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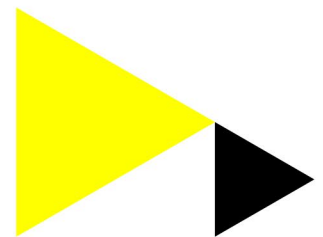
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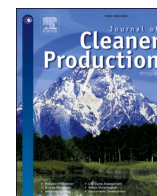
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Review

Motives, drivers and barriers to urban upcycling: Insights from furniture upcycling in the Netherlands

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ABSTRACT

With growing environmental concerns, upcycling has become an important theme in literature and practice. Upcycling can help slow and close resource cycles through product life-extension. Cities offer opportunities for upcycling initiatives and seek to tackle challenges in urban solid waste management by encouraging entrepreneurs to create value from local waste streams in urban resource centres and circular crafts centres. However, little is known about what drives urban upcycling and which barriers and drivers occur. This study explores urban upcycling in the context of the Dutch furniture industry, since The Netherlands positions itself as a 'circular economy hotspot' and furniture offers promising opportunities and best practices for upcycling. The analysis of 29 semi-structured interviews with experts engaged in urban upcycling reveals personal motives, drivers and barriers. Personal motives include (1) a personal purpose to 'do good', (2) an urge to challenge the status quo and (3) learning and inspiring by doing. Key drivers entail opportunities to (1) engage in collaborative experimentation, (2) participate in cross-sectoral local networks, (3) develop resource-based adaptive competences, (4) respond to increasing demand for upcycled products and (5) make social business activities financially viable. Key barriers perceived by upcycling experts include (1) limitations in resource availability, (2) increasing capacity requirements, (3) negative public quality perception, (4) limited marketing competences and (5) an unequal playing field. This study contributes with a comprehensive definition of urban upcycling and a structured overview of key factors that drive and constrain urban upcycling.

1. Introduction

To develop a cleaner and more competitive Europe, the European Union has proposed the transition to a circular economy (Ellen MacArthur Foundation, 2013; European Commission, 2022), which can be defined best as an industrial system that is restorative or regenerative by intention and design (Kirchherr et al., 2017). Within this context, the Netherlands aims to be a circular economy 'hotspot' and has started to implement local waste management policies and infrastructures at a municipal level to meet these ambitious targets (Faun et al., 2019; Werner et al., 2020; Faun and Maas, 2021; Ministerie van Infrastructuur en Waterstaat, 2023).

Despite increasing efforts of Dutch businesses and governments to transition towards a circular economy, many products still end up incinerated after their first use. For example, most of the annual 80 kiloton of discarded furniture is incinerated via municipal bulky waste,

while sales of lower-quality fashion furniture with shorter lifespans continue to grow (Intven and De Haes, 2022). The urban context is of interest as at present 55% of the world population live in cities and this number is expected to grow to 68% by 2050 (Martins et al., 2022). This unprecedented growth offers opportunities for developing and scaling up circular initiatives (Raven et al., 2012; van Winden and van den Buuse, 2017; Prendeville et al., 2018). 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 (Prendeville et al., 2018; Birgovan et al., 2022). 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., 2019a,b). This cross-national fast-growing concentration of consumption, waste generation and energy usage will increase

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organizational and environmental challenges for urban solid waste management but may also create new opportunities for accelerating and scaling up circular initiatives that aim to upcycle waste.

To date, most Dutch municipal waste management practices merely facilitate recycling processes and incineration (Hanemeijer and Kishna, 2023), also known as ‘downcycling’ (Braungart et al., 2007; Allwood, 2014; Potting et al., 2016; Lüdeke-Freund et al., 2019; Sung et al., 2019a,b, Ministerie van Infrastructuur en Waterstaat, 2023). Material that potentially could be reused, repaired, refurbished, remanufactured, or repurposed is damaged during the waste management process and ends up being incinerated rather than ‘upcycled’. In practice, recent years have seen an increasing number of initiatives aimed at value retention through upcycling (Sung et al., 2019a,b; Cooper et al., 2021; Singh, 2022). National and regional policy makers are seeking ways to promote upcycling initiatives as a means to contribute to their circularity goals (Futurium, 2019; Faun et al., 2019, Ministerie van Infrastructuur en Waterstaat, 2023). However, it remains unclear what the motives of Dutch experts are to engage in urban upcycling and what the drivers and barriers are they encounter during the development of their initiatives.

This paper focuses on furniture and interior design products, as a key source of the urban waste stream. 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 (Singh et al., 2019; Cooper et al., 2021). Data on volume, weight or composition of bulky waste is scarce, but furniture products amount to 10 million tons annually in European cities, largely consisting of wood (Forrest et al., 2017). Although wood is recyclable and relatively easy to upcycle, 90% of the furniture waste stream is going 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.

By exploring how Dutch experts engage in urban upcycling initiatives, this study aims to present a comprehensive definition of urban upcycling and provide insight to researchers, policymakers and practitioners on dominant factors that drive or hinder urban upcycling initiatives. This will help researchers to study and understand the re-emerging phenomenon of urban upcycling and facilitate policymakers and practitioners to make choices required to support upcycling initiatives in an urban context. The two research questions are.

1. What is urban upcycling?
2. What are the motives, drivers and barriers for Dutch urban upcycling experts to engage in the practice of urban upcycling?

2. Background

Upcycling is a popular term which may be used to refer to various circular concepts, initiatives, strategies, goals, or business models. In this section, literature and policy reports are used to explain the scope, meaning and relevance of upcycling and to substantiate the study's focus on upcycling in the specific context of entrepreneurial initiatives in Dutch cities.

2.1. What is upcycling?

Due to climate concerns and increasing levels of waste, upcycling has re-emerged as an ever more important theme (Sung et al., 2019a,b; Cooper et al., 2021; Singh, 2022). Upcycling was introduced in industrial design literature by Braungart and colleagues in 2007 as the main goal of the cradle-to-cradle industrial design strategy, which is to ‘enable materials to maintain their status as resources and accumulate intelligence over time’ (Braungart et al., 2007, p. 1338). Six years later, McDonough and Braungart (2013) published the best-selling work “The

Upcycle”. Using nature as a metaphor, they argue for all industrial materials to be re-used at their highest potential value across consecutive product lifecycles, with zero-negative or even potential positive impact on the natural environment (McDonough and Braungart, 2013).

Despite the widespread popularity of upcycling, scholars and practitioners have been struggling with a proliferation of definitions and synonyms of upcycling. Upcycling is generically referred to in literature as a practice or process in which discarded materials are modified into something of higher value, functionality or quality (Sung, 2015; Lüdeke-Freund et al., 2019). Most literature on upcycling refers to a range of life extension strategies, including functional reuse, repair, refurbish, remanufacture, repurpose and improved recycling (Sung et al., 2019a, 2019b; Singh et al., 2019; Singh, 2022). Some scholars specifically refer to upcycling as a creative and/or social innovation process of material reuse (Wegener and Aakjær, 2016; Bridgens et al., 2018; Wegener, 2023), and in popular language upcycling is often associated with creative repurposing of waste material.

Literature shows that upcycling has several potential origins. In addition to the concept of ‘industrial upcycling’ (McDonough and Braungart, 2013), scholars introduced the terms ‘individual upcycling’ (Sung et al., 2019), ‘social upcycling’ (Wegener and Aakjær, 2016) and ‘consumer upcycling’ (Coppola et al., 2021; Shi et al., 2022). In their comprehensive literature study, Sung et al. (2019) suggest that individual upcycling, entailing upcycling activities by private individuals or small and medium enterprises (SME), may have even more impact than industrial upcycling (Sung et al., 2019). Consumer upcycling refers to upcycling activities by consumers (Coppola et al., 2021; Shi et al., 2022), while social upcycling includes a wider range of actors in their role as citizen, professional or volunteer and emphasizes the role of interactions across organizations, professions and domains (Wegener and Aakjær, 2016).

While upcycling initially gained particular interest with creative practitioners and scholars in fashion and design (Han et al., 2015; Cassidy and Han, 2017; Aus et al., 2021), the concept has been embraced also in industrial engineering, resulting in a wide range of publications related to ‘functional’ upcycling in specific industries and with particular (by-)products, such as plastics and polymers (Zhao et al., 2022; Guselnikova et al., 2023), EV-batteries (Qian et al., 2022), wind turbine blades (Yang et al., 2022), solar panels (Cao et al., 2022; Boon Tay et al., 2022), textiles (Stanescu, 2021), CO2 (Qin et al., 2018) and furniture (Singh et al., 2019; Cooper et al., 2021; Ofori-Agyei et al., 2023).

Across European cities individual entrepreneurial upcycling initiatives are emerging, particularly in The Netherlands (Lepelaar et al., 2022), and policy makers are seeking ways to support these initiatives (Faun et al., 2019; Futurium, 2019; Ministerie van Infrastructuur en Waterstaat, 2023). Despite the potential impact and benefits of individual and social upcycling of bulky waste (Singh et al., 2019; Cooper et al., 2021; Ofori-Agyei et al., 2023), upcycling of bulky waste in an entrepreneurial and social city context remains relatively underexplored in circular economy literature.

To facilitate and stimulate upcycling initiatives, it is important for policy-makers and practitioners to understand the meaning and scope of upcycling. Therefore, this study explores urban upcycling and presents a working definition, using furniture as an exemplary promising waste stream.

2.2. Upcycling in an urban context

The city provides important context conditions required to face major challenges in a transition to a circular economy such as the concentration and growth of available resources, municipal and regional policy instruments, availability of experimental living labs, demographic aspects (age, income, education) and the rate of municipal recycling (Barbero and Pallaro, 2018; Prendeville et al., 2018; Futurium, 2019; Arsova et al., 2022; Neves and Marques, 2022).

As urban areas provide an important space for action, cities across

Europe have started collaborative upcycling initiatives in so-called 'urban resource centres' (Futurium, 2019). Dutch city governments encourage social initiatives, SME-entrepreneurs, and other urban stakeholders to participate in 'circular crafts centres' (Faun et al., 2019; Werner et al., 2020; Ministerie van Infrastructuur en Waterstaat, 2023). Since 2019, more than 100 Dutch municipalities received subsidies to realise a national network of circular crafts centres (Circulair Ambachtcentrum, 2023). By 2023, following a Dutch national contest for municipalities, many cities submitted new plans and the number of realised urban crafts centres had increased to 80 municipalities involved in nearly 60 developing centres (Ministerie van Infrastructuur en Waterstaat, 2023). For example, in various cities workshops have been developed which engage citizens to upcycle old clothes, textiles and furniture. In the city of Zwolle, lab facilities were created for an intermediate vocational art school to test upcycling solutions in collaboration with social entrepreneurs (Faun et al., 2019).

Circular crafts centres combine municipal waste disposal facilities, thrift shops and entrepreneurial upcycling initiatives, and often aim at involving citizens and/or other local stakeholders in social activities (Faun et al., 2019; Futurium, 2019). However, since urban upcycling initiatives have appeared in a wide range of configurations and are often in an experimental stage, they require support, knowledge, and guidance on how to create and scale successful business models. This experimental city context provides opportunities to test potential policy measures that facilitate the development of circular business models through practical experimentation and innovation (Voytenko et al., 2016; Futurium, 2019; Scholl and The Kraker, 2021).

Adapted from a combination of definitions of upcycling and urban initiatives in literature (Sung, 2015; Prendeville et al., 2018; Lüdeke-Freund et al., 2019; Sung et al., 2019a,b), in this study urban upcycling is defined as:

"an action aimed at creating or modifying a product from discarded materials, components or products into something of higher value, functionality and/or quality involving a city and its stakeholders (citizens, community, business and knowledge stakeholders)".

Emerging urban upcycling initiatives, such as urban resource centres, upcycle centres and circular crafts centres (Faun et al., 2019; Futurium, 2019), focus on maintaining or extracting value from locally available waste resources by slowing and closing local resource cycles with a focus on 'high-value' recycling-related strategies (Bocken et al., 2017; Hanemeijer and Kishna, 2023). Additional value is created in this context by circular initiatives which are based on individual upcycling propositions, mostly related to repairing, repurposing, refurbishing or reusing in a different context.

As city research has been focusing more on energy and recycling through urban mining, which mostly entails downcycling (Brunner, 2011; Gutberlet, 2015; Arora et al., 2020), this has left an interesting research gap for urban upcycling. While new urban upcycling initiatives are rapidly spreading across Dutch cities, the adoption of circular economy initiatives in the urban context is underexplored (Arsova et al., 2022) and research on upcycling has largely focused on environmental and financial opportunities and technical feasibility of industrial upcycling (Singh et al., 2019; Malé-Alemayn et al., 2022; Zhao et al., 2022).

Since it remains largely unclear what drives urban experts to take up new upcycling initiatives and social benefits are also relevant but have been scarcely explored (Sung, 2015; Sung et al., 2019a,b), this research focuses on relevant motives, drivers and barriers for urban entrepreneurial upcycling initiatives, including relevant social aspects.

2.3. Drivers and barriers for urban upcycling

To understand how entrepreneurial upcycling initiatives emerge in the Dutch city context, it is important to identify relevant barriers and drivers, or 'factors that either support or inhibit an organisational unit's conceptualisation and implementation' (Geissdoerfer et al., 2023, p.

3816).

Related studies which discuss potentially relevant factors for urban upcycling include work on urban resource centres (Futurium, 2019), literature on related themes such as upcycling (Sung et al., 2019), consumer upcycling (Coppola et al., 2021; Shi et al., 2022), circular cities (Prendeville et al., 2018), circular business models (Vermunt et al., 2019), upcycled fashion products (Yoo et al., 2021), bottom-up circular initiatives (Russell et al., 2020) and circular oriented innovation (Brown et al., 2019). These studies use a wide range of categories and sub-categories and some offer conceptual frameworks with comprehensive future research avenues (Tura et al., 2019; Shi et al., 2022). Categories sometimes overlap or may be ambiguous, such as personal versus organizational, hard versus soft, internal versus external, micro versus meso versus macro level, or intrinsic versus extrinsic factors.

To avoid overgeneralisation, complexity and redundancy, and without claiming to be complete, five common categories are used and personal 'motives' are described as a separate category. This includes for instance motives such as status and recognition as a circular economy thought leader, career progression, opportunities for specialisation or training, excitement to learn and pursue new knowledge, a sense of purpose and pride in role, working with likeminded people (Brown et al., 2019), consumer empowerment (Coppola et al., 2021), self-esteem, social interaction or product-engagement (Shi et al., 2022).

Based on this diverse literature base, five relevant categories of drivers and barriers for urban upcycling are identified (Table 1)

3. Method

This explorative study aims to identify motives, drivers and barriers of urban experts to engage in upcycling. Thematic analysis allows the researcher to identify key themes by analysing shared meanings and experiences (King and Brooks, 2018). Therefore, a step approach suggested by Braun et al. (2019) was followed to analyse data from twenty-nine semi-structured interviews with twenty-four experts from the same number of organizations engaged in urban upcycling.

3.1. Data collection

The twenty-four organizations listed in Table 2 were selected based on their engagement in initiating and developing urban upcycling initiatives and by using purposive sampling (Bryman and Bell, 2011). In total, twenty-nine interviews were conducted with an average length of 45–60 min over a period of three years between 2020 and 2023. Interviews were semi-structured as this allowed researchers to explore relevant replies of the interviewees by asking further questions (Bryman and Bell, 2011). Some organizations (A, D, I, M, O) were interviewed multiple times or were requested to send additional information to gather more in-depth information. Three interviews were conducted with multiple participants, one at the same time (U) and two (D, O) at different times, to gather multiple and shared perspectives from the same organisation.

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. Topics of the semi-structured interviews entailed personal motives and conditions and under which upcycling initiatives in the furniture and interiors industry were created.

3.2. Data analysis

Interview data were analysed to identify personal motives, drivers and barriers experienced by experts who engage in urban upcycling initiatives. Questions on personal motivation focussed on internal drives, intentions, and motives of interviewees to engage in urban upcycling, including personal ambitions and individual goals. Questions about drivers concerned contextual factors, such as critical incidents,

Table 1

Drivers and barriers from literature.

Factor	Drivers	Barriers
Financial	Business growth ^{1,2, 13} Cost savings ^{1,2, 13, 14} Profitability ¹³	Cheap available virgin material ¹⁰ Limited financial resources ¹² High price of upcycled products ¹² High cost of repair and refurbishment ¹¹
Market	Increasing and new markets ^{1, 2} Customer retention ¹ Circular-oriented tendering and procurement ² Circular awareness and knowledge ^{3, 12} Consistent material supply ^{3, 12, 14} Controlled quality ^{3, 12}	Resource quality, quantity, and timing ^{10, 12} Lack of public awareness ^{2,10, 11, 12, 14} Poor demand for recycled materials ¹¹ Weak demand for second-hand furniture ¹¹ Resistant competitors ¹⁰ Distrust among supply chain partners ^{2, 13} Lack of social approval ¹² Lack of resource material ^{2, 13} Public distrust for product from waste ^{2,10, 12, 13} Lack of availability of spare parts ¹¹ Limited collection and reverse logistics infrastructure ¹¹
Technological	Inspiring product concepts ^{1, 14} Technological improvements and innovation ^{1,2, 13} Technical requirements ² Material flow tracking systems ³ High value and quality of materials/products ^{3, 14} Standardised flexible upstream technological capacity ³ Digital marketing service technology ^{4, 14}	Lack of relevant competences ^{2, 12, 13} Lack of specifications and standards ^{2, 11, 12} Use of lower quality materials ¹¹ Poor design ¹¹ Internal lack of knowledge & technology ^{10, 13, 14}
Organizational	Sustainable ambitions ¹ Partner-seeking ^{2,3} Integrated supply chains & reverse logistics ^{12, 13, 14} Contribute to public acceptance, standards and awareness ^{2, 12} Social networks and co-locating services ^{3, 12} Local marketing and branding ^{3, 12} Easily accessible location ³ Standardized and efficient processes ^{3, 13}	Contractual linear lock-in ² Lack of collaboration and integrated supply chains ^{13, 14}
Institutional	Legal incentives ^{1, 2} Public campaigns aimed at consumers ^{5, 6, 12} Political vision ⁶ Urban collaborative experimentation ⁶ Local municipality involvement and support ^{4, 12} Inclusive public tenders ^{4, 7} Transregional/-national infrastructure ^{8, 14} Availability of creative talent, knowledge, and technical skills ^{9, 12}	Waste legislation restrictions ^{10, 12} Lack of regulatory incentives ^{2,10, 11, 12, 13} Legacy accounting regulations ²

Note: 1 = Geissdoerfer et al. (2023); 2 = Brown et al. (2019); 3 = Sung et al. (2015); 4 = Futurium. (2019); 5 = Yoo et al. (2021); 6 = Prendeville et al. (2018); 7 = Barbero and Pallaro (2018); 8 = Raven et al. (2012); 9 = Arsova et al. (2022); 10 = Vermunt et al. (2019); 11 = Forrest et al. (2017); 12 = Caldera et al. (2022); 13 = Khan et al. (2022); 14 = Hina et al. (2022). Full references in reference list.

Table 2

List of interviewees. Note. Int. refers to “interviewee” also used later in the Results section.

Int.	Organisation	Function of interviewee(s)	Urban upcycling engagement
A	International waste management & waste valorisation company	Senior account manager (2X)	Supporting entrepreneurship in upcycling as a founder and board member in a foundation for waste reduction and engaging in a wide range of upcycling initiatives in business and local citizen initiatives in reuse and repurpose as a senior manager in an international waste logistics management company.
B	Office furniture manufacturer	Manager Innovation	Developed corporate circular innovation lab and product range for refurbished and repurposed office furniture for B2B with large accounts
C	Regional waste management company	Policy advisor circular economy	Proactively engaged in national and regional circular craft centre programmes, promoting B2B upcycling and supporting experimental upcycling initiatives in urban regions
D	Municipality department urban solid waste	Programme manager/Senior policy advisor b (1X) Senior policy advisor a (1X)	Involved in governmental and local municipal initiatives aiming for upcycling in a city context
E	International digital exchange platform for used products	Head of Sustainable Impact and country manager	Initiated public campaigns on a national level for individual upcycling of discarded material aimed at consumers and in close cooperation with municipalities.
F	International furniture retail chain	Sustainability Business Partner	Initiated various in-corporate retail experiments aimed at consumer reuse/resell, repair support and repurposing in collaboration with local artists.
G	Furniture retail chain	Owner	Engaged in local multi stakeholder collaborative project involving development of furniture retail-chain repair services outside guarantee period.
H	National furniture industry trade organisation	Innovation manager	Promoting upcycling initiatives on a national level and developing new logistics infrastructure for recollection and reuse of discarded wood in collaboration with furniture industry
I	Interior project producer	Sustainability manager (2X)	Collaborating with business customers for internal and external reuse and repurposing of discarded wood, wood panels and/or complete furniture from interior projects

(continued on next page)

Table 2 (continued)

Int.	Organisation	Function of interviewee(s)	Urban upcycling engagement
J	Waste management enterprise	Owner/Director	Developed national logistical infrastructure for recollection of discarded mattresses and initiated various experiments with repurposing on material and component level.
K	Architecture, interior design office & platform	Co-Founder	Frontrunner, initiator and incubator of various entrepreneurial upcycling in city context, such as repurpose of wind turbine blades in public furniture and reuse of interior and construction products.
L	Material broker and circular consultant	Owner	Involved in various municipal projects and entrepreneurial initiatives aiming to investigate and test options for re-applying of a wide range of discarded bulky waste materials in a different context by re-connecting cross-sector value chains.
M	Furniture refurbishment company	Commercial director 2x	Developed and commercialised innovative technology and services for furniture refurbishment.
N	Interior products design & B2B platform	Owner & senior designer	Founder of design company with focus on circular design and production of interior products based on discarded material in close collaboration with social organizations and community of social entrepreneurs.
O	Online platform & consultancy	Creative director (1X) and Community manager (1X)	Mission-driven consultation engaged in various project with emphasis on community building, knowledge exchange and promotion of upcycling in furniture and interior design with particular emphasis on development of repair services in collaboration with corporate retailers and local entrepreneurs.
P	Interior products design company	Founder	Development of premium design furniture with material from iconic municipal constructions in Dutch cities.
Q	Design studio	Co-founder/owner	Developed range of interior design products from dismantled museum transport boxes with digital reference to online background information.
R	Design studio	Owner//senior designer	Founded in-and outdoor home design company with focus on applying discarded wood as a resource and involved as a consultant-designer in financial district corporate project, actively promoting upcycling through hospitality interior design and construction.

Table 2 (continued)

Int.	Organisation	Function of interviewee(s)	Urban upcycling engagement
S	Interior products design and production	Owner	Developed various successful consumer product ranges and interior design projects, based on upcycling of discarded products from multiple sectors, such as oil drums and heating boilers.
T	Products store and workshops	Founder	Selling and producing a wide range of products made from city-sourced material, including in-and outdoor home products from reclaimed wood and old bicycle tires.
U	Upcycled textile products, workshops & producer of educational material	Entrepreneur, Educational institution, Public management	Develops and sells products, services and educational material based on upcycling of material from municipal recycle centre.
V	DIY store/production studio	Director	Developing international urban network of DiY-stores for used products and upcycling services, such as sorting, maker-spaces, training and rental.
W	Interior products design company	Founder	Various design projects and upcycling product lines for interior products in collaboration with social work and corporate resource suppliers.
X	Furniture designer and producer	Founder	Repurposing historical oak floors of iconic and memorable city buildings to durable upcycled furniture, such as tables and desks.

circumstances, and occurrences interviewees regarded as main reasons for success. Questions about barriers related to external factors that make it more difficult and challenging for experts to engage in upcycling activities. An interview protocol was used as a guide for the interviewer (appendix).

Following [Braun et al. \(2019\)](#), the analysis of motives, drivers and barriers was conducted in three main steps. In the first step, researchers familiarised themselves with primary data from the interviews by listening and viewing recordings and by reading and rereading transcripts multiple times. Secondly, interview transcriptions were imported in MaxQDA for further analysis by means of open coding ([Corbin and Strauss, 1990](#)) and applying brief verbal descriptions to small chunks of data. Thirdly, based on iterative change and adjustment of codes, relevant sub thematic code categories were clustered in themes and illustrated with examples ([King and Brooks, 2018](#)).

4. Results

This section presents an overview of themes and sub thematic code categories identified ([Fig. 1](#)), revealing three personal motives of interviewees to engage in upcycling (4.1), five external drivers (Section 4.2) and five barriers (Section 4.3) experienced by urban upcycling experts which are illustrated by means of exemplary quotes.

4.1. Personal motives

The interview data analysis revealed three principal personal motives which stimulate urban experts to engage in upcycling initiatives.

Personal motives (Section 4.1)		Drivers (Section 4.2)		Barriers (Section 4.3)	
Themes	Subthematic code categories	Themes	Subthematic code categories	Themes	Subthematic code categories
Do good	- Aim for social impact - Raise environmental awareness - Create legitimacy for circularity	Collaborative experimentation	- Local co-creation - Local partnerships	Limitations in resource availability	- Low quality of material - Volatility of volumes - Absence of data
Challenge	- The status quo - Fixed ideas - Pervasive linear thinking	Cross-sectoral local network	- Local infrastructure - Local (digital) community	Increasing capacity requirements	- Complex outsourcing processes - Need for new technology
Learning by doing	- Practice - Learn	Resource-based adaptive competences	- Avoid waste processing - Resource-based product design - Adaptive manufacturing	Negative public perception	- Avoiding upcycling proposition - Risk-averse partner choice - Resource supplier restrictions
		Increasing customer demand	- Growing business demand - Increasing public interest	Limited marketing competences	- Limited marketing budgets - Not enough best practices - Corporate gatekeeping
		Social business viability	- Financial health for continuity - Collaborate with social partners - Integrate environmental goals	Unequal playing field	- Legacy regulations - Operational efficiency focus - Unsupportive tax system

Fig. 1. Themes and sub thematic code categories.

These three ‘internal drivers’ include (1) a strong aim for doing good, (2) the urge to challenge the status quo and idées fixes and (3) an intrinsic motivation to learn and inspire others by doing.

4.1.1. Doing good

The strong personal purpose to ‘do good’ is illustrated by interviewees referring to upcycling initiatives as ‘a personal quest to make the world a better place’ (Int. N) or as a means ‘to leave something good behind’ (Int. O). This ‘main reason to get out of bed’ (Int. C) frequently relates to social impact for local or regional communities. For example, a local DIY thrift shop organizes upcycling workshops aiming to ‘upgrade the area by adding vibrancy to it’ (Int. V) and a designer creates products from local waste to ‘give the material back to city in a beautiful form’ (Int. P).

Social goals can also be aimed at generating local social employment or traineeships for the less fortunate, creating legitimacy towards internal stakeholders, such as employees, or external stakeholders, such as suppliers. For example, two sustainability managers mention that local social upcycling initiatives aim at stimulating employees to contribute to internal process improvements. One of them notices that colleagues ‘are now really thinking more consciously’ (Int. I). Another interviewee refers to supplier engagement, stating that ‘it was fulfilling for them that something was being made of it [repurposing product]’ (Int. Q).

Several interviewees argue that upcycling ‘as a means to inspire people’, may even be more important and impactful than the direct physical contribution of urban upcycling, since ‘the real scalability is in making more people aware’ and system changes ‘will not happen without the consent of ordinary people’ (Int. C).

4.1.2. Challenge the status quo and “idées fixes”

Several interviewees express that their main motivation comes from a strong urge to challenge the status quo and ‘idées fixes’, or institutionalised and pervasive linear thinking. For example, they aim to prove that circular innovations ‘can be done after all’ (Int. W) or they find joy in showing that ‘recycling, upcycling, reusing things don’t have to be tacky’ (Int. Q).

4.1.3. Learn and inspire by doing

Interviewees specifically refer to their intrinsic motivation for developing their personal upcycling competences or for inspiring others to engage in upcycling. Learnings may relate to practical organizational and design skills, such as how to ‘tackle a waste stream’ (Int. T), or how to create new designs ‘sourced by local materials’ (Int. V). Some are more internally focussed to ‘just wanting to learn something and do it my own way’ (Int. N), while others are more externally focussed towards inspiring other people and may even include life-enhancing experiences by engagement in upcycling such as sharing ‘a kind of mindfulness, peace

and a certain meaning’ (Int. U).

4.2. Drivers

The analysis of interview data also exposed five key drivers that stimulate urban experts to develop upcycling initiatives. These drivers include (1) collaborative experimentation, (2) interconnecting local networks, (3) adaptive process development, (4) increasing customer demand and (5) social business viability.

4.2.1. Collaborative experimentation

Interviewees are stimulated by experimental engagement in a wide variety of partnerships. The data shows collaborative experimentation to have three fundamental characteristics.

First, the process is co-creative. Urban upcycling experts co-create ‘sectoral take-back systems and test impact tools’ (Int. H) and try to learn ‘which [resource] streams are interesting and what works best ... what are the dealbreakers’ (Int. C) or ‘find out the needs of consumers’ (Int. X).

Second, collaborative experimentation creates legitimacy, legally and internally in businesses. In corporate companies it is needed to become compliant since they will ‘get hit with the extended producer responsibility’ (Int. O). It can also help to create inspiring examples to ‘to start something themselves’ and ‘make [upcycling] sexy.’ (Int. C, H).

Third, collaborative experimentation is locally driven. Some municipalities act as incubators to test alternative waste-to-product routes by engaging directly with upcycling frontrunners, providing incentives, such as temporary housing and financial support. Municipalities may engage in these local business activities because they think it is important that ‘products are made and sold locally again’ (Int. L) or to understand and test new upcycling practices with local regulations, since:

‘the government has to get the hang of this [legal barriers] before we can make it [upcycling] really big’ (Int. U).

Interestingly, educational institutions and universities play a special role in collaborative experimentation. While various upcycling entrepreneurs mention that their current activities directly emerged from, or were inspired by, educational projects (Int. W, T, L, M, N, V, X), some also find their customer-base in educational institutions (Int. A, B, I, U, X). Others engage in upcycling collaborations with educational institutions to reintroduce, and revalue, ‘forgotten’ crafts such as furniture repair (Int. O) and textile processing techniques (Int. U) because:

‘there needs to be more and better training ... and it [upcycling] is just seen as very dull ... we should see it much more as the new hipster hairdresser’ (Int. O).

4.2.2. Cross-sectoral local networks

The data revealed that upcycling initiatives often emerge from collaborations across different sectors or disciplines, in which connectors, such as *'an intermediary'* (Int. C) to create a *'circular craft centre or network'* (Int. C), play an important role. The data shows that two connecting elements in these local networks stand out: new logistics infrastructures and digital marketing communication platforms.

New physical logistics infrastructures need to be developed *'for upcycling to function well'* (Int. D), including various neighbourhood hubs *'which provide the storage and trade of all those materials'* (Int. K) and *'smart equipment installed to avoid unnecessary transport'* (Int. A). New functions and roles emerge from this context, such as the value chain orchestrator *'who owns the data that allows to organise that [logistics] from within'* (Int. A). Integrated IT-platforms that connect logistical service providers with suppliers and customers of resources require *'material passports'* (Int. H, R, B, O, X, P, N), which facilitate product tracking, sustainable impact measurement and consumer product labelling.

Urban upcycling entrepreneurs engage with local communities and social media platforms for promotional activities. Upcycling entrepreneurs largely depend on informal relations with individual suppliers *'to gain karma points'* (Int. V) because *'space and time needs to be reserved'* for them to put operations in practice (Int. V). Interviewees refer to ad-hoc and low-budget marketing activities as critical incidents which have *'boosted'* sales numbers. These marketing efforts include participating in regional business challenges, using free publicity in local media, directly engaging with influencers or participating in international business fairs (Int. M, Q, N, W), for example by piggybacking with larger firms that operate on a local level.

4.2.3. Resource-based adaptive competences

Opportunities for upcycling are enhanced by introducing new processes, skills and technologies in waste management, product design and production which can adapt to fluctuations in volumes and variety in quality.

In waste management, upcycling is stimulated by monitoring and reducing handling damage or by moving sorting activities to earlier stages in the waste management process. To illustrate the importance of damage control, a policy advisor of a waste management company argues that *'at least, the value is not reduced as a consequence of our activities'* (Int. C). Other interviewees suggest that waste management processes should rather be avoided by making sure that material *'does not reach the recycling platform'* (Int. L), for example by using resource hubs and thrift shops *'as a sort of entrance to a recycling platform'* (Int. U).

In product design, adaptive methods which *'design from the material'* (Int. N.) and can handle the variety in used materials, puts makers who *'have the advantage of being very young, flexible and see the advantages of this [waste]'* (Int. S.), in a favourable position.

As for technology, interviewees engage in development of advanced machines or low-tech tools because existing technology is often not suitable for handling varying quality of resource. New machines and tools are adapted from existing technologies and often focus on preparing products for further processing. Examples of these adaptive innovations are customised cleaning or sorting machines (Int. T), simple-but-effective moulds that facilitate more efficient crafts production (Int. Q, X) and a refurbishment technology adapted from the car-industry *'which made it possible to make giant steps'* (Int. M).

4.2.4. Increasing customer demand

Experts experience important drivers for upcycling in public and corporate tendering processes and envision long-term public-interest entailing business-growth opportunities with upcycling in consumer markets.

First, interviewees note the growing business demand for circularity. Various public authorities *'have issued a circular tender ... then the costs don't matter'* (Int. B). An innovation manager of a national furniture trade association suggests that *'there is a market for higher-end refurbished*

furniture' (Int. H), which is confirmed by the owner of a furniture design company stating that circular-only office furniture companies appear that *'grow much faster than a regular branch'* (Int. W).

Second, there is growing popularity of used products, growing climate-consciousness, and public interest in locally crafted products. For example, the creative director of an online furniture community platform states that *'second-hand is a big trend'* (Int. O). The country manager of a popular digital platform specifically refers to new growth opportunities in a matured market arguing *'that's [climate-consciousness] the thing we can now gas up on'* (Int. E) and the co-founder of a design studio notices that *'people appreciate craftsmanship and unique pieces much more'* (Int. Q).

4.2.5. Social business viability

Interviewees suggest that financial viability is crucial for upcycling business continuity and they find ways to balance financial aims with social and environmental goals and scale up in a continuous process of trial and error. To illustrate this, an owner of a design studio stated:

'it's a chicken and the egg story, allowing more people to participate, more impact, bringing in more. And at the same time grow the collection with that, so that at some point there will be a tipping point' (Int. N)

By actively engaging with social labour institutions, social initiatives and citizen communities, upcycling entrepreneurs balance financial aims with generating social impact and contributing to environmental goals. In a production context, this is illustrated by Interviewee W who upcycles products for businesses with the help of prison-workers and uses environmental goals which *'appeal very much to the prison'* while commissioning clients *'contribute a bit to this [social labour] with their waste material'* (Int. N).

4.3. Barriers

The interview data showed that entrepreneurs perceive five barriers which will be explained further in this section. These key barriers include (1) limitations in resource availability, (2) increasing capacity requirements, (3) negative public perception, (4) limited marketing competences and (5) an unequal playing field.

4.3.1. Limitations in resource availability

Suitable material for upcycling *'runs out, that's the trickiest thing'* (Int. X). However, limited availability of resources includes other aspects, such as quality of material, volatility of supply and availability of data, causing operational constraints and safety issues.

One interviewee explains that contaminated and dirty resources are *'a lot harder to turn into a nice, clean [upcycled product]'* and explains that fluctuations play a role because:

'sometimes you have more demand than the amount of material you can supply, but on the other hand, sometimes you also have more waste material than you can sell' (Int. W).

Various interviewees suggest that unpredictable time of availability and unavailable product data are important barriers, which may also lead to safety issues because *'it has never been used for this application before'* (Int. K). To illustrate, a founder of a design company, states that:

'we often have to deal with asbestos or with paint containing lead, with that mortar, lead compound ... you really have to be sure that the material is safe, as it often involves costs to have the material blasted bare and repainted, or to be remediated'. (Int. P)

4.3.2. Increasing capacity requirements

An interviewee observes that upcyclers *'cannot handle the full volumes [collected]'* (Int. C). An important way to cope with this barrier entails outsourcing activities, for example to specialised companies or social working places. One interviewee illustrates that outsourcing to social

employment requires additional effort and involvement in the processes of partners:

'we created a three-step package. The first group who are just starting out or are not very resilient in work can just help, collect, take out screws, clean, all that sort of thing. The second group who then literally have a kind of saw package or a machine package, they can make it to size ... and a small third group attended a furniture maker training course in a reintegration project, and they make the final products.'

Other interviewees solve capacity issues by develop innovative production technologies (Int. M), cleaning machines (Int. T) or smart-but-simple low-tech tools (Int. Q). Others find ways to outsource activities to specialised producers (Int. G, R, P, T), to volunteering customers or to local communities (Int. V, U) or to social employment (Int. W, N).

4.3.3. Negative public perception

Various interviewees observe an overall negative attitude of society towards using waste as a resource, which negatively affects stakeholder engagement and available resources. This is clearly illustrated by entrepreneurs who feel forced to adapt their value proposition, partner choice and resource focus to this major barrier because circularity is *'still not their [the public] motivation'* (Int. R).

As for value propositions, some interviewees in the premium segment are reluctant to use sustainability aspects in their proposition to *'prevent people from thinking 'oh, that's one of those grassroots brands'* (Int. R) and because:

'you attract people who like the idea - 'oh, made from waste material, how good! Good job!' And then they end up not buying your product. And that's because you ... You made a lamp with very cheap, not very nice parts' (Int. W).

As for partner choice, one interviewee even prefers to work with *'genuine manufacturers of basic materials'* (Int. J) because:

'the hardest part is getting the evidence, getting the material proven ... Everyone is terrified of trying something new ... it [product from waste] is still looked at with suspicion ... ' (Int. J).

As for available resources, one interviewee chooses to upcycle only internal resources because:

'we find it very difficult, to work with other people's junk' and 'we apparently don't mind working with our own junk' (Int. I)

Finally, suppliers are reluctant to share their waste resources since they fear reputational damage if logos and brand names are *'used in the wrong way [and therefore] choose incineration as a safe way of disposal ... '* (Int. A).

4.3.4. Limited marketing competences

Interviewees refer to three important barriers related to marketing and customer relations.

Firstly, they may have limited marketing budgets to *'make nice commercials like those linear ones'* (Int. O) and struggle with strategic marketing focus. Although they find various cost-efficient and creative ways to generate exposure (see 4.1), these efforts are merely ad-hoc, opportunistic and lack strategic focus. Secondly, they suggest that more best practices, proof-of-concepts and launching customers are needed to *'to make it [upcycling opportunities] more visible'* (Int. I). Thirdly, they face bureaucratic decision processes in larger organizations with *'all kinds of management layers'* and *'people who don't have that ambition'* (Int. K) and therefore they *'have to pull, organise and force things'* (Int. I).

To address these barriers, one of the interviewees started a collaborative marketing initiative and calls for active government support to *'make a cool commercial'* and to *'enter the belly of the beast ... we want a circular furniture boulevard'* (Int. O).

4.3.5. Unequal playing field

Interviewees experience an unjust playing field favouring new imported linear products over locally produced upcycling alternatives. This major barrier is created by legacies in waste regulations, operational waste management and the Dutch tax and accountancy regulatory system.

First, legacy regulations create barriers for using waste as a resource. For example, various interviewees refer to waste regulations that prohibit the transport and processing of material that *'residents discard to us [waste management companies] and has the status of waste'* (Int. C). One interviewee suggests that accountancy compliance regulations are too complex and require alignment with the circular economy, for example because *'a product can never return to its original value'* (Int. M).

Second, urban operational waste management is focused on *'having streets as clean as possible within budget'* (Int. D), rather than maintaining potential value. Therefore, one of the interviewees suggests *'you have to prevent it [waste with potential value] from ending up at those environmental parks'* (Int. E).

Third, the Dutch tax system creates high costs for labour and used products. Interviewees argue that *'taxes on labour are too high and taxes on raw materials are too low'* [Int. K], which makes it difficult to compete with new materials imported from low-wage countries. Since upcycling usually involves additional manual handling, various interviewees consider the current tax system a fundamental barrier for the circular economy because *'cleaning, storing and preparing materials for reuse ... is very expensive now'* (Int. T). Others refer to value added taxes, and suggest lower rates for upcycled material, since *'it was already paid for with the original material'* (Int. U).

5. Discussion

This section presents the definition of urban upcycling and discusses motives, drivers and barriers for urban upcycling initiatives perceived by upcycling experts. Next, contributions to research and practice are presented, followed by limitations and emergent research themes.

5.1. Definition of urban upcycling, motives, barriers and drivers

The objective of this study was first to present a comprehensive definition of urban upcycling and second, to provide insight to researchers, policymakers and practitioners on dominant factors that drive or inhibit urban upcycling initiatives.

Urban upcycling is defined as:

actions aimed at creating or modifying a product from discarded materials, components or products into something of higher value, functionality and/or quality involving a city and its stakeholders (citizens, community, business and knowledge stakeholders).

Key factors that drive or inhibit urban upcycling were found by analysing motives, drivers and barriers perceived by urban upcycling experts to engage in urban upcycling initiatives. Building on empirical data gathered from 29 interviews in The Netherlands, three personal motives for experts to engage in urban upcycling including were identified: (1) a personal purpose to 'do good' by contributing to social or environmental goals, (2) a strong urge to challenge mainstream norms and beliefs, and (3) a motivation to learn and inspire by doing. While motives 1 and 3 are similar to those in Brown et al. (2019) who identified 'a sense of purpose' & 'excitement to learn and pursue new knowledge' as motives for circular oriented innovation, motive 2, which relates to an urge to challenge mainstream norms and beliefs, appears specifically relevant to urban upcycling. This may be related to the application of discarded products and materials, which is often perceived as waste, and hence negatively affects expectations of product quality and aesthetics.

The study also revealed key drivers and barriers summarised in Table 3.

Table 3
Personal motives, drivers and barriers for upcycling.

Personal motives		Drivers		Barriers	
1	Do good	1	Collaborative experimentation	1	Limitations in resource availability
2	Challenge the status quo & ideas fixes	2	Cross-sectoral local networks	2	Increasing capacity requirements
3	Learn and inspire by doing	3	Resource-based adaptive competences	3	Negative public perception
		4	Increasing customer demand	4	Limited marketing competences
		5	Social business viability	5	Unequal playing field

First, urban upcycling initiatives are stimulated by personal motives and external drivers that are strongly related. For example, collaborative experimentation (driver 1) provides a good context to learn and inspire by doing and challenge people and ideas (motivator 2). And it becomes easier to ‘do good’ (motive 1) if social business activities are financially viable (driver 5). This match between personal and organizational drivers may be beneficial, or even necessary. However, some of these mutually reinforcing drivers may also inhibit further business growth of initiatives. For example, experimentation may be focussed on generating new ideas, rather than dissemination and structured scale-up. Therefore, Scholl & de Kraker (2021) suggest a more structured approach of urban experimentation and more focus on sharing of knowledge.

Second, upcycling experts struggle with mutually reinforcing barriers (Table 3). First, urban upcyclers are faced with (1) resource limitations in combination with (2) increased capacity requirements. Various studies confirm that extreme varieties in quantity and quality of resources and limited logistical and technical data and competences are major issues in circular innovation (Forrest et al., 2017; Vermunt et al., 2019; Brown et al., 2019). Next, upcycling initiatives face market challenges by a combination of (3) negative customer perception and (4) limited marketing competences. Despite this market barrier, and in contrast to Forrest et al. (2017), experts experience a growing demand in business-to-business markets and envision longer term growth in consumer markets. However, these mutually reinforcing marketing barriers may inhibit entrepreneurs to fully exploit these opportunities. A study on European urban resource centres observes that combining marketing competences and digital skills are indeed key success factors, especially for local entrepreneurs (Futurium, 2019).

Third, a comparison of findings with existing literature reveals that important aspects are understudied. For example, literature on do-it-yourself upcycling by consumers describes personal motives such as empowerment (Coppola et al., 2021), self-fulfilment, social interaction or product-engagement (Shi et al., 2022), but this study shows that similar personal motives are also relevant for other stakeholders in upcycling initiatives. Hence, future research could investigate how personal motives of various stakeholders, such as consumers, entrepreneurs and corporate employees, may be aligned and can create synergies for developing new business models and a more favourable public perception for upcycling.

Fourth, social aspects, which have gained increasing interest in recent circular economy literature (Caldera et al., 2022; Khan et al., 2022; Hina et al., 2022; Valencia et al., 2023), are expected to be more prevalent and relevant to urban upcycling than to other circular strategies. The reason is that many upcycling activities require a relatively high amount of specialised, creative and adaptive competences and skills often involving direct personal human interaction on a local level. These requirements create favourable circumstances for combining education and social integration with the creation of labour-intensive jobs. Paradoxically, the data also reveal that the same characteristics also create interesting cases for development of advanced adaptive technologies, such as robotics.

Fifth and finally, while former studies suggested that the legal and tax systems acts as important drivers for circular initiatives (Brown et al., 2019; Geissdoerfer et al., 2023), no evidence for this was found in this study’s sample of upcycling entrepreneurs. Moreover, in line with earlier observations by Vermunt et al. (2019) and Forrest et al. (2017), upcycling experts feel that present legacy legislation and tax regulations stimulate *linear* business models, rather than circular initiatives, thus providing a playing field which is perceived by upcycling experts as fundamentally unequal, unfair and unjust. Therefore, upcycling experts call for alignment of the regulatory and tax frameworks to circular economy ambitions, hence creating a level playing field which enables and stimulates upcycling entrepreneurs to use waste as a resource.

5.2. Contributions to research

This research is a first step towards more comprehensive research on upcycling in urban contexts. The work seeks to contribute to various literature domains, including upcycling, circular cities, circular business models and circular innovation. By taking an interdisciplinary perspective these insights are combined into a comprehensive research contribution on the emerging field of urban upcycling.

This study contributes to earlier literature on upcycling, circular economy, circular cities, circular business models and circular innovation (Sung et al., 2019; Prendeville et al., 2018; Brown et al., 2019; Vermunt et al., 2019; Russell et al., 2020; Yoo et al., 2021; Hina et al., 2022). Table 4 compares the present study’s findings to earlier work. First, this study contributes to previous research on upcycling by providing a comprehensive definition of *urban* upcycling, reflecting how urban stakeholders play an important role in upcycling practices extending earlier conceptual work (e.g. Braungart et al., 2007). Second, through empirical work using case studies (as opposed to earlier literature review; Sung, 2015), important motives, drivers and barriers for urban upcycling initiatives are highlighted. Third, while there have been studies on upcycling (Braungart et al., 2007), circular cities (Prendeville et al., 2018), and barriers for circular business models in a Dutch context

Table 4
Contribution highlights and comparison with most cited literature.

Key studies	Methods	Key findings	What this study adds
Braungart et al. (2007)	Conceptual paper	Introducing concept of upcycling in industrial design.	Specific SME entrepreneurial and urban context.
Sung (2015)	Literature review	General overview of trends in publication, definitions, benefits, drawbacks and barriers of upcycling.	Including drivers based on empirical work (case studies).
Sung et al. (2019)	Quantitative survey	Adapted definition and personal motives based on UK individual makers in household upcycling.	Qualitative study in a different geographical context, involving other actors such as businesses
Vermunt et al. (2019)	Multiple-case-study	Barriers for circular business model implementation in The Netherlands.	Adding motivators and drivers and a specific context of urban upcycling.
Brown et al. (2019)	Qualitative study semi-structured interviews	Identifies motives, drivers and barriers in broader circular economy context.	More specific focus on upcycling in a city context.
Hina et al. (2022)	Literature review	Identifies category-level drivers and barriers for circular economy business models.	CEBM in an urban context and importance of social aspects.
Valencia et al. (2023)	Semi-systematic literature review	Identifies areas in circular economy to integrate social dimension.	Include upcycling of municipal bulky waste as new area for inclusion of social aspects.

(Vermunt et al., 2019), the work provides a comprehensive overview on urban upcycling and the diversity of motives, drivers and barriers.

Researchers can build on this study's insights on personal motives to enrich existing frameworks (Tura et al., 2019; Hina et al., 2022), or by integrating the specific drivers and barriers for urban upcycling in future circular business model research avenues identified in earlier work. For example, future research could investigate how personal motives drive successful business collaborations and partnerships in the context of Circular Economy Business Models (CEBM), how social activities contribute to the creation of viable CEBM (Hina et al., 2022).

More research is also needed on how entrepreneurial frontrunners in urban upcycling contribute to cognitive and/or behavioural change with regard to circular economy by engaging in business model experimentation (Konietzko et al., 2020; Bocken et al., 2021). For example, it would be interesting to understand how their personal motives related to inner self-fulfilment (Shi et al., 2022), such as the ambition to 'learn by doing', and the more externally focused urge to 'do good' and 'challenge' the status quo, either positively or negatively affect the circular business model development process at various experimentation stages.

Finally, this study reveals that motives, drivers and barriers related to the social dimension are important but understudied in circular economy literature (Valencia et al., 2023). Therefore, social indicators need to be integrated in current circularity metrics to quantitatively assess viability and feasibility of upcycling operations and related circular strategies (Brändström and Saidani, 2022). Researchers can use the findings to further explore how social drivers relate to the development and legitimacy of circular business models and the circular economy.

5.3. Contributions to practice

This work investigates urban upcycling initiatives and provides insights on how to enhance and scale existing initiatives in the context of a city or urban region. Policy-makers can use the motives, drivers and barriers found in this research to develop relevant schemes and incentives to stimulate urban upcycling.

First, local, regional and national public institutions are advised to incorporate public procurement criteria that stimulate the purchase of upcycled goods, which resonates with the mandatory green public procurement criteria in recent ESPR-Ecodesign regulations (European Commission, 2024). Government and local administrations play a leading role in utilizing upcycled materials in offices and other government facilities, which increases demand and contributes to a more positive public attitude towards upcycling and the circular economy.

Second, local governments can create incentives that promote resource availability, reduce risks for upcycling startups, and encourage collaborative experimentation in upcycling. For example, by providing local temporary working spaces at low costs and/or financial guarantees to promising local initiatives, entrepreneurial citizens and local social SME that engage in upcycling will be empowered to spend time and effort on collaborative development and marketing new products from discarded material.

Third, building on the results of this study, it is recommended to develop additional policy measures to strengthen organizational competences of SME engaged in upcycling related to resource-adaptivity and marketing. For example, upcycling entrepreneurs could be stimulated to join subsidised educational programmes, coaching sessions and networking events aimed at entrepreneurial competence development for the circular economy. Governments could also develop joint promotion campaigns that stimulate the purchase of upcycled products and promote the usage of relevant services, such as repair-cafes and digital marketplaces for reuse.

Fourth, additional measures are proposed to avoid the destruction of furniture during the collection and transport of municipal bulky waste and an extension of the ban on incineration. Current Dutch municipal collection systems of bulky consumer waste are aimed at facilitating

quick and efficient disposal by citizens, which stimulates value destruction at a very early stage and facilitates avoidable incineration of potentially valuable resources which can be easily upcycled, such as wood. Current EU-regulations, such as the ban on destruction (European Commission, 2024) and the extended producer responsibility (EPR) (European Commission, 2020; European Commission, 2023a,b), are yet limited to some materials applied in furniture, such as textile and/or steel. An extended ban on incineration and mandatory EPR schemes for materials which can upcycled would create important incentives across supply chains to separate material and create mono-streams which facilitate upcycling.

Fifth, financial incentives such as tax reductions on the VAT of used products, the development of true pricing policy measures and import restrictions on unsustainable products make upcycled products more competitive compared to cheap virgin products.

Finally, practitioners in existing large-scale upcycling processes, such as urban resource centres, municipal circular crafts centres and corporates engaged in upcycling, are advised to include the social dimension in their impact assessments, share available data and compare their work to other initiatives. Organizations often rely on techno-economic analyses, life-cycle analyses and financial indicators to assess viability of upcycling operations. However, this study showed that the social dimension is of crucial importance, including factors like employability and social inclusion, which are often linked to internally legitimizing urban upcycling, reputation, cost and income streams. This echoes earlier work on the importance of socio-economic issues in the circular economy (Valencia et al., 2023). Therefore, it is recommended to include metrics for measuring social impact in policy and practice, which resonates with ESRS- European Sustainability Reporting Standards (European Commission, 2022).

5.4. Limitations and future research

This study identifies motives, drivers and barriers based on a qualitative in-depth analysis of perspectives of Dutch experts in urban upcycling. Findings on factors that stimulate, or hinder upcycling initiatives confirm that more research is needed on drivers and barriers of circular economy business models, both more in-depth as well as in a wider context, as suggested in recent literature (Hina et al., 2022).

First, this study was limited by 29 interviews with a sample of 24 experts engaged in upcycling initiatives related to the Dutch furniture and interior design and willing to participate in this study. Due to this relatively small sample of experts in urban upcycling, specific forms of upcycling and/or types of companies may be over- or underrepresented. For example, the sample represents more small entrepreneurs engaged in product design, such as repurpose and creative refurbishing, than corporates which engage in functional forms of upcycling such as reuse, repair and remanufacturing. Since the corporate context and functional forms of upcycling may differ in norms, values, and legislations (Scott, 2013), more research is needed on the differences between various types of upcycling.

Second, since the sample of this study mostly consists of frontrunners in furniture upcycling, follow-up research could shed more light on effective interventions and development approaches to scale up various types of SME upcycling initiatives in an urban context, for example by examining how different types of actors in upcycling supply chains successfully collaborate and experiment to develop feasible and viable circular business models, also outside the context of furniture upcycling.

Third, since little is known about the various forms of upcycling and their relative environmental, social and financial impact, more quantitative research is also needed to gain insight in weights, volumes, items, the composition of bulky waste streams and impact generated from various upcycling strategies. Related to this, studies could explore how value destruction during the collection and handling of municipal bulky waste can be avoided, while creating social impact, like new jobs.

Fourth, the research reveals potential mutual benefits for small social

entrepreneurs in upcycling and corporates to collaborate and create social impact through scaling upcycling initiatives and identifies new intermediating roles across resource supply chains, such as material brokers and orchestrators. However, to-date little is known yet about these types of collaborations, about how successful these initiatives are, and how they impact current practices. Therefore, follow-up research could explore how collaborative social entrepreneurship and cross-sector connecting agents in urban upcycling contribute to the transition to a circular economy.

Fifth and finally, since the research was limited to The Netherlands, it remains unclear whether similar drivers and barriers for urban upcycling occur in other geographical urban contexts. Research in a wider context could investigate comparisons with other cities in the EU or the Global South, where more insight on building a circular economy is needed (Hofstetter et al., 2021).

6. Conclusions

This study is the first empirical study on urban upcycling that presents a comprehensive definition of urban upcycling and provides an integral insight into the most critical factors that drive and constrain urban upcycling. Urban upcycling is defined as: “actions aimed at creating or modifying a product from discarded materials, components, or products into something of higher value, functionality and/or quality involving a city and its stakeholders”. The study reveals that experts are motivated to engage in urban upcycling by a personal urge to (1) do good, (2) challenge the status quo and (3) learn by doing, while initiatives are predominantly stimulated by (1) collaborative experimentation, (2) cross-sectoral local networks, (3) resource-based adaptive competences, (4) an increasing demand for upcycled products and (5) viability of social business activities. Dominant factors that hinder urban upcycling initiatives include: (1) limitations in resource availability, (2) increasing capacity requirements, (3) negative public quality perception, (4) limited marketing competences and (5) an unequal playing field.

The findings confirm earlier research suggesting that business model experimentation plays a key role in developing circular business initiatives (e.g., Bocken and Konietzko, 2022) and acknowledges previous studies on the importance of urban social networks to facilitate the exchange of knowledge and material resources in a cross-sectoral context and opportunities for developing relevant entrepreneurial competences and practice testing of new initiatives (e.g., Voytenko et al., 2016; Futurium, 2019; Scholl and de Kraker, 2021; Caldera et al., 2022). The present study specifically sheds new light on the relevance of the dominant motivating, enabling and constraining factors for upcycling in the urban context.

Finally, to scale local initiatives and create more circular bulky waste management systems it is important to make business models for urban upcycling more viable, feasible, desirable, and widely accepted. This study reveals that the social dimension offers important opportunities. Therefore, future work might explore business models of urban upcycling initiatives, as well as the environmental and socio-economic impact of upcycling in the urban context.

CRediT authorship contribution statement

Marco van Hees: Writing – review & editing, Writing – original draft, Investigation. **Inge Oskam:** Writing – review & editing, Supervision. **Nancy Bocken:** Writing – review & editing, Supervision.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Marco van Hees reports financial support was provided by Taskforce for Applied Research SIA. If there are other authors, they declare that they

have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jclepro.2024.144485>.

Data availability

Data will be made available on request.

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