Beyond closing the loop – integrating social considerations into circular economy transitions in cities

To cite: Rezaie, S.[1]*; Vanhuyse, F[1].; André, K.[1] (2022). Beyond closing the loops – integrating social considerations into circular economy transitions in cities. Regions in Recovery Conference Special Session: Circular Cities and Regions (online). 21- 31 March 2022.

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Abstract

The circular economy (CE) model – in which resources are kept "in the loop" for as long as possible through a series of re-using, remanufacturing, recycling, and recovery strategies – has been praised for its potential to substantially reduce the environmental impacts of our current economic model. It has been supported by a wide range of policy makers as a way to tackle climate change. To ensure this new model of "closing, narrowing and slowing the loop" is sustainable, a people's perspective needs to be included. In this paper, we present preliminary findings from a social impact assessment in the city of Umeå, Sweden, given its ambition to become a world leader in circular economy. We recommend expanding currently narrow views on social impacts in circular city transitions by (1) assessing not only sectoral shifts in employment but also job quality, (2) addressing the accessibility of CE initiatives, and (3) investigating the impacts linked to personal and property rights. Our findings can inform other cities about their transition journeys.

Keywords

Circular economy, cities, social impacts, urban transitions

1. Introduction

The circular economy (CE) concept has gained increased prominence in the last decade among policy makers, businesses, and academics, because it presents an alternative economic system to the currently unsustainable consumption and production patterns in which resources are extracted, used and discarded (Geissdoerfer et al., 2017; Ghisellini, 2015; Kirchherr et al., 2017). It is estimated that a CE could cut virgin resource use by 28% and reduce global greenhouse gas emissions by 39% (Circle Economy, 2021). Therefore, the CE concept has been described as a way to help countries meet the goals of the Paris Agreement in limiting global temperature rise to 1.5°C above pre-industrial level (Circle Economy, 2021). It is argued that it can also help achieve a significant number of Sustainable Development Goals (SDGs) and contribute to the 2030 Agenda (Schroeder et al., 2019).

As more governments implement national CE plans, the CE concept is also becoming popular with urban policy makers (Campbell-Johnston et al., 2019; Kębłowski et al., 2020). Petit-Boix and Leipold (2018), for example, outline the cities that have implemented a CE plan and organize the initiatives around different urban targets, such as infrastructure, social consumption, industries and businesses, and urban planning. The results show that although most circular city initiatives are in Europe, the environmental research is concentrated on China, with a focus on waste management strategies. Vanhuyse et al. (2021b) made similar conclusions; the authors develop an evidence map of 178 publications on circular cities published in the last ten years and find that most research focuses on European cities, with a focus mainly on waste and wastewater management, and recycling and recovery strategies.

Scholars have stressed the urgency of moving from solely technocentric perspectives towards including social dimensions for CE strategies to be transformative and socially inclusive (Miranda et al., 2020; Padilla-Rivera et al., 2020; Vanhuyse et al., 2021a). So far, assessments of the social impacts of transitioning to a CE, including impacts on citizens, have been largely neglected (Hobson, 2021, 2020; Hobson and Lynch, 2016; Pitkänen et al., 2020). Regarding the transition to circular cities, evidence on social consequences is missing and inequalities might emerge given the neglect of social impacts in CE strategies. For example, Vanhuyse et al. (2021a) discovered that only 8% of the literature on circular transitions in cities published in the last decade considers social impacts. Furthermore, the focus of the studies was limited to employment opportunities and governance issues.

With this study, we aim to contribute to the emerging literature on circular cities and close current research gaps concerning the social impacts of the transition towards a circular city. Our objective is to understand how different stakeholders perceive the transition towards a circular city and uncover potential (intended or unintended) social impacts of the transition. We focus on the city of Umeå in Northern Sweden, which has declared its ambition to become a pioneer in the CE. Our research question is: *How do different stakeholders in the city of Umeå understand the CE and how will people be affected by it?*

The next section puts this study in context. We provide an overview of the circular city concept and social impacts, background information on the city of Umeå and an outline of our methodological approach. The results section contains our main findings on the interviewees' understanding of a CE and their perceptions of the impacts of a CE transition. Then, we discuss our findings and conclude by discussing future research opportunities.

2. Materials and methods

2.1. Definitions

2.1.1. Circular cities

The circular city is an emerging concept in sustainable urban development. It is derived from the CE model and applied on a spatial territorial dimension (Gravagnuolo et al., 2019). The circular city concept's benefits are believed to lie in its ability to decouple the creation of value from the consumption of finite resources, and improve a city's prosperity, liveability and resilience (Ellen MacArthur Foundation, 2017). As with the CE, there is no agreement on a single definition so far; however, there have been attempts to conceptualise circular cities. Based on the Ellen MacArthur Foundation's vision (2017), a circular city embeds the principles of a CE, with the goals of keeping assets at their highest value; decreasing waste and pollution; regenerating natural systems in and around cities; and facilitating the use of digital technology. Prendeville et al. (2018, p. 187) define a circular city as a city *"that practices CE principles to close resource loops, in partnership with the city's stakeholders (citizens, community, business and knowledge stakeholders), to realize its vision of a future-proof city"*. Paiho et al. (2020, p. 6) highlight shared components in different conceptualizations and develop their own definition of a circular city which *"is based on closing, slowing and narrowing the resource loops as far as possible after the potential for conservation, efficiency improvements, resource sharing, servitization and virtualization has been*

exhausted, with remaining needs for fresh material and energy being covered as far as possible based on local production using renewable natural resources."

Vanhuyse et al. (2021b) analyse the literature on circular cities published in the last ten years and demonstrate that the research has focused on European cities, with most efforts concentrated on waste and wastewater management, recycling and recovery strategies. The study stresses the need for future research on circular cities to adopt a more holistic perspective. Figure 1 illustrates a snapshot of the evidence map provided by the authors, highlighting the geographical distribution of the literature on circular cities around the world.

Figure 1. Snapshot of the interactive evidence atlas on circular cities publications between 2010 and 2020. Source: (Vanhuyse et al., 2021b).

2.1.2. Conceptualising social impacts

To date, there is no agreement on how social impacts should be considered within the context of circular cities and transitions (Pitkänen et al., 2020). To fulfil this study's aim, we follow the definition set by the International Association for Impact Assessment, who provide a holistic understanding of social impacts as *"the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions"* (Vanclay et al., 2015, p. 1), including eight impact areas to uncover social impacts (Table 1). In this study,

we included all categories except for the impact area people's environment (category 5), because the narrative around the CE is that it will have positive environmental impacts.

In the context of CE transitions, we have uncovered what each of these impact areas entails in more detail by reviewing previous studies examining the social impacts in circular cities (for a comprehensive overview, see Vanhuyse et al., 2021a) and theoretical literature on the underlying concepts. With **people's way of life** (category 1), we identified relevant sub-categories such as employment, consumption, transport and mobility. **People's culture** entails people's perceptions which shape their beliefs, norms and practices (for instance, environmental awareness and perceptions on CE in this context) (see, Hobson, 2020; Nogueira et al., 2020). **People's community** refers to the emergence of new forms of consumption and impacts on social cohesion, social equity and the stability of the community (see, Fratini et al., 2019; Nowakowska and Grodzicka-Kowalczyk, 2019; Soto, 2020). **Political systems** mainly covers factors linked to power (a)symmetries, underlying governance structures, types of participation and the level of involvement (see, Fratini et al., 2019; Kębłowski et al., 2020; Nogueira et al., 2020). The category **health and well-being** refer to various types of well-being, including material well-being, social inclusion and the general quality of life, as well overall public and mental health (see, Lee et al., 2016; Nogueira et al., 2020). The category **people's personal and property rights** describes whether people are economically affected or disadvantaged, for instance through civil right violations, which is crucial in a CE transition where new services are developed, and people might be exposed to increased digitalisation (see, Hobson, 2020; Lekan and Rogers, 2020). Lastly, under **people's fears and aspirations** we aim to cover general perceptions about safety and the future.

Table 1. Conceptualisation of social impact categories.

Impact area	Description
People's way of life (category 1)	How people live, work, play and interact with one another on a day-to-day basis
People's culture (category 2)	Shared beliefs, customs, values and language or dialect
People's community (category 3)	Cohesion, stability, character, services and facilities of the community

Political systems (category 4)	The extent to which people can participate in decisions that affect their lives, the level of democratization that is taking place, and the resources provided for this purpose
People's environment (category 5)	The quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation; their physical safety; and their access to and control over resources
People's health and wellbeing (category 6)	The state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity
People's personal and property rights (category 7)	Whether people are economically affected or experience personal disadvantages, which may include a violation of their civil liberties
People's fears and aspirations (category 8)	People's perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children

Source: (Vanclay, 2003; Vanclay et al., 2015)

2.2. The case of Umeå

The city of Umeå is one of the fastest growing cities in Northern Sweden (OECD, 2020), numbering 130,000 inhabitants in 2020 (Statistics Sweden, 2021). The Comprehensive Plan for the city projects a radical population increase to 200,000 inhabitants by 2050, which will affect the municipality's use of natural resources and infrastructure demands (Umeå kommun, 2018a). Historically, the city's production-based CO_2 emission levels have remained below the national average (approximately 4.7 tonnes of CO_2 per capita) and the city aims to achieve net-zero emissions by 2050, in alignment with national objectives (OECD, 2020). One of the main challenges relating to current emission levels is the city's transport sector, because it is the main source of CO_2 emissions in Umeå (Umeå kommun, 2018b). Umeå's consumption-based emissions are higher than the national average, with 9.8 tonnes of CO_2 per capita (Axelsson et al., 2018). The transport sector also poses a challenge, causing 32% of total emissions, followed by private investment (21%), food (17%), public consumption and investment (13%), clothes and gadgets (9%), housing (6%) and others (2%) (Axelsson et al., 2018).

The transition towards a CE has been a political priority since the Strategic Plan 2016–2028, which sets the objective of the city becoming a pioneer of the CE (Umeå kommun, 2016). The CE is viewed as a way to achieve the goal of becoming fossil-fuel free by 2040, while enhancing innovation and creating a stimulating environment for new business models, as well as transforming Umeå into a green, sustainable and sharing city (OECD, 2020). The OECD study on the "Circular Economy in Umeå, Sweden" provided some first recommendations on how to develop a roadmap for achieving the city's stated CE ambition. Some of those recommendations are: (1) to promote the CE by mapping existing CE initiatives and developing a strategy connected to existing city targets, (2) to facilitate collaboration among a wide range of stakeholders and (3) to enable the required government and economic conditions. Since the publication of the OECD report, the municipality has taken its first steps towards strengthening the city's CE transition. For instance, it has placed a project manager on CE, mapping existing circular initiatives (see Umeå kommun, n.d.), and commissioned studies on the city's urban metabolism and green procurement opportunities (see, IVL Svenska Miljöinstitutet, 2020; Umeå kommun, 2020).

2.3. Data collection and analysis

We first collected city documents and reports, previous studies, and supplementary material linked to the city's stated CE ambition to understand the city's priorities, provide an overview of city targets linked to the CE transition and map existing CE initiatives. This process supported the mapping of relevant stakeholders linked to a CE transition in Umeå. We then selected the stakeholders for semi-structured interviews based on conversations with the municipal government as well as independent internet searches on businesses, academia and civil society organisations linked to the planned CE transition in the city. These stakeholders were allocated to different groups using the quadruple helix model, stressing the relevance of governments, the private sector, academia and research institutes, and citizens/civil society (Leydesdorff, 2012). We aimed to capture a wide range of perspectives by contacting stakeholders from different sectors (transport, building and housing, energy, water and waste management, food, etc.). Snowballing techniques were applied to identify additional interviewees during each interview.

We interviewed a total of 25 stakeholders during September–December 2021, with a balanced representation across the four groups (Annex 1). Informed consent was collected from each interview partner. Annex 2 contains the interview guide. The interviews were recorded, and detailed notes were taken. Most interviews were conducted in English; however, nine interviews were undertaken in Swedish. The notes from the Swedish interviews were translated into English.

Additions were made to the interview notes while listening to the recordings. The revised interview notes were then uploaded and analysed using a qualitative data analysis software (NVivo). The interviews were coded by two researchers and verified by a third one. We used content analysis to find connections and discrepancies between the different stakeholders' viewpoints, following an iterative and explorative approach which combined inductive and deductive coding. We started with a deductive coding framework based on the impact areas suggested by Vanclay et al. (2015) (see Table 1) as it offers a holistic understanding of social impacts. In addition, we reviewed the scientific literature to untangle what each of these categories entails. When coding the interviews, we also added new aspects inductively as they emerged. The findings were accorded to the different stakeholder groups they represented from the quadruple helix model. The preliminary findings were also presented in two virtual focus group discussions held in February 2022, with six and four participants in each group. We invited stakeholders from different sectors, who participated in the previous interviews, to test whether our analysis corresponded to the participants' assessments, and whether they wanted to provide clarifications.

3. Results

3.1. Stakeholder's understanding of CE and its application in Umeå

From the interviews and the collection of city documents, it became apparent that Umeå is at an early stage of its journey towards achieving a CE. Even though the city has formulated its ambition of becoming a pioneer of the CE (Umeå kommun, 2016), a concrete roadmap to support that vision has yet to be identified.

The different stakeholders in the city presented generally diverse perspectives on the CE concept, particularly their understanding of the CE in Umeå. A few reoccurring themes became apparent. For instance, the CE concept and the notion of sustainability were sometimes used interchangeably – both when we asked about the CE vision in Umeå as well as in the participants' general understanding of the concept. CE was often referred to as sharing economy. Overall, stakeholders spoke positively about a CE transition, describing the main benefits as positive environmental impacts and economic gains. Based on the participants' personal understanding, a CE entails:

(1) a prolonged lifespan of products and materials by using them for as long as possible through different strategies, mainly reusing, rethinking, and recycling, and thereby reducing wastes;
(2) sharing initiatives;
(3) sustainable consumption and production; and
(4) the use of renewable resources.

The waste management and energy sectors were mainly associated with CE. As highlighted by one stakeholder from the municipality on the CE concept:

> *"It is a broad concept applicable at different scales. The circular economy is applicable in traditional waste management systems and material flows to get more value of products that stay in use. Another area is sharing. How can we have services and consume less so we do not produce as much?"*

Figure 3 provides an overview of the 20 most frequent words counted under people's personal understanding of a CE, with sustainability, circularity and sharing identified as central aspects for the interviewees.

Figure 2. Word cloud 20 most frequent words under personal CE perceptions. Source: own elaboration.

3.2. Perceptions of social impacts linked to a CE transition in Umeå

Table 2 contains an overview of the social impacts discussed by interviewees from different stakeholder groups in Umeå. We identified both positive and negative impacts and present them in Table 2 accordingly under each impact area. Social impacts linked to people's way of life (impact area 1) were considered the most frequently, with a total of 20 interviewees from all stakeholder groups expressing concerns on shifts in employment. Impacts on people's community (impact area 3) presented another main concern, 14 interviewees stressed positive impacts on social cohesion and 10 interviewees discussed new forms of consumption (for instance, sharing, renting, repairing). People's public awareness (13 interviewees) was the third most discussed impact (impact area 2). Concerning political systems (impact area 4), 9 interviewees discussed the participation of various stakeholder groups in the city's CE plans. Impacts on health and well-being and personal and property rights were barely mentioned.

Table 2. Overview of perceived social impacts of a CE transition by different stakeholders in Umeå.

Impact area	Sub-categories	Perceived positive impacts (+)	Perceived negative impacts (-)
People's way of life (1)	*Employment*	Potential job gains through CE strategies and new local jobs	Job losses in retail market and car sector suggested New skills required in connection to new jobs and quality of jobs needs to be assessed
	Consumption	Increased affordability of CE services and products for population with low incomes	Risk of a growing social divide due to changes in consumption and lifestyles, for instance through price increases
	Transport and mobility	Positive impacts through modal shift suggested – for instance, less traffic	Alternative modes of transport too timely, affordability and accessibility challenges
	Other	Potential of migration for new circular jobs, role of education and emergence of new careers	Potential of growing urban–rural divide
People's culture (2)	*Cultural diversity*	Cultural knowledge and learning exchange through local CE initiatives	
	Public awareness	Environmental awareness generally considered high in Umeå Culture of sharing, renting, refurbishing, starting in Umeå	Radical shift in mind-set required to create a 'circular culture'
People's community (3)	*New forms of consumptions*	Positive impacts linked to CE initiatives, such as increased affordability	CE initiatives not always sustainable – for instance, Uber services

			Access to CE initiatives presents obstacles
	Social cohesion	New social ties and networks through sharing initiatives Neighbourhood services create feeling of togetherness and increase trust	
Political systems (4)	*Participation*		Risk of social divide between people who are involved and those who are excluded from CE vision In particular, civil society organisations and citizens might be excluded and wish for more involvement
People's health and well-being (6)	*Public health*	Positive impacts linked to modal shift perceived – less cars and better air quality	
	Well-being	Improved mental health suggested, with CE empowering individuals to take concrete actions in contrast to sustainability	
People's personal and property rights (7)	*Digitalisation*		Negative impacts linked to increased digitalisation – for instance, elderly and migrants, who lack access and skills for digital empowerment
Fears and aspirations (8)	*Fears*		Fear of creating negative impacts through CE plans Fear of excluding vulnerable societal groups Fears linked to growing and changing population Fears linked to time and scale of transition

Concerning **people's way of life** (impact area 1), 20 interviewees from different stakeholder groups shared concerns linked to employment. As a public sector representative highlighted:

> *"The biggest changes would occur in the retail market and clothing stores who sell things with a short life span. Some would of course survive. This would create a shift in the labour market for fashion, beauty, and IT. […] This would impact workers in these sectors, both in the stores but also globally in third world were products are produced."*

Four interviewees from the public and private sector stressed specific sectoral changes. The retail market has been perceived as one of the sectors associated with significant job losses, along with the construction sector and the car industry. For instance, participants expressed fears about increased digitalisation and automation of cars and a potential takeover by the sharing economy. The connection between local consumption and global production, where there might be positive impacts on local production through CE strategies but negative impacts on exporting nations with emerging economies, was outlined by representatives from all four stakeholder groups (11 interviewees).

Four interviewees highlighted that the labour market might be reorganised, with job gains linked to different CE strategies (sharing, repairing, refurbishing, recycling), which could create local jobs but will also require new skills. Those new job requirements will need to be reflected in educational programmes, in which new careers should emerge, with six stakeholders stressing the role of education. Additionally, three interviewees were concerned about the quality of new jobs, referring to the working conditions for bike courier jobs and Uber services.

Concerning **people's culture** (impact area 2), nine stakeholders discussed public awareness of the CE, stressing that shifts in mind-sets are required for a successful transition towards a CE. Stakeholders claimed that, so far, it has been difficult to get people without existing environmental awareness involved in CE efforts (even though environmental knowledge is considered generally high in Umeå, according to three interviewees). Participants stressed that it has also been difficult to convince citizens with high incomes who have no incentives to change their consumption patterns. Nevertheless, seven interviewees (mainly from public sector and civil society, and one private sector representative) stressed that a "circular culture" is emerging. As a private sector representative stated:

"It has become a trend. It used to be shameful to buy second hand but now people are proud."

Four interviewees discussed the potential of enforcing cultural knowledge and learning exchange through local CE initiatives. Civil society and public sector representatives raised the example of repair workshops involving people from different cultural backgrounds and generations, where CE activities can bridge cultural and language barriers.

Under **people's community** (impact area 3), positive impacts were mainly discussed in relation to new forms of consumption, such as sharing or repairing initiatives. The main societal benefits linked to those were more affordability and access for families with low incomes; the example of Fritidsbanken was mentioned, an initiative where people can borrow outdoor and sports equipment free of charge for 14 days.

At the same time, seven interviewees from the public sector and civil society organisations discussed various pitfalls connected to sharing initiatives. As one public sector representative mentioned:

> *"Sharing is not always sustainable. […] We need to look at the life-cycle perspective. We need to look at social sustainability if we think about services like Uber. How is it socially sustainable? We don't replace sustainability with CE. The core is sustainability."*

Accessibility was discussed, not only in terms of physical access (for instance, the distance from people's homes to recycling centres) but also in terms of inclusiveness (for instance, obstacles linked to digital platforms for elderly people) and time sensitivity (CE activities will be more time intensive).

A total of 14 interviewees (mainly from the public sector, and its operating companies, and a few civil society representatives) believed that CE initiatives enhance social cohesion. These interviewees said that such initiatives create new social ties and meeting points and connect people from different age groups and diverse cultural backgrounds in a spirit of togetherness and belonging. Two interviewees pointed out that the level of trust is already high in Umeå and will only increase through CE initiatives.

Under **political systems** (impact area 4), interviewees mainly discussed the issues of participation and involvement in the city's CE plan. The results for the level of involvement among different stakeholder

groups were mixed. Out of a total of 18 interviewees talking about existing collaborations linked to CE plans, 11 people claimed that current collaborations are insufficient particularly representatives from civil society organisations. Existing collaborations were mainly identified between the municipality and the municipality-owned companies, which provide public services linked to housing, energy, waste, and water management. One interviewee stressed the challenges linked to participation:

> *"You don't always get invited at the grassroots level. You talk about participation through workshops with citizens which has been done but you reach the ones who are already onboard and not the big part of the population."*

Two stakeholders from civil society and one representative from academia were concerned about a potential social divide emerging between the people that feel included in the city's vision and those that do not have the means to express their voice. Three interviewees discussed a few additional aspects linked to existing governance structures. For instance, one public sector official expressed the need for top-down governance to accelerate the transition, while a civil society representative wished for engagement with high-level decision-makers from the municipality:

> *"Get us the people who make the decisions in Umeå kommun, it is not interesting trying to make plans and only receive representatives that do not have an impact on how the work will be carried out. It is important if we put our volunteering time. We need to make an impact."*

The impacts on **health and well-being** (impact area 6) were barely discussed; three interviewees regarded indirect positive impacts on public health, particularly through a modal shift and thereby emission reductions. Two interviewees mentioned impacts on well-being, with a stakeholder from civil society stressing that there might be positive impacts on mental health through a CE transition, as they believed that the CE empowers individuals to take concrete actions, in contrast to the notion of sustainability.

Under **personal and property rights** (impact area 7), impacts linked to a digital transformation in a CE were highlighted by five interviewees. Again, elderly people and migrants were highlighted as vulnerable groups, often lacking access to technology and the skills needed for digital empowerment. A stakeholder from the public sector pinpoints this barrier:

"The marginalized groups in a digital transition are elderly and immigrants, it is about information and these groups are difficult to reach with information."

In addition, two stakeholders pointed out the potential negative impacts linked to the provision of housing as well as clean and affordable energy.

Concerning **fears and aspirations** (impact area 8) related to a CE transition in Umeå, we identified a diverse set of fears with several main themes emerging:

- fears linked to the city's vision and plan such as miscommunication, not succeeding, feeding into an empty agenda, or even creating negative impacts;
- fears linked to just transition considerations, for instance excluding vulnerable groups or creating intergenerational issues;
- fears linked to a growing population, for instance considering the new needs and services required for the planned population increase and uncertainties on how to tackle this issue; and
- various fears linked to the time and scale of the transition, with the desire to drastically move faster to reach the required transition.

4. Discussion

As stressed by Vanhuyse et al. (2021a), there is a lack of social impact considerations in the literature on circular cities and, where they are covered, studies focus on employment opportunities and governance issues. For the case study on Umeå, we found similar results: perceived impacts were narrow; interviewees shared concerns mostly linked to people's way of life such as shifts in employment; both positive and negative impacts on people's community in connection to CE initiatives; and public awareness under people's culture. The results on participation were mixed, with the majority of interviewees suggesting negative impacts due to the low levels of engagement with civil society and citizens. Impacts linked to health and well-being and personal and property rights were barely discussed.

This links to the perceptions of the CE, where only a few CE strategies (reusing, recycling and rethinking) and the waste management sector have been mentioned frequently. At the same time, the CE was often associated with sustainability or the sharing economy. Compared to other European cities that have a CE roadmap, concrete targets and supporting strategies in place (for instance, Helsinki and Peterborough), Umeå is at an early stage of its CE transition pathway. This might have impeded the participants'

understanding of the potential impacts of the planned transition as they might not yet be perceived as tangible. Some crucial areas, such as reducing consumption- and production-based emissions in the transport sector, have been identified by previous studies (see Axelsson et al., 2018) which could help to further identify priority areas and implement CE strategies. We also suggest that the city's CE vision and strategies are communicated to different stakeholder groups in the city. This will help broaden current stakeholder perceptions on the CE, as well as increase ownership and support. Furthermore, the links between the city's CE ambitions, other sustainability targets, and national goals, need to be identified (for instance, becoming fossil-fuel free by 2040 or reaching 200,000 citizens by 2050). The potential pitfalls and contributions to different sustainable development goals also need to be investigated further.

That said, below we anchor three of the observations into the literature, which we deem the most relevant, namely 1) employment; 2) social cohesion and access; and 3) personal and property rights.

Impacts on employment were discussed most frequently by interviewees from all stakeholder groups. Yet the extent to which different sectors and types of employment will be impacted (both positively and negatively) warrants more research. While scholars suggest substantial job opportunities in a CE (see Wijkman and Skånberg, 2017), so far, the circular cities literature has focussed on informal waste sector workers, particularly in the context of low-income countries (see Becerra et al., 2020; Goldstein, 2017; Govender, 2017; Tong, 2017; Tong and Tao, 2016). The narrow focus presents an obstacle to understanding the impacts on different stakeholders, and trade-offs in affected sectors. We therefore suggest assessing the job quality of circular jobs, the type of skills required for different circular jobs and the preparedness of citizens to gain those new skills.

We gathered both positive and negative perceptions on impacts linked to the community category. One controversy concerned the benefits and pitfalls of CE strategies, especially sharing services. While ten stakeholders believed they will create more social cohesion and trust, seven interviewees discussed various pitfalls. Notably, the majority of interviewees' that highlighted the beneficiaries of CE initiatives were public sector representatives. One example of potential pitfalls provided was working conditions of Uber services. Other challenges raised were the accessibility of digital platforms and services, as well as the physical access to CE initiatives. This relates to a broader discussion about the inclusiveness and accessibility of CE initiatives. For instance, Xiao et al. (2019) stress challenges linked to the sharing

economy and address potential societal disruptions such as negative spending habits and massive job displacements. Mont et al. (2020) also claim that the impacts of sharing initiatives are poorly understood.

Overall, there is little consideration of current rights holders and how they will be affected. In their study on social impact considerations in circular cities, Vanhuyse et al. (2021a) highlight that personal and property rights are barely discussed. The scholars identify concerns about land rights linked to waste management. However, it will be crucial to explore the impacts on personal and property rights, especially in the context of sharing services. Ballardini et al. (2021) shed light on issues related to repairing, reusing and leasing activities linked to intellectual property and property laws. The authors claim that the fields are currently failing to provide incentives for innovations and more sustainable business models.

5. Conclusion

To date and to the best of our knowledge, there have been no holistic studies of the social impacts related to circular city transitions. We therefore aimed to help close this gap by exploring the social impacts of the planned circular city transition in Umeå, uncovering stakeholder perceptions on intended or unintended societal consequences. We found that social impact considerations are currently narrow, with the main concerns relating to shifts in employment and impacts on people's community, while impacts on people's health and well-being as well as personal and property rights were barely discussed.

Based on our findings, we recommend involving stakeholders from different stakeholder groups early in the city's CE vision and planned strategies. This will help to develop a shared understanding of the CE and mobilise broader support among the different stakeholder groups. It will also be necessary to clarify how the CE can contribute to the fulfilment of city targets and priorities, identify potential conflicting goals, and thereby understand who might gain or lose from the transition to a CE. Consequently, strategies for mitigating these potential conflicts are needed. For instance, how to reach vulnerable population groups – in the case of Umeå, elderly people and people with language or cultural barriers. A first step towards ensuring that the transition does not affect vulnerable groups is including them in the discussion.

It is worth mentioning some limitations of this study. Even though we did an extensive stakeholder mapping and applied different strategies to gain diverse perspectives, we might have missed some relevant city stakeholders and therefore not included some relevant perceptions on the social impacts of a CE transition in Umeå. Additionally, we included only stakeholders' perceptions in this working paper.

We will validate these further in focus group discussions and compare the stated perceptions with quantitative evidence for Umeå, including socio-economic and socio-demographic data, and map the access to current CE initiatives.

We suggest that future studies need to explore further the social impacts of a circular city transition and collect evidence for health and well-being impacts, as well as impacts on personal and property rights. It would also be valuable to investigate cities which are at different stages of their CE journey and compare the social impacts at various stages of implementation. Future studies could add supply chain thinking to their analysis to map social impacts along the supply chain. The impacts linked to people's community and political systems could be further explored from a spatial equity lens, investigating access and participation. We call for more concrete tools and guidance to support local policy makers in integrating social considerations into their urban CE plans. Only then will the transition towards a CE in cities be transformative and contribute to more sustainable urban pathways.

Author contributions

RS – Conceptualization, data curation, formal analysis, methodology, writing – original draft

FV – Conceptualization, methodology, writing – original draft, funding acquisition, project administration

KA – Writing – review and editing

Acknowledgements

This work was funded by Vinnova under grant [2019-03237].

Declaration of interests

The authors declare no competing interests.

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Annex 1: Overview of interviews

Type of stakeholder	Organisation (number of interviews held)
Government (6)	Green Party Umeå (1) Umeå municipal government (5)
Municipal services, at times provided by municipally owned companies (6)	Bostaden Umeå (1) Companion Noord (1) Fritidsbanken Umeå (1) Umeå City Library (1) Umeå Energi (1) Vakin (1)
Private Industry (3)	Cykelåkeriet (1) Östenssons Design (1) Ragn-Sells (1)
Academia (3)	RISE (1) Umeå university (2)
Civil society (7)	Emmaus (1) Naturskyddsföreningen Umeå (1) Red Cross Umeå (1) Studiefrämjandet (1) Svenska kyrkan (1) Umeå Hackerspace (1) Vänn I Umeå (1)

Annex 2: Interview guide

1. Background information on participants
1.1. What is your current position and role in your organisation?
1.2. Do you work with the topic of circular economy (CE) and if yes, in which way?
1.3. In those CE initiatives or activities, who do you collaborate with?
1.4. What is your main motivation to work with the topic of CE?
2. Personal perceptions on CE

2.1. What is your understanding of CE?
2.2. From your point of view, what are the main benefits of CE?
3. CE in Umeå, opportunities and barriers of the CE
3.1. How do you envision Umeå by 2030 in the context of a CE transition?
3.2. What would you consider as the main opportunities of a CE transition in Umeå
3.3. What would you consider as the main barriers of a CE transition in Umeå?
3.4. Do you feel that there is a political will towards a CE transition in Umeå?
3.5. Do you feel that there are enough support systems in place to facilitate a CE transition in Umeå?
3.6. Do you feel involved in city's vision of becoming a leader in the CE?
4. Social impacts and CE
4.1. Who might be affected by a CE transition in Umeå? (Please also explain why or how)
4.2. Are there any groups or organisations that could be advantaged/disadvantaged by the transition towards a CE in Umeå?
4.3. In your current work in Umeå, have you already noticed groups that are advantaged/disadvantaged in the CE transition process?
4.4. Can you think of any other social impacts linked to a CE in Umeå?
5. Closing
5.1. Do you have any additional comments?
5.2. Were any questions unclear?
5.3. Can you recommend other stakeholders that we could interview?
5.4. Can we interview you again if needs be?
5.5. Would you like to be involved in the dissemination of the results (sometime in 2022)?

Note: This presents a merged version of the interview guide as we slightly adjusted the questions to each stakeholder group.