Value; N=Number of items.)

Concerning financial aspects, it should be noted that stakeholders in every case study area perceive the financial stability of the service providers as a basic pre-condition. Regarding the efforts to continuously aim for additional resources, however, there are some differences, insofar as the stakeholders in Amsterdam and Pécs consider this task more important. Reducing the number of loss-making services and improving profitable ones, even if these interventions have social or environmental costs/risks, is perceived negatively in all areas except for Łódź. Furthermore, it is worth mentioning in this respect that stakeholders generally feel that environmental risks are more dangerous than potential social costs. Finally, in connection with the dilemma of providing the same quality of services to all customers even if secured accessibility challenges profitability, the stakeholders of Pécs have more unfavourable perceptions than those elsewhere.

In all cases, stakeholders are in favour of waste/resource management being funded by public financial resources. There are, though,

significant differences among the perceptions, particularly if we compare answers from Ghent and Naples (Supplementary materials, Table 6).

##### 4.1.2. Regulation

The investigation of aspects of *regulation* focused on the perceived relevance of the comprehensiveness of the general legal frameworks, the importance of explicit legal formalisations, and finally the significance of local autonomy in adopting place-based implementations (Evaluating tables in Supplementary materials: Tables 7–9).

Regarding the comprehensiveness of legal frameworks, stakeholders generally have positive perceptions, except for those in Naples. The formalisation of waste/resource management-related policies and practices at various levels of (hierarchically ordered) regulation is highly appreciated, yet leaving room for place-based solutions in the local context is even more favoured by the stakeholders.

Regarding the favoured legal frameworks, a dual tendency may be noted: on the one hand, national-level regulations are prioritised as opposed to local frameworks, while on the other hand, EU ordinances are preferred to both local and national regulations in four out of the five case areas. The exception is Pécs, where the stakeholders do not have positive perceptions of EU frameworks. It should also be mentioned that in Central Eastern Europe, EU regulations are much less appreciated than in Amsterdam, Ghent and Naples.

##### 4.1.3. Implementation

The survey also turned to the stakeholders to ask about their ideational understanding of the relevance of the implementation factors of benchmarking and monitoring, the imposing of fines on violating customers, permitting periods of grace before fines become due, and the importance of promotion campaigns (Supplementary materials: Tables 13–16).

The benchmarking of service providers is prioritised by the stakeholders of Pécs and Naples, but not so much by respondents in Amsterdam. Strict fines being imposed on violating customers is very positively perceived in Naples but much less so in Amsterdam. Allowing a period of grace before fines become due is accepted in Central Eastern Europe while being generally rejected in Western case study areas. Finally, promotion campaigns are highly appreciated in all case study areas.

##### 4.1.4. Infrastructure and technology

This section was designed to explore the stakeholders’ perceptions about using eco-innovative and smart technologies in challenging circumstances in connection with costs, acceptability, and accessibility (Supplementary materials: Tables 17–19).

Applying eco-innovative and smart technologies, even if the costs of the services potentially increase, is generally perceived as positive, however, it is perceived as slightly negative among the stakeholders of Ghent, and even more unfavourably in Łódź. There is high support for this only in Naples where the acceptability of services is challenged.

##### 4.1.5. Policy design

This section was developed to map out the stakeholders’ preferences about *policy design* (strategy-formulation mechanisms, and modes of collaboration in waste/resource management), as well as their understanding of who should be the main actors in the field. Four variables were used in the survey in this section (Supplementary materials: Tables 20–23).

There are differences among the case areas regarding strategy-formulation, insofar as both in Amsterdam and Ghent stakeholders are rather in favour of top-down logic, while respondents of Naples, Łódź, and Pécs support a more bottom-up method of policymaking.

Regarding who should dominate the decision-making in waste/resource management, stakeholders are generally in favour of the generative agency of non-political actors, except for Ghent where

respondents rather expect political agents to be influential.

In connection with the discussion and development of waste/resource management strategies and policies, stakeholders in all case areas agree that a wide coalition of agents should be involved and tasked. However, there is a division worth mentioning between Amsterdam and Ghent on the one hand, and Naples, Pécs, and Łódź on the other, as stakeholders of the former regions are somewhat less in favour of broad inclusion than the stakeholders in the latter regions. It is also crucial to note that, except for Łódź, stakeholders believe that the discussion of strategies and policies should be more open than the effective decision processes.

Finally, in the pairwise comparison, stakeholders were asked about their preferences regarding the *institutional reflective capacities* of waste/resource management: if they prefer the service providers to strive for imminent answers or rather aim for long-term solutions (Supplementary materials: Table 24). There is a consensus among stakeholders that waste/resource management policies should strive for long-term solutions.

4.2. Across the factors

Concerning the top three most relevant institutional aspects (Table 1), the stakeholders of Amsterdam and Ghent have similar perceptions: cooperation among service providers to develop and share eco-innovative solutions; service providers should have the autonomy to develop place-based legal frameworks and practices; and in general waste/resource management should be comprehensively regularised. The last two factors are understood as basic conditions also by the stakeholders of Pécs and Łódź. The Polish stakeholders' legal frameworks and promotion campaigns are perceived as the most crucial institutional elements. In Pécs, the general understanding is similar, yet not promotion campaigns but innovation-oriented cooperation among service providers is ranked at the top. In Naples, stakeholders are focused on promotion campaigns, the examination of best practices, and the application of eco-innovative solutions even if this latter effort

**Table 1**  
Top three most relevant institutional aspects according to the cases.

Amsterdam	
Waste/resource management service providers should cooperate in developing and sharing eco-innovative solutions	8.7
Leaving room for implementation based on the local context	8.6
Comprehensive and executable regulations on waste/resource management	8.4
Ghent	
Waste/resource management service providers should cooperate in developing and sharing eco-innovative solutions	8.9
Comprehensive and executable regulations on waste/resource management	8.6
Leaving room for implementation based on the local context	8.3
Naples	
Waste/resource management service providers should continuously study best practices	9.3
Using eco-innovative and smart technologies to improve waste/resource management even if these developments are challenging the acceptability of services	9.3
Promotion campaigns to encourage participation in and acceptance of waste/resource management	9.1
Pécs	
Comprehensive and executable regulations on waste/resource management	9.4
Waste/resource management service providers should cooperate in developing and sharing eco-innovative solutions	9.2
Leaving room for implementation based on the local context	9.1
Łódź	
Promotion campaigns to encourage participation in and acceptance of waste/resource management	8.6
To explicitly formalise all the waste/resource management-related issues and practices in regulations at different levels (national, regional, local, organisational, etc.)	8.0
Comprehensive and executable regulations on waste/resource management and Leaving room for implementation based on the local context	7.8

Source: Authors' elaboration

challenges the acceptability of services.

Concerning the bottom three least relevant institutional factors (Table 2), the stakeholders of Amsterdam and Ghent have common understandings as well. They reject the profit-orientation of service providers if this goal creates social costs or environmental risks, just as they are not in favour of allowing a period of grace for violating customers. The stakeholders of Naples also reject the profit-orientation of service providers if there are potential social costs or environmental risks, and they do not see the importance of eco-innovative solutions either if these technological/service developments challenge equal accessibility. The stakeholders of Pécs have negative perceptions about eco-innovative solutions and smart technologies if these improved services are not accepted by customers or equal accessibility is not maintainable due to these developments. Those eco-innovations that challenge equal accessibility are also deeply rejected by the stakeholders of Łódź. Furthermore, they do not favour the adaption of existing models of best practices over locally produced innovations, while they do not consider the efforts of service providers for additional financial resources as something important either (see Table 3).

5. Discussion

CE transition in an urban region is challenging because the process needs to take place simultaneously at and between different management levels. The transition management framework distinguishes four levels of governance activity (Heurkens & Dąbrowski, 2020; Loorbach, 2007, 2010; Wittmayer & Loorbach, 2016). The survey focused mainly on the 'Transition Agendas with tactical-level activities' from the

**Table 2**  
Bottom three least relevant institutional aspects according to the cases.

Amsterdam	
Reducing loss-making waste services and improving profitable services even if this intervention has environmental costs/potentially negative impacts	2.9
Reducing loss-making waste services and improving profitable services even if this intervention has social costs/potential negative impacts	3.6
Allowing a period of grace before fines imposed on violating customers become due	4.1
Ghent	
Reducing loss-making waste services and improving profitable services even if this intervention has environmental costs/potentially negative impacts	2.5
Reducing loss-making waste services and improving profitable services even if this intervention has social costs/potential negative impacts	3.2
Allowing a period of grace before fines imposed on violating customers become due	3.4
Naples	
Reducing loss-making waste services and improving profitable services even if this intervention has environmental costs/potentially negative impacts	3.1
Reducing loss-making waste services and improving profitable services even if this intervention has social costs/potential negative impacts	4.0
Using eco-innovative and smart technologies to improve waste/resource management even if these developments challenge the equal accessibility of services	4.7
Pécs	
Reducing loss-making waste services and improving profitable services even if this intervention has environmental costs/potentially negative impacts	2.8
Reducing loss-making waste services and improving profitable services even if this intervention has social costs/potential negative impacts	4.4
Using eco-innovative and smart technologies to improve waste/resource management even if these developments challenge the equal accessibility of services	4.9
Łódź	
Using eco-innovative and smart technologies to improve waste/resource management even if these developments challenge the equal accessibility of services	5.8
Continuously aiming for additional financial resources (e.g. private investments, government subsidies etc.) for the waste sector	6.1
Instead of developing local innovations, waste/resource management service providers should adapt an existing model of best practices if it seems to be a cheaper solution	6.2

Source: Authors' elaboration

**Table 3**  
Private or public financial resources.

	Scale			
Waste/resource management should be funded by private financial resources	1–5			
Waste/resource management should be funded by public financial resources	6–10			
	MV	N =	MV	N =
Amsterdam	7.0	15	Pécs	6.5
Ghent	5.5	12	Łódź	6.9
Naples	<b>8.8</b>	8	Total	6.9

Source: the authors

stakeholders' perceptions and perspectives. These activities are defined as 'activities aimed at the mid-term, aiming for a change in established structures, institutions, regulations, and physical or financial infrastructures' (Heurkens & Dąbrowski, 2020, p. 15; Wittmayer & Loorbach, 2016, p. 19).

The integration (and non-integration) of countries and regions into the EU is examined widely from different perspectives, for instance from the perspective of trade (Bolea, Duarte, Hewings, & Sánchez-Chóliz, 2021), the financial perspective (Tang, 2016), citizen engagement (Guasti, 2016), identity (Fligstein, Polyakova, & Sandholtz, 2012), and from the perspective of the change of governance (Stead & Pálné Kovács, 2016) and territorialism (Faludi, 2018). Although these works simultaneously reflect sovereignty, the role of nationalism, and European values, most of them also make a distinction between the original or founding member states (the Netherlands, Belgium, Italy) and the former socialist bloc (Hungary, Poland). This difference has also been revealed in the present research: Central Eastern European urban regions prefer their own (local or national) legislation over EU legislation (in waste management).

Concerning the order of governance, the preferred mode of policy formulation is bottom-up in Naples, Pécs, and Łódź, while rather top-down in Amsterdam and Ghent. In line with this, in Amsterdam and Ghent, a rather narrower coalition of agents is favoured as the main decision-maker entity. The difference in the preferred management order may reflect the success (The Netherlands, Belgium) or failure of the general management order and its negative perception (Italy, Hungary, Poland) according to the judgment of the stakeholders. The success of The Netherlands can be seen in the ambition of the central government to develop the country's economy towards one based on the principle of the CE by 2050. In the case of Belgium, especially Flanders, a combination of instruments and tools has been used to move waste management further up in the waste hierarchy, promoting prevention and material recovery since 1981 (Obersteg et al., 2019, pp. 22–23), that has been a central process. A controversial top-down process can be seen in the case of Hungary, where waste management has undergone an intensive centralisation process in the last ten years which creates many uncertainties for decision-makers and waste management actors. The uncertain legal environment and the centralisation of the market for secondary raw materials do not facilitate a CE transition at the urban region level as recyclable materials are moved out of the region (Varjú, Mezei, & Vér, 2020).

Stakeholders in ŁMA face low level of environmental awareness mainly manifested in improper waste separation or even the lack of it. There is a lack of widespread actions to pass on good practices. Local authorities do not stand for lobbying for innovative ecological solutions (Obersteg et al., 2019). This may be the reason why the use of eco-innovative and smart technologies are perceived unfavourably in Łódź, especially if the costs of services increase, as the introduction of new technologies requires a change of mindset. (Awareness raising was considered important by all stakeholders in all urban regions.)

The openness of Naples' stakeholders to smart technology could be an effect of the role of universities in innovation. For example, Federico II University hosts the Apple Developer Academy, unique in Europe.

In the waste management process, the literature distinguishes

between two systems: the community regime and the market regime. The community regime treats household waste, while the market regime treats commercial and business waste. Today, the two systems are becoming increasingly interoperable and the ratio varies from country to country and from region to region (Antonioli & Massarutto, 2012). In all cases, stakeholders are in favour of waste/resource management being funded by public financial resources. There are, though, significant differences among the perceptions, particularly if we compare answers from Ghent and Naples (Table 1). Ghent has a successful and flexible waste management system with private actors and customisation at the local (municipal) level remains possible (Obersteg et al., 2019). On the other side of the coin, the failure of 'private' waste management from the 1980s can be seen in Naples, which caused the 'Land of Fire' disaster. This is also supported by the fact that in Naples stakeholders preferred strict fines for violating customers, and by the responses where the stakeholders of Naples also reject the profit-orientation of service providers in the case of potential social costs or environmental risks.

Concerning the bottom and top three least relevant institutional factors, the stakeholders of Amsterdam and Ghent have a common understanding. This demonstrates the common socio-economic (Flemish) cultures and geographical proximity. The very strong common understanding in the rejection of the profit-orientation of service providers if this goal creates social costs or environmental risks, just as their aversion to allowing a period of grace for violating customers is rooted in the high (corporate) social responsibility in the countries' tradition (c.f. Renneboog, Ter Horst, & Zhang, 2008).

## 6. Conclusion

The co-creative and reflexive approach of the REPAiR project helped to reach the most important stakeholders, this paper has sought to examine the territorial differences between the perceptions and interpretations of stakeholders in five peri-urban regions and concluded that there is no 'one-size-fits-all' solution on the road towards CE transition. The research findings provide a greater understanding of the possibility of path dependency in transition, or in other words, the landscape (cultural, broad political) changes take place only slowly (Geels, 2002).

The local socio-spatial context is very important for CE transition, which is successfully captured by the survey conducted with local stakeholders. Such a survey tool not only helps to understand the local context, but also helps to develop pluralistic models or model alternatives for a successful transition to CE process variations, exchanges of experience or knowledge transfer (c.f. Dąbrowski et al., 2019). Therefore, the questionnaire used is also a novel evaluative tool to assist decision-makers to understand the barriers to and permissive factors of waste management in the transition towards circular city regions. It also emphasises multiple background dimensions of the CE transition, including financial, regulative, implementation factors, infrastructure and technology, and policy design.

This paper contributes, with a cross-country comparison, to the transition management framework (Loorbach, 2007, 2010) emphasising the socio-cultural embeddedness of the 'Agendas'. While most studies on the (urban) transition towards CE focus on cities, insufficient attention is paid to its regional dimension at the scale of an urban region (Obersteg et al., 2019). This paper also contributes to the research of peri-urban regions.

Furthermore, this paper points to the policy formulation proposal that (in governance) the institutional and legal framework in waste management/CE transition should not be uniformized, but tailor-made to the regional scale for the improvement of waste management. Additionally, the elaborated questionnaire, the method used here, can be replicated and may help decision-makers understand their cities' status in the transformation towards circularity considering different important factors.



## CRedit authorship contribution statement

**Viktor Varjú:** Conceptualization, Funding acquisition, Investigation, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.  
**Ákos Bodor:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Validation, Writing – original draft.  
**Zoltán Grünhut:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Validation, Writing – original draft.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgement

This research has been carried out within the framework of the European Horizon 2020 funded research REPAIR: REsource Management in Peri-urban AREas: Going Beyond Urban Metabolism and has received funding under grant agreement no. 688920. This paper reflects only the authors' view. The Commission is not responsible for any use that may be made of the information it contains.

The authors would like to thank to the case study partners in the REPAIR consortium who were really kind to translate the survey questions to their own languages and help to reach their living lab stakeholders to fill in the survey.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ccs.2023.100523>.

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