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Scaling Circular Collaborations in Cities through Engagement

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Abstract: Circular economy has gained traction within companies resulting in many exploring new product and business model combinations. Yet, to transition towards a circular economy on a societal level requires going beyond new product and market-based opportunities. To enable societal level change, ecosystem-level innovations are important and so collaboration plays a key role. Cities are considered in this paper as hubs of innovation playing a key role in transitioning to a circular economy. They are responsible for 80% of global resource consumption, with a high concentration of capital, data and talent spread over a relatively small geographic area; making them an important part of societal level transitions. The current work stresses the need to understand and support collaborations in transitioning towards a circular economy. This paper explores what factors influence collaborations and how organizations collaborate for a circular economy in the context of cities. An initial literature review resulted in a framework for exploration, which informed the set-up of the questionnaire. This helped in conducting semi-structured interviews with people ranging from founders, designers to engineers from six circular start-ups, which operate and utilize the resources in cities; to understand how different organisations collaborate in cities. Results showed they focus on operationalizing their innovation through engagement with various stakeholders. As they increased their visibility in cities showcasing their value, increasing the ways and number of engagements, the organisation engaged with people and organisations having similar values and grew by scaling through engagement. This paper elaborates the idea of scaling through engagement as a way for circular organisations to scale.

Introduction

Many countries have created nationally determined targets to tackle climate change. The current trajectory and goals alone, are not enough to reach the targets (UNEP, 2020). A large part of the emissions is due to material handling and use. To tackle this we need to adopt a circular economy that helps to reach the global target well below two degrees (The circularity gap report, 2021; Liu & Raftery, 2021). A circular economy takes a systemic approach to tackle sustainability, requiring changes at many different levels. But much of the focus has been related to product and business model innovations. To move circularity beyond new market explorations to societal level transitions, ecosystem-level innovations are important. A key differentiating factor for ecosystem-level innovations is collaboration. Cities also play a key role in this transition from a linear to a circular economy, containing 55% of the population and 80% of the global resources (Ritchie & Roser, 2018). They are places of abundant resources worth harnessing and stakeholders geographically close enough to aid collaboration, which could

help close the resource loop (Morlett, 2014; Li, 2015).

Literature Review

Circular Oriented Innovation

Circular Oriented Innovation (COI) is a problem-centric innovation process that combines design, business model and ecosystem strategies to narrow, slow, close and regenerate resource flows (Brown et al., 2019; Bocken et al., 2016; Konietzko et al., 2020; Geissdoerfer et al., 2017; Braungart & McDonough, 2009). Yet, most research into circular-oriented innovation takes a product or business model perspective (Konietzko et al., 2020). The ecosystem perspective is underdeveloped, however, it is important to achieve higher levels of circularity.

Ecosystem Innovation

Ecosystems comprise any set of actors that contribute to a collective outcome (Jacobides et al., 2018; Talmar et al., 2018). Ecosystem

innovation is where many different actors collaborate towards a collective outcome in a

dynamic environment. In a dynamic environment, successful collaborations are the ones adapting to emergent factors (Clarke & Fuller, 2010; Majchrzak et al., 2014).

A key characteristic of ecosystem innovation is inter-organizational collaboration (Jacobides et al., 2018; Fuller et al., 2019). Brown et al. (2019) investigated why circular organizations collaborate by assessing the barriers and drivers faced by different organizations and related them back to the hard (market and technical) and soft (social and institutional) aspects. How can collaborations change over time is under-investigated within the circular economy. Information from initiation to implementation on how companies collaborate throughout the entire process can offer insights into the effectiveness of current collaborative processes and agreements with the aim to propose normative changes to stimulate increased radical COI activities (Brown et al., 2020).

Cities and circular economy

Cities are considered key environments for the emergence of innovative interactions and relationships. Creative and innovative industries tend to localize in the proximity of urban environments, thus taking advantage of shared knowledge and density of specialised and potential customers, suppliers, designers, experts and workers to create new tools, technologies, methods, instruments, products, processes, policies and services (Concilio et al., 2019). They offer an ideal environment with proximity, density, and variety for innovation to take place (Athey et al., 2008). Cities face urgent needs to expand and advance circular economy adoption and sustainability-oriented practices due to growing concerns over climate change, environmental pollution, and the inequitable distribution and allocation of resources in the linear economy (Nogueira et al., 2020). Cities also present unique opportunities for circular economy interventions as they are places where human populations are concentrated and where multiple natural (ecological) and man-made (social and technical) systems intersect, (Markolf et al., 2018). Cities are ecosystems where external emergent factors influence circular

organizations. The emergent factors could also influence the collaboration that takes place in cities, and when it comes to collaboration those who adapt to these emergent factors are the ones that are successful in the long term (Majchrzak et al., 2014).

The previous work indicates a lack of knowledge on how collaborations for a circular economy change over time, especially in cities, and how external emergent factors in cities affect the organizations. The initial literature revealed the following questions for further exploration:

- How are the barriers and drivers of collaboration for circular organizations in cities distributed across a timeline?
- How do the various levels of involvement of the stakeholders in a circular-oriented project change across a timeline?
- How do the external factors in cities influence circular organizations and their potential collaborations?

Method

To explore the three primary research questions a set of interviews have been conducted. The interviews were semi-structured to give the interviewer the freedom to add or adapt questions if necessary (Patton, 2016). Furthermore, semi-structured interviews give the opportunity to gain reflective knowledge and at the same time ongoing information about the research topic (Gioia et al., 2013). The focus of the questions was guided by the four subtopics in the interview guide; barriers and drivers of collaboration; level of collaboration; responsibilities in collaborations; and emergent factors influence on the organisations in the city. Several questions under each topic guided the semi-structured interviews.

Semi-structured interviews were conducted with members of six circular start-ups, which operate and utilize the resources in cities (Table 1). The reason for the selection of the interviewees was organisational knowledge and experience. The interviews were conducted with one member from each organization.

Research framework

A framework was designed based on the research questions framed at the end of the

<i>Participant Number</i>	<i>Organisation description</i>	<i>Role in the organisation</i>	<i>Interview time</i>
1	Intends to use electrical barges in the city for a better recycling process.	Researcher/Strategist	66min
2	Intends to create circular furniture through up-cycling practices	Founder	70min
3	Intends to regenerate plastic waste into various different plastic artefacts	Founder	45min
4	Intends to regenerate plastic waste into a brick for creating houses in developing nations. The bricks could be reused again.	Partner	50min
5	Intends to create knowledge for plastic recycling and creating plastic artefacts for alternate purposes.	Team member / Product Designer	90min
6	Intends to promote sharing of toys between students in schools through use of a product made from old cut down trees in the city	Co-Founder	72min

Table 1. Organisation and interviewee description.

literature review. This framework was used to guide the conversation and was a research tool to help the interviewee reflect on activities across a timeline, corresponding barriers, drivers, types of partners, and external influences in the project. The interviews were conducted online with a digital tool (the online whiteboard: Miro) as a platform where the research framework was used as a guiding material.

Data Analysis

A systems thinking approach was chosen to analyse and synthesise the information, as there are multiple different actors (individual consumer, organization, a network of organizations, and cities) who are present across many different levels of exploration (individual needs, organizational goals, and aspirations of cities). Systems thinking expands its view and focuses on how the parts interact, instead of isolating and studying smaller parts of the system (Aronson, 1996). It also helps in understanding open problems, where multiple causes and phenomena are occurring at the same time. Similarly, this study tends to understand how the various parts in a circular system in cities collaborate with each other and what this means for the system as a whole.

The interviews were audio-recorded and an online tool (Transcription tool: otter.ai) was

used for transcription. A second round of validation of the transcripts was done by listening back to the interviews by the primary author.

Various tools from systems thinking were utilized in the analysis and synthesis of the data. Initially, feedback loops (Williams & Hummelbrunner, 2009) were identified from individual events from the transcribed interviews. Relations between the feedback loops were used to form a system map ("Systems practice," 2017). Based on the system map, various larger insights were gathered. These insights were then synthesized using the iceberg model (Goodman, 2016) and segregated into events, behaviour patterns, underlying structure and mental models to understand how they interact with each other.

Results

Results are described following the various levels in the iceberg model (Figure 1).

Customers are collaborators

Customers sometimes start as collaborators. They then take an active role in shaping the collaboration and end result together. Customers are not customers anymore but collaborators of the organization. The organisations try to co-create with the various

customers on the end result they are trying to contribute towards.

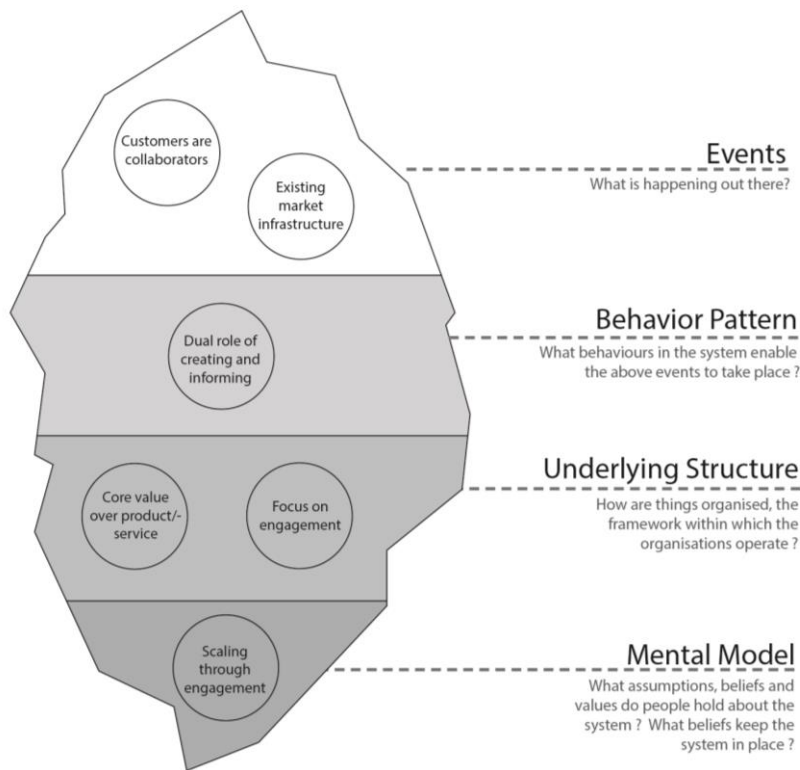


Figure 1. Iceberg model, showcasing interaction between different results.

“...Is he is our partner or customer and in this case, so in this case this is is that but we are a mixwe are building together the experience ...” [Participant 2]

Changes in market infrastructure

When circular organisations make a product/service it is not possible for them to sell in the existing market infrastructure. The existing market is made for linear products and selling of circular products is not possible through regular distribution means.

"I have a client who sells all over the world in international.....But if I sold him this product (upcycled circular furniture), he will think that I am mad....this kind of companies. The regular companies in are very traditional " [Participant 2].

These organisations then tend to find/create different mediums of selling their products than using the existing market infrastructure.

" ...And we started a (online)bazar to buy and sell the (organisations) items... " [Participant 5]

Dual role of creating and informing

The organizations are engaging collaborators in two different ways, in terms of informing them and creating something for them. *Creating* relates to organizations developing artefacts that directly contribute to a circular economy. (Eg. Creating a recycled phone case). In the case of *informing*, organizations are informing for behaviour change in the people they are collaborating with and informing their collaborators as to how they can actively participate towards a circular future, beyond the base product/service offering (Eg. Enabling other people to create a recycled phone case). The level of informing and creating varied across organisations, but in almost all cases organisations performed both roles.

“...these were these were not sort of the technical developments. So not the machines but things around machines. And then we also wanted to grow sort of the platform. You know,

we launched like a map to find people in your area, too..." [Participant 5]

Core value over product/service

On the surface level, it might seem like the organisations are selling a product/ service. But the organisations were much more focused on their core purpose. For the organizations, it is not a great product/service that they are trying to sell but rather a value. (E.g. the values of sustainability, sharing...)

" ...So I think that's sort of the deeper layer I think the sharing is, is just a means to accomplish it. And the display itself is also just a means to this bigger goal of making sharing normal.... " [Participant 3]

It is also true for the people who use the product/service of the organization where the core value overcomes the importance of the product.

" ..So always give them a card with and they say wine or beer was in the barrel before?! So they know and yeah, people just love that story... " [Participant 3]

Focus on engagement

As the organizations are trying to sell value and not a product, engagement with the various people they are involved with becomes a crucial part. The organisations tend to actively engage the people more than just using their product/ service. They try to involve the customers in more than one way and create possibilities in which people can contribute towards the core value they are offering.

"....Yeah, these could be bought off machines that were difficult to find or things that were made from recycled plastic.....it was more of a complete package. Also, like more background information on plastics,..." [Participant 5]

Discussion

Scaling through Engagement

When we look at the mental model level from the iceberg model, we can start to understand

why we get the above results. The organisations are trying to change the linear model of growth via taking, making and disposing, which can be argued as wasting more. However, if circular start-ups are changing from this model of growth, how are they growing and scaling in a circular economy? The answer comes down to engagement. They are scaling through engagement with the various collaborators that are part of the organisation. Engagement can be just another activity — whereas scaling through engagement represents a mindset for growth based on engagement.

When we look at what these organisations do to scale through engagement, we observed the dual role of creating and informing as a key part. When the organisations perform the dual role, they grow by increasing the number of engagements and increasing the ways of engagement. When they increase the number of engagements, they create multiple ways which enable people to easily engage with the organisation and contribute towards the organisation's core values. For example, a plastic recycling and production company could create open-source 3D print models for recycled plastic, so that more people can create and print themselves a solution.

When they increase ways of engagement, they increase the number of ways in which a particular collaborator is involved in the project. This could mean, for example, expanding the number of products or services to include people in different ways with the organization. To illustrate this further, a plastic recycling company can provide one product to easily segregate plastic and in another service where they are able to easily shred the segregated plastic.

Cities as enablers for innovation

From our observations, cities provided the proximity for the organizations to identify new partners, density for a continuous supply of materials and variety so that the organizations were able to change their ways of engagement accordingly as needed. Cities acted as an innovation hub providing the necessary soft (policies, networks) and hard infrastructures (workspaces, housing, funding, buildings) for the organizations. It is also important to notice the open nature of cities for allowing such activities and engagements to take place. It is

due to the openness of the cities and its supporting structures within which these engagements are enabled.

In future studies, the specific role of infrastructures in cities on circular organisations and how they can influence the organisations can be explored. This project used retrospective studies to understand how organisations innovate across a timeline in cities. Yet engaging, longitudinal studies could uncover further insights into how these collaborations happen.

Conclusion

The aim of this study was to gain an understanding of how circular organisations in cities collaborate for a circular economy. The study of six circular start-ups in cities provided insights into the role of customers as collaborators, how the market infrastructure influences them and how the organisations react to the events by performing a dual role of *creating* and *informing*, and a focus on engagement. We also discussed how circular organisations can scale through engagement and collaboration.

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References

Aronson, D. (1996). Overview of Systems Thinking. <http://www.stefanibardin.net/wp-content/uploads/2017/01/Overview-of-Systems-Thinking.pdf>

Athey, G., Nathan, M., Webber, C., & Mahroum, S. (2008). Innovation and the city. *Innovation*, 10(2–3), 156–169. <https://doi.org/10.5172/impp.453.10.2.3.156>

Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308–

320. <https://doi.org/10.1080/21681015.2016.1172124>

Braungart, M., & McDonough, W. (2009). *Cradle to cradle*. Vintage.

Brown, P., Bocken, N., & Balkenende, R. (2019). Why Do Companies Pursue Collaborative Circular Oriented Innovation? *Sustainability*, 11(3), 635. <https://doi.org/10.3390/su11030635>

Brown, P., Bocken, N., & Balkenende, R. (2020). How Do Companies Collaborate for Circular Oriented Innovation? *Sustainability*, 12(4), 1648. <https://doi.org/10.3390/su12041648>

Clarke, A., & Fuller, M. (2010). Collaborative Strategic Management: Strategy Formulation and Implementation by Multi-Organizational CrossSector Social Partnerships. *Journal of Business Ethics*, 94(1), 85–101. <https://doi.org/10.1007/s10551-011-0781-5>

Concilio, G., Li, C., Rausell, P., & Tosoni, I. (2018). Cities as Enablers of Innovation. *Innovation Capacity and the City*, 43–60. https://doi.org/10.1007/978-3-030-00123-0_3

EMF (2015). *Growth within: a Circular Economy Vision for a Competitive Europe*, vol.100. <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundationGrowthWithinJuly15.pdf>

Fuller, J., Jacobides, M., & Reves, M. (2019, February 25). *The Myths and Realities of Business Ecosystems*. MIT Sloan Management Review. <https://sloanreview.mit.edu/article/the-myths-and-realities-of-business-ecosystems/>

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking Qualitative Rigor in Inductive Research. *Organizational Research Methods*, 16(1), 15–31. <https://doi.org/10.1177/1094428112452151>

Goodman, M. (2016, August 16). *Systems Thinking: What, Why, When, Where, and How? - The Systems Thinker*. The Systems Thinker. <https://thesystemsthinker.com/systems-thinking-what-why-when-where-and-how/>

Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, 39(8), 2255–2276. <https://doi.org/10.1002/smj.2904>

Konietzko, J., Bocken, N., & Hultink, E. J. (2020). A Tool to Analyze, Ideate and Develop Circular Innovation Ecosystems. *Sustainability*, 12(1), 417. <https://doi.org/10.3390/su12010417>

Li, J. (2015). Wastes could be resources and cities could be mines. *Waste Management & Research*, 33(4), 301–302. <https://doi.org/10.1177/0734242x15581268>

Liu, P. R., & Raftery, A. E. (2021). Country-based rate of emissions reductions should increase by 80% beyond nationally determined contributions to meet the 2 °C target. *Communications Earth &*

- Environment, 2(1). <https://doi.org/10.1038/s43247-021-00097-8>
- Majchrzak, A., Jarvenpaa, S. L., & Bagherzadeh, M. (2014). A Review of Interorganizational Collaboration Dynamics. *Journal of Management*, 41(5), 1338–1360. <https://doi.org/10.1177/0149206314563399>
- Markolf, S. A., Chester, M. V., Eisenberg, D. A., Iwaniec, D. M., Davidson, C. I., Zimmerman, R., Miller, T. R., Ruddell, B. L., & Chang, H. (2018). Interdependent Infrastructure as Linked Social, Ecological, and Technological Systems (SETs) to Address Lock-in and Enhance Resilience. *Earth's Future*, 6(12), 1638–1659. <https://doi.org/10.1029/2018ef000926>
- Morlett, A., 2014. Cities as the front-runners of circular economy. *London Infrastruct. Plan – Circ. Econ. Present*
- Nogueira, A., Ashton, W., Teixeira, C., Lyon, E., & Pereira, J. (2020). Infrastructuring the Circular Economy. *Energies*, 13(7), 1805. <https://doi.org/10.3390/en13071805>
- Patton, M. Q. (2002). Two Decades of Developments in Qualitative Inquiry. *Qualitative Social Work*, 1(3), 261–283. <https://doi.org/10.1177/1473325002001003636>
- Ritchie, H., & Roser, M. (2018). Urbanization. *Our World in Data*. <https://ourworldindata.org/urbanization>
- Systems practice. (2017). In Omidyar Group. <https://oecd-opsi.org/toolkits/systems-practice-workbook/>
- Talmar, M., Walrave, B., Podoyntsyna, K. S., Holmström, J., & Romme, A. G. L. (2020). Mapping, analyzing and designing innovation ecosystems: The Ecosystem Pie Model. *Long Range Planning*, 53(4), 101850. <https://doi.org/10.1016/j.lrp.2018.09.002>
- The circularity gap report*. (2021). Circle economy. <https://www.circularity-gap.world/2021>
- UNEP (2020). UNEP, Emissions Gap Report 2020. <https://www.unep.org/emissions-gap-report-2020>
- Williams, B., & Hummelbrunner, R. (2009). *Systems concepts in action: a practitioner's toolkit*. Stanford Business Books.