# Chapter 21
# How Does 'Locality' Matter in Enabling a Circular Built Environment?: A Focus on Space, Knowledge, and Cities

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**Abstract** There is a growing interest in understanding and using local knowledge, resources, and stakeholders to achieve tailored and effective circular solutions in the built environment. Although the importance of clear centralised guidance and regulations are emphasised in the existing literature, there is also an emerging acknowledgement that understanding the 'local context' will be key to achieving tailored solutions that can effectively work in practice. However, there is a lack of discussion around the meaning and significance of 'locality' in terms of circularity solutions in the built environment. This discussion paper introduces space (both physical and social) and knowledge as two key aspects of 'locality' for enabling effective circular solutions in the built environment. Further, it argues that the cities can be seen as the locus of circular economy because of their role in localising space and knowledge. Thus, the paper enables a starting point to structure research towards an improved understanding of (i) the role of space and knowledge co-production for a circular built environment, (ii) the relevant local stakeholders, as well as (iii) city-level governance of locality in supporting a circular built environment.

**Keywords** Circular Economy · Context · Knowledge · Locality · Space · Urban

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## 21.1 Introduction

Circular economy (CE) is a concept that has attracted significant attention from academia, policy and practice. Although there are multiple ongoing discussions around CE, the CE discourse tends to adopt a deterritorialised approach, which focuses on innovation and growth [1]. Similarly, most research on circular built environment emphasise centralised or generalisable solutions and approaches such as digital systems, product/building design principles, life cycle or material flow assessment tools, as well as business models [2]. Debates around CE tend to be deterritorialised, and focused on sectors, because their focus is on economic system and production principles, which operate beyond local scales. However, such a perspective falls short in articulating the practical implementation and operation, and hides the full scale of politics of CE, thus creating a serious implementation gap which must consider local scales [3, 4].

On the other hand, the wider research on sustainability and socio-technical transitions widely recognises the importance of 'locality' to develop effective solutions in practice [5]. Here, 'locality' broadly refers to the specific set of socio-material relationships and practices associated with a place (e.g., region, city, neighborhood etc.), which affects the outcomes of sustainability efforts in practice for that place. Indeed, there is also an emerging acknowledgement in circular built environment research that understanding and working with the 'local context' (i.e., local stakeholders, knowledge and resources) is essential for effective circular initiatives [6].

However, currently there is a lack of clarity and discussion about how 'locality' matters in enabling a circular built environment [7]. Particularly, there has not been any discussions on what constitutes the 'local context', and what needs to be harnessed, or worked with, in that context, to enable effective circular solutions in practice. Based on a critical literature review, this conceptual discussion paper reflects on the meaning and significance of 'locality' in terms of enabling circular solutions in the built environment. It discusses space (both physically and socially) and knowledge as two peculiars of 'locality' in the context of circularity in the built environment. This discussion is then extended to the role of cities in enabling a circular built environment. It is argued that it is through the localising of space and knowledge that cities become effective in governing circular actions and strategies. The conclusions highlight the implications of the presented discussions on conceptualising local context, local stakeholders, and city-level governance in circular built environment research and practice.

## 21.2 Locality of Space and Circular Economy

### *21.2.1 Locality of Physical Space*

Circular economy (CE) is often seen as a means to achieve sustainability. A ‘value-retention process’ can be envisioned in a CE system by intentionally closing, slowing and/or narrowing the cycle of resources [8]. The built environment is the expression of a material bank, which prompts us to consider the transition of the built environment to a CE to improve resource efficiency. The built environment consists of immovable buildings and infrastructure whose main consumption is bulk mineral materials [9]. The unit and added value of these bulk construction materials is low compared to other products, making their flow and supply usually limited to a local (e.g., regional scale). Thus, achieving circularity of materials in the built environment requires understanding and utilizing the local physical space, which means considering the physical characteristics of the space [10].

Much of the literature related to materiality of built environment in cities and regions has implicitly and sporadically demonstrated that the physical characteristics of space, such as density, distance, and material availability, can influence the circularity of building materials [9]. These characteristics of physical space can be reflected in areas of different scales from building to urban, and even to a national scale. Different types of spatial features can influence the circularity of materials in the built environment by giving relative advantage to slowing (extending the lifespan of the structure), closing (ending the loops between use and production) and narrowing (reducing the consumption of materials) the cycle. In other words, different spatial features such as terrain, land availability, availability of natural resources etc. [11] can affect the material circularity. Their role is direct or indirect in the CE due to the correlation between them. For example, regions with flat terrain are more habitable, where populations congregate to create a high-density built environment. High-density construction shrinks available land resources, reducing the landfills for waste materials on the one [12], and reducing available building plots on the other hand; thus, shifting construction activity to renovating existing settlements in order to improve durability [13].

Considering such influence of physical space on potentials of circularity, it is worth establishing the spatial characteristics at a local level to design locally adapted circular strategies. Particularly, the decrease in spatial scale can make the impact of physical space on material circularity more evident by reducing the geographic access to natural and anthropogenic materials. Therefore, the local spatial characteristics are crucial in determining the most appropriate strategies and actions for achieving circularity.

For example, high building density usually implies a concentration of population and scaled-up cities where efficient recycling activities are constrained by construction space and where newly built activities are limited by land resources. Therefore, in such localities slowing strategies can be considered a priority because the goal of such CE activities is to improve the lifespan of the structure and avoid new construction and demolition activities. Another example is the issue of supply and recycling of materials in construction. A CE perspective suggests that the smaller the transportation distance, the better it is, to minimise the resources associated with transportation, which is a non-value adding activity [14]. Therefore, generally, for recycling, on-site and proximity disposal are considered as the best options, while for supply, locally available materials are preferred. However, on the one hand, construction material recycling facilities are located either in localities with frequent construction and demolition activity or near highways [15]. On the other hand, in high building density areas, the construction space on site is compressed, resulting in a lower possibility of on-site recycling, and a shift to off-site recycling, which increases the transportation distance. Overall, an adequate understanding of the local physical space is important for the effectiveness of CE strategies and actions in the context of the built environment.

### *21.2.2 Locality of Social Space/Place*

An understanding of space as a material/physical entity has long been seen as limited from the perspective of social sciences. From this perspective, space is explained as social phenomena resulting from situated and located social activities. Gotham [16] defines social space as a social relation and social construction that participates in the production and reproduction of social structures, social actions, and relations of power. In the context of a circular built environment, a social perspective on space becomes crucial for at least two reasons. First, a good understanding of the affected (local) socio-spatial contexts is key to developing and implementing circular initiatives that can deliver the anticipated benefits in practice. Second, such an understanding is also crucial for enabling a socio-ecological transition through CE initiatives instead of establishing an exploitative development logic that benefits only few actors [3, 17].

For the practicability of circular initiatives in the built environment, understanding locality from a socio-spatial perspective becomes critical, because in practice, it is through the socio-spatial relationships that various actors' resources, interests, and visions are configured; and thus, aligned or misaligned. It is this alignment/misalignment that eventually determines whether the new circular way of doing things could be established in practice as anticipated. Thus, there is a growing amount of empirical work showing that the social aspect of locality is key for enabling effective implementation and practicability of circular initiatives.

For example, the literature on Urban Living Labs (ULL) where real-life sustainable transition experiments take place, vividly show how such alignment happens in practice. Cuomo [18] demonstrates that, by bringing various local stakeholders together on a real-life experimentation, ULLs enable cooperative governance, which fosters creativity and positive cooperation that develop and implement practicable CE solutions. Further, acknowledging the effectiveness of ULLs in understanding and addressing social aspects of locality, Gundlach et al. [19] argue that the concept of ULL can be extended to cooperative urban development, where the built assets themselves become ULLs towards a circular built environment. On a parallel note, a socio-spatial perspective is also critical for ensuing the business viability of circularity initiatives at a local level. Howard et al. [20] adopts a placed-based view on SMEs to study SMEs role and resilience in CE. They find that SMEs become more resilient when their business value creation also help societal and environmental value creation. This means that “SMEs who recognize the role of placed-based societal identities and ecosystems not only become more resilient, but their considerations for community welfare and labour are intertwined with geographic-specific natural capital and the circular economy”. This is a particularly important argument for circularity in construction, where majority of the companies are SMEs that are operating locally. Finally, Oyinyola et al. [6] demonstrate how understanding and working with local social groups reinforced a circular experiment of housing through various mechanisms including incentivisation for engagement, job creation, upskilling, user acceptance, and replication of new circular solutions.

It is also important to see ‘locality’ from a socio-spatial perspective to ensure a just sustainable transition through circular initiatives, and prevent an exploitative development logic [3]. The field of urban geography has long studied the relationship between the dominant political and economic models, and the ways in which the built environment is planned, developed, and operated to varying benefits and costs of different social groups in the society [21]. Some concerns have been raised in CE literature that the deterritorialised, technically- and growth-focused discourse of CE, can work as a disguise of the real politics involved in shifting the existing economic models (and so the politics) in an unjust way. Keblowski [22] argue that in this case, CE can just be used as “an urban sustainability fix by selectively incorporating ecological goals in urban governance strategies”. However, because CE is as political and economic as it is technical and operational, when ‘locality’ is understood and incorporated from a socio-spatial perspective, it could provide a chance for people to (re)gain agency to enable a just socio-ecological transitions [3, 22].

## 21.3 Locality of Knowledge and Circular Economy

Throughout the past years there has been a paradigm shift in the way knowledge and science, and their roles in society are perceived. One of these shifts is the turn towards knowledge co-production, which calls for democratizing knowledge and science considering the hierarchical connection between knowledge and power that confers hegemony on science [23]. Knowledge co-production aims at achieving not only scientific but also societal impact through the collaboration between scientific and non-scientific actors as well as collective dialogue among actors with different expertise [23, 24]. As such, this transition in science towards knowledge co-production had focused on linking science with practice and linking science with policy. These calls aimed at making science more interdisciplinary and transdisciplinary by bringing in knowledge from diverse perspectives [6].

Norström [24] demonstrate the effectiveness of knowledge co-production for sustainability defining co-production in this context as “iterative and collaborative processes involving diverse types of expertise, knowledge and actors to produce context-specific knowledge and pathways towards a sustainable future”. In the context of sustainability, knowledge co-production becomes essential to address the complex challenges of urban sustainability [25].

In a similar plea, and with regards to circular built environment, more recently, D’amato [25] demonstrate that “knowledge co-production entails the integration of different knowledge types and collaboration across multiple societal actors with potentially conflicting viewpoints and agendas”. In this regard, they suggest that there are three main kinds of knowledge that are recognized by all the actors: lay knowledge, expert knowledge, and scientific knowledge. However, these kinds of knowledge are “dealt with, to different extents, according to the roles played by different actors in the process of knowledge generation”. Similarly, Fratini et al. [27] argue that there is a need to bridge between scientific and practice-based knowledge to develop and stabilize CE concept because these are inevitably influenced by geographically and culturally contextualised ‘socio-technical imaginaries’—i.e. “collectively held, institutionally stabilised and publicly performed visions of desirable futures, animated by shared understanding of forms of social life and social order attainable through, and supportive of, advances in science and technology”.

With the above views, knowledge can be perceived as a key aspect of ‘locality’ for enabling effective tailored circular solutions in the built environment. As Durose et al. (2018) cited in Broto et al. [28] state “knowledge co-production recognizes that citizens hold knowledge, particularly in urban development planning action, requiring experiential learning to deliver sustainable outcomes”. In this light, they claim that “community accountability is crucial in tracking the implication of multiple knowledges and intentions in co-production processes”. As such, it is important to consider that although “co-production strategies may address epistemic injustices” they may also “generate new ones” [27].

Therefore, it is critically important to consider those situated knowledge processes as co-producing governance concepts, such as ‘circular economy’, which have major impacts on the people inhabiting the affected localities. Literature on sustainability transitions in cities [29] demonstrate how “knowledge and power are inevitably interlinked in the governance of urban transformations” [27, p. 4], Jassanoff [23] shows how “scientific knowledge both embeds and is embedded in social identities, institutions, representations and discourses”. Addressing the challenge of epistemic injustice for local people in knowledge generation requires broadening the source of knowledge by respecting and incorporating multiple ways of knowing and engaging with diversified actor groups; not only elite actors with high power and influence (e.g., not only government bodies, technocrats, scientists, large NGOs, but also local and indigenous communities, small businesses and NGOs).

## 21.4 Localising Role of Cities and Circular Economy

Understanding circularity in terms of locality speaks for the need to focus on people's living environment. Projections show that by 2030 more than half of the world population will live in cities, and so, it is natural to 'localise' circular thinking and circularity in cities. This makes particularly sense when the ambition is to embrace an understanding of sustainability and circularity that is open to, and benefits, large masses, and not only a limited number of actors [30].

Cities are well placed to support a circular eonomy due to high concentrations of resources, capital, and talent [31]. Cities can provide that optimal space for interaction to explore the nexus between the resources (e.g., energy, materials) needed for building and urbanization, where this latter term is understood as a socio-economic-cultural process that embraces a social view of space and knowledge creation. Thinking of circularity as the nexus between resource flows and socio-economic-cultural processes of urbanization allows to centralize the role of urban planning and design as a method to both optimize physical space and empower local actors for knowledge co-production and active participation [32].

From a land-use/physical space point of view, cities represent an adequate scale for the governance and facilitation of circular economy due to their existing governance and infrastructures that are already in place for regulating economic processes and providing essential services (e.g., energy and waste management). As highlighted by Williams [10], urban planning and design can localise looping of resources through the co-location of producers and consumers of various value streams. Williams [33] gives examples of this: The London Plan [34] which allocated land for a variety of 'low value' circular activities (e.g., urban farming, storage and logistics facilities, waste management and green space), as well as Stockholm's plan [35] which encouraged urban form (high-density, mixed-use development linked by public transport and district heating networks) that supports the operation and expansion of a circular system (ecocycles) across the city.

It follows from this that land-use planning in cities has an important role also in enabling circularity in the built environment. There are already studies which report findings that support this argument. Tambovceva [36] evaluated the level of awareness and attitude towards construction and demolition waste among Latvian construction companies. Participants of the study mentioned the lack of space on the construction site as an obstacle to waste sorting and later recycling. Arora [37] used a bottom-up stock analysis approach to estimate the material and component stock of public housing developments in Singapore, where material stock estimations and potential outflows is crucial from matching demands and achieving resource efficiency. Furthermore, to facilitate finding the location of publicly available sorting containers and areas in Latvia, ZAAO Ltd. has developed an interactive map for residents and contractors to easily find the nearest sorting site around.

From a socio-economic-cultural perspective, it is a major challenge to identify the right circularity priorities, strategies and actions that holistically address multiple interests in urban contexts. It is this challenge that requires a good consideration of social aspects of local space and knowledge co-production with local actors. For example, on the one hand, changing consumer behavior is the most important and challenging issue for local policymakers [38]. On the other hand, there are several successful examples of implementing circular economy at city level, such as, creation of networks of reuse points for discarded items, such as household appliances and furniture, collection of household food waste to turn it into biogas, and implementation of circular urban farming principles.

Ultimately, these suggest the need for developing holistic urban planning and design frameworks that consider physical space, socio-spatial relationships as well as effective ways of knowledge co-production with local actors. For example, the city of Lappeenranta in Finland has focused its efforts in six areas: public procurement, land-use planning, construction, recycling and waste management, nutrient recycling, sharing economy and smart services. It is emphasized that communication, as well as ensuring the commitment of stakeholders to the task, is especially important for achieving the goals [39]. In a similar way, Williams [33] argues that 'circular development' (not circular economy) should be the focus of urban planning. She puts forward a framework for circular development that involves not only land-use considerations but also complementary socially- and knowledge-driven issues, such as market capacity building, partnership building and new regulations. Although there is a paucity of research on exactly how a circular built environment can be best supported through such holistic urban planning and design approaches, there seems to be an agreement in the literature about the need for urban governance to consider local physical space, knowledge and socio-spatial relationships to achieve any circular transition [40, 41].

## 21.5 Conclusions

Circular approaches are needed in the built environment due to its enormous impact on resource depletion and climate change. However, the dominant generalized and deterritorialised approaches have limited effect in enabling the desired circular transformation in the built environment. Therefore, locally-informed circularity strategies and activities are required to fundamentally change the existing linear system of building towards a stronger circularity. The paper argues that 'locality' matters in enabling a circular built environment because local materiality, stakeholder interests, social relationships, and knowledge are crucial in achieving the desired circular transformation. It also argues that cities are key to understanding and addressing these aspects of locality due to (i) high concentrations of built assets, resources, capital, and talent in cities, and (ii) the prospects of organising these for circularity through urban governance.

Although many circular economy initiatives are underway across industries, some of the barriers of circular transformation in the built environment are unique. A major challenge for the built environment is to promote integrative initiatives that bring together a large variety of stakeholders, while another one is to bundle diverse local initiatives and align them along overarching goals. These challenges critically require a joint consideration of local physical space, stakeholder knowledge and socio-spatial relationships. In this context, cities seem to present the ideal scale to govern the circular transformation by integrating local and general through a clearer picture of the relationship between use and production, back and forth effects, and cross-cutting relationships and politics between sectors and actors.

However, knowledge-related issues and socio-spatial relationships have so far been formulated too abstractly (ie., theoretically) in the context of circular built environment. They need to be aligned more clearly with the practical concerns and characteristics of the socio-technical system of the built environment. Hence, it may be possible to use the large international pool of empirical examples of the CircularB community to explore how locality plays out in practicing circularity in the built environment, and bridge the current gap between the theory and practice. This would help developing systematic knowledge about how to approach, and work with, local actors and spaces, as well as revealing how such local aspects could be aligned along overarching circularity ambitions. Although limited to a critical discussion of the literature, this paper provides the basis for such an effort, and calls for further empirical work in this area.

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