



# Local governments' perspective on implementing the circular economy: A framework for future solutions<sup>\*</sup>

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## ABSTRACT

With half of the global population living in urban areas, prevailing unsustainable production and consumption patterns, and ecological crises, the circular economy topic gains momentum. However, the implementation of the circular economy from a local governance point of view has been explored in a rather fragmented manner, although public policies remain crucial in driving countries towards more circular systems. This paper aims to explore whether and how local governments contribute to circular economy implementation by applying Voß et al.'s (2007) steering framework for sustainable development. By using desk research analysis and focus group and individual interview discussions with representatives of municipalities and regional waste management centres, we identified challenges for implementing the circular economy with a lack of local governments' contribution, namely municipal waste management, textile waste, distribution of human resources, networking, and local business. Finally, we created a framework for circular solutions by mapping national and foreign practices through five perspectives, namely learning, sharing vision, reflexive governance, regulation, and negotiation in networks.

## 1. Introduction

In the context of prevailing unsustainable production and consumption models and ecological crises, the circular economy topic gains momentum. A circular economy is often presented as a practical strategy for implementing sustainable development (Geissdoerfer et al., 2017; Van den Bergh, 2020). The circular economy puts environmental sustainability forward and acknowledges the need for favourable economic settings (Homrich et al., 2018), but social sustainability is usually absent and may even reinforce social inequality (Johansson and Henriksson, 2020). The circular economy may be the expression towards weak sustainability (Kirchherr et al., 2017; Johansson and Henriksson, 2020) as it suggests a system where recycling and reuse are assumed as substitutes for raw materials. The urgency behind a circular transformation is based on a looming resource and ecological crisis (Hobson and Lynch, 2016) as well as globalisation and increase of resources consumption (Bonciu, 2014).

In practice, the circular economy is implemented in diverse contexts, from resource efficiency (Blomsa and Brennan, 2017), product design

(Lacy et al., 2020; Van den Bergh, 2020) and product integrity (Stahel, 2010), appropriate waste management and recycling (Ghisellini et al., 2016; Murray et al., 2017; Knickmeyer, 2020), companies' practices of reuse and repair cafés (Ghisellini and Ulgiati, 2020), post-consumption waste transformation into valuable materials (Braungart and McDonough, 2002), and urban circular initiatives (Russell et al., 2020).

Interestingly, the implementation of the circular economy from a local governance point of view has been explored in a rather fragmented manner, although public policies remain crucial in driving the EU towards a full circular implementation (Cainelli et al., 2020). Historically, the EU waste legislation is very detailed and mature, since launching the first EU Packaging Directive in 1994, the End of Life Vehicles Directive in the late 1990s, and the 2008 Waste Framework Directive. Governments and policy makers mainly of developed countries have attempted to direct the growing material waste streams back into industry through recycling programs in order to close the material loop (Lieder and Rashid, 2016). Obviously, it has a direct impact on towns and cities by laying down waste management priorities and specific targets (e.g. management of municipal waste, e-waste). More recently, the circular

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economy came to the forefront of EU economic policy (Russell et al., 2020) when the European Commission confirmed its “Closing the Loop” action plan in 2015. This action plan includes a broader definition of municipal waste and no longer limits the definition simply to waste that is collected by local governments (European Parliament, 2015).

With half of the global population living in urban areas (towns and cities), proper urban governance through local governments might play a significant role by facilitating a state’s strategies to local communities and businesses. However, waste collection and recycling rates are heterogeneous over space, varying among municipalities because of differences in infrastructure, ways of waste collection, and maturity about environmental problems (van den Bergh, 2020). Furthermore, the circular economy is increasingly used as the overarching strategy of municipal, regional, and international plans to foster green development (Fratini et al., 2019). Implementing circularity require systemic transformations (Termeer and Metze, 2019), which can be hindered when some actors involved are not aware of the role they are expected to undertake (Senge et al., 2007), especially when it comes to execution. Therefore, it is expected that municipalities are responsible for facilitating a state’s strategies to local communities and businesses and should take the lead.

Although there are some empirical research studies about municipalities’ role to foster the circular economy through hybrid governance of solid waste management (Lindqvist, 2013) and urban circular initiatives (Fratini et al., 2019; Russell et al., 2020), the major focus is on the cases of metropolitan cities (Prendeville et al., 2018; Cramer, 2020; Russell et al., 2020) or Chinese cities (Wang et al., 2018) because of their economic and social importance, population, density, and urbanisation.

Moreover, most of the previous research studies refer to the reviews of publicly available documents such as cities’ or countries’ strategic plans and reports (Johansson and Henriksson, 2020), while lacking a qualitative approach to the problem. Very few articles go into much depth when discussing “how” and “what it takes” to implement circular economy principles in urban contexts in general (Levosio et al., 2020) or how municipalities accept this top-down approach and implement it. Little attention is paid in the scholarly circular economy literature to the active role that local governments can play. The lack of fundamental analyses of the social contexts and institutional conditions under which the circular economy is being implemented is therefore considered an important barrier to its contributions to socially just and environmentally desirable societal transitions (Moreau et al., 2017; Korhonen et al., 2018). In addition, recent research of the circular economy in small open countries is focused mostly on leaders, such as Belgium, the Netherlands, Finland, Sweden, Denmark, etc. There is a lack of comprehensive research about implementation of the circular economy in small economies, which are in the initial stage of the transition to the circular economy (Mitrovic Milan, 2018) or on-track to the circular economy (Momete, 2020).

Therefore, the pressing question remains to what extent and how municipalities may contribute to circular economy implementation across all steps in the value network. The theoretical approach used in this study refers to an umbrella attitude towards the circular economy concept as well as Voß et al.’s (2007) steering framework for sustainable development.

Our empirical focus is on Lithuanian local governance. Lithuania is a country which has done well year over year, moving up the rankings in three circular economy indicators, namely, per capita waste production and recycling rate of both municipal waste and packaging (EU Circular Economy Update, 2019). There are three incineration plants, and it is the only one country in the EU which banned the import of waste to incinerate. Circular economy initiatives are rather limited. The country does not have any tax incentives in place for circular products or services.

Our contribution is threefold. First, we expand the knowledge of challenges to local governments engaging in the circular economy. Furthermore, we create the practical framework of circular solutions for

local governments by mapping national and foreign practices through five perspectives, namely learning, sharing vision, reflexive governance, regulation, and negotiation in networks. Our proposed steering solutions could be implemented beyond the Lithuanian case. In addition, it would be important to set out a social contribution. This study also aims to raise legislators’ awareness about the circular economy, which goes beyond just waste management, and also includes prevention and active collaboration with local communities and businesses.

The paper is organised as follows. Section 2 outlines the overview of the circular economy through local governance and its theoretical foundation, followed by Section 3, which presents the Lithuanian local governance case. Section 4 explains research methods. In Section 5, the main results (drivers, gaps, and key stakeholders) are presented. Sections 6 and 7 present the discussion and conclusions.

## 2. Background overview on the circular economy through local governance

The concept of the circular economy does not belong to one science discipline, and therefore it is difficult to define. It lacks a strong scientific basis (Fratini et al., 2019) and critical discussion (Johansson and Henriksson, 2020), as it is loosely based on a fragmented collection of ideas derived from a variety of scientific disciplines and semi-scientific concepts (Korhonen et al., 2018). The most known ones include Cradle-to-Cradle, where waste becomes a value-producing resource (Braungart and McDonough, 2002), optimisation of product-services systems and the “Inertia Principle” (Stahel, 2010), industrial ecology (Graedel and Allenby, 1995), and the Triple Bottom Line (Elkington, 1997). Homrich et al. (2018) defined the circular economy as opposition to linear open-ended systems, aiming to face the challenges of resource scarcity and waste in a win-win approach between economic and environmental perspectives. In this paper, we follow Blomsma and Brennan (2017) with an umbrella approach derived from Hirsch and Levin (1999) towards the circular economy, that is characterising it as a relation between pre-existing concepts that were previously unrelated, or not related in the manner the umbrella concept proposes, by focusing attention on a particular shared quality or characteristic of the concepts. By its comprehensive and encompassing content, the circular economy differs from earlier attempts concerning only selective collection of waste or individual attempts to recycle or to increase energy efficiency (Bonciu, 2014). In addition, Murray et al. (2017) also refer to the circular economy as a “general term covering all activities that reduce, reuse, and recycle materials in production, distribution, and consumption processes” (Murray et al., 2017, p. 5).

### 2.1. Circular economy at local governance

Public sector institutions have a social and fiduciary responsibility to conserve natural resources and promote social welfare and equity. It has far greater responsibilities for advancing the notion of sustainable development when compared to corporations (Ball et al., 2014). Lieder and Rashid (2016) proposed top-down and bottom-up approaches to support CE implementation. Top-down approach contains legislation and policy and support infrastructure and social awareness. Hence, public institutions advocate a collective consciousness about environmental issues as well as societal benefit of industrial activities by strict control of industrial businesses.

The prevalent institutions were established and designed in times when linear economy concepts dominated the discourse. Termeer and Metze (2019) noted that currently institutions constrain circular choices. Ghahari et al. (2019) explored relationship between investments and performance using regional (state-level) US data. Regional expenditure does not always reflect the actual work performed on infrastructure improvements because it does not account for wastage, management, and operational inefficiencies, and corruption. By carrying out a comparison between eco-cycle and circular economy policies

in Sweden, Johansson and Henriksson (2020) also noted that the state is represented rather as an inherent obstacle than as a facilitator to other actors. Based on the functional institutional approach, public institutions seek to perform their function of fulfilling efficient contracting (Roland, 2004). Local governments are formal institutions responsible for municipal waste management. However, such an approach does not explain the needs, evolution, and change of a specific institution nor does it reveal much about how institutions interact.

A literature review discovers a distinct discourse towards so-called circular cities. Levoso et al. (2020) explored how urban systems identify their circularity potential and use it to develop a plan for the implementation of circular strategies. Given the dependency of urban areas on energy, water, and material resources, cities will only heighten the issues brought by the linear economy if a paradigm change is not enforced (Lehmann, 2017). It is worth mentioning the study by Prendeville et al. (2018), which explored how Dutch cities adopt the circular economy as a strategy. Although none of the investigated cities has the appropriate institutional setting to create a circular economy, Prendeville et al. (2018, p. 188) developed a definition for a circular city, which “is a city that practices principles to close resource loops, in partnership with the city’s stakeholders (citizens, community, business and knowledge stakeholders), to realise its vision of a future-proof city”. Cramer (2020) questioned how the implementation of the circular economy actually takes place and evolves over time, using the example of the Amsterdam Metropolitan Area. Fratini et al. (2019) explored how the circular economy is imagined in the academic literature in support of sustainability transitions in European cities, and how European cities imagine the circular economy as a knowable object of governance. Fratini et al. (2019) suggested conceptualising and operationalising the circular economy through the prism of socio-technical imaginaries, namely discourse analysis, institutions, representations, and identities. Cities have quite different translations of the circular economy imaginary as their engagement with the circular economy has aligned to pre-existing political and institutional arrangements (Fratini et al., 2019).

Although global policies are necessary to set the goal of transitioning towards the circular economy, local interventions are crucial to make the goal a reality (Levoso et al., 2020). Cities could play a vital role by managing local transport and waste and water systems and offering locations for low-carbon innovations (Nevens et al., 2013). Pitkänen et al. (2016) emphasised municipalities’ commitment and active participation in fostering green and circular initiatives. In the more local-scale cases, public sector involvement might work to increase the credibility of the green business cases. Termeer and Metze (2019) analysed to what extent and how governments can contribute to transitions or transformative change, especially since the circular economy inherently conflicts with norms underlying existing policies and regulations (Kirchherr et al., 2017; Korhonen et al., 2018).

Initially, the rise of many non-profit recycling initiatives that served charitable and community building purposes was cast as a moral duty to the environment (Blomsma and Brennan, 2017). Gradually, these small-scale initiatives became primarily the responsibility of larger organisations, due to solid waste management. Finally, at the local level, in particular in urban centres, small initiatives promoting circular practices contribute to the renewal of urban centres and the reuse of public places (Ghisellini and Ulgiato, 2020).

Various sustainability transitions are qualified as too slow, for example, recycling at such a tempo would be far too slow to achieve a closed loop. Overall, the circular economy has most often been considered only as an approach to more appropriate waste management (Ghisellini et al., 2016), which is not surprising as recycling is fundamental to the circular economy (Murray et al., 2017). Hence, more attention should be paid to opportunities for developing a local dimension of recycling in the circular economy (Van den Bergh, 2020) and greater enforcement and more active public participation in the shifting of consumption practices (Hobson and Lynch, 2016). Van den

Bergh (2020) suggests distinguishing pragmatic, realistic CE policies (e.g. deposit-refund system) from imaginative, futurist strategies (e.g. increase the intensity of a product’s lifetime, regulation of advertising).

This paper, in contrary to previous research (Fratini et al., 2019; Prendeville et al., 2018; Levoso et al., 2020), does not analyse strategies of circular cities, that is cities, which declared themselves as having unique strategies to contribute and implement the circular economy. It takes rather an overarching approach, by taking a series of different municipalities to deeply understand how they implement desirable circular transitions.

## 2.2. Theoretical frame for steering circular economy in municipalities

By explaining how municipalities could better serve to facilitate circular economy implementation, we refer to Voß et al.’s (2007) steering framework for sustainable development (Fig. 1). Following Blomsma and Brennan (2017) and Hirsch and Levin (1999), an umbrella approach is adopted to conceptualise the circular economy. Actually, there are many widespread umbrella concepts, such as zero waste, resource efficiency, bioeconomy, sustainable consumption and production, and green economy. Both the circular economy and sustainable development might be treated as umbrella concepts, used loosely to encompass and account for a set of diverse phenomena (Hirsch and Levin, 1999). Following Voß et al.’s (2007) framework, we adapt ambivalence, uncertainty, and distributed power for explaining and steering the circular implementation from municipalities’ point of view.

**Ambivalence.** The concept of the circular economy is affected by its inherent subjectivity, particularly when it comes to implementation. Different actors value and frame reality differently, hence trade-offs between diverse goals, which are generally accepted as legitimate, occur. One example can be related with the usage of more recyclable materials and prolonging a product’s lifecycle. For example, if one uses more regenerated-recycled cotton in manufacturing, the products’ quality may be less and would last a shorter period of time.

In addition, often these goals remain vague in terms of focus, quantification, and timescale (Voß et al., 2007). When it comes to waste management, which is historically mature (European Parliament, 2015), the European Commission has set common EU targets for recycling municipal waste of 65% by 2030 and for recycling packaging waste of 75% by 2030. Such measurable targets decrease the ambivalence; however, other areas of implementing the circular economy are lacking clear outcomes, for example implementing eco-design and circular cooperation. Moreover, local government managers, who focus their efforts only on fulfilling policymaking for the central government, may be doing so solely for tokenistic purposes (Andrews and Beynon, 2017). Local governments need to realise the potential of inclusive decision processes by being open to public input, and considering a variety of viewpoints enables decisions based on local knowledge (Knickmeyer, 2020).

**Uncertainty.** In line with uncertainty about how to interpret the circular economy (Kirchherr et al., 2017), there is no full agreement on what its precise objective should be (Van den Bergh, 2020; Korhonen et al., 2018). A special aspect of the circular economy problems is that they contain interactions between very different elements from the domains of society, technology, and the environment (Voß et al., 2007). Moreover, the engineering and natural science orientated studies constitute the biggest body of knowledge behind the circular economy and have been developed in isolation from strategic, management, and organisational studies. Governmental decisions are extremely important in implementing circular solutions, as engineering aspects and technological barriers usually do not stop the circular economy transition (Kirchherr et al., 2017). One way to reduce uncertainty about the circular economy is raising social awareness. The movement in this area has been well supported by the public institutions and educational programs, and public campaigns as well as seminars have increased significantly during the last few years (Lieder and Rashid, 2016).

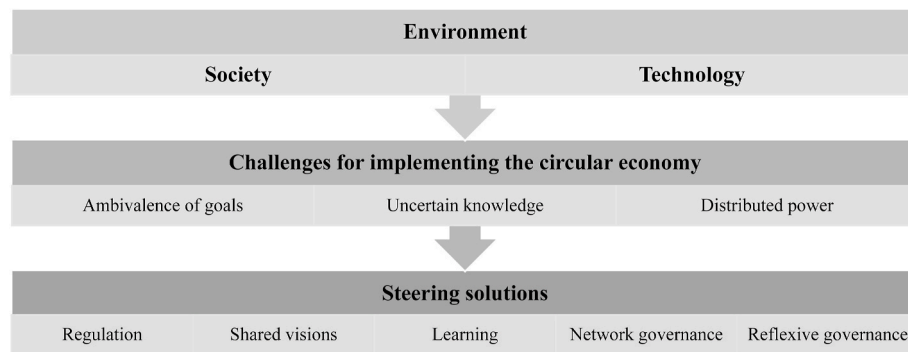


Fig. 1. Theoretical frame for steering circular economy implementation (adapted from Voß et al., 2007).

**Distributed Power.** The linear and the circular economy differ in individual decisions; actions related to reusing, recycling, and remanufacturing; and a structured and systemic approach carried out in a regulated manner at the EU (Bonciu, 2014). The national goals for the circular economy are decentralised across countries. Although each country has its own targets (mostly recycling of different waste streams), the achievement of goals is distributed across the country. Eventually, regions and municipalities should embed circularity targets into their strategic plans and agendas. Research on the circular economy emphasises the need for systemic transformations (Senge et al., 2007) that cover in-depth, system-wide, and quick changes simultaneously, which is virtually impossible because of the inherent trade-offs between them. There are positive societal environmental shifts (Moreau et al., 2017) as in-depth change requires people to break through their routines, learn about new modes of behaviour, and challenge existing cultures (Termeer and Metze, 2019). Through networking, local governments seek to better meet their service responsibilities, being underpinned with a “logic of consequences” (Andrews and Beynon, 2017). Collaborations across institutions also lead to more effective service delivery (Osei-Kojo et al., 2020) and diminish the effect of distributed power.

To sum up, municipalities are commonly ambivalent about goals, knowledge of the circular economy is often uncertain, and the power reflected in related responses is often widely decentralised.

### 3. Lithuanian local governance case

The EU is confronted with a double challenge for policymaking: supporting the laggards to catch up, and challenging the frontrunners to make next steps to fully close the loops and move towards shorter loop R-imperatives (Reike et al., 2018). Importantly, Lithuania has been considered as a modest performer of the circular economy. Lithuania's performance in the three major circular areas related to Eco innovation indexes covered is lacklustre, with all three ranking in the bottom half of EU member states (EU Circular Economy Update, 2019).

Lithuania is a small open economy with 2.8 million inhabitants which became a member of the EU in 2004. Based on Eurostat data, in

Lithuania GDP per capita in 2019 is 17,385 euro or 84% of EU 28. Lithuania belongs to the group of high human development countries (UNDP, 2020). Intra-EU trade accounts for 59% of Lithuania's exports (Latvia 10%, Poland 8%, and Germany 7%), while outside the EU 14% goes to Russia and 5% to the United States. In terms of imports, 69% come from EU Member States (Germany 12%, Poland 11%, and Latvia 7%), while outside the EU 15% comes from Russia and 3% from China.

Based on Eurostat data, the services sector contributes 60.3% to the GDP and employs 68% of the active population. The most important sectors of Lithuania's economy are wholesale and retail trade, transport, accommodation and food services, information technology, and communications sectors. Tourism is one of the fastest growing sectors. The industrial sector contributes 25.5% to the GDP and employs around 25% of the active population. The main industrial sectors are electronics, chemical products, machine tools, metal processing, construction material, household appliances, food processing, light industry (including textile), and furniture. The country is also developing oil refineries and shipyards. The manufacturing sector alone contributes to 17% of the country's GDP. Agriculture contributes 2.9% to the GDP and employs 8% of the workforce.

There are 10 counties that differ by area and population (Fig. 2), 10 regional waste management centres (RATC), and 60 municipalities, which are the main administrative-territorial units. Sixty-seven percent of Lithuania's population live in urban areas.

Municipal waste management in Lithuania follows a European pattern of outsourcing or externalisation as a third-generation policy area (Lindqvist, 2013). Local public-private partnerships are rare, as the municipalities have rather contracted out or kept the provision of services in-house or through fully (or partially) owned companies (e.g. RATC). The public municipal waste management services are quite well developed: in 2018, these services covered 99.42% of all inhabitants and 99.47% of economic entities. Local public service delivery networks are constituted by multi-stakeholders, ranging from waste carriers and waste recyclers in the local community to those at the regional (RATC, incineration plants) and national levels.

In 2018, 1142 thousand tons of municipal waste was collected in

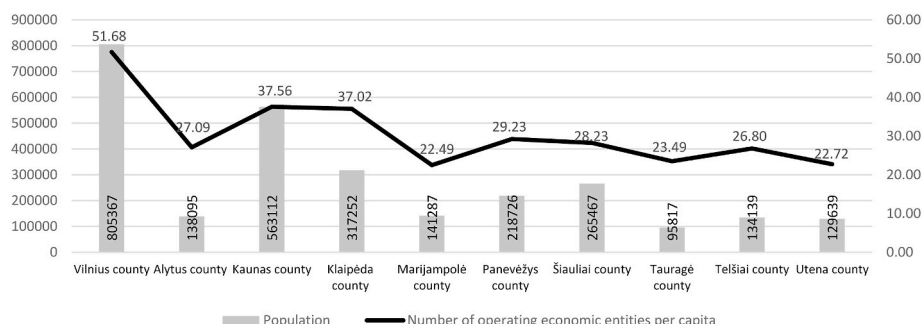


Fig. 2. Descriptive statistics of Lithuanian counties (2018; based on Statistics Lithuania, 2020).



Lithuania. More than half of all municipal waste (60%) was collected in the three most populous and economically active regions. Naturally, urban regions generate more municipal waste than rural ones. Lithuania's overall municipal waste per capita (Fig. 3a) indicator seeks 407 kg/per capita, that is, lower than the EU (28) average (489 kg/per capita), implying that, on average, the regional consumption is less than average in the EU and therefore generates less waste.

The collection of municipal waste is based on a container system (79.4%). In 2018, 8.5% of municipal waste was delivered to large-scale waste collection sites and 8.23% through complementary systems. The rest of the municipal waste was collected by bypassing and other means. The overall recycled municipal waste compared to municipal waste generated (Fig. 3b) indicator was 56.67% and was higher than the average of the EU (47%). Of that number, more than 30% of waste was composted (often in low demand), and only 24.25% was recycled (including export). The highest recycling rate was seen in recycling packages of glass (85.5%), paper and paperboard (79.5%), metal (91.5%), and PET from deposit systems (91%). The lower recycling rate was seen in various other type of plastic (especially in combined) and textile waste. Even though mostly all municipalities cross the 55% recycling rate (2025 recycling target), recycling indicators should be treated with caution. Municipal waste still largely ended at landfills, even in regions where significant investments were made in RATC for mechanical-biological treatment, that is, about 25% of all municipal waste was disposed of in landfills, and about 12.52% incinerated.

In 2018, 65% of all collected municipal waste was mixed municipal waste, an average of 266 kg per capita generated. In addition, 48.10% of all mixed municipal waste was biodegradable waste (Fig. 4), which consisted of textile waste (7.73%), wastepaper and paperboard (6.43%), green waste (4.40%), and other waste. Unfortunately, 13.31% of all mixed municipal waste still consisted of various types of packaging waste, glass waste (4.94%), metal waste (1.74%), and electrical and electronic equipment (0.29%). Therefore, the role of primary waste sorting is very important, as 47.22% of waste could not fall into the overall mixed municipal waste flow.

#### 4. Research methods

The research presents an inductive access and interpretive perspective based on the Lithuania local governance case. Table 1 presents a summary of applied research methods.

To deeply understand the main challenges of the circular economy, focus group discussions and interviews have been carried out. A focus group (from 5 to 15 people) is focused on a specific discussion which takes place in a semi-structured conversation and in an informal setting. A semi-structured interview is used to reveal the depth of insights about circular economy implementation in municipalities. It is important to note that focus group discussions were organised for smaller groups and similar to other municipalities, and interviews were organised for larger municipalities. The participants were selected according to their

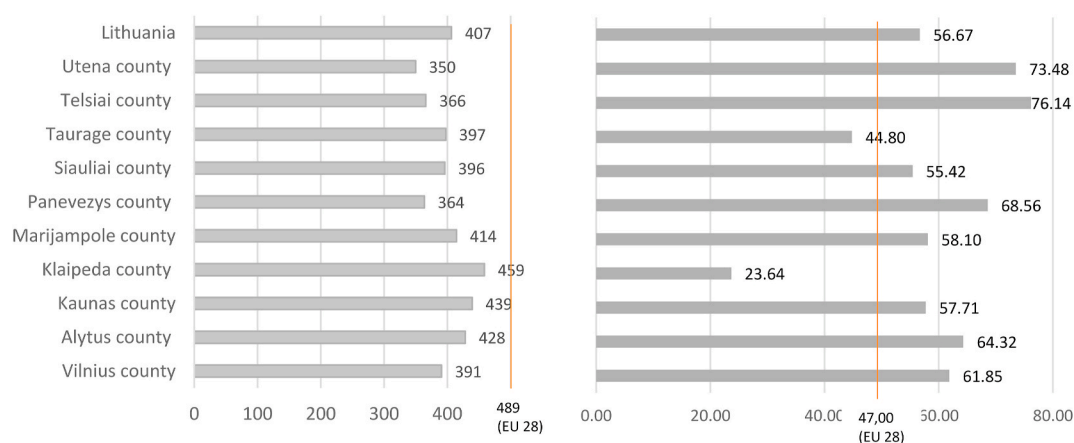


Fig. 3. a. Municipal waste, per capita (2018). Fig. 3b. Recycled municipal waste compared to municipal waste generated, % (2018).

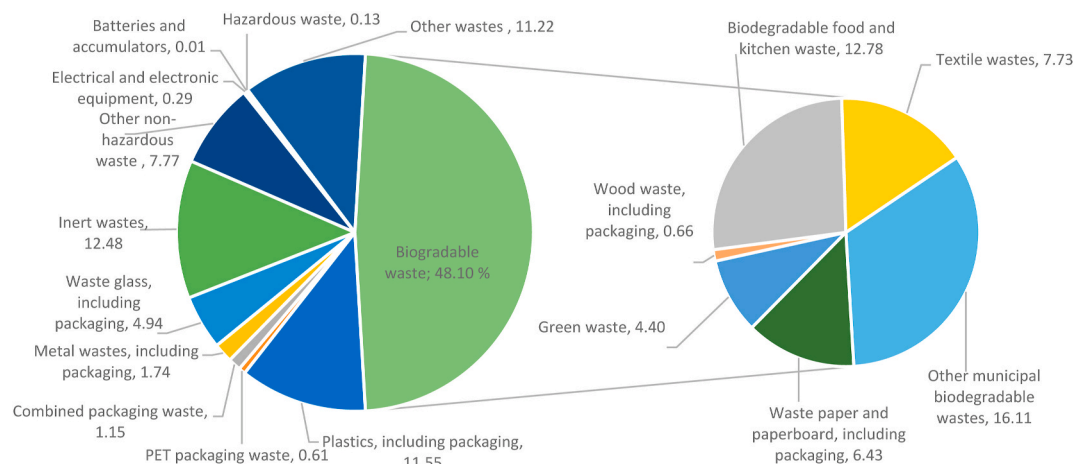


Fig. 4. Mixed municipal waste composition, % (2018).

**Table 1**  
Summary of used research methods.

	Research methods		
	Desk research	Focus group discussion	Interviews
<b>Data collection method</b>	Web-scan approach	Semi-structured interview	Semi-structured interview
<b>Data analysis method</b>	Descriptive analysis and qualitative content analysis	Qualitative content analysis	Qualitative content analysis
<b>Sample</b>	Websites of municipalities (60) and RATC (10)	3 focus group sessions (22 participants)	3 interviews with larger municipalities (6 participants) and 3 interviews with RATC (3 participants)
<b>Duration (average)</b>	–	180 min per session	60 min per interview
<b>Number of pages</b>	–	33 pages (summaries)	38 pages (transcripts)
<b>Period of data collection and analysis</b>	2020 February–May	2020 February–March	2020 March–September

relevance to the topic or their own willingness to participate in the discussion. The research involved three focus groups, which consisted of five to six municipalities' members. This number corresponds to the

**Table 2**  
Sample of focus group discussion and interviews participants.

Municipality	Number of participants	Position
I focus group session		
Alytus city municipality	2	Head of Environmental Protection Department, Specialist of Environmental Protection Department
Lazdijai district municipality	1	Chief Specialist of the Local Economy Division
Birštonas municipality	1	Chief Public Order Specialist of the Division of Law and Civil Registration
Kašiadorys district municipality	2	Head of the Department of Agriculture and the Environment
II focus group session		
Panevėžys city municipality	2	Chief Specialist of City Infrastructure Division; AQ ecologist
Pasvalys district municipality	1	Chief Specialist of Strategic Planning and Investment Division
Rokiškis district municipality	1	Chief Specialist of Department of Architecture and Heritage
Utena district municipality	2	Head of Division of Environment and Civil Protection Division; Deputy director in a waste management company
Visaginas municipality	2	Head of Public Order and Charges Division, Ecologist
III focus group session		
Kretinga district municipality	2	Deputy mayor, Chief specialist
Plungė district municipality	1	Chief Specialist of Local Economy Division
Rietavas municipality	1	Ecologist of Economic Development and Investment Division
Tauragė district municipality	2	Chief Specialist of Public procurement and Chief Specialist of Department of Architecture and Heritage
Švenčionys district municipality	2	Head and Ecologist of the Department of Agriculture and the Environment
<b>TOTAL</b>	<b>22</b>	
Interviews		
Kaunas city municipality	2	Deputy director of administration, Head of Investment and Projects Division
Vilnius city municipality	2	Chief Specialist of the Environmental Protection and Plantation Management Subdivision; Head of Urban Management and Environmental Protection
Kaunas district municipality	2	Head of the Environment Department; Chief Specialist of the Environmental Protection and Plantation Management Subdivision
Alytus RATC	1	Head of Environmental Management and Planning Division
Šiauliai RATC	1	Ecologist
Klaipėda RATC	1	Head of Waste Management Division, Regional Non-hazardous Waste Landfill

optimal size of the focus group and is suitable for further data analysis. Also, it was organised with three interviews with representatives of larger municipalities and three interviews with representatives of RATC. Out of the total of 31 participants (Table 2), most of them work in a position directly related to environmental issues.

Finally, by applying web-scan research, good practices leading to fostering the circular urban initiative have been identified.

## 5. Main results: drivers, gaps, and key stakeholders

Based on the results of focus groups, interviews, discussions among researchers, and following Lee (1999), open codes, grouped into three axial codes, namely *drivers*, *gaps*, and *key stakeholders* in the circular value chain, have been identified (Table 3).

The main gaps related to the implementation of the circular economy cover waste management, textile waste, and local business. Unambiguously, **municipal waste management problems** are the most significant and mainly influenced by *residents' reluctance to sort, lack of information about sorting, and bulky waste or homeless waste*. The cities' residents, in particular apartment dwellers, still sort waste poorly, which results in large quantities of mixed waste. Moreover, the lack of information about sorting is still a problem in more rural areas, even though publicity is widely used by municipalities. Homeless waste appeared also to be an important problem, which signals low environmental awareness. This problem is more relevant for rural areas as bulky waste is usually left near the municipal waste collection containers or in the wilderness along the rivers.

The other challenge stressed by municipalities is **increases of textile waste**, which are influenced by *insufficient textile collection infrastructure and lack of information*. The current textile collection infrastructure is not provided properly, as containers fill up quickly or are far from the residents. However, this problem may be potentially temporary as municipalities must implement a textile containers system by 2025. On the other hand, residents are constantly stockpiling textiles that were not previously gathered. The other reason for increasing textile waste is the lack of information because for residents it is important to know what is going on with the textiles that are being collected.

Finally, municipalities weakly cooperate with local business because historically this cooperation was not regulated by laws. Moreover, local business has been identified more as an obstacle. One of these aspects concerns **insufficient business environmental responsibility** because industrial waste is mixed with municipal waste, particularly in smaller municipalities. The other aspect is the problem of waste from *illegal businesses* (e.g. car repair companies, "garages"). If it were possible to identify the main waste carriers and propose specialised waste collection methods (e.g. different types of containers), this problem would be solved. Furthermore, information and education about the potential opportunities and benefits of legalising a business should be useful too. It is also important to emphasise the activities of other economic entities such as *farmers* (collection of hay films on farmers' farms and storage of agricultural machinery tires) and *tire manufacturers and importers who*

**Table 3**

Summary of results.

Elements of theoretical frame	Axial codes	Sub-codes	Definition
Challenges for implementing the circular economy	Gaps (uncertain knowledge, ambivalence)	Municipal waste management	Problems related to the waste management, such as low quality of sorting, lack of motivation to sort, bulky waste, etc.
		Textile waste	Problems related to the textile waste, such as lack of collecting infrastructure, lack of information, etc.
		Local business	Problems related to the local business (e.g. insufficient business environmental responsibility, waste generation management accounting system [GPAIS] problems, problems of waste from illegal businesses, etc.).
	Key stakeholders (distributed power, uncertain knowledge)	Human resources	Problems related to the distribution of human resources at local governance.
Networking		Collaboration between municipalities, RATC, and stakeholders (such as residents, academia, waste management companies, etc.).	
Steering solutions	Drivers	Education and publicity	Citizens' education (training, courses, etc.) and environmental publicity initiatives.
		Provision of infrastructure	Infrastructure which helps ensure the implementation of the circular economy, such as deposit system, battery collection system, purchasing of equipment.

deal with the specifics of certain waste management. There are significantly too many tires to be disposed of, which become homeless waste; manufacturers and importers are not obliged to keep separate accounts for agricultural tires and double their handling costs, and instead of organising the management of these large tires, some manufacturers and importers choose a waste manager, which handles a corresponding quantity of truck and passenger car tires and benefits from a tax. Also, there is the problem of using a waste management accounting system (GPAIS).

All representatives of municipalities and RATC stressed that they communicate with local residents through various types of communication on a regional waste management level. Cooperation with academia (universities, schools, kindergartens, or other educational institutions) is quite highly developed through participation in lectures, ecological projects, educational sessions, and events. However, the most problematic cooperation is with local business because it is based on the principles of control: for example, “municipality takes prevention—warns the company about their industrial waste”; “increases the control of waste from manufacturing companies”; or there is no dialogue with local businesses at all. The local cooperation difficulties arise because business companies have their own contracts with waste managers. On the other hand, some cooperation is observed in individual municipalities (for example, Entrepreneurs Association). RATC usually act as intermediaries among residents, waste collectors and recyclers, incineration plants, and landfilling.

Additionally, an important problem appeared to be the distribution of human resources at local governance. Apparently, in smaller municipalities only one person is assigned to be responsible for environmental activities, including the circular economy. Meanwhile, in larger municipalities, different departments are responsible for one or two activities, often not related to the circular economy. Local governments should collaborate more, involving as many other stakeholders as possible. In the case of households, the municipality's collaboration is highly regulated by contracts and rules, including activities of municipal waste collection and recycling (with households, RATC, waste management companies, waste carriers) and reuse (share) and repair (with other households through RATC sharing places). In the case of businesses, the municipality's relations are significantly less regulated by contracts and rules, except for municipal waste collection and partial recycling. In other circular value chain parts (like secondary raw materials, design, reuse, repair) the municipality's relations with other stakeholders are of recommendatory nature.

Drivers related to the circular economy mainly include society's education, publicity, provision of infrastructure, and initiatives. Publicity or provision of information to the society appeared to be the most common role taken by municipalities. The ways of publicity are very similar, followed by regulative and mimetic reasons. For example, “print articles in the local press”; “information on sorting is provided on the

websites of the municipality and RATC”; “organised shows on cable TV, radio, radio quizzes”; “cooperation with schools, kindergartens, lectures, participation in ecological projects and events of educational institutions”; “after the installation of underground sites, public events were organised to present the new infrastructure”; and “leaflets, booklets”. RATC also communicate about their activities by emphasising the importance of primary sorting through the media, radio, newspapers, and social media.

The other obligatory function which municipalities fulfil is **non-formal education**, which is mostly orientated towards changing households' waste sorting behaviour (“creative society is encouraged”; “rangers at containers teach residents how to sort”; “municipality makes actions when once a year (with ecologists and controllers) they pass through towns and tell how to sort”), **preventive supervision** (“prevention is taken by warning companies that may mix industrial waste with municipal waste”; “municipalities organise and allocate funds for the implementation of tenders for nature protection projects”), and **collaborative initiatives for society** (“actions with the community such as “do” action; involve children”; “businesses operating on the principles of circular economy, which share their experience”).

Municipalities' **infrastructure** facilitates the implementation of the circular economy with the obvious focus on waste collection and sorting (“battery collection system is well developed”; “solving the sorting problem by implementing recessed systems with ‘chips’ (counting the number of times sorting containers have been used)”; “invests in innovations, equipment that could improve the sorting of municipal waste. Initially, the municipality conducts a pilot in one urban district by purchasing equipment (e.g. animal waste containers) and monitors the usage by households, their awareness. In this way, it is decided whether it is worth investing, because it is a lot of money”). RATC also provide an infrastructure for sharing things for reuse purposes, which they promote by publicising it. Overall, the obtained results are not surprising, as the identified activities are directly related to the key functions of the municipalities, for example, municipal waste collection.

## 6. Discussion: steering solutions

Following our theoretical model, the research results confirm that municipalities identify the circular economy mostly as waste management and seek to contribute as much as defined by the legal framework. Hence, knowledge about the circular economy is uncertain (Voß et al., 2007), and this hinders the implementation of the circular economy on a wider scale. Historical functions of municipalities, that is, waste collecting and waste recycling, limit implementation of circular solutions (Termeer and Metze, 2019).

In line with Johansson and Henriksson's (2020) study about circularity shifts in Swedish environmental policy, an identified problem is also the lock-in of legislation in the linear economy. For example, according to the legal acts, RATC cannot deliver waste directly to

industrial companies because legally waste is not treated as a product. Therefore, they sell or deliver waste only to waste recyclers, incineration, or landfills. So, ambivalence of goals complicates the implementation of the circular economy at the local level. Therefore, the development of local, national, and international coherent environmental policies is a critical initiator through making circular options more viable, creating new funding opportunities, or setting targets for future development (Pitkänen et al., 2016).

According to the conceptual framework, we argue that there are five types of solutions for circular economy implementation: regulation, shared vision, learning (education), negotiation in networks, and reflexive governance (Fig. 5).

The learning solutions (which are related to the society's education and publicity) are the most popular in relation to the circular economy. Various **publications were prepared and published** on websites to inform residents (for example, *information leaflet "Waste path from container to recycling"*; *booklet on sorting for school children*; *waste encyclopaedia*; *waste management memo*). In addition, **in the media of the region**, residents were **constantly informed about the development of the waste management** systems, innovations, and relevance (e.g. *radio series on the environmental theme in "green channel"* and the *ecology section*; *computer games about waste sorting*; *films for children about waste sorting*; *electronic map of sorting containers*). RATC together with municipalities encourage residents to **participate in various competitions and projects** (national project "We sort"; *regional waste sorting competitions or competition "Stop using—come up with how to re-use!"*). Organised **excursions to the regional waste landfill, lectures, and seminars** on the environmentally friendly method of extraction and the importance of waste sorting and **consultation seminars** on the promotion of responsible consumption culture and ecological behaviour in associations and municipalities also contribute to the provision of the educational function.

The **negotiation in networks** could be ensured by **building networking** (municipalities are starting to cooperate with the associations for initial discussions about the circular economy) and **infrastructure enhancing sharing**, for example, RATC together with municipalities **organised the bypasses** for the collection of bulky waste, including electronic waste, and organised **the collection of unnecessary books** to landfills. Furthermore, the **storage points** have been set up at existing bulky waste collection points where unnecessary items can be **shared**.

The **shared visions** (which are related to the different initiatives, mostly sharing activities) are one of the least active activities in relation to the circular economy. Because of the compulsory environmental requirements, a **product waste collection campaign** is organised in all RATC, whereas some types of waste are collected free of charge from residents, institutions, and organisations. The **campaign "Received compost free of charge"** was carried out for all residents (for the delivered complete device[s], electrical and electronic equipment; not less than 20 kg, the resident is given 0.5 m<sup>3</sup> of green waste compost free of charge).

Because of the compulsory environmental requirements, solutions related to the **regulation** and **reflexive governance** are mostly oriented to waste management.

In addition, we also reviewed circular solutions from municipalities of other countries. It is noticeable that the trend is the opposite. The dominated good practices are related to the **shared visions**. These shared visions are expressed by various types of **sharing platforms**. For example, in "Living Lab" the environment works as an innovation platform, an urban laboratory, where new solutions can be developed and tested (Helsinki)<sup>1</sup>; a peer rental service for parking spaces, where its owners can rent their spaces to others when they do not need them (Helsinki)<sup>1</sup>; free rental platform of Slovenian designed clothing

(Ljubljana)<sup>1</sup>; in Seoul there is the tradition where people share food with neighbours, borrow and lend tools and equipment or other goods with others, and exchange labour at harvest time<sup>1</sup>; the Seoul government also supports (1) new start-up businesses and larger corporate companies to increase their sharing services (including the provision of co-working space that is municipality-owned),<sup>1</sup> (2) car and bike sharing programs, (3) children's clothes and toy sharing project, (4) sharing of public community centres.<sup>1</sup> They also consider circular solutions by **promoting initiatives related to the local production, repair, and re-use initiatives** such as Repair Café, where the idea is to have experts in different professions (electricians, seamstresses, carpenters) and volunteers available once a month to help repair and refurbish products (Ljubljana)<sup>1</sup>; reuse and repair activities; cooperative supermarkets and food waste recovery initiatives promote responsible consumption and help to develop local activities and production in Paris.<sup>1</sup> It is noticeable that the other important group of solutions for circular economy implementation by municipalities is **learning**. In other countries, solutions related to learning or education are expressed by organising trainings/seminars/lectures for changing experience, knowledge, and skills (in such cities<sup>1</sup> as Amsterdam, Brussels, Glasgow, London, Kristiansand, etc.). In other countries, solutions related to the **negotiation networks** are expressed by creating the centres for citizens and business **cooperation** (in such cities<sup>1</sup> as Amsterdam, Brussels, Glasgow, London, Kristiansand, etc.) and by the **improvement of infrastructure** for circular solutions, for example, transform fly ash from incineration plants to building materials, including road construction (Kristiansand)<sup>1</sup>; when re-surfacing asphalt roads, the waste products, millings and chippings, are then reused in construction/renovation of streets and sidewalks, as added volume for banks in the unbound bearing layers, and/or for the sub-base layer (Ljubljana)<sup>1</sup>; and old bus seats are used for children's playground equipment (Ljubljana).<sup>1</sup> The solutions for circular economy implementation related to the regulation and reflexive governance are less popular among municipalities. **Regulation** is expressed by **allocation of financial and non-financial instruments**, for example, in Ljubljana farmers who sell directly to restaurants and hotels are supported from the City Tourism Office<sup>1</sup>; in London, finances are provided to help fund circular economy businesses<sup>1</sup>; in New York there is government-funded research on material reuse<sup>1</sup> and intensive organic farming is supported (Lille).<sup>1</sup> **Reflexive governance** is expressed by **integration of the circular economy principles into public procurement processes** in such cities as Berlin, Paris, Toronto, and Basel. Furthermore, the **supplementation of municipal environmental policies and plans** in such city as Brussels becomes important as a reflexive governance solution.

It is noticeable that when analysing the actions of other countries for the circular economy, there are various solutions which involve more stakeholders (for example, municipality-resident; municipality-business; municipality-business-resident, etc.). According to Knickmeyer (2020) the leadership of local governments can be improved through reliability (ability to effectively treat sorted waste), legitimacy (punitive measures), and effectiveness (dissemination of information about the program benefits). However, the current activities that promote circular economy implementation at the Lithuanian local governance level are quite fragmented (mostly related to responsible waste management) and oriented mostly to compliance with environmental requirements and laws. The circular economy also emphasises eco-design initiatives and attempts to keep the product in the market by reusing, re-sharing, and remanufacturing. Although the state is given the role of supporting market initiatives through soft initiatives, this is still in the very initial (although growing) stage, for example, creating sharing platforms for used goods or support by developing a local dimension of recycling. Our results are in line with Johansson and Henriksson (2020), that the responsibility for establishing circularity is left to the market, in the form of consumers-individuals and companies-entrepreneurs. Therefore, the role of local governments should be more proactive and strengthening across the circular value chain. The complexity and multi-sectoral nature of the circular economy call for multi-level and multi-governance

<sup>1</sup> <https://www.c40.org/researches/municipality-led-circular-economy>.



Solutions	Lithuanian practices*	Additional foreign practices	Proposed practices
<b>Learning (education)</b>	<ul style="list-style-type: none"> <li>– Participation in various competitions and projects;</li> <li>– Excursions to the regional waste landfill;</li> <li>– Lectures and seminars about waste sorting;</li> <li>– Publications, social media (facebook, twitter, etc.), TV.</li> </ul>	<ul style="list-style-type: none"> <li>– Creating the centers for citizens and business cooperation (eg. textile labs);</li> <li>– Lectures, seminars and consultations about the circular economy</li> </ul>	To enhance learning solutions: <ul style="list-style-type: none"> <li>- by issuing informational stickers (eg. on containers), directional signs for collection points;</li> <li>- by using target communication tools in target rural areas about waste management.</li> </ul>
<b>Shared visions</b>	<ul style="list-style-type: none"> <li>– Sharing activities (eg. compost for free, sharing of post-consumption products, "home collection" services).</li> </ul>	<ul style="list-style-type: none"> <li>– Various sharing platforms (eg. food, clothing, transport, parking, technology, etc.);</li> <li>– Promoting local production, repair and re-use initiatives.</li> </ul>	To enhance shared visions solutions: <ul style="list-style-type: none"> <li>– by encouraging sharing of post-consumption good quality products (eg. clothing);</li> <li>– by initiating creative workshops with the aim to promote eco-design solutions and the use of secondary raw materials.</li> </ul>
<b>Reflexive governance</b>	<ul style="list-style-type: none"> <li>– Municipal and regional strategic plans are mostly orientated on waste management.</li> </ul>	<ul style="list-style-type: none"> <li>– Supplementation of municipal environmental policies and plans;</li> <li>– Integration of the circular economy principals into public procurement.</li> </ul>	To enhance reflexive governance solutions: <ul style="list-style-type: none"> <li>– by integrating more circular economy related ambitious measurable aims into regional and municipal strategic development plans;</li> <li>– by raising competences in green public procurement;</li> <li>– by sharing good practices of green public procurement;</li> <li>– by increasing responsibility and accountability of waste managers (eg. to ask textile waste managers for a certificate proving how the textile has been handled).</li> </ul>
<b>Regulation</b>	<ul style="list-style-type: none"> <li>– Municipal waste management regulations.</li> </ul>	<ul style="list-style-type: none"> <li>– Ensuring compliance with the rules laid down;</li> <li>– Allocation of financial and non-financial instruments.</li> </ul>	To enhance regulation governance solutions: <ul style="list-style-type: none"> <li>– by initiating national level decisions for revision of extended producers responsibility for tyres management;</li> <li>– by revising financial mechanisms for primary sorting promotion, as both sorting and unsorting residents pay the same.</li> <li>– by implementing effective preventive controlling mechanisms (eg. cameras near illegal landfills).</li> </ul>
<b>Negotiation in networks</b>	<ul style="list-style-type: none"> <li>– Infrastructure enhancing sharing (eg. storage points);</li> <li>– Starting building networking.</li> </ul>	<ul style="list-style-type: none"> <li>– Building partnerships and learning networks;</li> <li>– Improvement of infrastructure by circular solutions (eg. using recycled materials in construction of roads, playgrounds, etc.).</li> </ul>	To enhance negotiation in networks: <ul style="list-style-type: none"> <li>– by increasing local public-private partnership (eg. annual region conferences; financial incentives);</li> <li>– by making waste collection systems "closer" to the resident (eg. textile container near retail chains);</li> <li>– by using up better digital tools, e.g. interactive maps for circular business, textile collection system.</li> </ul>

Fig. 5. Summary of solutions for circular economy implementation at local governance.

approaches (Pitkänen et al., 2016) and rethinking of conventional regional economic development policies.

**Implications for academia.** We clarified the interactions between the circular economy and local governance which appeared to be scant in the scientific literature. Importantly, we adapted Voß et al.'s (2007) steering framework for sustainable development to facilitate the implementation of the circular economy by local governance.

**Implications for local governments.** We identified challenges for implementing the circular economy within the lack of municipalities' and RATC contributions. We created a practical framework of circular solutions for local governments by mapping national and foreign practices through five perspectives, namely learning, sharing vision, reflexive governance, regulation, and negotiation in networks. Our proposed steering solutions could be implemented beyond the Lithuanian case.

To support transition to the circular economy, local governments should more focus on smart waste management, which systemically contains automatization of waste segregation, collection, and route optimisation, as well as digital apps for creating communication, eco-innovations related to waste management schemes and policies. To support local governments in implementing smart waste management, one way is to apply digital solutions such as introducing electronic sensors and gradually automating materials and processes. To achieve higher waste sorting levels resulting in higher levels of recycling, education and social innovations raising social awareness is a long-term important tool. Specifically, Lithuanian municipalities are going to commit to responsibilities regarding food waste separation from the municipal waste stream. As regards the reduction of large amounts of textile waste, encompassing national strategy for circular textile should be created with clear action plans for textile waste sorting and recycling and initial discussions with local business about expanded producers' responsibility schemes. Finally, it is important to mention not to be trapped within the recycling economy, losing opportunities to advance towards innovative features of the circular economy, such as product

design, renewability, integration of patterns, and collaborative production systems.

**Implications for society.** This research also aims to raise local governments' awareness about the circular economy, which goes beyond just waste management, and also includes prevention and active collaboration with business and local communities. In particular, this research tries to understand the changing role of municipalities from just functional implementation to wider networking across the circular value chain.

## 7. Conclusions

The current role of local governments is based just on functional waste management and still lacks a wider networking across the circular value chain. In the context of the circular economy, development of human resources together with a learning society are highly important.

From our research, it is highly evident that those circular economy solutions, which are not regulated, are very weakly implemented by local governance. Current solutions are mostly orientated to waste management. Learning (education) is the most developed by local governance, while steering solutions of sharing a vision, reflexive governance, regulation, and negotiation in networks are at the initial stage.

We identified the trade-off between large volumes of communications (a very developed function) and lack of information about waste travelling across the value chain and a still developing culture of municipal waste sorting. It should be noted that some streams of waste have high sorting rates, for example, PET bottles packaging collected by the deposit system. Sorting of municipal waste by residents is still a problem, although huge investments have been assigned for waste sorting infrastructure and communication tools. Green procurement is also weakly developed. All solutions should move from just waste management orientation to a wider implementation of the circular

economy.

Despite the fact that the research was carried out only in Lithuania, the results might be compared with other countries, taking into account national contexts. Research results might be useful for seeing certain trends and providing further recommendations. The similarities and differences might be identified between common EU and national trends, especially for modest countries, regarding the circular economy implementation.

**Future research.** At the research moment, municipalities were in a transition period of preparing new strategic development plans for 2021–2027; therefore, the detailed documents' content analysis on strategic plans and relationship with operational level would be valuable. Particularly, it is important to explore how key performance indicators included in the strategic plans are being integrated within municipality's internal accounting systems or how municipalities do integrate energy and water usage, materials, and food waste measurement at local governance level. Thus, our study suggests that more research is needed into the more critical aspects of implementing circular economy strategies by local governance, in terms of environmental rebound effects, regulatory impacts, effects of digital solutions, and development of environmental performance measurement systems.

## CRediT authorship contribution statement

**Lina Dagilienė:** Conceptualization, Investigation, Writing – review & editing, Supervision, Funding acquisition. **Viktorija Varaniūtė:** Methodology, Investigation, Visualization, Writing – review & editing. **Jurgita Bruneckienė:** Investigation, Formal analysis, Writing – review & editing.

## 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.

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## Appendix A. Supplementary data

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