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Eikelenboom, Manon; Long, Thomas B. ; de Jong, Gjalt

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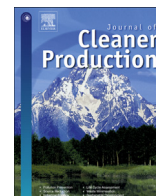
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Circular strategies for social housing associations: Lessons from a Dutch case

Manon Eikelenboom^{*}, Thomas B. Long, Gjalte de Jong

Campus Fryslân, University of Groningen, Wirdumerdijk 34, 8911 CE, Leeuwarden, the Netherlands



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ABSTRACT

The aim of this research is to explore how social housing associations can introduce circular strategies and integrate social elements, next to ecological elements, within these strategies. In order to investigate this aim, this paper first explores the circular strategy options that can be adopted by housing associations. Thereafter, the paper explores how social elements can be integrated within these strategies via the establishment of relationships with communities in the network of housing associations. By performing an in-depth case study, we identified potential circular strategies for housing associations and indicate how community relationships could be established within these strategies. The findings highlight that community relationships in the vision formulation and activities involved in the execution of circular strategies may assist in creating synergies between the ecological aims of circular strategies and the perspectives and needs of communities. On the other hand, the results indicate that not establishing relationships with communities or only establishing relationships in the strategy outcomes may be detrimental to both community needs and the ecological aims of circular strategies.

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1. Introduction

The circular economy is a promising approach to help reduce global sustainability pressures (European Commission, 2014). The ecological foundations of this approach recognize that planetary resources are limited and that waste can be a useful resource (Murray et al., 2017). The circular economy has been defined as 'an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations' (Kirchherr et al., 2017: p.224). In order to achieve these aims, the circular economy concept proposes a range of strategies that can be adopted by businesses in order to slow and close resource loops (Bocken et al., 2016).

The focus in the circular economy literature has been on redesigning manufacturing and service systems to benefit the environment (Geissdoerfer et al., 2017). Therefore, research and

practice has prioritized the environmental aims of the circular economy at the expense of wider social implications (Geissdoerfer et al., 2017). This is an important limitation as recent literature indicates the importance of social elements within the circular economy, including social benefits, such as human well-being and social equity, societal perspectives and societal stakeholders, such as NGOs and local communities (Inigo and Blok, 2019; Kirchherr et al., 2017; Murray et al., 2017). On the one hand, circular strategies may create social benefits, such as cleaner community spaces through recycling practices. On the other hand, they may result in negative social implications, for example, by requiring more expensive production practices, potentially limiting accessibility to low-income communities. Not exploring these social elements is problematic as it can lead to unintended negative social implications (Murray et al., 2017). Furthermore, involving societal stakeholders is important for the success of circular strategies, which often require fundamental changes to social behaviors and lifestyles (Geissdoerfer et al., 2017). For example, for producers to successfully adopt recycling strategies, users must adjust their behavior (Atlason et al., 2017). However, the involvement of societal

^{*} Corresponding author.

E-mail address: m.eikelenboom@rug.nl (M. Eikelenboom).

perspectives within circular strategies has been neglected in the literature (Inigo and Blok, 2019).

To address these gaps, this paper focusses on the adoption of circular strategies in the context of a Dutch social housing association. Social housing associations are private non-profit-making organizations with social goals: providing low income communities with affordable housing and improving their overall well-being (Dewick and Miozzo, 2004). Circular strategies are seen as promising for housing associations as they could help reduce their negative environmental impacts by (1) closing material loops in construction and demolition and (2) reducing waste, water and energy usage in buildings and neighbourhoods (Pomponi and Moncaster, 2017). Reducing the environmental impacts of Dutch housing associations is important as they own over 30% of the total housing stock and are key enablers of a transition within the building sector (Nagel and Lustenhouwer, 2017). Social housing associations offer a unique context for studying the social elements of the circular economy as they have to take social elements, in particular the perspectives and needs of low-income communities, into account when introducing circular strategies. This is due to the central importance of social goals within housing associations, where all initiatives must be evaluated in the light of these goals (Dewick and Miozzo, 2004). For instance, Dewick and Miozzo (2004) have found that housing associations expressed an interest in implementing environmental initiatives but only when it improved the overall living conditions of low-income communities. The current literature is unclear about whether and how circular strategies could be introduced in contexts where social elements are of central importance. Therefore, this paper aims to investigate how social housing associations can introduce circular strategies and integrate social elements, next to ecological elements, within these strategies.

To achieve this aim, this paper first explores the circular strategies that could be adopted by housing associations. To do this, this paper builds on the circular strategy framework developed by Bocken et al. (2016). A critical assessment of the strategies, using a grey literature review, is conducted to evaluate whether the strategies can be applied to the context of housing associations or whether modifications are needed. Second, this paper investigates how housing associations can integrate social elements within these strategies. We propose that housing associations can achieve this by building relationships with communities in the networks in which the circular strategies are situated. We see communities as constituting a variety of local actors including housing association tenants (which are also users), other local residents and local community organizations (such as tenant associations and community centers) (Wallis et al., 2010). Relationships with communities in the network can increase community support for circular strategies and can enable the adoption of community knowledge and partnerships within these strategies (Dacin et al., 2010; Joyce and Pacquin, 2016). Despite calls for more community engagement in the circular economy (Hobson, 2016), few studies have examined relationships with communities within this context. Existing examples mostly focus on citizen initiatives, such as citizen innovation spaces (Ouillon et al., 2017). While these examples are useful to explain the potential contribution of communities to the circular economy, they do not explain how relationships with communities can be established within the networks in which circular strategies are situated.

The research aim was investigated through an in-depth case study in a social housing association in the Netherlands. Data was collected through grey literature publications, two focus groups and 15 interviews. The results identify potential circular strategies that could be adopted by housing associations and highlight how different types of relationships with communities could assist

housing associations in integrating social elements within these strategies. Our study responds to calls for a wider recognition of social elements within the circular economy (Murray et al., 2017).

2. Literature

2.1. Circular strategies

The circular economy concept proposes a range of efficiency and productivity enhancing activities, collectively known as circular strategies (Blomsma et al., 2019). Circular strategies specify visions and activities for how businesses can operate in a circular economy (Blomsma et al., 2019; Bocken et al., 2016). This paper builds on the circular strategy framework established by Bocken et al. (2016) (Table 1). The identified strategies are not mutually exclusive and can complement each other. Bocken et al. (2016) note, for instance, that high-quality Miele washing machines are an example of 'classic long life' and 'encouraging sufficiency' strategies. Furthermore, different circular strategies will be relevant in different contexts depending on firm industry and function (Blomsma et al., 2019).

Circular strategies can lead to multiple environmental benefits, including reduced resource depletion and waste. However, researchers have highlighted that circular strategies may induce several rebound effects, limiting their environmental benefits (Bocken et al., 2016). First, circular strategies may not reduce resource usage where secondary goods are insufficient substitutes for primary goods when they are of inferior quality or less desirable to users (Cooper and Gutowski, 2015; Zink and Geyer, 2017). Second, circular strategies may increase consumption and production if they improve access to and decrease the prices of goods and services; consumers may increase their use of a product or spend their cost savings on other polluting activities (Bocken et al., 2016; Zink and Geyer, 2017). Third, circular strategies may have negative indirect effects such as an increase in the sales of disposable products as customers believe they can reduce their impact through recycling (Zink and Geyer, 2017). Another important critique on circular strategies is their narrow approach, which often does not include societal participation nor address societal perspectives (Millar et al., 2019). Including these social elements in circular strategies is important to transform consumption patterns and lifestyles and overcome the above-mentioned rebound effects (Millar et al., 2019). It has even been argued that without considering social elements, the circular economy will remain a technical tool that does not change the course of the current unsustainable economic paradigm (Korhonen et al., 2018).

2.2. The circular economy in the building sector

Circular economy research in the building sector has increased due to growing environmental concern as the sector consumes 40% of global natural resources, produces 40% of global waste and 33% of global emissions (Hossain and Ng, 2018). The transition to a circular built environment is therefore important and could reduce environmental impacts while contributing to economic growth and providing social benefits (Leising et al., 2018; Lopez Ruiz et al., 2020). A circular approach for buildings has been defined as 'a lifecycle approach that optimizes the buildings' useful lifetime, integrating the end-of-life phase in the design and uses new ownership models where materials are only temporarily stored in the building that acts as a material bank' (Leising et al., 2018: p.977). Multiple circular strategies for the building sector have been identified, including reusing old buildings and materials, designing buildings for disassembly, delivering functionality without ownership, and substituting resources with renewables (Foster, 2020; Leising et al., 2018).

Table 1
Circular strategies (based on Bocken et al., 2016).

Strategy	Description
1. Access and performance	Delivery of services without users having to own physical products, often includes services such as maintenance & repair. Pricing per unit of service.
2. Extending product value	Exploitation of the residual value of products and the delivery of 'as new' products to customers. Involves establishing take-back systems and capturing value through reduced material costs.
3. Classic long-life	Delivering high-quality, long-lasting products for premium prices often accompanied with high levels of services.
4. Encouraging sufficiency	Delivering long-lasting products for premium prices emphasizing a non-consumerist approach and focussing on influencing customer behaviour.
5. Extending resource value	Exploiting the residual value of resources through collecting otherwise wasted materials and turning them into new forms of value.
6. Industrial symbiosis	Turning waste outputs from one process into feedstock for another process. Involves new collaborative agreements, joint cost reductions and the creation of new business lines.

Despite the increased interest, the transition towards a circular built environment is at an early stage, focussing mainly on the recycling of materials (Hossain and Ng, 2018; Munaro et al., 2020). This is caused by several challenges. First, multiple different actors are involved in construction value chains, which are often fragmented and characterized by low awareness of circularity (Leising et al., 2018; Munaro et al., 2020). Second, there are multiple technical challenges due to the long lifespan and complex design of buildings (Munaro et al., 2020; Pomponi and Moncaster, 2017). Other challenges include: uncertainty about material prices in the future, a lack of quality standards for recovered materials, unclear financial cases, an unequal division of benefits, and a lack of incentives to adopt circularity (Adams et al., 2017). Pomponi and Moncaster (2017) highlight that the greatest challenges ahead will not lie in further technological innovation, but in the role of people, both individuals and society as a whole. Therefore, it has been proposed that to implement circularity in the building sector, increased interaction, collaboration and co-creation among manufacturers, waste companies, policymakers and communities is essential (Munaro et al., 2020).

2.3. Community relationships in circular strategies

Community relationships are important to integrate societal perspectives in and increase the social and environmental benefits of circular strategies (Inigo and Blok, 2019; Murray et al., 2017). Relationships with communities can be established within the social networks in which circular strategies are situated (Liu et al., 2013). In broad terms, social networks are defined by a set of actors, the relationships between these actors, and the structure of relationships among the actors (Nohria and Eccles, 1992). These actors could be individuals, organizations, industries or even nation states and their relationships may refer to friendship, influence, the exchange of products, services or information, or anything else that forms the basis of a relationship (Tichy et al., 1979). Situating strategies within these networks is important as actors in the network can provide organizations with access to information, resources, markets and technologies, allowing them to achieve strategic objectives (Gulati et al., 2000). This argument is especially relevant within the context of circular strategies as companies have to participate in collaborative circular networks in order to close resource loops (Sousa-Zomer et al., 2018).

Within circular economy research, limited attention has been paid to understanding relationships with communities in the network. However, within sustainability research, informal relationships between organizations and non-enterprise actors, such as local residents, NGOs, and the environment, have received increased attention (Frow and Payne, 2011). While economic relationships are built with business partners, social or informal relationships can be built with communities (Joyce and Paquin, 2016).

Developing and maintaining mutually beneficial relationships with communities in the network can influence the success of sustainable business models through enhanced acceptance, commitment and support (Joyce and Paquin, 2016). Furthermore, these relationships can enable the adoption of local knowledge and the creation of local partnerships (Dacin et al., 2010). Research on renewable energy has, for instance, shown that community relationships can lead to increased environmental and social benefits, such as locally appropriate installations and enhanced social cohesion (Walker et al., 2007). However, not all relationships with communities in the network may enhance the acceptance and success of circular strategies, for instance, due to one-way communication strategies (Stringer et al., 2006).

We adopt a social-ecological systems perspective to examine when and how relationships with communities can assist in integrating social elements in circular strategies. Within a social-ecological systems perspective the social system refers to social activities and perspectives, and the ecological system refers to ecological processes and outcomes (Chapin et al., 2009). Social ecological systems theory proposes that social elements can be integrated within environmental strategies by establishing two-way interactions in which local communities adapt their needs to natural resources and adapt natural resources to suit their needs (Jochim, 1981; Stringer et al., 2006). These two-way interactions can be established when communities (1) are concerned about natural resources, (2) have incentives for natural resource use and protection, and (3) have the capacity to influence natural resources (Jodha, 1998). There is increasing evidence that these interactions can lead to synergies between the environmental goals of environmental strategies and the needs of local communities (Shackleton et al., 2019). Following these insights, we propose that housing associations may be able to integrate social elements, next to ecological elements, within circular strategies by building relationships, which involve two-way interactions, with communities within the networks in which circular strategies are situated.

3. Case description

This study focusses on a social housing association in the Netherlands. Dutch housing associations build, maintain and rent houses to low-income communities and aim to improve liveability in neighborhoods. Dutch housing associations own over 30% of the total housing stock and are therefore key players in the circular transition of the building sector. Transitioning the building sector is important as it is responsible for 35% of CO₂ emissions, 50% of resource usage, 40% of the energy usage of the Netherlands (Nagel and Lustenhouwer, 2017).

This study focusses on a housing association with 185 employees which rents out over 20,000 houses to low-income communities. The housing association's core task is to provide

affordable and pleasant housing to its tenants and it additionally strives to create, in cooperation with local stakeholders, pleasant, safe and viable communities. In doing so the housing association interacts with a variety of stakeholders including the municipality, tenant associations and community interest groups (Fig. 1). Relationships with tenants and tenant associations are important and these stakeholders participate in new initiatives through

information sessions and consultations. Since 2016, the housing association has been involved in environmental initiatives, for example by constructing energy neutral houses. The housing association has been a national leader in adopting environmental initiatives, implementing the ambitious target of transforming its entire portfolio into energy-neutral buildings by 2030 and being among the first to explore the opportunities of the circular

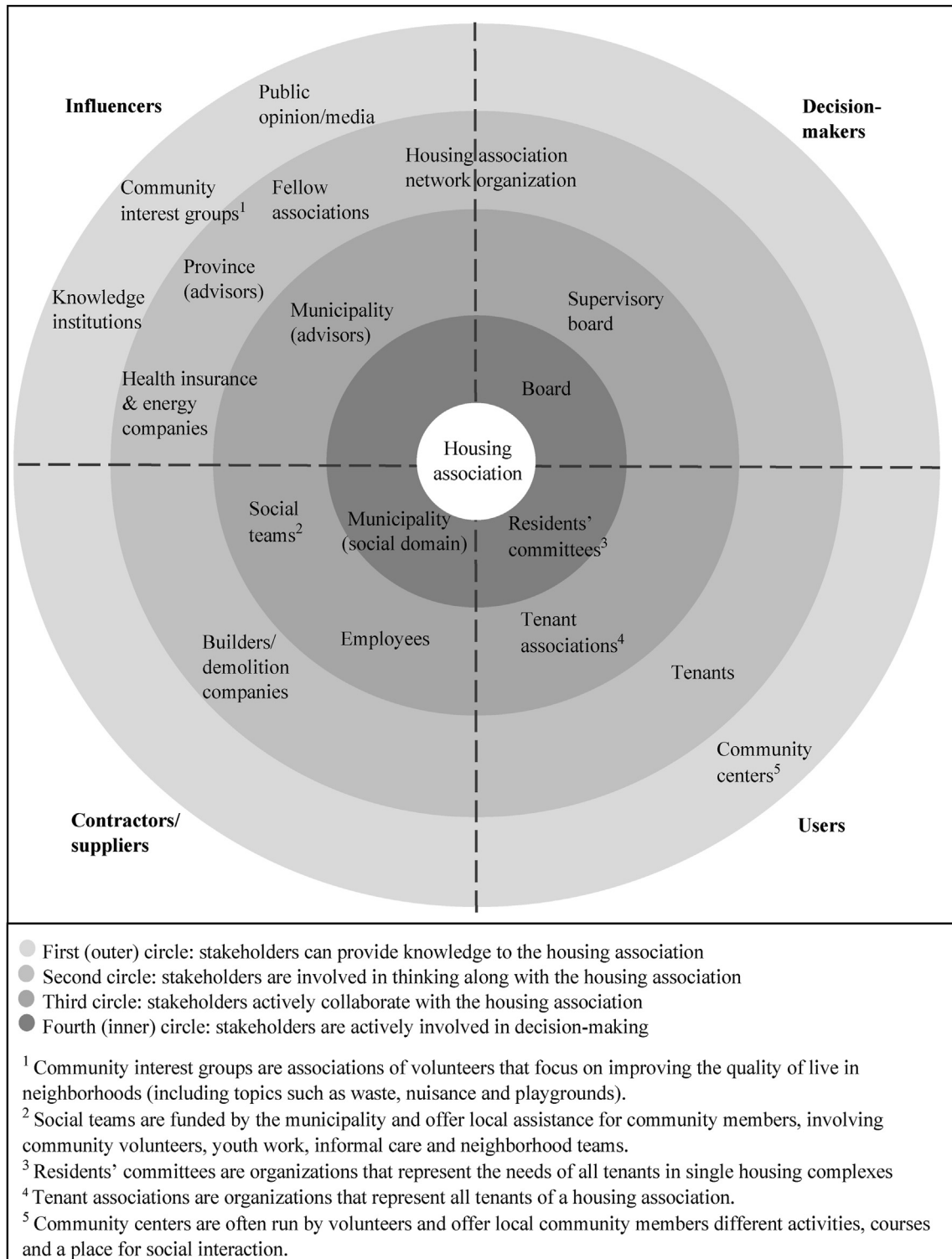


Fig. 1. Key housing association stakeholders according to function and type of interaction.

economy. However, the introduction of a circular strategy is still at an exploratory start-up phase. There are concerns about the impacts of circularity on the well-being of low-income communities, for example, though increased living expenses. Our case study focusses on the potential adoption of a circular strategy within this housing association and its network. This provides an interesting context for our research due to (1) the dominant social mission of the housing association and its interactions with the community and (2) the aim of the association to adopt a circular strategy.

4. Method

This study is based on a single case study in a housing association where one of the researchers worked on the research aim at the strategy department for one day a week during 2018–2019. A single case study is appropriate to analyze the complex interplay of actors involved in circular strategies and allows for the generation of rich data including different actor perspectives (Lapan et al., 2012). Abductive inference is adopted in this study, which is an appropriate method for making sense of new situations through inference from empirical observations (Richardson and Kramer, 2006 p. 499). Abduction is useful to explain new and surprising empirical data through the elaboration, modification, or combination of pre-existing concepts as it confronts theory with the empirical world (Richardson and Kramer, 2006). The abductive approach is thus useful when the objective is to discover new things, other variables or relationships, leading to the generation of new concepts and the development of theory, rather than confirming existing theory (Dubois and Gadde, 2002). This approach has for instance been adopted in previous studies to uncover new forms of sustainable business models (Stubbs and Cocklin, 2008) and investigate circular ecosystems (Zucchella and Previtali, 2018). Abduction accepts existing theory, which can improve the theoretical strength of case analysis. In this research, we build on the previously discussed literature regarding circular strategies, community relationships and social-ecological systems theory. We focus on the continuous interplay between the theory and the empirical observations with the aim of integrating these streams, as well as advancing knowledge, through an in-depth analysis of the case study (Dubois and Gadde, 2002). Fig. 2 portrays the methodological steps that were taken in the research.

4.1. Identifying circular strategies

In the first step a practice review of circular strategies in housing associations was conducted by searching the grey literature. Publications on the potential of circularity in housing associations were collected from (1) housing associations, (2) network organizations, (3) governments and (4) banks, resulting in 23 relevant publications. These publications provided information on the circular initiatives that could be or were already adopted by housing associations. For example, the housing association network organization published a guide on how housing associations could take steps towards a circular housing stock. As the number of relevant publications was limited, one of the researchers joined and observed 7 explorative meetings (30–60 min), involving innovation and strategy managers, on the potential of circular strategies in the housing association.

The practice review materials and participant observation notes were analyzed and coded using the circular strategy framework (Table 1). The coded data were evaluated against whether they could fit the strategies or whether revisions were needed. Based on this, a new set of strategies was developed. This framework does not identify circular strategies that have been adopted by housing associations, but strategies that could be adopted. This research

aimed to focus on strategies that can be practically adopted by housing associations and therefore also coded for viability, paying particular attention to potential barriers that were identified. Based on the outcomes, it was decided to focus on two specific circular strategies in the rest of this research – namely, the ‘extending product value’ and ‘industrial symbiosis’ strategies.

4.2. Situating the strategies within the network

In step two, the networks in which the two identified strategies would be situated were investigated using the net-map method (Schiffer and Hauck, 2010). Net-map is a participatory interview technique that helps people to understand, visualize, and discuss situations in which many different actors influence the outcomes. It allows companies to examine not only the formal relationships in the network but also informal relationships that cannot be understood by merely studying documents. The main aim of this step was to identify the network the circular strategies would be situated in, paying specific attention to relationships with communities.

The net-map approach was conducted with a group of 7 employees with strategic responsibility and/or who work with external stakeholders (Table 2). Each employee was introduced to the research and briefly interviewed beforehand. The session started with a characterization and discussion of the two circular strategies. Participants were divided into two groups, corresponding to the two strategies. The net-map approach involved three main steps. First, participants thought of all external individuals, groups or organizations that could be involved in and/or affected by the strategy. Second, participants linked the identified actors by drawing colored arrows between them, including the direction and transactional content of their relationships. Finally, participants reflected upon the network maps, paying specific attention to the relationships with communities. The focus group lasted for 4 h and was recorded and transcribed (focus group script is provided as supplementary material).

4.3. Interviewing actors in the network

In the third step, actors from the identified networks were interviewed. The aim of these face-to-face semi-structured interviews was to collect in-depth information on the potential relationships with communities within the networks. Furthermore, the interviews were used to check the maps made in the focus group, providing external validation for the focus group results. Other actors identified to have relationships with communities were interviewed, in addition to community actors. Contacts were acquired through the housing association. This resulted in 15 interviews in total (Table 3). All interviews started with an explanation of the selected circular strategies, and the interviewees were asked about their potential role and position in the network. In the next steps, interviewees were asked to reflect upon their potential relationships with (other) community actors in the network. All interviews were recorded and transcribed (interview protocol is provided as supplementary material).

4.4. Analyzing the data

In the fourth step, network maps for the two circular strategies were created based on the net-map discussion and interviews. The final maps were reviewed with the strategic manager of the housing association. The net-map discussion and the interviews were coded using a 1st and 2nd order analysis (Gioia et al., 2012), taking the previously discussed literature into account. The data structure is included in appendix A.

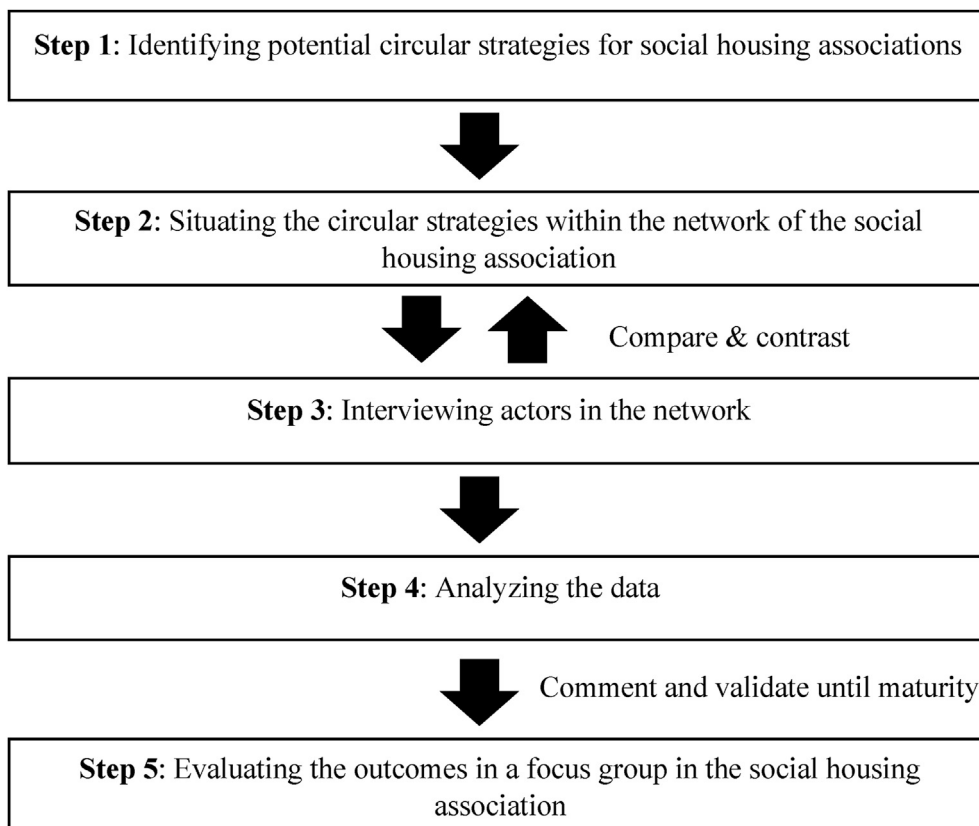


Fig. 2. Method overview.

Table 2

Focus group participants.

Department	Function
Strategy	1. Strategic relations manager
	2. Strategic relations manager
	3. Strategic manager
Asset management	4. Innovation manager
	5. Senior asset manager
Estate	6. Contract manager
	7. Project leader

4.5. Evaluating the outcomes

In the last step, the results were evaluated in a focus group in the housing association, involving the same participants as the first focus group. The focus group lasted for 2 h and was recorded and transcribed. In the focus group, participants were asked to reflect on the circular strategies, the relationships with communities, and the ability of these relationships to assist in integrating social elements within these strategies.

5. Results

5.1. Circular strategies for social housing associations

Table 4 contains the circular strategies, identified through the practice review, for housing associations. Only one new strategy was identified in the analysis, which was a strategy specifying outsourcing of circularity to the supply chain. Modifications to the ‘access-and-performance’, ‘extending product value’, ‘extending resource value’ and ‘industrial symbiosis’ strategies were made to reflect the nature of the services provided by the housing

association. Some strategies needed to be extensively modified, including the ‘classic long-life’ and the ‘encouraging sufficiency’ strategies, involving further integration of social elements, such as the inclusion of the needs of low-income communities. For instance, the ‘classic long -life’ strategy needed to be adjusted as asking premium prices from low-income communities was undesirable. Furthermore, the ‘industrial symbiosis’ strategy was extensively modified, focussing more on the exchange and combination of materials, resources and knowledge to develop integrative circular solutions in neighbourhoods. It focusses more on finding collaborative solutions in terms of recycling and re-use, compared to solutions in production processes for which the term industrial symbiosis is generally being used.

The viability of all strategies was questioned in the practice review documents and by the housing association in the explorative meetings. First, it was argued that low-income communities may not benefit from the ‘access and performance’ strategy as an all-inclusive service package may increase fixed monthly expenses, which can pose a burden on low-income households. For example, one housing association started a trial including the rental of sustainable fridges in their contracts with tenants, however the project was terminated due to the concerns of tenants about the limited energy cost savings and increased monthly expenses. The ‘access and performance’ strategy also involved viability issues due to the scale of operational changes needed for its implementation. Furthermore, builders may face difficulties with pre-financing the large number of houses required by housing associations as they have less access to cheap financing compared to housing associations. Second, it was argued that the ‘extending resource value’ strategy could be difficult to adopt due to the unpredictability of the supply and demand of demolition materials and clashing ambitions

Table 3
Interviewees.

Actor	Interviewee function	Length (in minutes)
Social team	1. District manager	60
Social working space	2. Supervisor & manager	50
Community center	3. Manager	30
	4. Project manager	30
Tenant association	5. Board member	30
Community space & restaurant	6. Owner	40
Second-hand shop	7. Manager	45
School	8. Sustainability coordinator	45
Municipality	9. Project manager	50
	10. Senior policy officer	80
	11. Sustainability officer	70
Waste processor	12. General director	50
	13. Communication director	50
Builder	14. Manager circularity	60
	15. Developer	65

Table 4
Circular strategies for housing associations.

Strategy	Vision	Activities	Expected outcomes	Modifications
1. Access and performance	Delivering a service, 'living', to low-income communities, who arrange all living requirements through a single housing association contract. Builders remain owners of buildings to encourage longer lifetimes.	Activities to offer low-income communities a 'living' service (e.g. electricity & rental of appliances). Increased collaboration and new contracts. More contact with tenants to specify service packages and reduce living costs.	- Reduced (living) costs due to large scale contracts - Reduced environmental impacts due to longer lifetimes	The housing association service strategy (where the service housing is provided to tenants) is extended with other services, buildings remain in the ownership of builders.
2. Extending product value	Extending residual value of local parts & materials and delivering 'as new' houses to low-income communities through reuse and remanufacture.	Activities and partnerships with architects, builders, and demolition companies enables demolition materials reuse.	- Reduced environmental impacts due to reuse - Reduced material costs	Focus is on increasingly collaborating with builders and demolition companies, rather than with consumers in take-back systems.
3. Classic long-life	Delivering longer lifespan houses, through using high-quality materials and modular building practices, enabling low-income communities to stay in their houses throughout their lifetime.	Activities that enable longer lifespans, including a shift in suppliers and incentive systems for durable building practices. Potentially closer contacts with tenants to facilitate maintenance.	- Tenants can stay in their houses for longer periods - Reduced costs through longer usage of buildings, decreased amortizations and demolition costs - Reduced environmental impacts	Modular design principles are adopted. Focus is on cost reductions instead of premium prices. A social goal is included in the vision.
4. Encouraging sufficiency	Encouraging low-income communities to adopt circular lifestyles through providing sharing spaces, tracking technologies and coaching services. Focus on influencing behaviour.	Activities that enable adoption of circular lifestyles. Requires closer contacts with communities and relations with new partners such as energy coaches.	- Reduced maintenance and living costs - Reduced environmental impacts due to circular lifestyles	Focus is on assisting low-income communities instead of delivering a product. Charging for services is undesirable.
5. Extending resource value	Exploiting residual value of materials through sourcing and collecting demolition materials and selling them.	New collaborations needed to collect, store, sell and transfer materials.	- Value capture through selling otherwise wasted materials	Focus is on selling materials instead of reusing them.
6. Industrial symbiosis	Facilitating platforms where different parties can combine and share materials, resources and knowledge to develop integrative circular solutions in neighbourhoods.	New collaborative agreements and partnerships (e.g. with demolition companies/municipalities) by sharing communal services and exchanging materials, knowledge and by-products.	- Joint cost reductions - Reduced environmental impacts due to sharing and new circular solutions.	Focus is on exchanging attributes including knowledge and ideas, rather than focussing on sharing wasted outputs. Focus on solutions for recycling and reuse.
7. Outsourcing circularity	Specializing in offering affordable housing, outsourcing circularity to the supply chain where builders, demolition companies and energy companies reduce their impacts.	New and closer collaborations with suppliers and architects, by requiring circularity and reduced environmental impacts.	- Reduced environmental impacts due to reduced impacts of supply chain partners - Reduced costs due to innovative solutions	The housing association itself is not actively involved in circular activities.

of actors in the construction value chain. For instance, it was noted that bringing demolition materials to the market could cause clashes with demolition companies due to their current stake in these materials. Furthermore, this strategy may only lead to limited environmental gains due to transportation. Third, problems were indicated for the 'classic long-life' and 'encouraging sufficiency' strategies due to high initial costs and the inability to earn these back due to the undesirability of charging higher prices to low-income communities and balance sheet regulations. For instance, it was indicated that housing associations are not yet able to increase amortization periods for buildings on their balance sheets. Additionally, designing (modular) buildings with long life spans was argued to be difficult due to the complex design of houses. Furthermore, the 'encouraging sufficiency' strategy might be difficult for housing associations to execute as, since the housing act of 2015, they are required to focus on providing affordable and pleasant housing to low-income communities, limiting their ability to engage in activities such as coaching and providing sharing spaces.

The three remaining strategies only suffered from limited viability issues mostly referring to the challenge of collaborating with multiple stakeholders with different goals and balancing the demand and supply of materials. While the 'outsourcing circularity' strategy was seen as viable, it did not require the adoption of circularity by the housing association. Based on these outcomes, we decided to focus on the 'extending product value' and 'industrial symbiosis' strategies in the remainder of this research.

5.2. Relationships with communities in circular strategies

Figs. 3 and 4 show graphical representations of the key actors and relationships in the networks in which the 'extending product value' and 'industrial symbiosis' strategies would be situated. The figures show multiple anticipated relationships with communities and that there might not only be direct relationships between the housing association and its tenants. Other actors, such as second-hand shops, could also establish relationships with tenants. Furthermore, different community actors could be involved in the relationships, including other local residents, tenant associations, community interest groups and community centers. Relationships with these actors were argued to be important as they could allow the housing association to use existing social structures in circular strategies and create a broad social movement. Figs. 3 and 4 show the different types of anticipated relationships, including the transfer and exchange of (1) products and services, (2) cooperation, (3) knowledge and information, (4) influence and (5) enthusiasm.

The data showed that relationships with communities in the network were considered to be important as they could enable increased support for and success of the strategy:

If community members understand why we perform the strategy, they will be more likely to support it. Otherwise, there will be no cooperation and circular approaches are likely to fail (focus group, participant 5).

Community relationships could also enable the inclusion of community needs and perspectives within circular strategies:

Involving community members may enable the recognition of every day social practices and needs within circular approaches (tenant association, board member).

The data structure (appendix A) shows that there are different ways in which community relationships could be established

within the networks in which the circular strategies were situated. These include relationships in the vision formulation of the strategy, the activities involved in its execution, and the outcomes of the strategy. Relationships may operate in isolation, for instance, a community may only be linked to the vision formulation, or in two or more ways, up to full linkage, where communities are linked to the vision formulation, activities and outcomes of the strategy.

5.2.1. Relationships with communities in the vision formulation

First, community relationships could be established through their involvement in the vision formulation of the circular strategy. Such relationships refer to the transfer of information about the vision to communities and integration of community knowledge in the vision. It was for example mentioned for the 'extending product value' strategy that:

Low-income communities might have interesting knowledge on circularity and engage in reusing activities out of material poverty reasons. [...] We might be able to use this knowledge in our approach (focus group, participant 1).

Furthermore, community goals could be included in the vision, and could involve increased financial independence, participation, community cohesion, a cleaner and saver neighbourhood, and job opportunities. It was for instance mentioned for the 'industrial symbiosis' strategy that:

Every party can have another goal in the network, some ecological, some more social. [...] Maybe being circular is not our common goal but our way of working towards different goals (focus group, participant 5).

Involving the community in the vision formulation can assist housing associations in looking at the strategy from a different perspective, creating a feeling of ownership among community members for the strategy, and developing a strategy that fits community needs:

We can help indicate the circular potential of the neighbourhood. Maybe you think it would be beneficial to create a mobile phone app for sharing left-over materials, however we know that this might not connect to the needs of community members due to their limited use of apps and lack of knowledge about what to do with these materials (social team, district manager).

Multiple interviewees indicated the importance of setting clear guidelines and goals before involving the community in the vision formulation to ensure useful input and fulfilled expectations among community members. Involving communities in the vision formulation may be a long and intensive process, requiring careful interactions among diverse actors:

You have to invite community members and talk about their knowledge and ideas regarding circularity. However, this is not easy as there are diverse actors involved. Technicians may for example only see problems in the ideas of community members, and financial people may expect the ideas will make house designs unprofitable (municipality, senior policy officer).

5.2.2. Relationships with communities in the strategy activities

Second, relationships with communities could be established through their involvement in the activities involved in the

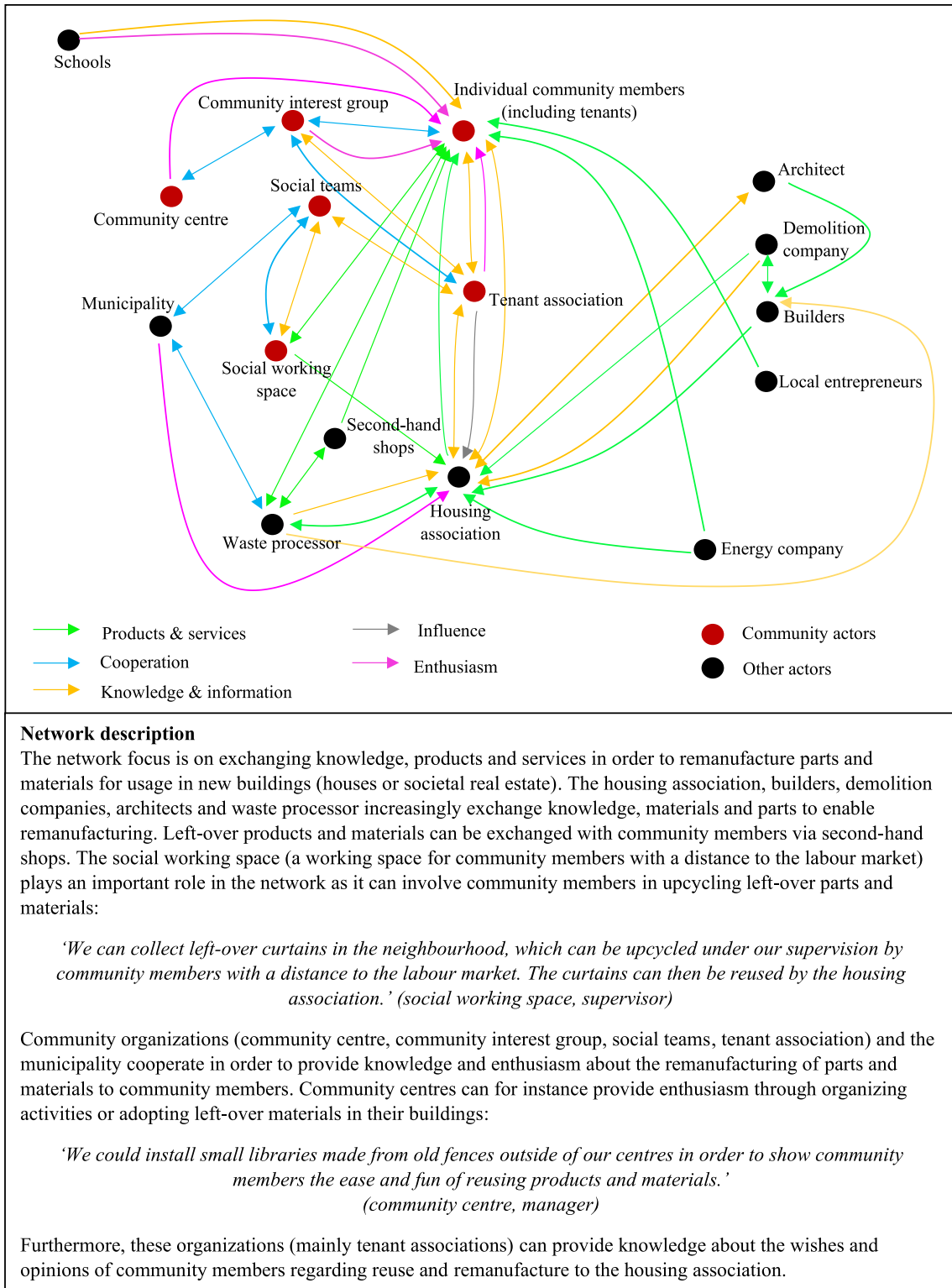


Fig. 3. The network for ‘extending product value’.

execution of the circular strategy, such as the performance of activities by communities within the strategy. For example, community organizations, such as tenant associations, can play a role in communicating how a strategy will operate in relation to a community, for example for the ‘industrial symbiosis’ strategy:

Tenant associations should be involved in the communication as they speak the language of the community, know how to address them and can get them enthusiastic about difficult topics such as circularity (focus group, participant 7).

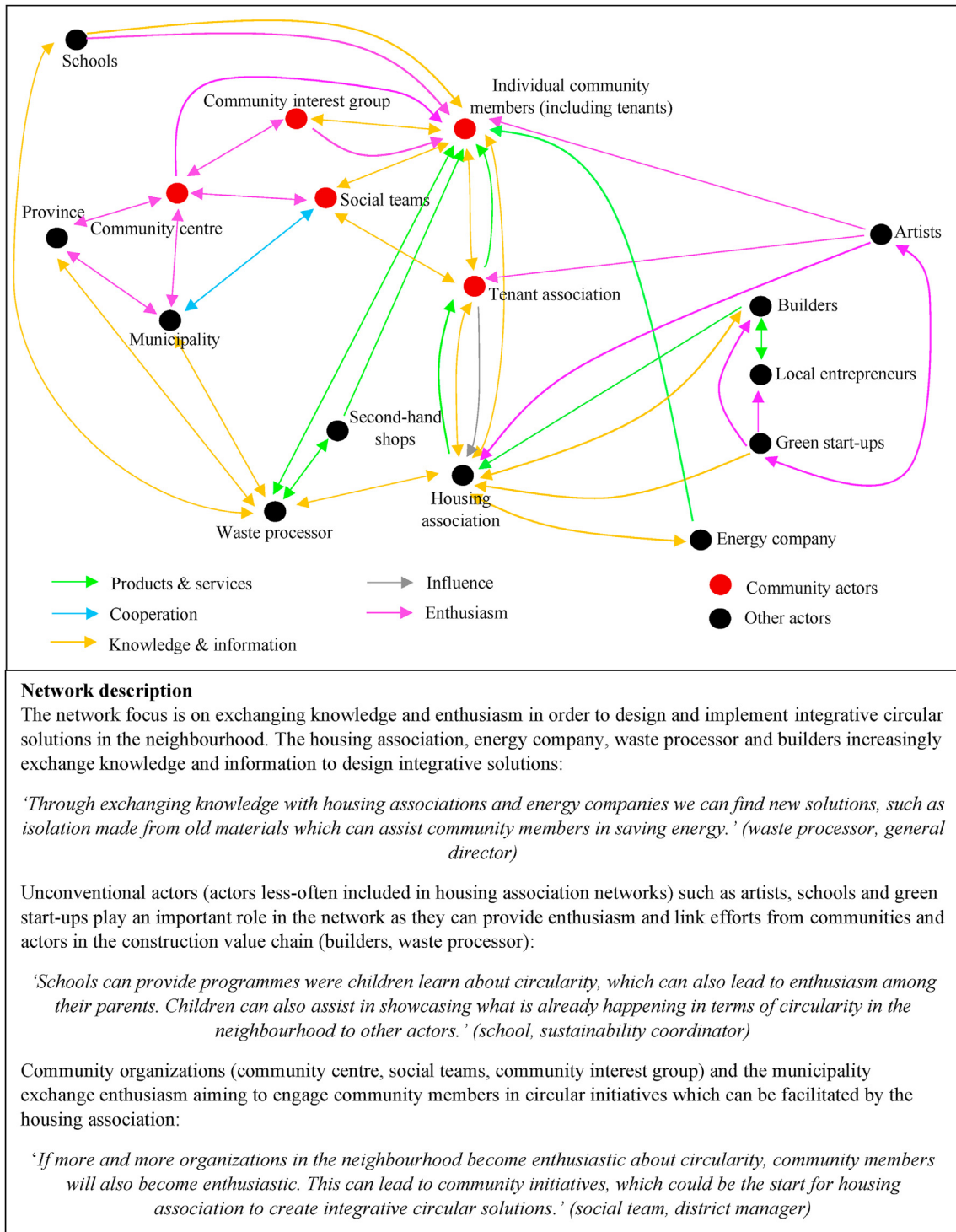


Fig. 4. The network for ‘industrial symbiosis’.

Furthermore, individual community members can perform activities within the circular strategy, such as upcycling left-over materials in cooperation with social working spaces. Housing associations can also actively cooperate with communities by transferring responsibility for these activities to communities. For example, it was mentioned by the director of the circular waste processor that, within the ‘extending product value’ strategy, community centers could be responsible for the collection of otherwise wasted materials, enabling them to find locally

appropriate methods in cooperation with other network actors. Involving communities in the strategy activities may increase the awareness of individual community members about their environment and the importance of circular approaches:

When we involve individuals in the upcycling of materials, they really start to think about the value of things. For example, what is the value of this left-over wood, and what can we do with it? This experience results in an increased awareness of their

environment and an increased willingness to recycle (social working space, supervisor).

Furthermore, involving community members in circular activities may make it easier for other community members to become involved also. However, several interviewees mentioned the difficulty of transferring small-scale community initiatives into a broader movement:

Focusing on community initiatives is very labor intensive as you only reach a very small group of people per initiative. We experienced that it is difficult to transform these initiatives in a long-term movement towards circularity (waste processor, general director).

5.2.3. Relationships with communities in the strategy outcomes

Third, relationships with communities could be established through their involvement in the outcomes of the circular strategy. This will likely involve the distribution of some gains of circular strategies to housing association tenants in the form of reduced living costs. It was for instance mentioned for the 'extending product value' strategy that:

Housing associations have to make sure the reuse of materials leads to a reduction in costs which can be translated into lower rental rates for low-income communities (municipality, senior policy officer).

Involving communities in the strategy outcomes – for example, ensuring communities benefit directly from the strategy – can increase the willingness of community members to cooperate in the strategy as circularity becomes connected to financial independence. However, it was also mentioned that focussing too much on reducing the living costs for low-income communities may be detrimental to the long-term benefits of the strategy:

If we continue to put short term financial incentives, in terms of the affordability of houses, on the first place, community members will not focus on long term affordability and the effects we have on our planet. We may give them a perfect circular house, but they may still spend all their gains in cheap, polluting shops (municipality, sustainability officer).

5.2.4. Relationships with communities in all parts of the strategy

Fourth, community relationships could be established in all parts of a circular strategy. Housing associations may base their strategic vision on community goals, involve communities in the strategy activities and distribute the gains of the strategy to the community, leading to a situation where the circular strategy is highly community oriented. It was for example noted for the 'extending product value' strategy that:

Strongly involving communities and their goals may lead to a new approach where the focus is no longer on extending the value of demolition materials, but on revaluing and reusing the talents of community members (community space, owner).

This may help housing associations to focus on community needs and perspectives within their circular strategies, but may also lead to a situation where there is less emphasis on the long-term environmental aims of these strategies:

I agree that we have to involve the community, however letting them decide about everything from A till Z might be too much. It may be a burden for them and limit our environmental achievements as the environment might not be the first concern of communities (focus group, participant 4).

5.2.5. No relationships with communities

Finally, it was mentioned that it might be beneficial not to establish relationships with communities, due to (1) a lack of understanding of and interest in circularity among communities, (2) the potential community burden of involvement, and (3) high costs involved in establishing relationships with communities. It was for example argued in the 'extending product value' strategy that:

We [the housing association] can design the ways in which we reuse materials. Communities should not have an influence, if their housing will get cheaper, they will be happy (focus group, participant 7).

The focus in this context would be on 'unburdening' communities and minimizing effects. Smart circular designs, which are not dependent upon the behavior of tenants, could increase efficiency and reduce the need to involve communities in circular strategies. However, most interviewees mentioned the importance of establishing community relationships to create benefits for communities and enable the design of locally acceptable circular strategies:

If you design a circular approach, but you do not connect it to the community, you can forget it. If you only see the objects without recognizing the people, you will miss a lot of the involved complexities. We may end up designing houses that are not desired by communities and therefore have a short lifetime, making neither us, the environment nor communities happy (municipality, senior policy officer).

6. Discussion

The aim of this study was to investigate how social housing associations can introduce circular strategies and integrate social elements, next to ecological elements, in these strategies. Our study contributes to the circular economy literature by highlighting different types of circular strategies that could be adopted by housing associations. The circular strategy options identified in the practice review were not very different from the original circular strategies (Bocken et al., 2016) and most did not extensively integrate social elements. Our study showed how this can be problematic. The case association voiced concerns about all of the identified strategies, including their potential negative impacts on low-income communities and limited expected success. Our study adds to the literature by highlighting the difficulty and confirming the importance of integrating social elements, next to ecological elements within the circular strategies of social housing associations.

Our study contributes to the circular economy literature by showing how social elements could be integrated within the circular strategies by establishing relationships with communities in the network. We identified how different types of relationships could be established with communities in the vision, activities and outcomes of circular strategies. Our results imply that these relationships can assist in integrating social elements in circular strategies as they can increase community support for, and the extent to which their perspectives are integrated into, the

ecological goals and processes of these strategies. However, our results also indicated that not all relationships with communities may be equally effective. Based on our findings, we designed a framework for the integration of social and ecological elements within circular strategies (Fig. 5). The x-axis represents the part of the circular strategy in which relationships with communities are established. The y-axis represents the integration of social and ecological elements within the circular strategy.

First, our case showed that by establishing relationships with communities only in the strategy outcomes, housing associations may increase community support for the circular strategy. This is caused by the potential benefit communities can achieve from the circular strategy, mostly referring to reduced living costs. However, this approach does not allow communities to provide input into the strategy. This can result in ecologically focused circular strategies as portrayed in situation 1 and 2 (Fig. 5) that suffer from limited community adoption, overlook synergies between social and ecological goals or are unable to achieve their ecological aims. Our case showed for instance that establishing relationships with communities in the strategy outcomes only, may increase the focus of community members on short-term financial gains, and not on long-term environmental benefits. This may result in rebound effects such as described in Zink and Geyer (2017).

Second, our case showed that, by creating relationships with communities in the vision formulation of, and activities involved in the execution of the circular strategy, housing associations can (1) allow communities to influence the ecological aims of circular strategies as community needs and perspectives can be included from the start and (2) increase incentives and concerns of communities for the ecological aims, as these can be more directly tied to local activities and community well-being. This can result in circular strategies that integrate social elements next to ecological elements as portrayed in situation 3 (Fig. 4). Our study highlighted

that situation 3 could, for example, occur when housing associations include community goals, such as a clean neighbourhood, in the strategy vision and involve community members in activities, for instance by giving them responsibility for finding the best waste-collection methods. However, our case also indicated that this might be a slow and challenging process for housing associations due to the diverse actors and perspectives involved.

Third, our case indicated that by creating relationships with communities in all parts of the circular strategy, housing associations can give community members the ability to influence the ecological goals and processes of these strategies. However, a high level of community influence in all parts of the strategy may mean the strategy is increasingly community goal orientated. This may negatively impact a community's incentives to engage with ecological aspects to the detriment of the ecological aims (Jodha, 1998). In this situation, social elements take over the strategy, as portrayed in situation 4 and 5 (Fig. 4). Our case study indicated that situation 5 could, for example, occur when housing associations adopt the 'extending product value' strategy, focussing on community goals, such as revaluing community member talents. Establishing relationships with communities in all parts of the strategy does not necessarily have to lead to this situation when housing associations are able to create synergies between social and ecological elements. This could for instance be achieved when community goals, such as revaluing community member talents, are directly linked to environmental activities, such as the upcycling of materials.

Our framework adds to the literature by highlighting the importance, and potential nature of relationships with communities in the network for the integration of social elements, next to ecological elements, within circular strategies. Furthermore, our results indicate that different types of relationships with communities can have different effects. In the circular economy literature,

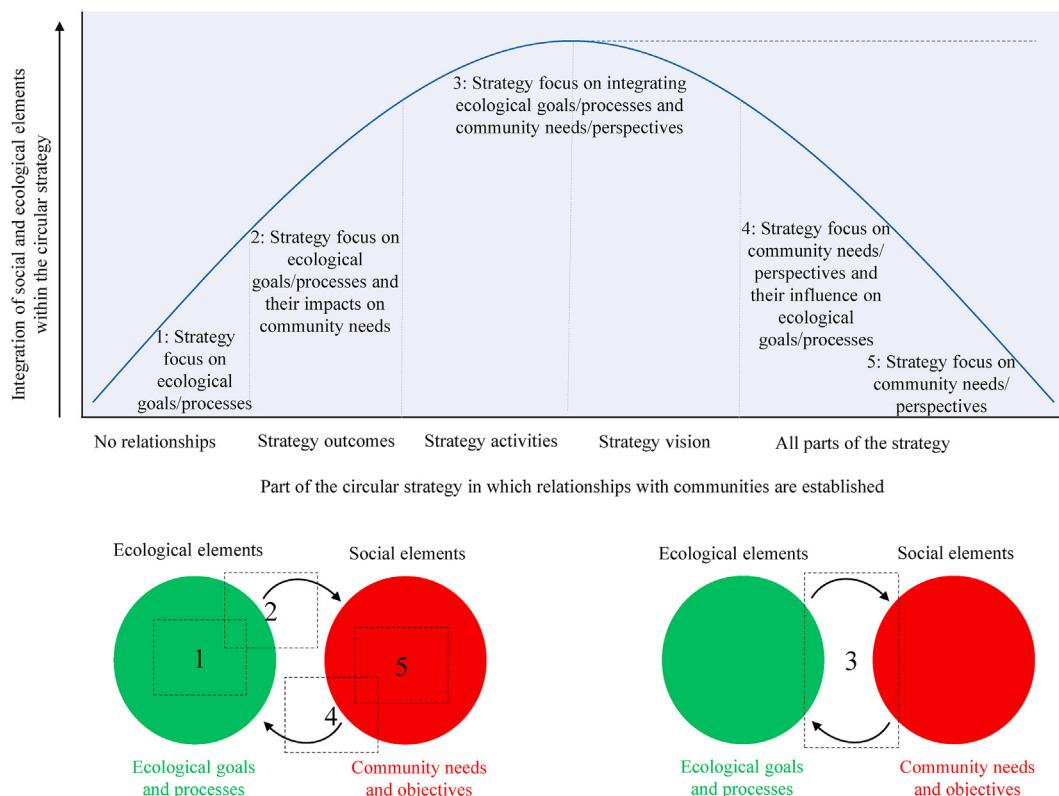


Fig. 5. The integration of social and ecological elements in circular strategies.

communities are often excluded or only included in the outcomes of circular strategies (in terms of impacts on social equity and employment) as portrayed in situation 1 and 2 (Kirchherr et al., 2017). Our study adds to the circular economy literature by showing that this is problematic as it can lead to rebound effects and limit environmental or social benefits (Millar et al., 2019). Our research also shows the danger of focussing too much on community needs and objectives - which can be detrimental to long-term ecological outcomes - highlighting the importance of balancing social and ecological goals, and showing the potentially fine line between generating synergies or conflicts between goals. Additionally, our results highlight the importance of creating relationships with communities in the vision formulation and activities involved in the execution of circular strategies. In this way, synergies between the ecological aims of circular strategies and the needs and perspectives of communities can be created.

6.1. Limitations and future research

There were limitations within this study, which point to areas for future research. First, this was a single exploratory case study. Therefore, the results are likely to be context specific. However, our findings are likely to be relevant beyond other housing associations, as the circular economy spreads into different sectors, circular strategies will increasingly require the consideration of a multitude of social elements (Geissdoerfer et al., 2017). Our case study provides valuable insights as it focusses on a context which requires increased attention to social elements. Future research is necessary to address other contexts, including other countries and cultures, as these may influence the formation and outcomes of relationships with communities within circular strategies. For example, in countries with more collectivist cultures, or traditions of community organising, it may be easier to reach a broader group of community members by involving communities in the strategy activities, such as through community initiatives.

Second, due to the limited adoption of circular strategies within housing associations this research focussed on two potential strategies only. We were unable to analyze the differences in establishing relationships with communities in different types of circular strategies, for instance, in strategies focussed on assets compared to those focussed on services. Future research should investigate these differences. Furthermore, due to our focus on the strategic level we were not able to explore the position and power of tenants at the level of single housing complexes. The importance of community support may for instance be intensified when circular strategies are applied at the level of single housing complexes where residents' committees are actively involved in decision-making about maintenance and renovation. Therefore, future research is needed to investigate the role and power of individual tenants and residents' committees in circular strategies at the level of single housing complexes.

Third, integrating community needs and perspectives within the ecological focus of circular strategies may be difficult due to conflicting needs and interests among the involved actors. Our case showed for instance that community members may focus more on the short-term financial gains of the circular strategy, while other actors may focus more on long-term environmental outcomes. However, our study also showed that synergistic interests and needs can exist. Further research is needed to explore the conditions under which synergistic interests and needs, instead of conflicts, exist among different actors, as our study only scratched the surface of the complexities of this issue. For instance, future research could explore the process by which common interests among the different actors involved in circular strategies are established. Furthermore, future research is needed to investigate

the two-way interactions in further detail, including investigating how these interactions evolve over time. Future research is also needed to explore the integration of broader social elements within circular strategies, as our study mainly focussed on community perspectives and needs. Finally, research could investigate the social impacts of circular strategies and community involvement within these strategies.

7. Conclusion

This paper highlighted a case of exemplar circular strategies within the context of a social housing association. Based on the results, this paper concluded that social elements can be integrated within circular strategies through the creation of relationships with communities in the networks in which these strategies are situated. Such relationships, especially those established in the vision formulation and the activities involved in the execution of the strategy, enable communities to adapt the ecologically oriented circular strategies to their needs and perspectives, and increase community support for the ecological aims of these strategies. Establishing such relationships with communities may be complex and costly, requiring careful interactions among a diverse set of actors. However, if housing associations ignore this complexity, they may end up missing important social elements leading to high costs in later stages and circular strategies that are unable to achieve long-term environmental benefits.

CRediT authorship contribution statement

Manon Eikelenboom: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Thomas B. Long:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Supervision. **Gjalt de Jong:** Conceptualization, Writing - review & editing, Supervision, Project administration.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: This paper is the product of a PhD studentship funded by the University of Groningen and the case organization.

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Appendix A. Supplementary data

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