

The Emerging Landscape of Urban Upcycling: identifying manifestations in a city context

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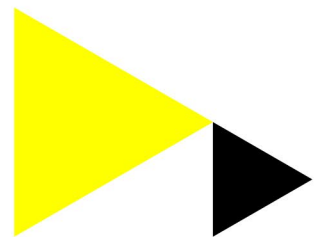
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Editors Kirsi Niinimäki and Kirsti Cura,
Aalto University



PLATE

Product Lifetimes
And The Environment

PROCEEDINGS

5th PLATE Conference
Espoo, Finland

31 May – 2 June
2023



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PLATE2023

**The 5th Product Lifetimes and the Environment Conference in
Aalto University, Espoo, Finland, 31 May – 2 June, 2023**

The 5th international PLATE conference (Product Lifetimes and the Environment) addressed product lifetimes in the context of sustainability. The PLATE conference, which has been running since 2015, has successfully been able to establish a solid network of researchers around its core theme. The topic has come to the forefront of current (political, scientific & societal) debates due to its interconnectedness with a number of recent prominent movements, such as the circular economy, eco-design and collaborative consumption. For the 2023 edition of the conference, we encouraged researchers to propose how to extend, widen or critically re-construct thematic sessions for the PLATE conference, and the paper call was constructed based on these proposals. In this 5th PLATE conference, we had 171 paper presentations and 238 participants from 14 different countries. Beside of paper sessions we organized workshops and REPAIR exhibitions.

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The Emerging Landscape of Urban Upcycling: identifying manifestations in a city context

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Keywords: Upcycling; Circular Cities; Solid Waste Management; Furniture.

Abstract: Upcycling has been embraced by circular economy enthusiasts, policy-makers and collaborative initiatives across Europe. Early studies describe upcycling as a concept aimed at resource conservation by keeping products, components and materials at their highest potential value across consecutive product lifecycles, with zero-negative or even potential positive impact on the natural environment. Similarly, more recent literature on the circular economy views upcycling as a strategy to slow and close resource cycles through product life-extension approaches, such as reuse, repair, refurbishment, remanufacturing and repurpose. With growing environmental concerns, upcycling has become a re-emerging theme in literature and practice. Cities offer opportunities for an increasing number of upcycling initiatives, but little is known about what manifestations of upcycling occur specifically in urban areas or how these urban upcycling initiatives emerge. For example, so-called Urban Resource Centers seek to tackle challenges in urban solid waste management by encouraging entrepreneurs to create value from local waste streams. Therefore, our objective is to address this literature gap and explore manifestations of upcycling in a city context by means of qualitative research, following a case-study approach based on data collected from research archives and 17 preliminary interviews with entrepreneurs and experts in urban upcycling of furniture and interior design products.

This study contributes to a structured overview of urban upcycling initiatives and the internal and external factors that drive entrepreneurial initiatives and development. Future work will build on this study to make urban upcycling initiatives more widespread and impactful to deliver on their environmental and social goals.

Introduction

In the face of climate concerns and increasing levels of waste, upcycling is becoming an ever more important theme (Cooper, 2021; Sung et al., 2019; Singh, 2022). In this section we first introduce the concept of upcycling, next we explore upcycling in an urban context and finally we zoom in on upcycling in the furniture industry.

What is upcycling?

Definitions, benefits, and various types of upcycling have been explored and identified in a structured literature review by Sung (2015), who observes that scholars have struggled with a proliferation of definitions of upcycling and proposes that upcycling aims at creating or modifying products from waste to products of higher quality or value. However, other scholars propose more broader definitions of upcycling and suggest that upcycling processes,

strategies and principles can also aim towards maintaining value, for example by prolonged usage, and consider adding new intangible elements, such as functionality or services, also as a means for upcycling (Luedeke-Freund et al., 2018; EMF 2012; Braungart et al., 2007).

Whether an activity can be called upcycling or downcycling depends on the resulting value and quality after modification of waste resources (Sung, 2015; Sung et al., 2019; Luedeke-Freund et al., 2018). For example, recycling is generally associated with sustainability by the public and is getting more attention in literature, but it is often not the most preferred circular strategy as it still requires significant energy inputs and leads to degrading material quality (Allwood, 2014). Therefore, in most cases, recycling is downcycling.

Industrial upcycling was introduced in sustainable industrial design literature by

Braungart and McDonough (2007) and further popularized through best-selling business publications, design tools and documentaries advocating the cradle-to-cradle principle. Cradle-to-cradle uses nature as a metaphor to advocate that all industrial material should be re-used at its highest potential value and that toxic waste material should be designed out or kept separated from the natural environment in closed loops (Braungart & McDonough, 2007). The cascaded re-use of human-made material and the separation between the technical cycle and the biological cycle were introduced as key principles for the circular economy (MacArthur, 2013) and the cradle-to-cradle principle was positioned in literature as an example of create-value-from-waste sustainable business model archetype, along other related concepts, such as circular economy, industrial symbioses and recycling (Bocken et al., 2014).

On the other hand, humans have been creating new objects from previously used material for thousands of years. This type of upcycling, which is referred to as 'individual upcycling' and often entail individual creative or small-scale entrepreneurial initiatives, may even have more benefits and higher potential sustainable impact than industrial upcycling but has gained relatively little attention in literature (Sung, 2015; Singh et al., 2019).

Urban upcycling

The city provides important context conditions required to face major challenges in a transition to a circular economy (Prendeville et al, 2018; Barbero & Pallaro, 2018; Arsova et al., 2022). At present 55% of the world population live in cities and this number is expected to grow to 68% by 2050 (UN Habitat, 2022). This unprecedented growth of metropolitan regions, which often extend beyond national governmental and geographic boundaries, offer opportunities for developing and scaling up circular initiatives (van Winden van et al., 2017; Prendeville et al., 2018; Raven et al., 2011). As city research has been focusing more on energy and recycling by urban mining, which mostly entails downcycling (Arora et al., 2020; Gutberlet, 2015; Brunner, 2011), this has left an interesting research gap for urban upcycling.

Although urban regions only cover 2% of the global surface, cities are important and fast-growing clusters of human activity that account

for 70-75% of global resource consumption, 50% of global garbage generation and 80% of global energy usage. (Birgovan et al., 2022; Prendeville et al., 2018). On average, cities produce 76% of global emissions, but if imported consumption-based goods and services are taken into account, carbon emissions for cities in industrialized countries are much higher (Sung et al., 2019).

This cross-national fast-growing concentration of consumption, waste generation and energy usage will increase organizational and environmental challenges for urban solid waste streams but may also create new opportunities for accelerating and scaling up upcycling initiatives. Therefore, urban areas provide an important space for action.

Upcycling in the furniture industry

Furniture and interior design products constitute an important urban waste stream accounting for nearly 50% of total solid waste in European cities with a total of 10 million tons annually, largely consisting of wood. Although wood is recyclable material and also relatively easy to upcycle, 90% of the furniture waste stream is going straight to landfill or incineration (Cooper et al., 2021). Its significance in the volume of urban solid waste streams, its financial and environmental impact on urban waste systems and its potential opportunities for creating multiple value in an urban context makes furniture waste streams particularly interesting for studying urban upcycling.

Research on upcycling has largely focused on environmental and financial opportunities and technical feasibility of industrial upcycling, particularly in promising sectors such as the wood, textile, and plastics industry (Singh et al., 2019; Malé-Alemay et al., 2022; Zhao et al., 2022). However, social benefits, financial feasibility and marketability of upcycling have been scarcely explored (Sung, 2015).

As furniture consists of durable products that are technologically not very complex and accounts for a large portion of cities bulky waste, the furniture industry is a promising but under-researched sector (Cooper et al., 2019; Singh et al., 2019).

Method

This study aims to identify and scope preliminary manifestations of upcycling in an urban context by studying internal and external drivers to engage in entrepreneurial upcycling initiatives connected to urban waste streams and/or urban stakeholders.

Adapted from a combination of definitions of upcycling and urban initiatives in literature (Sung et al., 2019; Luedeke-Freund et al., 2018; Prendeville et al., 2018), we define an urban upcycling initiative as *a new plan or action aimed at re-using or converting discarded products, components or materials into something of higher value, functionality and/or quality in their second life in partnership with the city's stakeholders (citizens, community, business and knowledge stakeholders).*

As this study is exploratory of nature, we used a qualitative case study approach (Yin et al., 2013) building on interviews with practitioners who are engaged in urban upcycling initiatives. The interviewees listed in Table 1 were selected by means of purposive sampling (Bryman et al., 2011) based on their engagement in initiating and developing urban upcycling initiatives. We applied three additional sampling criteria in order to assure diversity and a broad scope of perspectives. Firstly by including the perspectives of entrepreneurs as well as expert practitioners from local authorities and practitioners in urban waste management. Secondly by interviewing entrepreneurs from business-to-consumer (B2C) as well as business-to-business (B2B) initiatives. And finally by including initiatives that offer tangible products as well as services-focused organizations.

Table 1. List of interviewees.

nr	Interviewee	B2C/B2B	Product/Service
1	Commercial director - furniture refurbishment company	Both	Both
2	Senior account manager - Waste management company	B2B	Service
3	Sustainability manager - Interior project producer	B2B	Product

4	Manager Innovation - Office furniture manufacturer	B2B	Product
5	Owner/Director - Waste management company	B2B	Service
6	Founder - Furniture design company	Both	Product
7	Co-founder - Architecture & interior design office	B2B	Service
8	Owner & senior designer - Interior products design studio	B2C	Product
9	Director - DIY store & production studio	B2C	Both
10	Creative director / Community manager - Online sales platform & consultancy	Both	Service
11	Founder - Interior products design company	Both	Product
12	Founder - Interior products design company	B2C	Product
13	Co-founder - Design studio	B2C	Product
14	Owner - Design studio	Both	Product
15	Owner - Interior products design and production	B2C	Product
16	Founder - Products store and workshops	B2C	Product
17	Program manager & Senior policy advisor – public solid waste management	Both	Service

The focus of the data collection and analysis was on identifying urban upcycling manifestations by exploring relevant internal and external factors through which these initiatives emerged and further developed.

First, primary data on relevant factors that drive urban upcycling were collected from seventeen semi-structured interviews of approximately 45-60 minutes with entrepreneurs and experts in urban upcycling (Table 1). 6 interviews were conducted in 2023 and 11 interviews were selected from a research archive of interviews on repurposing conducted by the same interviewer in 2020.

All interviews were recorded, transcribed ad verbatim and stored on research drive with formal consent of interviewees and permission to use collected data in academic research without publication of personal data.

Second, interview transcriptions were imported in MaxQDA for further analysis by means of open coding (Strauss and Corbin, 1990). Internal and external factors that drive urban upcycling were clustered to concepts and themes to identify preliminary manifestations. Finally, as a preliminary step towards further validation with practitioners and researchers in this ongoing research, the sixteen cases were mapped and classified according to the manifestations found.

Results

By focusing on factors that drive entrepreneurs to engage in urban upcycling initiatives we identified three focal themes and eight manifestations of urban upcycling. These themes and manifestations have been summarized in Table 2, together with some case examples.

Table 2. Main themes, manifestations and examples of urban upcycling.

	Themes	Manifestation	Examples
1	Urban upcycling innovation: process, market, product, service	A) Process focused urban upcycling	(1) develops efficient refurbishment technology
		B) Market focused urban upcycling	(9) valorises discarded building material in other market
		C) Product focused urban upcycling	(6) designs and produces tables from discarded oak floors
		D) Service focused urban upcycling	(10) project local repair services for furniture chain store
2	Urban upcycling entrepreneurship purpose	A) Urban upcycling 'for good'	(8) 'climate-quits' job and engages in upcycling start-up to generate sustainable impact
		B) Urban upcycling 'for income/profit'	(15) discovers opportunity to generate income/profit by engaging in upcycling
3	Urban upcycling collaboration	A) Urban supply chain upcycling collaborations	(12) outsources upcycling production activities
		B) Urban ecosystem upcycling collaborations	(2) aims to collaborate in product-private partnerships to facilitate urban upcycling ecosystem

Our findings are based on internal and external factors which have been listed in Tables 3 and 4. Internal factors include the reasons, ambitions, objectives and benefits for entrepreneurs in urban upcycling to engage in upcycling initiatives. External factors are based on contextual conditions and critical incidents mentioned by the interviewees, that were considered supportive for initiating and/or further developing initiatives by entrepreneurs in urban upcycling or by experts in urban solid waste management, but which cannot be directly controlled by urban upcycling entrepreneurs.

Table 3. Internal factors that drive urban upcycling initiatives.

Internal driving factors	Related interview nr. (table 1)	Related theme nr. (table 2)
Purpose / intended impact	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15	2A, 3B
Learning and business experimentation	1, 2, 5, 7, 9, 10, 12, 16	1, 2, 3
Create a viable business case	1, 2, 3, 4, 9, 10, 12, 14, 15	2B
Organisation process improvement	1, 2, 3, 4, 6, 7, 9, 10, 13, 14, 15, 16	1A
Customer relationship	1, 2, 3, 4, 6, 7, 9, 11, 16	1, 2, 3
Seeking collaboration	2, 9, 10, 11, 12	3
Educate and inspire others	3, 7, 9, 10, 11, 12, 13, 14	2A, 1D
Generate public exposure	1, 3, 10, 11, 13	1, 2
Entrepreneurial drive/spirit	2, 9, 10, 14, 15	1, 2, 3
Research & education driven	1, 3, 5, 6, 7, 9, 10, 11, 16, 18	1, 2
Material availability / urban mining	3, 6, 7, 9, 12, 13, 16	1A, 1C 3
Local engagement	9, 10, 12, 14, 16	1B, 2A, 3

Table 4. External factors that drive urban upcycling initiatives.

External driving factors	Related interview nr. (table 1)	Related theme nr. (table 2)
Supportive ecosystem (stakeholder collaborations and partnerships)	1, 2, 3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17	1, 2, 3
Availability of resources (quality, traceability, predictability)	2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 15	1, 3
Media exposure that supports positive public perception	1, 2, 5, 7, 9, 10, 11, 12, 13, 15	1, 2, 3
Material supplier involvement	2, 9, 11, 12, 13, 14	1, 3
Sustainable procurement	1, 2, 3, 4, 5, 7, 10, 11, 12	1, 2, 3
Political incentives (legal compliance, taxes, subsidies)	1, 7, 9, 10	1, 2
Proof of concept, inspiring examples and best practices	1, 2, 3, 5, 6, 7, 12, 13, 14, 15	1
Supportive education system	7, 10	1, 3

Conclusions

Our aim was to identify urban upcycling manifestations by clustering initiatives based on variables derived from internal and external factors that encourage entrepreneurs to start and further develop initiatives in urban upcycling. We have identified eight preliminary manifestations which are related to three main themes: innovation, purpose, and collaboration (see Table 2). However, since the preliminary manifestations in our study have not been validated, we propose further refinement and validation of the themes and manifestations by means of a literature study (see Table 5), and focus group workshops with experts and practitioners.

Table 5. Themes and examples of relevant literature.

Themes	Examples of relevant Literature
Urban upcycling innovation: process, market, product, service	Circular business model innovation strategy (Bocken and Ritala, P., 2021) Product Service Systems (Tukker, 2004)
Urban upcycling entrepreneurship purposes	Social entrepreneurship (Alter, 2007; Lubberink, 2019)
Urban upcycling collaboration	Circular supply chain management (Farooque et al., 2019; Geissdoerfer et al., 2019) Circular Ecosystem Innovation (Konietzko et al., 2020)

Other limitations of our study include the specific urban context and the sampling criteria used. Although the relation between initiatives and their city context is evident, it remains unclear whether a similar type of relation occurs between manifestations and the urban environment. Therefore, it would be relevant to explore how manifestations are related to a generic urban context, or to a specific city context. For example, it may also be interesting to study whether manifestations emerge differently in various urban contexts, such as cities in various countries within the EU or urban regions in western Europe versus the global south.

Next, since our sampling criteria did not include representation of relevant strategies such as repair, and the repurposing strategy may be overrepresented, we also suggest exploring how manifestations relate to slowing and closing loop strategies for upcycling (Bocken et al., 2016) and to the so-called R-strategies which have been proposed by the Dutch government to minimize resource input and waste (Potting et al., 2016).

Follow-up research could also extend on how various manifestations in an urban context are scaled up towards circular business models and how business models of stakeholders in urban ecosystems related to upcycling interact with each other and with actors in the regime context (Schaltegger et al., 2016; Koistinen et al., 2017).

As a first step in this four-year research project, we aim to validate manifestations by means of an extensive database of urban upcycling initiatives. These urban upcycling examples will be used to test our preliminary classification in additional mapping workshop exercises with researchers and practitioners. After this refinement and validation, the urban upcycling manifestations can be used by researchers, politicians, entrepreneurs and other practitioners to develop interventions, such as experiments or policy instruments, for scaling up and accelerating urban upcycling initiatives.

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References

- Agenda Partnership on Circular Economy. (2019). Urban Resource Centres. Accessed 15-10-2022 at : <https://ec.europa.eu/futurium/en/circular-economy/final-report-european-approaches-urban-resource-centres-available.html>
- Allwood, J. M. (2014). Squaring the circular economy: the role of recycling within a hierarchy of material management strategies. In *Handbook of recycling* (pp. 445-477). Elsevier.
- Alter, K. (2007). Social enterprise typology. *Virtue ventures LLC*, 12(1), 1-124.
- Arora, M., Raspall, F., Cheah, L., & Silva, A. (2020). Buildings and the circular economy: Estimating urban mining, recovery and reuse potential of building components. *Resources, Conservation and Recycling*, 154, 104581.
- Arsova, S., Genovese, A., & Ketikidis, P. H. (2022). Implementing circular economy in a regional context: A systematic literature review and a research agenda. *Journal of Cleaner Production*, 133117.
- Barbero, S., & Pallaro, A. (2018). Systemic design and policy making: the case of the Retrace project. *FormAkademisk*, 11(4).
- Braungart, M., McDonough, W., & Bollinger, A. (2007). Cradle-to-cradle design: creating healthy emissions - a strategy for eco-effective product and system design. *Journal of Cleaner Production*, 15(13-14), 1337-1348. [//doi.org/10.1016/j.jclepro.2006.08.003](https://doi.org/10.1016/j.jclepro.2006.08.003)
- Bocken, N. M., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of cleaner production*, 65, 42-56.
- Bocken, N. M., 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.
- Brunner, P. H. (2011). Urban mining a contribution to reindustrializing the city. *Journal of Industrial Ecology*, 15(3), 339-341.
- Bryman, A., & Bell, E. (2011). *Business research methods*. 3rd ed. Cambridge ; New York, NY, Oxford University Press.
- Cooper, T., Kaner, J., Furmston, K., & Cutts, A. (2021, May). Furniture lifetimes in a circular economy: a state of the art review. In *Proceedings of the 4th PLATE 2021 Virtual Conference* (pp. 26-28).
- Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative sociology*, 13(1), 3-21.
- Farooque, M., Zhang, A., Thüerer, M., Qu, T., & Huisingh, D. (2019). Circular supply chain management: A definition and structured literature review. *Journal of cleaner production*, 228, 882-900.
- Geissdoerfer, M., Morioka, S. N., de Carvalho, M. M., & Evans, S. (2018). Business models and supply chains for the circular economy. *Journal of Cleaner Production*, 190, 712-721.
- Gutberlet, J. (2015). Cooperative urban mining in Brazil: Collective practices in selective household waste collection and recycling. *Waste Management*, 45, 22-31.
- Koistinen, K., Laukkanen, M., Mikkilä, M., Huiskonen, J., & Linnanen, L. (2018). Sustainable system value creation: Development of preliminary frameworks for a business model change within a systemic transition process. *Sustainable business models: Principles, promise, and practice*, 105-127.
- Lubberink, R. (2019). Social entrepreneurship and sustainable development. In *Encyclopedia of the UN sustainable development goals*. Springer, Cham.
- Malé-Alemamy, M., Schoen, T., Galli, M., Bors, V., Kozhevnikova, A., & van Dijk, L. (2022, February). "Once my front door-now my coffee table"; Advanced computational design and robotic production with waste wood. In *AMS Institute Conference 'Reinventing the City': Reinventing the City| Sustainable Urban Transformations*.
- MacArthur, E. (2013). Towards the circular economy. *Journal of Industrial Ecology*, 2(1), 23-44.
- Prendeville, S., Cherim, E., & Bocken, N. (2018). Circular Cities: Mapping Six Cities in Transition. *Environmental Innovation and Societal Transitions*, 26, 171-194.
- Potting, B. J., Hekkert, M., Worrell, E., & Hanemaaijer, A. (2016). *Circulaire Economie: Innovatie Meten in De Keten*. [//pbl.nl/sites/default/files/cms/publicaties/pbl-2016-circulaire-economie-innovatie-meten-in-de-keten_2249.pdf](https://pbl.nl/sites/default/files/cms/publicaties/pbl-2016-circulaire-economie-innovatie-meten-in-de-keten_2249.pdf)
- Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business models for sustainability: A co-evolutionary analysis of sustainable

- entrepreneurship, innovation, and transformation. *Organization & environment*, 29(3), 264-289.
- Singh, J., Sung, K., Cooper, T., West, K., & Mont, O. (2019). Challenges and opportunities for scaling up upcycling businesses—The case of textile and wood upcycling businesses in the UK. *Resources, Conservation and Recycling*, 150, 104439.
- Singh, J. (2022). The Sustainability Potential of Upcycling. *Sustainability*, 14(10), 5989. MDPI AG.
- Sung, K. (2015). 'A review on upcycling: current body of literature, knowledge gaps and a way forward'. 17th International Conference on Environmental, Cultural, Economic and Social Sustainability 17, nr. 4: 28–40.
- Sung, K., Cooper, T., & Kettley, S. (2019). Developing interventions for scaling up UK upcycling. *Energies*, 12(14), 2778.
- Sung, K., Cooper, T., & Kettley, S. (2019). Factors influencing upcycling for UK makers. *Sustainability*, 11(3), 870.
- United Nations Habitat. World Cities Report 2022: Envisaging the Future of Cities Quick Facts Retrieved from: <https://unhabitat.org/wcr/>
- Zhao, X., Korey, M., Li, K., Copenhaver, K., Tekinalp, H., Celik, S., ... & Ozcan, S. (2022). Plastic waste upcycling toward a circular economy. *Chemical Engineering Journal*, 428, 131928.
- Sung, K., Cooper, T., & Kettley, S. (2019). Developing interventions for scaling up UK upcycling. *Energies*, 12(14), 2778.
- Singh, J., Sung, K., Cooper, T., West, K., & Mont, O. (2019). Challenges and opportunities for scaling up upcycling businesses – The case of textile and wood upcycling businesses in the UK. *Resources, Conservation and Recycling*, 150, 104439.
- van Winden, W., & van den Buuse, D. (2017). Smart City Pilot Projects: Exploring the Dimensions and Conditions of Scaling Up. *Journal of Urban Technology*, 24(4), 51–72.
- Yin, R.K. (2013) Case Study Research: Design and Methods. Sage Publications,



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