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DEWZROST: OPERACJONALIZACJA W KONTEKŚCIE MIASTA – W POSZUKIWANIU ALTERNATYWNYCH STRATEGII ROZWOJU

(DEGROWTH: AN OPERATIONALIZATION IN AN URBAN CONTEXT – IN SEARCH OF ALTERNATIVE DEVELOPMENT PATHS)

Rozprawa doktorska
przygotowana pod opieką
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Summary in Polish

Tytuł: Dewzrost: operacjonalizacja w kontekście miasta – w poszukiwaniu alternatywnych strategii rozwoju

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Środowisko naukowe już od dłuższego czasu jest świadome granic dalszego wzrostu gospodarczego, w związku z czym pojawiają się różne alternatywne strategie rozwoju. Jedną z takich strategii jest dewzrost – koncepcja rozwoju społeczno-gospodarczego oparta na ideach ekonomii ekologicznej i sprawiedliwości społecznej. Główną ideą dewzrostu jest redukcja rozmiaru gospodarki światowej poprzez sprawiedliwe zmniejszenie poziomu globalnej produkcji i konsumpcji.

Zainteresowanie dewzrostem stale rośnie, choć nadal brakuje jednoznacznych sposobów jego operacjonalizacji. Zaproponowanie kryteriów realizacji postulatów dewzrostu jest bardzo potrzebne, zwłaszcza w kontekście miejskim, któremu do tej pory w dyskusjach na temat dewzrostu poświęcano niewiele uwagi. Od ubiegłego roku odnotowujemy jednak znaczący przyrost publikacji nt. dewzrostu w miastach.

Kluczowym problemem badawczym poruszanym w niniejszej rozprawie doktorskiej jest operacjonalizacja koncepcji dewzrostu, zwłaszcza w kontekście miejskim. Głównym celem tej rozprawy jest stworzenie zestawu kompleksowych propozycji operacjonalizacji dewzrostu w miastach.

Niniejsza praca składa się ze wstępu, trzech powiązanych ze sobą artykułów naukowych opublikowanych w czasopismach o zasięgu międzynarodowym oraz dyskusji i wniosków podsumowujących cały cykl artykułów. Całość została przygotowana w języku angielskim.

W pierwszym artykule łączę dewzrost z obszarem *sustainability transitions*. Postawiłam tezę, że dewzrost zyskałby na sformalizowaniu w ramach *sustainability transitions* i sformułowałam w dwa cele:

1. Zbadać powiązania między obszarem *sustainability transitions* a dewzrostem w celu sformułowania wspólnej płaszczyzny dla obu z nich.
2. Zbadać, w jaki sposób ramy analityczne *sustainability transitions* mogą pomóc uczynić dewzrost bardziej szczegółowym i możliwym do zoperacjonalizowania.

Zastosowałam ramy analityczne perspektywy wielopoziomowej (multi-level perspective), aby opisać pożądaną transformację na rzecz dewzrostu i skonceptualizowałam inicjatywy na rzecz dewzrostu jako *transition experiments*. Ramy analityczne i aparat pojęciowy *sustainability transitions* okazały się pomocnymi soczewkami interpretacyjnymi do patrzenia na dewzrost i mogą pomóc w systematycznym ustrukturyzowaniu jego głównych postulatów oraz w zaprojektowaniu i zaplanowaniu transformacji na rzecz dewzrostu.

W drugim artykule podjęłam próbę stworzenia alternatywnej, dewzrostowej narracji nt. rozwoju miast. Stawiam tezę, że konieczne jest wyjście poza dyskusje między tymi, którzy podzielają podobne opinie i podjęcie dialogu z tymi, którzy należą do głównego nurtu i wpływowych obszarów, takich jak np. ekonomia miast. Celem artykułu jest znalezienie sposobów operacjonalizacji dewzrostu w miastach poprzez zestawienie postulatów dewzrostu z głównymi tematami analizowanymi w ekonomii miast. W wyniku takiego zestawienia sformułowałam 24 propozycje zagadnień kluczowych dla dewzrostu w miastach w odniesieniu do kluczowych tematów poruszanych w ekonomii miast. Konceptualizuję je jako dewzrostową ekonomię miast.

W trzecim artykule stosuję zagadnienia z poprzedniego artykułu jako kryteria do oceny, czy któreś z istniejących zjawisk i sieci miast mają potencjał, by przejść transformację na rzecz dewzrostu. Artykuł opiera się na dwóch tezach: że potrzebna jest nowa narracja dewzrostowej ekonomii miast, aby zoperacjonalizować dewzrost na szerszą skalę; oraz że analiza strategii i polityk miast reprezentujących wybrane sieci lub zjawiska przez pryzmat takiej narracji może wykazać, które z obecnych podejść do rozwoju miast są najbliższe wartościom dewzrostu. Celem artykułu jest ocena, które z analizowanych zjawisk miejskich – C40, miasta obwarzanka (wg. ekonomii obwarzanka Kate Raworth), *Transition Towns* czy kurczące się miasta – mają największy potencjał do wdrażania postulatów dewzrostu w miastach.

Summary in English

Title: Degrowth: An operationalisation in an urban context – in search of alternative development paths

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Limits to further economic growth became clear to the scientific community, and various alternative development strategies have appeared. One such strategy is degrowth, a socio-economic development concept based on ecological economics and social equity ideas. The main idea of degrowth is to decrease the size of the global economy by fair reductions in global production and consumption levels.

Interest in degrowth is constantly increasing, though clear ways of operationalisation of degrowth transitions are still lacking. A degrowth transition requires clear criteria for its implementation, especially in an urban context, to which little attention has been paid so far in degrowth debates. However, since last year we have seen an increase in the number of publications on degrowth in cities.

The key research problem addressed in this PhD thesis is how to operationalise the concept of degrowth, especially in an urban context. The main goal of this PhD thesis is to create a set of comprehensive proposals for the operationalisation of degrowth in cities.

This thesis consists of an introduction, three related scientific articles published in international journals, and a discussion and conclusions wrapping up the whole series of articles. It is written in English.

In the first article, I connect degrowth to the field of sustainability transitions. I put forward a thesis that degrowth would benefit from formalisation within the framework of sustainability transitions and formulated two goals for this article:

1. To investigate the linkages between sustainability transitions and degrowth to formulate a common ground for both of them.
2. To study how the analytical framework of sustainability transitions can help to make degrowth more specific and operational.

I applied the multi-level perspective analytical framework to describe the desired degrowth transition and conceptualised degrowth initiatives as transition experiments. The sustainability transitions analytical frameworks and conceptual notions proved to be helpful interpretative lenses for looking at degrowth. They can help to systematically structure its main postulates and help design and plan a degrowth transition.

In the second article, I aim to create an alternative urban development narrative. I put forward a thesis that it is necessary to move beyond the discussions between those who share similar opinions and enter into dialogue with those within mainstream and influential areas, such as urban economics. The article aims to find ways to operationalise degrowth in cities by juxtaposing degrowth proposals with the main themes analysed in urban economics. As a result, I formulated 24 proposals to support the degrowth transition in cities that address the key themes raised in urban economics. I conceptualise them as the agenda for urban degrowth economics.

In the third article, I apply these proposals to assess if some of the existing urban phenomena and networks have the potential to implement a degrowth transition. The article is based on two theses: that a new narrative of urban degrowth economics is necessary to operationalise degrowth on a larger scale; and that analysing the strategies and policies of cities that represent selected networks or phenomena through the lens of such a narrative can demonstrate which of the current approaches to urban development are the closest to degrowth values. The goal of the article is to assess which of the analysed urban phenomena – C40, doughnut cities (based on the doughnut economics of Kate Raworth), Transition Towns or shrinking cities – have the biggest potential to support a degrowth transition in cities.

Introduction

Ideas on how to address the current social-ecological crisis

There is substantial scientific evidence that we live in a time of global social-ecological crisis – with accelerating environmental degradation, biodiversity loss and climate change (Dasgupta, 2021; IPCC, 2022; Pascual et al., 2022) accompanied by the recent COVID-19 pandemic and intense ongoing war conflicts. Recent reports of the prominent intergovernmental organisations that deal with the two most pressing problems of our world, i.e., climate change and biodiversity loss, show that there have been no substantial improvements in countries' existing net zero pledges since the Intergovernmental Panel's on Climate Change (IPCC) COP26. Despite some progress, climate policy implementation remains too slow (IPCC, 2022). At the same time, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019) reported unprecedented rates of species extinctions and indicates how this links to the various challenges that human society will face in the future. All these are happening with deepening global economic and social inequalities in the background (Chancel et al., 2022). Something is going fundamentally wrong on our development path.

Since the publication of the famous "Limits to Growth" report (Meadows et al., 1972), various fields of studies and socio-economic development ideas have developed to tackle the abovementioned negative phenomena. Among them are: environmental economics, sustainable development, green economy, decoupling, sustainability transitions, circular economy, ecological economics, doughnut economics, steady-state economy, and the broad post-growth pluriverse. They differ in their intellectual roots and the scale and radicalism of changes they propose compared to the typical mainstream neoclassical economic approaches. The overview in the following paragraphs starts with the most conservative approaches and ends with the most far-reaching and progressive ones – from the point of view of how they address limits to economic growth.

Environmental economics is a subfield of neoclassical economics, which applies economic tools to address environmental problems and studies the economic effects of environmental policies. It is rather descriptive in nature and operates with the concepts of market failure and externalities. It does not question the underlying universally accepted development path based

on economic growth policies; instead, it is typically associated with green growth or sustainable growth (Reilly, 2012).

Sustainable development is a widely known and commonly accepted approach to broadly understood development that connects economic, social, and environmental aspects. It is defined as "a development model able to meet the needs of present generations without compromising the capacity of future generations to meet their own needs" (WCED, 1987). In opposition to the "Limits to Growth" report, in the sustainable development context, growth tends to be presented as the solution to social and environmental problems, not as the culprit of ecological decline (Gómez-Baggethun and Naredo, 2015).

The green economy is often understood as "a valid interpretation of the operationalisation of sustainable development in the practice of management" (Dokurno et al., 2016). UNEP (2018) defines a green economy as low-carbon, resource-efficient and socially inclusive. Economic growth should be driven by economic activities that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services (UNEP, 2018). In this context, growth is conceptualised as "green". Such a conceptualisation became convenient and popular among international political and business organisations and has gained extensive support in terms of broader faith in technologies and ecomodernism (Gómez-Baggethun and Naredo, 2015). Following the OECD's definition, green growth involves "fostering economic growth and development while ensuring that the natural assets continue to provide the resources and environmental services on which our well-being relies" (OECD, 2011, p. 9). It implies that the link between economic activity and its environmental impacts and material throughput has to be broken, i.e., decoupled. Decoupling may happen in relative terms (reduction of material throughput and emissions per production unit) and absolute terms (absolute reductions in material throughput and production). Absolute decoupling is needed to keep the global temperature change between 1.5 and 2˚C. Proponents of this idea believe this may be possible through technological changes, resource substitution and a service-based economy (Squires, 2013). However, although the green economy and green growth became ubiquitous terms widely promoted by leading multilateral organisations (such as World Bank, OECD, and UNEP), research shows no empirical evidence of absolute decoupling (Hickel and Kallis, 2020; Parrique et al., 2019).

Sustainability transitions field of research appeared as an attempt to theorise the transformative process allowing to achieve sustainable development. A sustainability transition (as a process) is defined as a "radical transformation towards a sustainable society, as a response to a number

of persistent problems confronting contemporary modern societies" (Grin et al., 2010). It originates from evolutionary economics (van den Bergh and Gowdy, 2000), complex adaptive systems theory (Loorbach, 2007; Rotmans et al., 2001) and innovation and technology studies (Rammert, 1997). Sustainability transitions area studies the transformation of socio-technical systems, which consist of actors (individuals, firms, organisations, and government structures), institutions (societal and technical norms, regulations, standards), material artefacts, and knowledge. It has developed conceptual notions and analytical frameworks to analyse the transformation towards sustainability, such as co-evolution, the multi-level perspective, the multi-phase perspective, and transition experiments.

One of the approaches which may allow reducing the amount of resources used in the production process is a circular economy which departs from the traditional linear economic model of "take, make and dispose of" to one in which the resources are in use as long as possible through applying the principles such as repairing, recycling, reusing, redesigning, repurposing etc. Implementation of the circular economy also necessitates the rethinking of ownership, meaning, e.g. the need for popularisation of collective ownership and leasing instead of selling the individual products, which entails that manufacturers would recollect and reprocess the raw materials at the end of each life-cycle as well offer repair services (Charonis, 2021).

Ecological economics is a heterodox field of research which developed in the 1970s. Its core premise is that the economy is a subsystem of the Earth's larger ecosystem. Due to this fact, finite resources and ecological sinks make the economy's continued growth unfeasible (Georgescu-Roegen, 1971; Martinez-Alier and Schlupmann, 1993; Pelletier, 2010). Another prominent feature which distinguishes it from mainstream economics is its focus on nature, justice and time and its contending that economics is normative (prescriptive) rather than positive (descriptive) (Victor, 2008).

Based on the concept of planetary boundaries (Steffen et al., 2015) and extending it by adding social boundaries, British economist Kate Raworth (2017) proposed the idea of doughnut economics. Nine planetary boundaries constitute an ecological ceiling transgressing which would mean unacceptable environmental degradation and reaching potential tipping points in Earth systems. Dimensions of the social foundation are derived from Sustainable Development Goals and mean internationally agreed minimum social standards for humanity. Between the ecological ceiling and social foundation lies a safe and just operating space for humanity, meaning that the results of human activity must not trespass the planetary boundaries and

simultaneously provide a decent standard of living for all. Doughnut economics is rooted in both orthodox and heterodox schools of economic thought – ecological, feminist, institutional, behavioural and complexity economics. It adopts the ecological economics' premise that economy is embedded into society and in larger Earth's system and understands the economies, societies, and the rest of the living world as "complex, interdependent systems that are best understood through the lens of systems thinking" (Fanning et al., 2020). Economic policy should aim to provide thriving within the doughnut instead of endless GDP growth. As for growth, doughnut economics adopts an agnostic approach (Raworth, 2017). The concept is growing in popularity, and recently it has been adapted to be applicable at the level of cities (Donut Berlin, 2021; Fanning et al., 2020).

One more concept that originates from ecological economics is the steady-state economy – an economy characterised by a constant stock of physical wealth, throughput and population size (Daly, 1977). Such a steady state has to be ecologically sustainable and socially just.

Finally, post-growth ideas are a broad umbrella term for various approaches to the socio-economic organisation which is not dependent on constant economic growth, such as prosperity without growth (Jackson, 2009; Victor, 2008), a-growth (van den Bergh, 2011), or degrowth, which is the focus of my PhD thesis. In this context, doughnut economics and steady-state economy also may be situated under this umbrella, as the former concept is agnostic to growth, and the latter implies a mildly fluctuating economy instead of a growing one.

Degrowth is the most radical and far-reaching idea among those listed here. It is a socio-economic development concept based on ecological economics and social equity ideas. Although the term *(décroissance)* first appeared in the 1970s, proposed by French philosopher André Gorz, it has only attracted broad interest since the 2000s (D'Alisa et al., 2015). As stipulated in the Degrowth Declaration, which set the scene for further research in this area (Research & Degrowth, 2010, p. 524), "the objectives of degrowth are to meet basic human needs and ensure a high quality of life while reducing the ecological impact of the global economy to a sustainable level, equitably distributed between nations." The proponents of degrowth emphasise the necessity of the immediate, voluntary and fair process of reducing the production, consumption and ecological footprint levels in the global economy, which they explicitly distinguish from the involuntary and harmful process of economic recession (acknowledging that the latter might happen if the economy continues to grow) (Research & Degrowth, 2010).

Interest in degrowth is constantly increasing, opening a window of opportunity to contribute to meaningful discussions and influence strategic policy-making initiatives regarding complex environmental and social challenges. It addresses crucial links between different frameworks of socio-economic development and has the potential to bridge the emerging proposals and make them feasible, e.g. it is the most far-reaching form of sustainability transitions (Khmara and Kronenberg, 2020), and the steady-state economy has to be the result of a degrowth transition (Kerschner, 2010). Degrowth also has much in common with the doughnut economics approach (Barca, 2018). However, clear ways of degrowth operationalisation in various contexts are still lacking.

Research problem: operationalisation of degrowth in an urban context – making the transition happen?

Degrowth is a bold proposal, but it has been criticised for being logically incomplete, ambiguous, and confusing owing to its multiplicity of definitions and operationalisation challenges (Fiorino, 2018; Pesch, 2018; Tokic, 2012). Nevertheless, recent research shows that reducing the energy and material throughput of the economy seems to be the only feasible way to prevent climate catastrophe (Hickel and Kallis, 2020; Keyßer and Lenzen, 2021). Thus, clear ways of operationalisation and implementation of degrowth are needed. The question of how to make degrowth possible was raised as early as 2010 during the 2nd International Degrowth Conference in Barcelona (2010). However, since then, more focus has been placed on other issues, such as exploring different theoretical perspectives which may inform degrowth (e.g., environmental justice, post-development studies, feminism), engaging into specific fields (e.g., technology), establishing degrowth as an emergent academic field, communicating its ideas and postulates on new forums (politics, media), and expanding its network of scientists and activists (Barlow, 2022). There are some established flagship proposals in degrowth discourse, like those related to work (working time reduction, introducing job guarantee and job sharing, in parallel with implementing universal basic income or free universal public services), as well as reduction or shutting down some of the most polluting industries (Hickel et al., 2022). Still, more concrete and context-sensitive ways of degrowth operationalisation are needed in various sectors and scales.

Although support for a top-down approach to a degrowth transition prevails in the degrowth literature (Cosme et al., 2017), the bottom-up grassroots action remains so far the only utilised tool for change. "Grassroot nowtopias" (Kallis et al., 2015, pp. 11–12), such as eco-communities, digital commons, communities of back-to-landers, urban gardens, community currencies, time banks, food and housing cooperatives are usually pointed out as such tools. Additionally, a growing body of literature has recently attempted to find ways for operationalisation of degrowth in the case of business (Froese et al., 2023; Hankammer et al., 2021; Hinton, 2021; Khmara and Kronenberg, 2018; Nesterova, 2021, 2020; Wells, 2018).

Degrowth transition would imply shortening supply chains and relocalisation of economic activity (Kallis, 2011; Kallis et al., 2015; Latouche, 2009). The local level (that of a city, town, village or community) appears to be central in degrowth literature, i.e., this is the basic level where the transition happens. As Latouche (2016, p. 89) pointed out, "politics, culture, and the entire way of life must regain their territorial anchoring." In this sense, relocalisation refers to the economy (i.e., creating highly self-sufficient local economies) and politics, i.e., decentralising decision-making, emphasising greater autonomy and democracy. Negative social and environmental impacts of globalisation and neoliberal capitalism provide another justification for relocalisation. The focus on the importance of the local dimension is notable and manifests itself in discussing the ideas of networked communities, eco-villages or broader bioregions as new political forms (Latouche, 2016; Trainer, 2012), but nevertheless, it received some criticism. For example, Romano (2012) claims that given political and territorial context (the localist one) does not necessarily produce the desired political and economic choices and societal values (Harvey, 1996). Another line of criticism relates to the fact that our planet is not a *tabula rasa* and existing human settlements can hardly be reconfigured; thus, there is an urgent need for degrowth to provide a thorough explanation of how cities (and big agglomerations in particular) "could be converted from 'growth machines' to degrowing places" (Mocca, 2020, p. 86).

Indeed, nowadays, cities are home to almost 60% of the world's population. They generate 80% of the global economic output and are responsible for 2/3 of the global energy demand and 75% of carbon dioxide emissions – even though they occupy only 3% of the planet's land (Seto et al., 2017). While scholars unanimously recognise the importance of cities, they discuss whether cities will be key components of the transition to sustainability or major threats to sustainability (Seto et al., 2017). Nevertheless, cities have the potential to serve as places for social, economic and ecological transition experiments and new initiatives and interventions to counteract

unsustainable behaviour and practices have often originated in cities (Frantzeskaki et al., 2017). They are focal lenses through which we can view the problems of the modern world addressed in the degrowth literature, and the link has to be made between the broader ideas of degrowth and urban challenges and opportunities.

Although the local dimension was always present and important in the degrowth discourse, the discussion on degrowth in cities, especially big ones, has appeared relatively recently. In the last decade, degrowth scholars have started to look at cities as loci for degrowth initiatives and practices. Initially, the research focused on rather fragmented issues, such as urban water supply (Domènech et al., 2013) and urban gardening (Anguelovski, 2015). More recently, a growing body of literature has addressed housing (Ferreri, 2018; Lietaert, 2010; Nelson and Schneider, 2018; Xue, 2015, 2012) and urban planning (Kuzmanic, 2017; Lehtinen, 2018; Prats, 2017; Savini, 2021; Wächter, 2013). The most notable sign of increased interest in degrowth in an urban context is two recent special issues in high-ranking journals, *Local Environment* (Xue and Kębłowski, 2022) and *Urban Studies* (Kaika et al., 2023). Most contributions to these special issues also relate to housing (Mete, 2022; Savini, 2021; Tunstall, 2022), urban planning (Cucca and Friesenecker, 2022; Martínez Alonso, 2022; Ruiz-Alejos and Prats, 2022; Xue, 2022) and mobility (Cattaneo et al., 2022; Kębłowski, 2023).

The fact that cities have appeared in degrowth research is undoubtedly a step towards finding a way to make the degrowth transition happen. Nevertheless, this is just the beginning. As Fitzpatrick et al. (2022, p. 9) suggested, ingredients do not make delicious meals; recipes do. Most of the topics of urban degrowth are studied separately (e.g., housing, mobility). There is a lack of a coherent storyline, a set of principles on which urban degrowth should rely, as well as there is lack of ways of getting there. The key research problem of this PhD thesis is to propose ways to operationalise degrowth in an urban context and thus create an alternative urban development narrative – an urban degrowth storyline. In order to do so and to move beyond discussions between those who share similar opinions, it is necessary to connect degrowth not only with debates on urban sustainability but also to enter into a dialogue with those within urban economics. Although there have been some attempts to outline "the degrowth economics" (Kallis et al., 2020, 2012; Nørgård, 2013), degrowth proponents often underestimate the economic perspective and mechanisms that could be used for its operationalisation.

Apart from describing a desired future, urban degrowth economics, one must also consider how to get there. In this context, it is particularly relevant to draw on knowledge generated within

the field of sustainability transitions and, more specifically, the field of urban sustainability transitions: research on fundamental and structural changes in urban systems through which persistent societal challenges are addressed (Frantzeskaki et al., 2017). In this context, it may be particularly useful to draw on one of its most often-used analytical frameworks – the multi-level perspective. According to it, transitions are non-linear processes that interfere at three functional levels: niches – loci for radical innovation; regimes – the dominant way in which societal needs are fulfilled (including conventions, rules and norms that guide the uses of particular technologies and practices); and landscapes – long-term, exogenous trends (Grin et al., 2010). Regimes are central in this hierarchy, as transitions are defined as shifts from one regime to another, and experiments in niches are crucial for regime change. At the same time, landscape developments, though hard to change, provide external pressure for regimes (e.g., challenges of globalisation, urbanisation, and environmental degradation). Conceptualising degrowth transition as a specific form of sustainability transition and applying to it this analytical framework along with tools, such as transition management and transition experiments, may help to make (urban) degrowth real.

Goals, theses, and an overview of the three articles

In light of the above definition of the research problem, two assumptions can be made: (1) to be socially and economically feasible, degrowth needs to move beyond idealistic claims and requires operationalisation; and (2) given the scale of impacts exerted on the global environment by cities, implementing solutions in an urban context would represent high leverage for solving planetary problems.

The main goal of this PhD thesis is to create a set of comprehensive proposals for the operationalisation of degrowth in cities. Drawing on the argument that (urban) economics offers some ideas that can be woven into new degrowth economics, I attempt to achieve this goal by proposing a set of criteria for urban degrowth economics. At the same time, I use the sustainability transitions analytical frameworks to conceptualise the degrowth transition, which suggests how to plan and manage the transition to a desired urban future.

My PhD thesis takes the form of a series of three related articles. Table 1 briefly describes the goals and theses of the three articles.

Table 1. Goals and theses of the articles included in this PhD thesis

Article	Goals	Theses
First article: Degrowth in the context of sustainability transitions: In search of a common ground	To study how the analytical frameworks of sustainability transitions can help to make degrowth more specific and operational	Degrowth would benefit from formalisation within the frameworks of sustainability transitions
	To investigate the linkages between sustainability transitions and degrowth to formulate a common ground for both of them	
Second article: Urban degrowth economics: making cities better places for living, working, and playing	To find ways to operationalise degrowth in cities through juxtaposing degrowth proposals with the main themes analysed in urban economics	To move beyond discussions between those who share similar opinions, it is necessary not only to connect degrowth with debates on urban sustainability, but also to enter into dialogue with those within mainstream and influential areas, such as urban economics
		Applying many of the already proposed policies and mechanisms may facilitate the transition towards degrowth and contribute to creating a comprehensive urban degrowth narrative
Third article: On the road to urban degrowth economics? Learning from the experience of C40 cities, doughnut cities, Transition Towns, and shrinking cities	To assess which of the analysed urban phenomena have the biggest potential to support degrowth transition in cities.	A new narrative of 'urban degrowth economics' is necessary to operationalise degrowth on a larger scale.
		Analysing the strategies and policies of cities that represent selected networks or phenomena through the lens of such a narrative can demonstrate which current approaches to urban development are the closest to degrowth values.

The first article links degrowth to the field of sustainability transitions. It conceptualises degrowth as the most far-reaching form of sustainability transition by applying the multi-level perspective analytical framework (Khmara and Kronenberg, 2020). According to this, different kinds of degrowth practices or "nowtopias" (such as co-housing projects, eco-villages, agroecology initiatives, urban farming, consumer cooperatives, the solidarity economy, community currencies, timebanks, decentralised renewable energy communities), which exist outside of formal institutions, may be considered to be grassroots niche experiments. They exert bottom-up pressure on existing unsustainable regimes. The central regime, which must be changed from the degrowth perspective, is the pursuit of economic growth. The new regime that is expected to result from the degrowth transition is the steady-state economy. Niches and regimes are embedded in the broader landscape, which can currently be associated with the neoliberal capitalist socio-economic system and a growing population, urbanisation and globalisation. Degrowth practices may be designed and governed as transition experiments with the application of transition management so that they may gradually break through the protected level of a niche and lead to a regime change.

The second article attempts to imagine what cities undergoing a degrowth transition should look like and which issues should be prioritised by juxtaposing degrowth proposals with the main themes analysed in urban economics (Khmara and Kronenberg, 2023a). These themes are (1) urban growth and city size; (2) urban land rent and land-use patterns; (3) industrial location, agglomeration and clustering; (4) housing and housing policy; and (5) transport. In other words, these are the regimes which need to be transformed. I addressed these from the normative degrowth perspective, highlighting the existing economic policies and instruments that could be used for degrowth operationalisation. This resulted in 24 proposals for urban degrowth economics.

In the third article, I applied the criteria developed in the second article to assess selected case study cities representing the following networks and phenomena: C40, doughnut economics, Transition Towns, and shrinking cities (Khmara and Kronenberg, 2023b). The cities selected to represent the above phenomena are Copenhagen, Amsterdam, Totnes, and Detroit, respectively. I conducted a content analysis of these cities' strategic documents, programs, reports, and local governments' websites, along with scientific literature in terms of compliance with the developed criteria in order to see which of the current approaches to urban development are the closest to degrowth values and could support a transition towards degrowth.

The novelty of this thesis and its inputs into economics

The series of three academic articles that constitute this PhD thesis provides important inputs into the ongoing debate on operationalising degrowth and, more broadly, reforming economics.

There is a broad consensus that the fundamental simplifying assumptions that one has to make to discuss most, if not all, neoclassical economics models make them rather unrealistic (Raworth, 2017), and indeed many of the most important inputs into economics are based on alleviating some of these simplifying assumptions. Examples include laureates of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel: Elinor Ostrom (economics of common-pool resource governance), Daniel Kahneman (behavioural finance), and George A. Akerlof, A. Michael Spence, and Joseph E. Stiglitz (asymmetric information). Two ecological economists, Herman Daly and Robert Ayres, were nominated to the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in Economics in recognition of their work that has laid the foundations for the concept of degrowth, including highlighting the dependence of economics on the environment and steady-state economics. This demonstrates the increasing acknowledgement of this alternative and innovative approach to economics. Degrowth is even more revolutionary, and postulates regarding its operationalisation seem quite radical compared to the current way of thinking about economics, yet crucial for creating alternative development paths.

Fortunately, over the last few decades, there has been a growing recognition of the linkages between the economy, society, and the environment. These are the three pillars of sustainable development. However, the naïve belief in resource substitution and (green) technological modernisation, which would allow the decoupling of economic growth from production and consumption, still prevails in mainstream economic thought (Squires, 2013). Nevertheless, the discussion on whether such an approach is feasible is slowly breaking through academic circles to reach a broader audience. Two conferences at the level of the European Parliament illustrate this: the Post-Growth 2018 conference and the Beyond Growth 2023 Conference. The aim of the latter is "to challenge conventional policy-making in the European Union and to redefine societal goals across the board, in order to move away from the harmful focus on the sole economic growth – that is, the growth of GDP – as the basis of our development model. The conference will put into practice the idea of a post-growth future-fit EU that combines social

well-being and viable economic development with the respect of planetary boundaries" (https://www.beyond-growth-2023.eu/about-beyond-growth/).

Another manifestation of validation and recognition of the topic's broader societal relevance is the fact of awarding 9.9 million euros to the research project titled "Pathways towards post growth deals" ("ERC Synergy Grants 2022 - project highlights," 2022) led by Giorgos Kallis, Julia Steinberger and Jason Hickel – perhaps the most prominent researchers working on degrowth. This project attempts at degrowth operationalisation, indicating how important a task it is. As Kallis himself grasped, "basically the idea is to try to bring degrowth's abstract ideas to the ground and think more concretely about the metabolisms, *policies, economics* and politics that can make degrowth REAL" (Kallis and Barlow, 2022, emphasis added). Meanwhile, this is what I have been doing within this thesis, albeit on a smaller scale.

One more prominent sign of a broader recognition and importance of degrowth is that degrowth-related policies were mentioned several times as the "alternative sustainability concepts" in the latest IPCC report (IPCC, 2022). After describing green growth, the authors point out that "critics, however, argue that green economy ultimately emphasises economic growth to the detriment of other important aspects of human welfare such as social justice […] and challenge the central idea that it is possible to decouple economic activity and growth (measured as GDP increment) from increasing use of biophysical resources (raw materials, energy) […]" (IPCC, 2022, pp. 177–178). Although the green economy is a valuable concept familiar to many, in order to be feasible it needs to step beyond the indisputable assumption that "economic growth and environmental stewardship can be complementary strategies" (Ryszawska, 2019, p. 108). Proposing clear ways of degrowth operationalisation and showcasing the links between degrowth and other (better known) concepts and approaches helps to make it clearer for a broader audience.

This PhD thesis enters into dialogue with urban economics. It is the most prominent field of economics that deals with issues specific to cities, but it features urban growth as one of its most important aspects, while potential limitations to growth are only considered in the context of spatial planning and the prevention of urban sprawl (O'Sullivan, 2012). Urban economics has already received some criticism for ignoring the macroecological realities related to urban areas exceeding their fair share of the planet's carrying capacity and focusing on market forces alone, and the need to reform it has also been expressed (Obeng-Odoom, 2016; Rees, 1992). My case of urban degrowth economics is an attempt to contribute to such reforming and bring attention to urban commons (Foster and Iaione, 2019; Polko, 2022; Sokołowicz, 2017).

Finally, the PhD thesis contributes to the field of sustainability transitions by linking it with degrowth and applying its analytical frameworks to the process of degrowth operationalisation. As Feola (2020, p. 247) points out, sustainability transitions research "should join forces with other disciplines to broaden its understanding of the pathways toward radical non-linear societal changes beyond capitalism." It works both sides: if degrowth is conceptualised as the most far-reaching form of sustainability transitions, then finding ways of its operationalisations enriches the research on sustainability transitions as well. Specifically, applying the framework to the scale of cities, as undertaken in this PhD thesis, contributes to research on urban sustainability transitions.

Degrowth scholars call their project "a concrete utopia" (Kallis, 2018; Latouche, 2009), i.e., the utopia which must be reached if we want to survive and sustain well-being as humanity, and there must be proposed concrete steps to reach it. Nevertheless, as we luckily do not live in a post-apocalyptic world of "Mad Max" or other movies of this kind, these concrete steps must rely on what is already available. This PhD thesis highlights what instruments, mechanisms, and policies may be used to make the concrete utopia of degrowth possible and indicates what else needs to be added.

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Article 1

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Degrowth in the context of sustainability transitions: In search of a common ground

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ABSTRACT

The aim of this article is to study how the sustainability transitions analytical framework can help to make other concepts of sustainable socio-economic development more specific and operational. Specifically, we investigate the linkages between sustainability transitions and degrowth. Based on a literature review of both degrowth and sustainability transitions, we distinguish several aspects that provide a common ground for both approaches. We identify degrowth as one of the most far-reaching forms of sustainability transitions but suggest that it would benefit from a more stringent conceptualization using the analytical framework of sustainability transitions. To this end, we apply some conceptual notions from sustainability transitions theory to describe the idea of a degrowth transition. In particular, we analyze two case studies of degrowth practices (Cargonomia and a Transition Towns network) using the analytical framework of transition experiments. Sustainability transitions analytical frameworks and conceptual notions proved to be helpful interpretative lenses for looking at degrowth, and they can help to systematically structure its main postulates.

1. Introduction

Concerns about the adverse environmental impacts of economic development and even about the limits to further economic growth have been an important part of academic debates since the second half of the 20th century, resulting in the emergence of concepts such as sustainable development or the steady-state economy (Daly, 1977; Georgescu-Roegen, 1971; Meadows et al., 1972). Over time, the transition to sustainable development has become a global goal for the UN and other international organizations (United Nations, 2015, 1992; World Commission on Environment and Development, 1987).

However, sustainable development cannot be achieved solely by setting long-term targets, without developing theoretical and practical knowledge about how to achieve them. The sustainability transitions research area developed in response to recognizing the above and as a result of multiple (academic and political) failures to deal with the transformative change towards sustainability. With its own specific vocabulary and analytical frameworks, the area of sustainability transitions research is more formalized in comparison with other approaches to the socio-economic transformation towards sustainability. What also makes the sustainability transitions approach different and broader than other frameworks of socio-economic transformation is that it "captures the co-dynamics of technologies, institutions, social and economic sub-systems and conditions" (van den Bergh et al., 2011, p. 8). Finally, sustainability transitions are simultaneously a research area and the subject of that research area. According to Markard et al. (2012, p. 956), sustainability transitions are long-term, multi-dimensional, and fundamental transformation processes through which the established socio-technical systems shift to more sustainable modes of production and consumption.

The push for substantial transformation towards a sustainable society closely links to the concept of degrowth, which calls for a radically different organization of modern society and the economy. From being merely an activist slogan, degrowth evolved into "an interpretative frame for social movement" (Demaria et al., 2013, p. 194), and a field of academic research. Similar to sustainability transitions, degrowth is both a research area and the process it studies. According to the Degrowth Declaration, degrowth is

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defined as "a voluntary transition towards a just, participatory, and ecologically sustainable society" (Research and Degrowth, 2010, p. 524). The main idea of the degrowth movement is to downsize the global and national economies fairly and thus reduce the ecological footprint to a sustainable level (Research and Degrowth, 2010). Such downsizing must be voluntary and democratic, with the emphasis on social and environmental justice (D'Alisa et al., 2015a; Demaria et al., 2013).

Although degrowth is a bold proposal and it is sometimes presented as one of the ultimate objectives of the circular economy (Schulz et al., 2019), it is not a complete and codified paradigm, and it does not aspire to become one, remaining a loose combination of ideas and postulates, "a confluence point where streams of critical ideas and political action converge" (Demaria et al., 2013, p. 193). Indeed, very few attempts have been made to operationalize degrowth, for example, in business, which is a driving force of the modern economy (Khmara and Kronenberg, 2018).

The aim of this article is to study how the analytical framework of sustainability transitions can help to make other concepts of sustainable socio-economic development more specific and operational. In particular, we investigate the linkages between sustainability transitions and degrowth (in the sense of being both the processes and academic fields) to formulate a common ground for both of them, i.e., to indicate the similarities in approaches to various ideological, conceptual and practical issues, despite using a different "language." As degrowth remains a loose collection of ideas rather than a well-theorized and formalized concept, we suggest that it would benefit from formalization within the framework of sustainability transitions.

Based on a critical review of the literature on both degrowth and sustainability transitions, we distinguish several aspects that provide a common ground for both approaches. To support our assumption, we apply conceptual notions from the sustainability transitions field of research (such as the multi-level perspective, the multi-phase perspective, and co-evolution) to describe the degrowth transition. Then, we analyze case studies of degrowth practices (mainly in an urban context), which demonstrate that degrowth practices may be understood and managed as transition experiments.

We find out that both approaches – degrowth and sustainability transitions – are closely related. Ideologically, degrowth represents one of the most far-reaching forms of sustainability transitions, yet it would benefit from a more stringent conceptualization using the analytical framework of sustainability transitions. Meanwhile, sustainability transitions research can also benefit from degrowth inspiration, especially in terms of broadening the scope of its interest in social innovations and enhancing the participation of various actors in transition governance.

The article is structured as follows. In Section 2, we introduce sustainability transitions and degrowth and briefly analyze previous attempts to link them. Then we elaborate on the common ground of both fields of study by providing similar approaches, ideas, and postulates. Finally, we describe degrowth with the terminology and analytical frameworks of sustainability transitions. In Section 3, we introduce transition experiments, their characteristics, and their mechanism of contributing to transitions, simultaneously linking them to the degrowth initiatives. In Boxes 1 and 2, we analyze two examples of degrowth initiatives with the framework of transition experiments. The article ends with a discussion and conclusions in Section 4. Fig. 1 demonstrates the flowchart of the research.

2. Linking degrowth to sustainability transitions

2.1. What are sustainability transitions and degrowth?

Although the idea of sustainable development is not new, there have been few attempts to theorize the transformative process that it involves. The emergence of the sustainability transitions field of research is one such attempt. An interdisciplinary academic community was formally inaugurated at the 1st European Conference on Sustainability Transitions in Amsterdam in 2009. However, research on sustainability transitions goes back to the early 2000s (Elzen et al., 2004) and links to studies on evolutionary economics (van den Bergh and Gowdy, 2000), complex adaptive systems theory (Loorbach, 2007; Rotmans et al., 2001), and innovation and technology studies (Rammert, 1997), etc.

The sustainability transitions research area studies the transformation of socio-technical systems. They consist of actors (individuals, firms, organizations, government structures), institutions (societal and technical norms, regulations, standards), material artifacts, and knowledge.

The field of sustainability transitions research can be divided into two sub-fields: Transition Dynamics and Transition Management. Transition Dynamics develops fundamental knowledge about transition processes, while Transition Management develops both fundamental and practical knowledge for steering these processes (Frantzeskaki, 2011; Van den Bosch, 2010). The sustainability transitions research area has developed conceptual notions and analytical frameworks to analyze the transformation towards sustainability, such as co-evolution, the multi-level perspective, the multi-phase perspective, and transition experiments.

Its own specific vocabulary and set of analytical frameworks distinguish sustainability transitions as more formalized in comparison with other approaches to the socio-economic transformation towards sustainability, one of which is degrowth. Though the term appeared for the first time in the 1970s as the French word "décroissance," it gained popularity only at the beginning of the 2000s as an activist slogan calling for the voluntary shrinking of production and consumption (Demaria et al., 2013). The term reached academic journals mostly after the first degrowth conference in Paris in 2008, which can be associated with the establishment of degrowth as a new field of academic research that links to studies on social movements, ecological economics, bioeconomics, etc.

Degrowth is rich in meaning, identifying a research area and a social movement, as well as a process. In the socio-economic change sense, we mostly refer to the definition of degrowth proposed in the Degrowth Declaration from the abovementioned conference, which classified degrowth as a transition process: "We define degrowth as a voluntary transition towards a just, participatory, and ecologically sustainable society. The objectives of degrowth are to meet basic human needs and ensure a high quality of life, while reducing the ecological impact of the global economy to a sustainable level, equitably distributed between nations … Once right-sizing has been achieved through the process of degrowth, the aim should be to maintain a 'steady state economy' with a relatively stable, mildly fluctuating level of consumption" (Research and Degrowth, 2010, p. 524). Other authors, such as Kerschner (2010), also promoted the understanding of degrowth as a transition process to a steady-state economy.

However, the concept of degrowth has received some critisism for being ambiguous and somewhat confusing (van den Bergh,

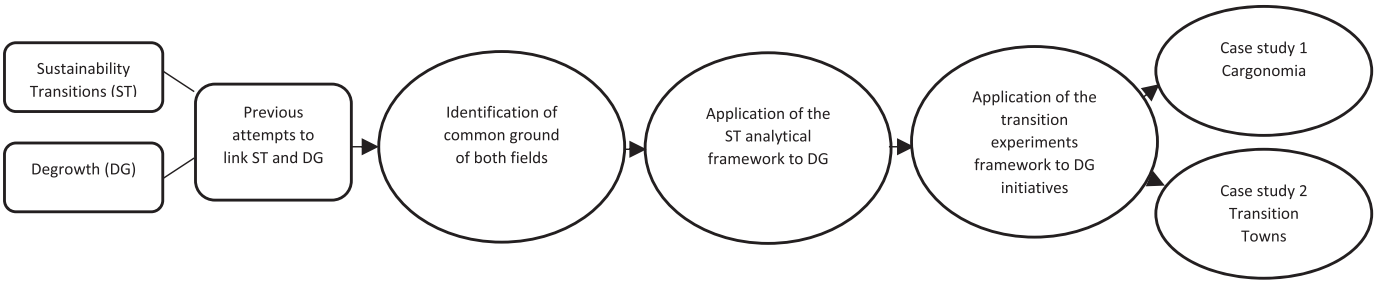

Fig. 1. Research flowchart (the rectangle shapes reflect sections that present existing theories, concepts, and frameworks, while the oval shapes indicate sections with our contribution).

2011), and logically incomplete in its current form (Tokic, 2012). A blog series on a strategy for degrowth has been initiated in reaction to the movement's "strategic indeterminence" (Barlow, 2019), meaning its "all-encompassing nature" and desire to act as an umbrella for a variety of concepts, theories, etc. (Herbert et al., 2018). Hence, developing an understanding of a systemic transformation for degrowth is of high importance.

2.2. Previous attempts to link degrowth and sustainability transitions

Some implicit attempts have already been made to link degrowth and sustainability transitions. For example, Gibbs and O'Neill (2017) analyzed different approaches to the green economy, placing low-carbon but still growth- and consumption-based economic agendas at one end, and degrowth at the other. They used sustainability transitions as a framework to conceptualize potential shifts in economic policies towards a greener economy. Based on Bina (2013) and Ferguson (2015), Gibbs and O'Neill (2017) divided discourses on the green economy into three groups: Those that are conventional pro-growth oriented/almost business as usual; those based on selective growth and greening the economy; and finally, those based on limits to growth and socio-economic transformation. While the beginning of the spectrum is frequently articulated in policy, it only suggests incremental change and is based on a *fit and conform* approach. The end of the spectrum is most rarely articulated in policy, and it proposes a transformative change and represents a *stretch and transform* approach. The authors included the steady-state economy and prosperity without growth and degrowth in the last group, along with social well-being, alternative food networks, and eco-housing developments, though prosperity without growth (D'Alisa et al., 2015a) and alternative food networks (Anguelovski, 2015) typically fit under the umbrella of the degrowth discourse.

Gibbs and O'Neill (2017) brought together two examples from opposite ends of the spectrum – the Green Tech Valley in the Austrian province of Styria and various degrowth-related initiatives. They used the sustainability transitions analytical framework to look at both case studies. In this way, sustainability transitions served as a "useful perspective" to explore and interpret the issues of disaggregation and the contestation of the green economy discourse, which can be applied to diverse kinds of initiatives – those based on clean-tech ecological modernization (Styria), as well as alternative ones (degrowth initiatives).

Haberl et al. (2011) also combined the notions of transitions, regimes, and degrowth, though not explicitly using the sustainability transitions analytical framework. They mentioned two major transitions that have occurred in the social metabolism of human societies – the transition from a hunter-gatherer regime to an agrarian one, and the transition from an agrarian regime to an industrial one. They claimed that a new development model, a "Third Transition," is needed, and they suggested that degrowth would fit as such a notion. Following this, O'Neill (2012, p. 222) proposed that "degrowth may be seen as an attempt to envision this third transition, and a steady state economy an attempt to operationalize the new regime."

However, both authors define regime as socio-metabolic, not socio-technical (as in the traditional sustainability transitions discourse). Moreover, in our understanding, the steady-state economy should become a new regime itself, not just a way to operationalize it (see subsection 2.4).

Similarly, Gibbs and O'Neill (2017) applied the sustainability transitions framework to look at degrowth in a somewhat general way, which may be explained by their specific research objective. Our perspective is different. We strive to find more links between the two approaches from the theoretical and conceptual points of view and apply the vocabulary of sustainability transitions to degrowth in more detail, to make degrowth more concrete and clear for potential decision-makers and, thus, more operationalizable. Distinguishing common ideas of both research areas is the first step in this direction.

In one of the newest works bridging degrowth and sustainability transitions, an attempt was made to "reconceptualize degrowth as a radical niche innovation to the capitalist-growth regime" (Vandeventer et al., 2019, p. 272). Here, we provide a broader understanding of degrowth, explore the links between both fields more deeply, and propose a different conceptualization of degrowth in the context of sustainability transitions.

2.3. Common grounds of degrowth and sustainability transitions

By applying a critical review approach "to combine perspectives and insights" (Snyder, 2019, p. 336) of key publications from the degrowth and sustainability transitions fields of research, we have distinguished several aspects that provide a common ground for both degrowth and sustainability transitions, illustrating them with specific approaches to particular issues from both research areas (Table 1). The first column lists the relevant aspects, identified by ourselves and based on a literature review, while the following two columns contain the supporting arguments from both fields of research, with references to the literature.

Although they use different language and have different levels of formalization, they ultimately converge. What distinguishes them the most is the role of technology. Sustainability transitions research gives a prominent role to technology as the tool that fulfills societal functions and treats it in a more "instrumental" manner (new technological artifacts are part of system innovations ensuring the transition to sustainability) (Geels et al., 2004; Rip and Kemp, 1998). Meanwhile, a huge ideological debate is taking place in the degrowth research on the role of technologies in society and

Table 1
Common grounds of degrowth and sustainability transitions.

Aspect	Degrowth	Sustainability Transitions
1. Creating and advocating for an alternative value system	• Emphasizing doing *different*, not only *less*; not only reducing production and consumption but also changing production and consumption patterns (Kallis et al., 2015); • Expressing the need for change in the structure of values and a change in value-articulating institutions (Demaria et al., 2013);	• Understanding sustainability transitions as a quest for new value systems which are more in tune with sustainable development (Geels, 2010; Grin et al., 2010a); • Assuming not only a change of the system but also a change in users' criteria of judging products, services, and systems (Kemp and van Lente, 2011);
2. Placing unsustainable production and lifestyle patterns as reasons for the modern economic crisis	• Pursuing growth and limits to growth as the reason for the current economic crisis (Jackson, 2009; Kallis et al., 2015);	• The current economic crisis as a symptom of a deeper-lying systems crisis rooted in the misbalance between unsustainable consumption and production patterns (Grin et al., 2010a; Loorbach and Lijnis Huffenreuter, 2013);
3. Looking at a crisis as an opportunity to change	• Seeing the current economic crisis as an opportunity "to invest in change" (Jackson, 2009, pp. 15, 172) (an opportunity to address financial and ecological sustainability simultaneously (Jackson, 2009, p. 18)); • Understanding the goals of the degrowth movement as not only surviving the resource depletion with the least social cost but as using this crisis "to stimulate the creation of a more equitable and sustainable world that questions the current modes of socio-economic organization and a civilization based on the careless over-exploitation of non-renewable resources" (Kerschner, 2015, p. 132);	• Claiming that in systems terms, crisis (including tensions in regimes and landscape pressures) is not negative and provides an opportunity to transform the system (Grin, 2010; Loorbach and Lijnis Huffenreuter, 2013; Swilling, 2013);
4. Stressing the importance of voluntary democratic transitions regardless of the perceived inevitability of crisis	• Emphasizing that the process of reducing production must be voluntary and fair, and distinguishing it from an involuntary and harmful process of economic recession (acknowledging that the latter might happen if the economy continues to grow) (Research and Degrowth, 2010; Schneider et al., 2010);	• Transition initiatives advocating for attention "to issues in the absence of a perceived crisis" (Bettini et al., 2017); • Emphasizing that transitions are not processes unfolding as a result of or in the aftermath of a crisis (Grin et al., 2017; Kemp and Rotmans, 2004);
5. Alternative social, economic and technological practices as chances to transform the system	• Grassroots nowtopias as non-capitalist practices and institutions in reaction to the inability of conventional institutions to secure basic human needs; nowtopian activities "exiting the economy" (D'Alisa et al., 2015b, p. 182): localized currencies (Dittmer, 2013; Hornborg, 2017), voluntary simplicity (Alexander, 2013), diverse economies (Gibson-Graham, 2008), solidarity economies (Bauhardt, 2014), Slow Cities (Mayer and Knox, 2006);	• Niche experiments providing wider regime change (Grin et al., 2010b); • Transition experiments as small-scale initiatives with a high potential to contribute to transitions; innovation projects with a societal challenge as a starting point for learning aimed at contributing to a transition (Van den Bosch and Rotmans, 2008); • Shifts towards urban farming, renewable decentralized energy systems, and social economies as examples of urban sustainability transitions (Frantzeskaki et al., 2017);
6. The need for institutional change to achieve transition	• Promoting new forms of living and producing: eco-communities, cooperatives; new government institutions, such as work-sharing or the basic and ceiling income (Kallis et al., 2015); • Change of human values and value-articulating institutions in the direction out opposite from understanding a human being as merely an economic agent (Demaria et al., 2013);	• Understanding transitions as far-reaching changes in various dimensions: technological, material, organizational, institutional, political, economic, and socio-cultural (Markard et al., 2012); • The need to simultaneously reorganize business models, laws, technologies, user practices, and cultural expectations, which can be conceptualized as institutional change (Fuenfschilling, 2017);
7. The role of technology	• No single approach (Kerschner et al., 2018); • Skeptics (Ellul, 2018; Grunwald, 2018; Pueyo, 2018) and enthusiasts (Bradley, 2018; Hankammer and Kleer, 2018; Haucke, 2018);	• Applying the notion of *socio-technical systems,* which consist of technology, regulations, user practices and markets, cultural meanings, infrastructure, maintenance networks, and supply networks; technologies fulfill societal functions, but they depend on other elements of the system (Geels et al., 2004); • Prominent role of technologies in actors' in transition processes strategies; technology as the site to organize change (Geels and Schot, 2010);
8. The role of civil society; the importance of bottom-up or grassroots movements	• Degrowth's roots in activism; • Stressing the importance of bottom-up, participatory, and democratic ways of achieving the goals of the movement (Kallis et al., 2015) (though the top-down approach prevails in the literature (Cosme et al., 2017));	• Importance of the bottom-up or grassroots approach to sustainability transitions in an urban context (Miller and Levenda, 2017; Seyfang and Haxeltine, 2012)
9. The role of localism	• Call to relocalize the economy (Kallis et al., 2015; Rees, 2015); • Most degrowth initiatives and practices have happened at the local level so far;	• Niches as local-scale phenomena, where "revolutionary change" occurs (Smith et al., 2010); protected spaces for social and technical innovations which can change the existing regime (Elzen et al., 2004; Grin, 2010; Smith and Raven, 2012);
10. The politicization of science	• Calls to politicize science (Kallis et al., 2015).	• Calls to politicize the study and practice of sustainability (Miller and Levenda, 2017).

which technologies are acceptable in the context of planetary limits (Kerschner et al., 2018).

Further to the conceptual similarities between degrowth and sustainability transitions as approaches to socio-economic development presented in Table 1, it is important to showcase the linkages between the processes of degrowth and sustainability transitions. The key characteristics of transition processes, as they are understood by transition scholars, are the following (Geels and Schot, 2010):

➢ Transitions are co-evolutionary processes that require changes in both the development and use of technical innovations.

- Transitions are multi-actor processes that involve various social groups (business communities, scientists, different consumer or user groups, policymakers, social movements, etc.).
- Transitions are understood as radical shifts from one system configuration to another. The term "radical" refers to the scope of change, not the speed.
- Transitions are long-term transformations, lasting several decades (40–50 years).

The degrowth process has much in common with the above-mentioned characteristics of sustainability transitions, yet this is not always explicitly articulated. Although its proponents do not use the term "technical innovation," and they envision degrowth transition by changing production and consumption patterns (with an emphasis on decreasing the level of both), changes in these patterns need to co-evolve as well.

The fact that the degrowth idea and field of research developed from a social movement suggests that it is a multi-actor process. So far, scientists and various consumer, user, and activist groups have been involved in the discourse the most. There are attempts to move the degrowth debate from the academic and activist area to only the political arena (as exemplified by the open letter to the European Parliament "Europe, It's Time To End the Growth Dependency," published in major European newspapers in association with the Post-Growth Conference in 2018). There have also been attempts to find out the role of business in the degrowth transition (Haucke, 2018; Johanisova et al., 2013; Khmara and Kronenberg, 2018).

Degrowth proponents often call for a radical transition to a more sustainable system. The scope of change is even more radical than in the case of other concepts of transitions to sustainability. Degrowth aspires not only to change the socio-technical systems (the use of cleaner and simpler production technologies) but to change the paradigm of the modern global economic policy, i.e., to reject economic growth as the main policy goal of most countries, especially developed ones. Unlike in the case of sustainability transitions, the time frames of the changes are not explicitly articulated in the degrowth debate, although they emphasize the urgency of the changes needed to avoid social and environmental disaster. Hence, this implicitly indicates that transition must be immediate, i.e., radical in terms of speed as well.

2.4. Degrowth described with the use of the sustainability transitions analytical frameworks

Similarities between degrowth and sustainability transitions allow us to apply the terminology of the sustainability transitions research area for describing degrowth. For this purpose, we will use the conceptual notions developed in the subfield of Transition Dynamics, namely the multi-level perspective, the multi-phase perspective, and co-evolution, though some of them are overarching for sustainability transitions studies in general.

One of the frameworks used most often to analyze sustainability transitions is a multi-level perspective (Geels, 2010, 2004; Geels and Schot, 2010; Markard and Truffer, 2008; Rip and Kemp, 1998). According to this framework, transitions are non-linear processes that interfere at three functional levels (degrees of structuration):

- niches – loci for radical innovation (Geels, 2004); a societal subsystem which can be understood as a (local) constellation of culture (the way of thinking), practices (the way of doing) and structure (the way of organizing and functioning) (Van den Bosch and Rotmans, 2008);
- regimes – conventions, rules and norms that guide the uses of particular technologies and practices of different societal groups (Geels, 2004); the locus of established practices and associated rules that stabilize existing systems (Geels, 2011); the dominant way in which societal needs are fulfilled; the dominant structure, culture, and practices with the incumbent power and vested interests in a societal system (Van den Bosch and Rotmans, 2008);
- landscape – long-term, exogenous trends (Grin et al., 2010a); a range of exogenous developments that influence niches and regimes (Geels et al., 2004); an external context for actors in niches and regimes which is difficult to change (Geels, 2004).

Regimes are central in this hierarchy, as transitions are defined as shifts from one regime to another, which results from the interplay of developments at all three levels (Geels, 2011). Experiments in niches are crucial for regime change, as niches are defined as protected spaces that "allow the experimentation with the co-evolution of technology, user practices, and regulatory structures" (Schot and Geels, 2008, p. 537). Such experiments, if scaled up, may provide broader incremental societal change (see Section 3). At the same time, landscape developments, though hard to change, provide external pressure for regimes (e.g., challenges of globalization, urbanization, environmental degradation, etc.).

A multi-level perspective may be a fruitful framework to analyze the degrowth transition. In the degrowth context, different kinds of degrowth practices or "nowtopias" (such as co-housing projects, eco-villages, agro-ecology initiatives, urban farming, consumer cooperatives, the solidarity economy, community currencies, time-banks, decentralized renewable energy communities, etc.), which exist outside of formal institutions, may be considered to be grassroots niche experiments.[1] Usually, proponents and practitioners of such initiatives are activists as well. Being associated with a particular initiative or supporting certain lifestyles, activists unite into social movements that exert bottom-up pressure on existing unsustainable regimes. The main regime which must be changed, from the degrowth perspective, is the pursuit of economic growth.

Compared to sustainability transitions, this is a different understanding of regime, which is more *socio-economic* than *socio-technical,* though technologies used are defined by this regime. Possibly, it can be understood as a *metaregime,* between the levels of regimes and landscape. Still, we apply the term "regime" as the pursuit of growth in production/consumption/profits as a goal that guides and motivates the everyday practices of producers, workers, consumers, business people, and even academics (given that maintaining economic growth and ways of providing it is one of the central topics in mainstream economics). Thus, it directly influences belief systems, innovation agendas, problem definitions, research heuristics, and values. Other regimes that have to be changed from the degrowth point of view may be identified as the following: an economy based on fossil fuels, centralized energy supply systems, the system of global production, and only-profit-driven business models. The new regime that is expected to result from the degrowth transition is the steady-state economy.

Niches and regimes are embedded in the broader landscape, which can currently be associated with the neoliberal capitalist socio-economic system, and with growing population, urbanization and globalization. They result in the challenges of increasing energy demand, environmental degradation, climate change, and

[1] We use the term grassroots as these experiments are usually initiated by local communities, not governments, either central or local, i.e., they are bottom-up in nature; they are also social or socio-economic rather than technological; we will elaborate on it in Subsection 3.1.

social and environmental injustice. The landscape provides an external context and cannot be influenced in the short run, even by radical changes in regimes (Geels and Schot, 2010). This slower speed of landscape changes explains the radicality of the movement, as degrowth aspires to change not only the regimes but the landscape as well (to reject neoliberalism; to slow down globalization trends by relocalizing the economy, etc.). If landscape changes take so much time, the process of regime changes must start immediately.

Another useful conceptual notion from the sustainability transitions field of research is the multi-phase perspective, which describes a transition in time as a sequence of four consecutive phases:

1) the pre-development phase;
2) the take-off phase;
3) the acceleration phase;
4) the stabilization phase.

In practice, these phases may not necessarily follow a set pattern, as transition processes are characterized by high levels of risk and uncertainty. As for degrowth transition (at least in the Global North), it is in its pre-development phase: the system is changing in the background (various niche experiments and social movements are appearing), but the changes are barely visible (changes remain in niches; social movements do not result in broad political change). Degrowth activists and scientists struggle to move the transition to the take-off phase (e.g., the abovementioned open letter to the members of EU Parliament during the 2018 Post-Growth Conference was an attempt to shift the discussion to the political level, at least in Europe, and to make the movement more visible for the broader community, so that it can pick up momentum). The acceleration phase would be the shift from the growth paradigm: the political rejection of GDP growth as the primary goal of national economic policies and as an indicator of well-being, along with the related institutional changes. So far, only Bhutan has officially adopted Gross National Happiness as a political goal, while the concept of *buen vivir,* an alternative understanding of development and well-being as being more community-centric, ecologically-balanced, and culturally-sensitive, has influenced Bolivia and Ecuador (Gudynas, 2011; Zurick, 2006). However, none of these countries refuse economic growth. Finally, the stabilization phase for degrowth would be achieving the state of the steady-state economy, when production and consumption levels remain sustainable.

Various subsystems (economic, technological, institutional, cultural, ecological) co-evolve and can reinforce each other, so that transition appears. Within the degrowth discourse, the co-evolution of social and ecological subsystems and their mutual influence is the most visible. It is for this very reason that degrowth proponents are particularly wary of planetary boundaries and other ecological constraints to further growth. The co-evolution of social and ecological subsystems is also evident in degrowth discussions and analyses carried out at the local level, underlining the need to reduce ecological footprints and live in harmony with nature. It also highlights that the degrowth transition needs to be motivated by co-design, involving both broad social representation as well as the representation of nature's interests. Co-evolution is also visible in degrowth practices, where (usually low) technology, user practices, and local institutions reinforce each other.

3. Degrowth practices as transition experiments – linking the phenomena

3.1. What are transition experiments and degrowth practices?

As mentioned above, the sustainability transitions research area consists of two subfields: Transition dynamics and transition management. The latter is simultaneously a new mode of governance that is aimed at resolving persistent societal problems and uses sustainable development as a normative framework. Distancing itself from classical management, transition management acknowledges uncertainty and ignorance, which makes full control of the problems impossible. Hence, it is explorative and design-oriented rather than focused on final solutions (Rotmans and Loorbach, 2010); thus, learning, searching, and experimenting are crucial in transition management (Rotmans and Loorbach, 2009). Finally, transition management is aimed at fostering sustainable development (Rotmans and Loorbach, 2009).

In contrast, degrowth has not developed any governance perspective. The steering power of its ideas lies in bottom-up social movements and activism. Although support for a top-down approach to a degrowth transition prevails in the degrowth literature (Cosme et al., 2017), the hitherto bottom-up grassroots action remains the only tool for change, hence our focus on degrowth practices, which constitute a form of experimenting with the degrowth concept in real life.

Transition experiments are among the key instruments of transition management (Frantzeskaki, 2011; Van den Bosch, 2010). As highlighted in the previous section, experiments are happening in niches (the lowest functional level in the multi-level perspective), and they play an important role in transition processes, as under certain conditions, they may contribute to regime change.

According to the general definition of Sengers et al. (2016), an experiment is an inclusive, practice-based, and challenge-led initiative, which is designed to promote system innovation through social learning under conditions of uncertainty and ambiguity. Experiments are happening in niches, which constitute deviations from existing regimes. The authors distinguish various terms that denote experimenting for sustainability (niche experiments, bounded socio-technical experiments, transition experiments, sustainability experiments, and grassroots experiments), with transition experiments as the most general category within which the other types fit.

Van Den Bosch (2010, p. 58) defined transition experiments as "innovation projects with a societal challenge as a starting point for learning aimed at contributing to a transition." Such experiments are aimed at searching for radically new ways of fulfilling societal needs in domains such as energy, mobility, or health care (Van den Bosch and Rotmans, 2008).

Transition experiments cover a broad range of innovations, implying institutional, financial, legal, or socio-cultural as well as socio-technical ones.

Among different types of experimentation, grassroots experiments put a strong emphasis on societal innovation and refer to "networks of activists and organizations generating bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved" (Sengers et al., 2016, p. 6). Due to the bottom-up nature of these experiments, the niches in which they take place are institutionalized more in the social economy than in a market economy, and they take the form of cooperatives, voluntary associations,

Box 1
Cargonomia

Description: A degrowth-inspired initiative operating as an organic food distribution point, a cargo bike center, and an open space for community and educational activities related to degrowth, sustainability, well-being, etc. (Csoma and Lazányi, 2019). Cargonomia formalizes the existing cooperation between three socially and environmentally conscious enterprises: The Cyclonomia Do-It-Yourself Bicycle Social Cooperative; Zsamboki Biokert, an organic vegetable farm and sustainable agriculture community education center; and Kantaa, a self-organized bike messenger and delivery company.

Relation to degrowth principles: Degrowth as a source of inspiration; the use and promotion of low-carbon and sustainable means of transport; promoting the local economy – distributing local, organic food products and propagating conscious and sustainable consumption, creating local, decent jobs that connect rural and urban areas by partnering with local, small scale businesses; strengthening the sense of community and conviviality by providing an open space for meetings, workshops, discussions, and other events; promoting sustainable lifestyles, care, and unpaid activities; promoting the principles of the "gift economy" and the "reciprocity economy."

(1) **Starting point**: The societal challenge related to unsustainable transport use in Budapest; the transport system is dominated by private cars, and the food system is dominated by global industrial agriculture products offered through large scale retailers; unsustainable consumption patterns.
(2) **Nature of the problem**: The problems addressed in the project are persistent because:
- city development strategies have exaggerated the focus on motorized transport, and it is prioritized more in the existing infrastructure;
- road transportation remains the most significant means of transport in Hungary,
- around 75% of grocery shopping is done in supermarkets,
- people's habits regarding sustainable transportation and consumption are hard to change.

These problems are complex, as many actors are involved, and uncertain.
(3) **Objective**: Contribute to the degrowth transition, i.e., contribute to several regime shifts (growth-based economy, fossil-fuel-based economy, global food production and consumption, and only-profit-driven business models) by changing local practice and culture. Showcase alternative solutions.
(4) **Perspective**: 2015 – no upper time frame (long-term).
(5) **Methods**: *Exploring* alternative means of transportation, food production and delivery, cooperation, and producer–consumer interactions; *searching* for new alternatives, new possibilities, and new partners; *learning* (first-order and second-order, see below).
(6) **Learning**: *Broad* – learning about the institutional dimension by searching for grants and public support; learning about the socio-cultural dimension by communicating with consumers, participants of workshops, and various events; learning about the technical dimension by facing the possibilities and challenges of organic and community-supported agriculture, using and producing cargo-bikes; *reflexive* – the learning process in the initiative produces new social and cultural values, promotes social cohesion, and showcases "something different from capitalism" (Gombos and Párdi, 2016); *social* – the participants of the initiative, as well as consumers and event participants, learn new perspectives and values (other than capitalistic ones).
(7) **Actors**: Mainly civil society actors: cooperative workers (including those from Cyclonomia, Zsamboki Biokert, and Kantaa), consumers, and event participants.
(8) **Context**: Real-life; the context of a postsocialist capital city.
(9) **Management context**: A grassroots initiative; no typical management context so far.

Mechanisms of contributing to transitions: this experiment is in the stage of *deepening* (different types of learning take place; participants try to learn as much as possible about the experiment in the specific context of Budapest). However, there is no evidence about Cargonomia being *replicated* in the same way elsewhere, even though there are similar projects on the topics of mobility, care, and inclusiveness (see, e.g., http://www.newcityzens.com). It is important to *broaden* the experiment in other contexts to verify its viability and create a niche-cluster for potential regime-shifts. Although it is debatable whether Cargonomia aims at *scaling up* due to its ideological principles (emphasizing unpaid care work), the scaling up possibilities for such an experiment lie in formalizing its activities by starting a co-operative or social enterprise and thus increasing the potential to penetrate the mainstream regime.

informal community groups, or social enterprises (Seyfang and Smith, 2007).

Grassroots experiments are the closest to what we call "degrowth practices" or "degrowth initiatives," and which also appear in the literature as "grassroots economic practices," "non-capitalist practices," or "grassroots nowtopias" (Kallis et al., 2015, pp. 11–12). Eco-communities, digital commons, communities of back-to-landers, urban gardens, community currencies, time banks, alternative food networks, etc. may be qualified as such practices. They appear in response to the crisis or to the failure of conventional institutions to meet societal needs. Kallis et al. (2015) distinguished five characteristics of such practices. The first is the purpose of production: Within such initiatives, goods and services are produced for use, not for exchange. Second, voluntary participant activities play a significant role in degrowth practices, substituting, to some extent, wage labor. The third characteristic lies in the anti-utilitarianism meaning that "the circulation of goods is set in motion, at least partly by an exchange of reciprocal 'gifts'" (Kallis et al., 2015, p. 12). Fourth, such practices do not have built-in capitalist dynamics to accumulate and expand. And fifth, the

Box 2
Transition Towns (Transition Network)

Description: An international network of grassroots initiatives that support local economies, fight Peak Oil and climate change, build resilient communities, and promote inclusivity and social justice. These initiatives usually involve active citizens who develop projects across various domains (food, energy, finance, transport). The movement started in 2005 and has now reached more than 50 countries (https://transitionnetwork.org).

Relation to degrowth principles: Although there is no explicit evidence that the Transition Townsmovement was directly fuelled by degrowth ideas, it is often associated with it (Demaria et al., 2013; Escobar, 2015; Gibbs and O'Neill, 2017; Johanisova et al., 2015; Kunze and Becker, 2015; Longhurst et al., 2016; Semal, 2012; Trainer, 2012, 2010). The Transition Towns movement's principles are closely related to those of degrowth: Respecting resource limits by promoting the local economy (community self-sufficiency and resilience), enhancing community spirit, social justice, inclusiveness, conviviality, and promoting voluntary simplicity. One of the first Transition Towns, Totnes in the UK, may serve as an illustrative example, with its high permaculture activity, local organic food producers, small and ethical business presence, and alternative housing arrangements, etc. (Longhurst, 2015).

(1) **Starting point**: Enhancing the local economy, community resilience, and self-sufficiency to avert or reduce potential adverse effects of Peak Oil, climate change, and economic instability.
(2) **Nature of the problem**: The problems addressed in the project have a global level; they are persistent as the global economy is still based on fossil fuels, which results in climate change and environmental damage; they are complex, as different national and global actors are involved, and highly uncertain.
(3) **Objective**: To adapt to the decarbonized and post-fossil-fuel economy; according to Seyfang and Haxeltine (2012, p. 385), the Transition Towns movement "does not intend to trigger a transition, but instead responds to landscape pressures at a microlevel and seeks to grow a niche of new infrastructure and practices to replace the incumbent regime when it fails to function." Still, it is fair to say that this experiment's objective is to contribute to a transition to sustainability; regimes which are to be replaced: fossil-fuel-based economy, global production and consumption, the current energy regime (centralized and fossil-fuel-based).
(4) **Perspective:** 2005 – no upper time frame (long-term).
(5) **Methods:** *Exploring* life with significantly less energy consumption; the opportunities of resilience and collective action; *searching* for tools to make the economy local, build resilience and ensure s high quality of life with less energy consumption; *learning* (first-order and second-order, see below).
(6) **Learning:** *Broad* – learning is built into the process of becoming a transition town. It covers practical matters (learning various technical skills which were common in the past but have been lost with the rise of consumer society, organizational skills, e.g., how to set up and facilitate a steering group, run participative workshops, etc.), institutional matters (e.g., how to cooperate with local government), and ideological issues (the movement's perspective on climate change, Peak Oil, resilience, visions of social change, etc.); *reflexive* – this type of learning is the most prominent in the movement's activities, as it addresses the system transformation of the modern, industrialized, consumer society and encourages its participants to question current frames of reference, e.g., that it will always be possible to sustain our current level of energy consumption; *social* – it is not only active participants of the initiative who take part in the learning process but also people from "out there" (through awareness-raising events, public talks, screening movies, etc.) (Hopkins, 2008; Seyfang and Haxeltine, 2012).
(7) **Actors:** The actors are multiple in the context of the niche (activists with different backgrounds, local economy actors, local government in some cases), but there is a lack of networking with regime actors, e.g., business (Seyfang and Haxeltine, 2012).
(8) **Context**: Real-life; from the context of mostly Anglo-Saxon countries, in the beginning, the initiative has spread around the globe.
(9) **Management context:** A grassroots initiative; however, the principles of the transition concept and tips for starting a transition may be considered a base for an embryonic management approach.

Mechanisms of contributing to transitions: Mechanisms of *deepening* and *broadening* are evident in the case of Transition Towns. The literature about Kinsale and Totnes, two prototypes of the initiative, written by the movement's founder Rob Hopkins, as well as other authors (Connors and McDonald, 2011; Hopkins, 2008, 2010; Longhurst, 2015), and a documentary (Koons, 2011) evidence the deepening knowledge about the original initiative. This is perhaps one of the reasons for the movement's success in *replicating* its model. According to the movement's website, there are currently 963 Transition Town initiatives around the globe covering a variety of geographical areas – small and large towns or cities, villages, islands, rural areas, and forests. However, the movement is still most popular in a few Anglo-Saxon countries (the UK, USA, Australia), and it is important to widen it further. Some of the key messages of the movement are articulated by mainstream actors in some countries (e.g., reskilling, localizing food production and thrift in the UK) or have been reinforced by economic crisis (Seyfang and Haxeltine, 2012), so the experiment has *scaling up* potential, although the cultural shift has not been significant so far.

relations and connections between participants play a crucial role, as these practices are community-based and result from collective action. However, these characteristics seem to be inherent to "pure" degrowth practices, and not all initiatives that appear in the literature as being related to degrowth possess all of these characteristics.

In the following subsection, we elaborate in more detail on the characteristics of transition experiments, their links to degrowth practices, and how transition experiments contribute to the process of transition.

3.2. Characteristics of transition experiments and their relevance to degrowth

Van Den Bosch (2010) pointed out distinctive characteristics of transition experiments in the categories such as (1) the starting point, (2) the nature of a problem, (3) the objective, (4) the perspective, (5) the method, (6) learning, (7) the actors, (8) the experiment context and (9) the management context. Here, we elaborate on each of these characteristics and highlight their relevance to degrowth. In Boxes 1 and 2, we apply these characteristics of transition experiments to describe two cases from the degrowth debate – Cargonomia, a social project in Budapest, Hungary, and Transition Towns, a network of towns working together on fighting environmental challenges and promoting community building at the local level. These cases were chosen on the basis that they are well-known and illustrative of degrowth initiatives. The evidence about the cases is based on secondary data.

As mentioned above, the starting point (1) in a transition experiment is a societal challenge, i.e., the question of how to solve a persistent societal problem. Thus, transition experiments are guided not by a vision of a possible final solution, but by a question, e.g., how can sustainable and clean energy be provided to the community or region (Van den Bosch and Rotmans, 2008). This characteristic of transition experiments is relevant in the degrowth context, as degrowth practices usually have the same starting point, i.e., how to meet a societal need with a strong sustainability commitment in mind.

Persistent problems bring us to the second characteristic, i.e., the nature of the problem. Persistent societal problems are uncertain and complex, as no final solutions are agreed on them, e.g., there is no agreed solution to the question of how to fight climate change or overcome natural resource scarcity, and the consequences of either solution or a lack of solution is highly uncertain. This is also highly relevant in the degrowth context. One of its most important goals is to substitute the regime of economic growth with an alternative one of a steady-state economy, yet it is not exactly clear how this regime will look like. Bottom-up degrowth practices are an attempt to envision this alternative regime. However, despite possible success in small communities (grassroots niches), the possibility of upscaling degrowth practices to the level of society (regime) remains uncertain.

The objective (3) of transition experiments is to contribute to societal change, i.e., to transition. The same is true for degrowth practices. Not every initiative that can be considered a degrowth practice explicitly aims at contributing to the overall degrowth transition to a steady-state economy. Nevertheless, they usually aim at changing other regimes, which is also crucial for such a transition.

The perspective (4) of transition experiments is medium-term or long term, due to the complex nature of transition processes that may last several decades. In the case of degrowth practices, it is hard to estimate the perspective, as they are not planned in a top-down manner and usually do not have time frames.

The methods (5) in transition experiments are exploring, searching, and learning. They are related to the uncertainty and complexity of persistent societal problems, and they link to the sixth characteristic, i.e., learning. The learning process in transition experiments is essential, as it aims to contribute to a transition. As transition experiments do not take place in laboratory conditions, but in a real-life context, they enable high-quality, broad, and reflexive social learning (Van den Bosch and Rotmans, 2008). Broad learning means that actors in experiments learn about different dimensions of a problem (institutional, socio-cultural, technological, etc.). Reflexive or second-order learning means thinking outside the box, i.e., the actors undermine the basic assumptions about the problems, as persistent problems cannot be solved within the dominant way of thinking. Ultimately, social learning means a participatory learning process in which various actors interact and develop different perspectives on reality (Van den Bosch and Rotmans, 2008). Exploring, searching, and learning are highly relevant in the degrowth context, especially learning. Degrowth practices also involve broad and reflexive social learning, with most emphasis on its reflexive character. As degrowth practices translate into alternative ways of fulfilling societal functions, organizing production and consumption, they imply reflexive learning. And it is definitely social, as the importance of social inclusiveness, contacts, and conviviality is underlined within the degrowth discourse, and knowledge-producing interactions usually take place between all participants of an initiative.

The actors (7) in transition experiments are multiple, as experiments are happening across society with many participants involved, and not only specialized staff. In the case of degrowth, this diversity of actors is hard to assess. So far, most degrowth practices have been niche initiatives that are often marginal; hence, it is difficult to talk about the multiplicity of actors in the same way for transition experiments.

Transition experiments take place in a real-life societal context (8), not in a controlled one, as transitions are open-ended for change. The same is true for degrowth practices.

Finally, the management context (9) of transition experiments is Transition Management, which is focused on sustainability transitions goals. As mentioned previously, degrowth has not developed any governance perspective; thus, it is hard to talk about management in this context. Every initiative is managed in the most suitable way for the participants (usually participative and horizontal). This is what the sustainability transitions field of research may provide degrowth with.

3.3. Mechanisms that contribute to transitions

In order for transition experiments to be successful, it is important to understand through which mechanisms they can contribute to a transition. The sustainability transitions field of research has developed theoretical insights into this question.

Van Den Bosch and Rotmans (2008) identified three mechanisms through which transition experiments may contribute to transitions: Deepening, broadening, and scaling up. Deepening builds upon the importance of social learning and experimenting in niches as protected spaces that deviate from the regime and provide a specific context for experimenting with sustainable practices. Deepening means that actors learn about a transition experiment as much as possible within a specific context. The interactive process of social learning builds first-order and second-order knowledge. And the fact that experiments happen in niches makes it possible to learn how local culture, practice, and structure are changing. The outcome of deepening is a new local constellation that fulfills a societal need in a fundamentally different way.

The learning process in transition experiments is characterized as contextual, as what can be learned is limited to a specific real-life context and the scale of the experiment. Hence, repeating an experiment in a variety of contexts is hugely important. Repeating an experiment is part of the mechanism of broadening, along with linking the experiment to other functions or domains. This also involves adapting an experiment to new contexts. Broadening implies “an invasion of other niches” (Van den Bosch, 2010, p. 67) and

generates new niche-clusters which may further contribute to a regime shift.

Broadening is a crucial intermediary mechanism between deepening and scaling up. Van Den Bosch and Rotmans (2008) define scaling-up as the process through which a new constellation of culture, structure, and practice scales-up and gradually becomes part of mainstream practices, fundamentally changing the way in which the societal function is fulfilled.

These mechanisms link to the routes of innovation diffusion that are applied in strategic niche management, namely replication, scaling up, and translation (Seyfang and Haxeltine, 2012). Despite the same name, scaling up as an innovation diffusion route is different from scaling up in the context of transition experiments, and it means scaling up in size (e.g., increasing the number of participants in the case of a grassroots innovation). Replication links to the mechanism of broadening and means replicating the model of a particular initiative in different contexts. Translation links to the mechanism of scaling up, as it means the diffusion of innovative niche practices to wider society, i.e., to the level of regime.

All three mechanisms relate to the multi-level perspective. The mechanism of scaling-up explains how regime change appears. However, this is a difficult process, as the deviant practices of niches do not necessarily work in the dominant context of a regime. This is caused by the dichotomy between niches and regimes, different "rules of the game." Niches function as "protective spaces" for experimenting (Smith and Raven, 2012), and adapting to their specific context is difficult. However, Van Den Bosch (2010, p. 69) argued that "in practice, the step from niche to regime is not a single step but the result of a process of many intermediate steps." That is why broadening is an important intermediary mechanism, as repeating the experiment in different contexts or applying it to different domains increases the stability of the niche. It may also facilitate the institutionalization of at least some niche practices, so that a niche-regime may appear or the incumbent regime may change.

In the degrowth discourse, Transition Towns are the most successful illustrative example of these mechanisms (see Box 2). Visioning and managing degrowth initiatives with these mechanisms in mind would help them to move beyond the protected spaces of niches and contribute to tangible regime changes.

Another illustrative example related to degrowth may be urban gardens. Although they spread during the Great Depression and both World Wars (Anguelovski, 2015), today, they still increase food security, especially in the Global South. They are mostly initiated bottom-up, "in people's desire to reconnect with food, nature, and community" (Firth et al., 2011, p. 555). Thus, they facilitate interactions between people, shared responsibility for common space, inclusiveness, stress recovery, relaxation, conviviality, etc., and they address inequalities in food provision (Anguelovski, 2015), which is highly relevant to degrowth. Nowadays, urban gardens are spreading around the globe, meaning that mechanisms of deepening and broadening take place. The support of governments, NGOs, and farmer groups for urban gardens in the Global South (Anguelovski, 2015) evidences the scaling-up possibilities for such initiatives and integrating them in the global food regime.

4. Discussion and conclusions

4.1. Our contribution

The aim of this article was to study how sustainability transitions analytical framework can help to make degrowth more specific and operational. For this purpose, we identified similarities between sustainability transitions and degrowth (both as research areas and processes) and used some of the sustainability transitions analytical frameworks to describe degrowth.

Our article contributes to the existing literature that deals with both degrowth and sustainability transitions, and it furthers the analysis of the links between them. For example, in one of the most relevant articles connected to this topic, Gibbs and O'Neill (2017) focused on the geographical perspective of the green economy. They investigated the role of regions as its drivers, drawing on different regional futures – from the "clean-tech economy" to those related to degrowth. Gibbs and O'Neill (2017) applied the analytical framework of the multi-level perspective as a "useful perspective" to look at such approaches. Although their study used an analytical framework from the sustainability transitions field of research to analyze degrowth ideas, we explored these linkages more comprehensively and with a broader objective. We provided an explicit analysis of the linkages between the two areas, explained key terms and conceptual notions, and applied other conceptual notions from the sustainability transitions field of research as well. This is what also differs our approach from that of Vandeventer et al. (2019), along with the conceptualization of degrowth as a form of sustainability transition rather than a niche.

However, connecting the sustainability transition analytical frameworks with approaches from the opposite ends of the spectrum by Gibbs and O'Neill (2017) provides evidence that indeed there are different forms of sustainability transitions with different degrees of "radicality." Also, the analytical frameworks from the sustainability transitions field of research "have proved helpful in understanding the opportunities and constraints that a shift to a green economy may encounter" (Gibbs and O'Neill, 2017, p. 165).

4.2. Main findings and challenges

Sustainability transitions and degrowth ideas are indeed closely related. This is evidenced by a number of similar visions and approaches to socio-economic development (Table 1), which converge in most aspects. Our case studies in Boxes 1 and 2, described with the use of the transition experiments analytical framework, support this argument as well.

The sustainability transitions analytical frameworks and conceptual notions proved to be helpful interpretative lenses for looking at degrowth, and they can help to systematically structure its main postulates. Functional levels of the societal system, as well as probable phases of a degrowth transition, have been identified. Degrowth requires a particular form of sustainability transitions, and it is the most far-reaching and radical. So far, niches in degrowth have mostly taken the form of grassroots and social experiments, as they have usually been created in a bottom-up way. Within such niches, the emphasis was placed on societal, rather than on technological change, even though niche actors do experiment with using alternative (usually simpler) technologies, e.g., using cargo bikes in Cargonomia or permaculture experiments in Transition Towns. The main regime which has to be changed is the economy based on economic growth. This is a slightly different understanding of regime, as it is socio-economic rather than socio-technical. Other unsustainable regimes of both socio-technical and socio-economic nature also have been identified. Through regime shifts, degrowth aspires to change the landscape as well, i.e., to reject neoliberalism, and to slow down globalization trends by relocalizing the economy, etc.

One of the most fruitful sustainability transitions concepts applied to degrowth is that of transition experiments. In this article, we suggest that degrowth initiatives may be understood as grassroots transition experiments by identifying characteristics of transition experiments in two case studies of degrowth practices, Cargonomia and Transition Towns. However, it is highly possible

that many degrowth practices, as in the case of many grassroots innovations, will remain on the level of niches, with little potential to contribute to a regime shift. And it is here that sustainability transitions studies may have space to contribute. Applying the same mechanisms through which transition experiments contribute to transitions may help degrowth practices to gradually break through the protected level of a niche. This would imply the application of transition management (along with its other instruments, such as strategic planning and visions, actor selection, etc.) to steer a transition process, and it would entail involving local governments and the other main stakeholders. This resonates with the proposals for top-down action from most degrowth scholars (Cosme et al., 2017) and the overall need for civic initiatives to improve "their organizational and cooperation culture," and acquire "more management and planning skills" (Gombos and Párdi, 2016, p. 47) (as exemplified by the case of Cargonomia). Of course, transition management would have to be adapted and, to some extent, altered to meet the specificity of degrowth initiatives, which mainly govern small-scale social innovations. This raises many questions: To which spatial scale should transition management be applied to contribute to a degrowth transition – to the level of a neighborhood, city, region, or the whole country? Or should it perhaps be applied to a specific societal problem? How can we visualize the implementation of a degrowth transition at the level bigger than one neighborhood? How can we measure it? All these topics open an inspiring avenue for further research on degrowth operationalization and the applicability of transition management to make it possible. Our research offers a preliminary step in that direction.

What can be stated at this level of research is that transition management teams should consist not only of a community of "experts," but it should account for the voice and agency of workers, activists, and other civil society actors. This would counter the criticism that transition management has received for being technocratic and legitimizing the knowledge created by small groups of elite experts (Lawhon and Murphy, 2012). It would also resonate with calls to re-think how knowledge is produced and used in society (Abson et al., 2017). Finally, it would also show how the sustainability transitions area of knowledge can benefit from insights from degrowth.

The process of knowledge production and use relates to the concept of the mindset or paradigm out of which socio-technical or socio-economic systems arise. Mindsets and paradigms constitute an important leverage point for bringing significant changes in the system (Meadows, 1999). Applying sustainability transitions notions and frameworks, and thus systems thinking, to degrowth positions the growth-based economic system as the regime which should be replaced, and it articulates once again that unlimited growth is a goal that must be abandoned.

4.3. Future research

The sustainability transitions field of research may also benefit from linking to degrowth in other ways. It is still an evolving area of research; hence, it can benefit from using new case studies, especially those related to social innovations, to develop its theoretical framework further (in particular, this relates to TM). This article resonates with the overall call for "rigorous analysis and critiques of capitalism" and engagement with discussions on post-growth futures (Feola, 2019).

Both research areas need to pay more attention to geographical and cultural contexts in their analyses. Discourse about the differences between the Global North and South and the relevance of promoting degrowth ideas in the latter is present in the degrowth debate, especially in the context of justice (D'Alisa et al., 2015b; Demaria et al., 2013; Foster, 2011; Martinez-Alier et al., 2010). At the same time, sustainability transitions were criticised for being geographically naïve, lacking "sensitivity to the socio-spatial struggles that can lead to a scaling up of a niche or regime beyond its predefined (typically national) boundaries or that can unevenly distribute a more/less sustainable regime within a nation or region, or at the global scale" and limiting the case study context to mainly developed Western countries, the Netherlands in particular (Lawhon and Murphy, 2012, p. 362). In response to such criticism, special issues appeared (Truffer et al., 2015), and the geography of sustainability transitions became one of the themes of the field's research agenda, with particular attention paid to the context of developing countries (El Bilali, 2019; Wieczorek, 2018). Still, this avenue is developing, and both degrowth and sustainability transitions could be mutually inspiring within it, with sustainability transitions paying attention to the development of formal institutions, and degrowth bringing in the voice of indigenous communities, articulating social innovation, etc. However, both fields of research concentrate on the polar sides of the Global North and South, largely disregarding the context of postsocialist countries, which are somewhere in between. This could be another fruitful area of research, and it gives the notion of transition a new connotation, as so far it is used mostly in the meaning of transitioning from a planned economic model to one based on the market (Kronenberg et al., 2017).

Finally, the fact that both case studies of degrowth practices used in this article take place in cities links degrowth with the emerging field of urban sustainability transitions. Cities are recognized to have high potential to contribute into a global sustainability transition, as solutions to sustainability challenges that are found and operationalized in cities may be scaled up globally (Elmqvist et al., 2018), and new initiatives and interventions to counteract unsustainable behavior and practices have often originated in cities (Frantzeskaki et al., 2017; Fratini et al., 2019). Hence, cities may serve as niches for experimenting with sustainability transitions. Relating to this, investigating what degrowth would mean on the level of a city is of high importance.

Declaration of competing interest

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

CRediT authorship contribution statement

Yaryna Khmara: Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing, Visualization, Funding acquisition. **Jakub Kronenberg:** Conceptualization, Methodology, Writing - review & editing, Supervision, Project administration, Funding acquisition.

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Article 2

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Urban degrowth economics: making cities better places for living, working, and playing

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ABSTRACT

The aim of this paper is to find ways to operationalise degrowth in an urban context by connecting to urban economics. Based on eleven textbooks, we identify five main themes analysed in urban economics: (1) urban growth and city size; (2) urban land rent and land-use patterns; (3) industrial location, agglomeration and clustering; (4) housing and housing policy; and (5) transport. We address these from the normative perspective of degrowth, simultaneously highlighting the existing economic policies and instruments that could be used for degrowth operationalisation. In essence, urban economics focuses on the efficient use of scarce resources to make cities better "places for living, working and playing". We propose taking what is relevant from economics, ensuring the transition to the desired future, instead of radically changing everything from scratch. Our premise is that applying many of the already proposed policies and mechanisms may facilitate the transition towards degrowth and contribute to creating a comprehensive urban degrowth narrative.

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1. Introduction

There is a dichotomy in scholars' views on cities which "will be either key components to the transition to sustainability or major threats to sustainability" (Seto et al. 2017, 8935). Cities are home to over half of the world's population, generate 80% of the global economic output, and are responsible for 2/3 of the global energy demand and 75% of CO_2 emissions – even though they occupy only 3% of the planet's land (Seto et al. 2017). Urbanisation plays an important role in economic growth (Glaeser et al. 1992; Henderson 2010), as reflected in cities being called "growth machines" (Molotch 1976) or "growth engines" (Jones, Collier, and Spijkerman 2020).

At the same time, there have been hopes that cities would become "agents of change" for sustainability (Vliet 2002). New initiatives and interventions to counteract unsustainable behaviour and practices have often originated in cities. One of them is degrowth, which calls for a radically different organisation of modern society and economy, based on values such as autonomy, sufficiency, care, and conviviality. As stipulated in the Degrowth Declaration (Research & Degrowth 2010, 524), "the objectives of degrowth are to meet basic human needs and ensure a high quality of life, while reducing the ecological impact of the global economy to a sustainable level, equitably distributed between nations". Such downsizing must be voluntary and democratic, with the emphasis on social and environmental justice (Demaria et al. 2013; D'Alisa, Demaria, and Kallis 2015).

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Degrowth is in line with other ideas promoted so far to address global challenges related to growing population, production, consumption, and environmental impacts. However, although important in terms of raising awareness, such ideas have not been able to influence policy-making, partly because they remain excessively general or even utopian, and partly because they have been overridden by other political priorities (Gómez-Baggethun and Naredo 2015). Although academic interest in degrowth has increased, degrowth remains a broad theoretical framework rather than a precise strategy for a socio-economic transition (Kallis et al. 2020).

Given cities' special importance and potential to serve as places for social, economic and ecological transition experiments, finding ways to operationalise degrowth in an urban context can lead to more specific development agendas being designed (Khmara and Kronenberg 2020). However, to move beyond discussions between those who share similar opinions, it is necessary not only to connect degrowth with debates on urban sustainability, but also to enter into dialogue with those within mainstream and influential areas, such as urban economics. Urban economics is a sub-field of economics that analyses urban issues and the spatial relationships between economic entities with the tools of economics. The aim of this article is to find ways to operationalise degrowth in cities through juxtaposing degrowth proposals with the main themes analysed in urban economics. By referring to five main themes of urban economics, we attempt to create an alternative urban development narrative and imagine what cities undergoing degrowth transition should look like and which issues should be prioritised.

Urban economics originates from neoclassical economics, and it embraces a microeconomic perspective and methodological individualism (Edwards 2007; Huriot and Thisse 2009; O'Sullivan 2012; Richardson 2013). Degrowth, in turn, has its roots in ecological economics with its macroeconomic perspective and systems thinking (Georgescu-Roegen 1971; Kallis, Kerschner, and Martinez-Alier 2012; Martinez-Alier et al. 2010; O'Neill 2012), and in French thought of political ecologists (Illich 1973; Latouche 1986). Both urban economics and degrowth have the potential to learn from each other. Urban economics has been criticised for ignoring the macroecological realities related to urban areas exceeding their fair share of the planet's carrying capacity and focusing on market forces alone (Obeng-Odoom 2016; Rees 1992). Few analytical models addressed the issues of limits to growth in an urban context (Nijkamp and Poot 1987; Nijkamp, Rietveld, and Snickars 1987) and even when acknowledging the existence of limits to growth, urban economists tend to be convinced that these limits may be overcome through, e.g. resource substitution and new technologies (Squires 2013). At the same time, while the idea of degrowth refers to economics, and there have been attempts to outline "the degrowth economics" (Kallis et al. 2020; Kallis, Kerschner, and Martinez-Alier 2012; Nørgård 2013), it often underestimates the economic perspective and mechanisms that could be used for its operationalisation. Instead, it concentrates on reducing the role of economic rationality in society by reducing the centrality of certain economic institutions, such as wage labour, private property, markets, and money (Parrique 2019).

While degrowth proponents often suggest that the denial of degrowth ideas "is reinforced by economists – the apostles of industrial modernity" (D'Alisa, Demaria, and Kallis 2015, xviii), we are confident that economics offers some ideas that can be woven into the new degrowth economics, which we try to illustrate with our case for urban degrowth economics. In a relatively forward-looking definition, O'Flaherty (2005, ix) suggested that urban economics is "about cities and public policies which can make them better or worse places for living, working and playing". We want to derive from urban economics those policies and instruments which can make cities better places for the environment and the broader society and effectively and efficiently use these resources for a degrowth transition.

The article is structured as follows. Section 2 elaborates on how cities may contribute to degrowth, based on an overview of the degrowth literature. In Section 3, we present the key themes of urban economics and analyse them from a degrowth perspective. We identified the key themes of urban economics based on eleven textbooks. The rest of this section is based on a conceptual analysis and degrowth literature review, with a focus on the most important proposals, as well as potential synergies and conflicts between degrowth and urban economics. Section 4

contains a synthesis of results, complemented with a discussion on degrowth operationalisation within prospective urban degrowth economics. Section 5 concludes.

2. How cities can contribute to degrowth?

Degrowth aims at "an equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long term" (Schneider, Kallis, and Martinez-Alier 2010, 512), i.e. reducing the overall metabolism of the economy. Given that cities generate most of the global economic output, as well as energy demand and CO_2 emissions, they are an important battleground for reducing this metabolism through changing the traditional material and energy flows and developing alternative ways to satisfy human needs, fulfil socio-economic functions, and – more broadly – create new forms of living.

Indeed, the urban context often appears in the degrowth literature as a place for experimentation with mobility, housing, decommodified eco-living, alternative production and consumption practices, among others (Alexander and Gleeson 2018; Cattaneo and Gavalda 2010; Khmara and Kronenberg 2020). The overarching guidelines for degrowth are ecological sustainability and social equity, and the values of autonomy, care, conviviality and sufficiency (D'Alisa, Demaria, and Kallis 2015). Following such values requires locally-based production and consumption (Kallis 2011; Latouche 2009), although such relocalisation has its limitations (Mocca 2020; Xue 2014).

There is increasing recognition of the role of space and spatial aspects in the socio-economic transformation among degrowth scholars, with a growing body of literature that connects degrowth and urban planning (Kuzmanic 2017; Prats 2017; Savini 2021; Wächter 2013; Xue 2021). The degrowth perspective highlights that urban economic growth is not necessary for citizens' wellbeing (Xue 2021), and indeed, it is of key importance to break the dependency on growth. Savini (2021) criticised the institutions that underlie contemporary urban planning that make cities engines of growth, namely functional polycentrism, (artificial) land scarcity, and Euclidian zoning. Instead, he proposed polycentric autonomism as an approach to territorial organisation, finity as an approach to the urban development paradigm, and habitability as the principle of socio-spatial organisation. More concrete planning propositions that reflect degrowth values and guidelines provide opportunities for local food production; they also allow mixed urban spaces to fulfil various functions, provide more public spaces for citizens' activities, and shift the emphasis from accessibility through mobility to proximity (Kuzmanic 2017; Prats 2017).

Reducing cities' overall environmental impact is closely related to reducing the impact of mobility and housing. The majority of degrowth proponents are united in claiming that the overall level of motorised mobility must be significantly reduced. There are various proposals to reduce urban private motorised mobility ranging from enhancing car sharing to the need for car-free cities (Krähmer 2020). The issue of housing is particularly important in an urban context, given significant inequalities in access to housing. The proposals of degrowth scholars regarding housing are decommodification and increased housing justice, restricting new housing construction and ensuring better utilisation of housing stock, along with exploring the potential of alternative forms of housing (Cattaneo and Gavalda 2010; Lietaert 2010; Nelson and Schneider 2018; Xue 2012).

While urban degrowth research focuses mostly on planning or refers to particular domains of urban economies, it still lacks a comprehensive imaginary of urban degrowth economics. In particular, it lacks the propositions of operationalisation which could be used here and now.

3. Key themes of urban economics analysed through the lens of degrowth

3.1. Key themes of urban economics

To identify the core themes of urban economics, we studied eleven textbooks found using the "urban economics textbook" query in the Google Books service. Google Books searches all

documents published as books, especially those of major publishers, and scanned by Google or otherwise available to this company.

Our sample included textbooks published after the year 2000. By focusing on textbooks, we wanted to capture the core messages that urban economics offers to its adepts, with the respective emphasis and structure. Textbooks offer the most basic outline of the topic, which is meant to influence the minds of students and others who wish to get acquainted with fundamental knowledge in the field.

The Google Books search resulted in 417 book suggestions. The selected eleven textbooks were mostly offered by major academic publishers who typically produce the most widely used and influential material. Other results included books on specific aspects of urban economics, such as housing, transport, or land, as well as more comprehensive and advanced academic handbooks on urban economics. We found both of these categories useful as an additional opportunity to validate the selection of the key themes in urban economics. Furthermore, the search resulted in many books only tangentially related to the topic or not related at all. Indeed, it seems that the market in urban economics textbooks is still "fairly thin", as suggested by Albouy (2012).

Our reference point was "Urban economics" (O'Sullivan 2012), perhaps the most recognisable and widely used and cited textbook, with nine editions and translations into four languages.[1] Based on a detailed reading of this textbook, we prepared an initial list of themes that we then sought in other textbooks. Ultimately, the five aggregate key themes of urban economics presented in Table 1 are those that appeared repeatedly in all of the eleven textbooks. However, as revealed by our detailed reading, the importance of these topics varied considerably between the different textbooks, and they appeared in different configurations, i.e. some issues were combined or less emphasised.

Table 1. Key themes discussed in urban economics based on the textbooks by Jones (2021), Sieg (2020), Brakman, Garretsen, and van Marrewijk (2019), Hartwick (2015), McCann (2013), O'Sullivan (2012), Brueckner (2011), McDonald and McMillen (2010), Edwards (2007), O'Flaherty (2005), and (Balchin, Isaac, and Chen 2000), additionally validated with the use of academic handbooks by Arnott and McMillen (2007) and Cheshire, Nathan, and Overman (2014).

Theme	General description
1. Urban growth and city size	A theoretical explanation of the economic forces responsible for the development of cities of different sizes and why cities differ in their economic scope. Debates on urban sprawl, zoning, and growth control. Urban sprawl is not considered an unequivocally negative phenomenon. Analysis of various growth-control policies and their impact on the city and other cities in the region.
2. Urban land rent and land-use patterns	Theoretical explanations of the distribution of people and activities within an urban economy and the relationship between location and land-rent. Land is considered scarce (but not fixed) and a subject for competing uses. Analysis of how the rent and value of land create equilibrium conditions in cities and allocate land for competing uses. Distance to some focal point is the main determinant of land prices.
3. Industrial location, agglomeration and clustering	Theoretical explanations of firms' location choices and spatial concentration. Critical aspects of locational behaviour are input factor prices, factor substitution, and market prices. The clustering of firms, industries, skilled workers and the "creative class" translates into urban economic growth. Firms cluster to benefit from agglomeration economies through input sharing, labour pooling and knowledge (technological) spillovers. Agglomeration economies provide self-reinforcing changes in location and result in increases in labour and land prices.
4. Housing and housing policy	Economic analysis of urban housing, studying the specificities of the housing market, evaluating housing policies and housing policy systems. Housing is considered a commodity. Exploration of the rationale for housing location from the perspective of developers and households. Analysis of the factors (amenities) that influence housing value and the formation of housing prices.
5. Transport	Economic analysis of urban transport, studying the costs and benefits of alternative transport systems, forecasting demand for urban transport and adjusting supply, and developing policy responses to internalise externalities related to urban transport which include congestion, (local) air pollution and accidents. Both private automobiles and mass transit are analysed; non-motorised transport is usually ignored.

3.2. Key themes in urban economics analysed through the lens of degrowth

Here we refer to the main themes addressed in urban economics from the perspective of degrowth. Degrowth would require a different conceptualisation of some issues. We outline such a possible conceptualisation, simultaneously highlighting the existing economic policies and instruments which could be used to transition to an urban degrowth economy.

3.2.1. Urban growth and city size: cities should not grow

Cities tend to change both in terms of population and occupied land. A growing population as well as inefficient planning policies often result in urban sprawl, towards which urban economists have an ambiguous stance. Some urban economists emphasise the narrowly understood microeconomic efficiency of urban sprawl, pointing out that containment policies usually have negative effects for urban housing markets (Anas 2012; Edwards 2007), while others recognise its significant economic and social costs, including commuting and infrastructure, pollution, the provision of public services, the loss of open-space amenities, and the risk of "speculation bubbles" (Ciscel 2001; Hortas-Rico and Solé-Ollé 2010; Nechyba and Walsh 2004). Degrowth also opposes sprawl (as well as further urbanisation). Sprawl is considered a negative phenomenon due to the appropriation of agricultural land and natural landscapes, increased consumption of fossil fuels due to the high level of commuting, biodiversity loss, expanding infrastructure, and the resultant environmental degradation (Alexander and Gleeson 2018; Demaria et al. 2013; Nelson and Schneider 2018; Schneider, Kallis, and Martinez-Alier 2010; Wächter 2013; Xue 2014). Thus, to some extent, degrowth and urban economics go side by side in recognising the costs of sprawl, and some existing anti-growth and sustainable land-use policies may be used in a degrowth transition.

Urban economics considers various containment strategies, such as smart growth, compact cities, polycentricity, zoning, and greenbelts. Perhaps the closest to degrowth values is the concept of compact cities, which implies dense urban structure with mixed land use, thus reducing the demand for intra-city travel, land, and infrastructure. Compact cities also favour social interactions (Helsley and Zenou 2014). Traditional urban containment policies, such as greenbelts or urban growth boundaries, support compact settlements and the efficient use of land in the contained area. However, to be effective and socially just, such policies should be planned and implemented at the level higher than local to prevent or mitigate freeriding effects in other urban areas that would allow for less dense, fragmented settlements. It is also highly important to combine growth control policies with appropriate approaches to land use and housing provision, which will be discussed in the subsections below. To facilitate this process, Savini (2021, 12) proposed displacing the planning paradigm of land scarcity by the one of finity, which would "interrupt competition by valuing existing urban qualities, opening up the possibility to maintain and regenerate them".

Indeed, due to the abovementioned concerns concerning housing affordability and possible free-riding effects, the effectiveness of containment policies is often contested by urban economists (Cheshire, Nathan, and Overman 2014; Edwards 2007; Jones 2021). However, their intellectual stance is grounded in the context of continuous economic growth and the individual's unlimited freedom of choice regarding his/her utility maximisation, which is contested in the degrowth discourse. That is why what is criticised in urban economics as inefficient and undesirable may be effective in the context of degrowth.

In the same vein, and also drawing from urban economics, urban containment can be promoted by limiting building and development permits. Such permits may be tradable, and trading zones may be introduced so that available permits are traded within predefined zones only (Nuissl and Schroeter-Schlaack 2009). This would also allow for the better allocation of limited permits and construction projects in line with the city's development plans and communities' needs while at the same time ensuring land availability for municipal and social uses. An additional measure would be to relax zoning regulations where needed to prevent their constraining communities' capacities to regulate and organise autonomously, as well as the possibilities of mixed area uses. Some zoning

policies introduce minimum-lot sizes or maximum density restrictions. From the degrowth perspective, introducing the opposite categories of maximum-lot sizes and minimum density restrictions may be desirable. However, it would have to be connected with maintaining the "human scale" of such restrictions, i.e. preventing overcrowding.

3.2.2. Urban land rent and land-use patterns: the decommodification of land

With the development of neoclassical economics, as land became commodified, land rent became subject to market exchange, reflecting not only the use value of land, but also the opportunity costs related to different potential uses. Such market-determined values of land frequently ignore social needs, and interest in land often yields monopoly or "windfall" gains for the owner (Balchin, Isaac, and Chen 2000). As land is necessary for all human activities, "misallocation of land inevitably entails misallocation of numerous valuable functions" (Hubacek and van den Bergh 2006, 6). Indeed, all production, housing, and public spaces are located on land, while at the same time, land is increasingly subject to speculative investment.

Karl Polanyi, whose critical stance towards ever-expanding markets serves as an inspiration for the degrowth movement, called land, money, labour, and natural resources "fictitious commodities" (Polanyi 1944). Following the degrowth logic, urban land should be treated as a resource rather than a commodity. It would reduce the dependence on markets and allow this resource to be better allocated in terms of social benefits. It would also reduce the present importance of land rents. Similarly, some modern economists also emphasise the need to break the "land-credit" cycle, i.e. preventing land from functioning as a financial asset to secure credits and enjoy unearned capital gains, which contributes to rising economic inequalities between landlords and renters (Ryan-Collins, Lloyd, and Macfarlane 2017).

Perhaps the most promising strategy for land decommodification is conceptualising and governing land as commons, which has already been recognised by degrowth scholars (D'Alisa, Demaria, and Kallis 2015; Euler 2019; Kostakis et al. 2018; Lockyer 2017; Perkins 2019). Bollier (2014) emphasised that commons are not just resources; they are resources plus certain communities, with the protocols, values, and norms generated by these communities to govern such resources. The prominent role of the community in governing commons corresponds with the degrowth values of autonomy, conviviality, and moving beyond the dichotomy of public vs private property. However, the role of (local) government is important in governing commons: according to Bollier (2014), the state and the municipalities, as local representatives of the state, must act as trustees for the commoners. Ultimately, they need to protect shared assets from enclosure and ensure that those assets are accessible to everyone on fair terms and that the commoners have the authority and space to engage in genuine commoning. Inspired by the work of Elinor Ostrom, Foster and Iaione (2019) suggested five design principles specifically for urban commons: collective governance, the enabling state, social and economic pooling, experimentalism, and tech justice. The principle of the enabling state reflects the facilitating and supporting role of local government emphasised by Bollier, while social and economic pooling refers to the presence of autonomous institutions operating within a non-mainstream economic system (e.g. cooperative, social, solidarity economies), which is particularly relevant to degrowth.

There are examples of various urban spaces and units being managed as commons, e.g. urban green spaces (Colding et al. 2013; Colding and Barthel 2013), housing (Chatterton 2016; Huron 2015), and public spaces (Radywyl and Biggs 2013). In the case of urban green spaces, the key characteristic of urban green commons is the right of the interested users to actively manage these spaces, regardless of who owns the land (Colding et al. 2013). Even privately owned land may generate flows of ecosystem services (Biernacka and Kronenberg 2019), which could be conceptualised as commons. Thus, urban planning authorities also need to address land and multiple informal green spaces that fall outside of their normally understood scope of responsibility and make them part of the broader green infrastructure networks (Feltynowski et al. 2018). This would be especially important in the case of private but non-used land and informal green spaces. Various

economic incentives may be used to facilitate the process of including private land in the green infrastructure, e.g. soil-sealing taxes, fees for cutting trees, subsidies for green roofs and unsealing activities.

Building and enhancing land commons may be supported by the creation of community land trusts, which would allow city residents to manage land in response to their needs and lay the foundation to manage other domains as commons, e.g. urban green spaces and housing. Such radical institutional changes on a broader scale are not likely to happen in the short term in an urban context, where most land is in private hands. They demand strong political will and bottom-up pressure. In the meantime, some proposals already discussed in economics may be used, e.g. reforming the tax system to provide the state and wider community with an efficient land value tax to capture the unearned windfall gains from collective development (Jones 2021; Ryan-Collins, Lloyd, and Macfarlane 2017). Subsequently, taxation could be designed in a way that encourages landowners to sell land to municipalities, as public ownership can ensure that socially desirable uses of land are preserved in particular locations. There are examples of successful appropriation of land by government and using it for social needs, like in Singapore (Haila 2015) or South Korea (Ryan-Collins, Lloyd, and Macfarlane 2017). Perhaps the most likely and reasonable first steps would be to adapt legislation and reach "the low-hanging fruits", i.e. to transfer non-used land, land with non-defined legal status, and brownfields to a specially created land bank.

3.2.3. Industrial location, agglomeration and clustering: cities as hubs of alternative economies

The traditional urban economics approach was to focus on economies of scale or agglomeration economies that translate into the availability and costs of production factors. However paradoxical that may sound, economies of scale and – even more so – agglomeration economies may also act in favour of an alternative economy. Indeed, transformation requires a critical mass of change agents, and that is perhaps more likely to occur in cities than elsewhere, especially in the case of issues such as input sharing and knowledge spillovers. What is more, urban degrowth economics should highlight positive externalities other than reduced costs, and extend the debate to doing good and collaboratively creating value, which should be the key principles for degrowth companies (Khmara and Kronenberg 2018).

The most traditional view highlighted minimising transport costs, which indeed is also important from the perspective of degrowth. However, degrowth economics would rather emphasise proximity to customers and reducing transport requirements than agglomerating production in search of cost reductions. Any cost minimisation approach assumes that manufacturers have full information on which to base their location decisions. However, this is rarely the case. In reality, there are many other potential arguments for choosing the location of business activity. Even some urban economists acknowledge that instead of maximising profits, some companies may follow "satisficing" profits, i.e. choosing locations that allow a company to make a satisfactory profit (Jones 2021). In fact, "satisficing" may also refer to other factors related to location selection, and indeed, locations are frequently discovered by chance (Berg 2014). Exploring "satisficing" may offer a promising link between traditional urban economics and degrowth.

As argued by Bolter and Robey (2020), the benefits of agglomeration economies involve three mechanisms: sharing, matching, and learning. These issues have clear links to degrowth. Sharing translates into the more efficient use of existing infrastructures and other resources. Matching refers to a proper match between workers and their jobs, and it may be particularly relevant from the point of view of promoting industrial democracy and doing good – and finding motivated people for this kind of work. Although learning is primarily related to increased productivity, it may also refer to spreading new, alternative business models and ideas, such as those related to degrowth. Following a broad interpretation of urban degrowth economics, all of these issues emphasise local connections between companies and other stakeholders, and they may support an alternative economy as much as they did the conventional one (Foster and Iaione 2016;

Leyshon, Lee, and Williams 2003). Many such alternative practices are widely discussed in the degrowth literature, e.g. community currencies, cooperatives, social enterprises, alternative work, and employment practices.

The alternative degrowth economy should focus on socially useful production and industrial democracy (King 2019). The latter refers to empowering workers and giving them the power of democratic control over their organisations and over what is produced and how. Agglomeration economies can certainly act in favour of such an alternative economy, but more guidance will be necessary on how to transform the mainstream business. An inspirational example in this context may be the Lucas Plan – the 1970s attempt by workers at the arms-related company Lucas Aerospace to defend their jobs by proposing alternative, socially-useful production using the company's technology and their own skills (Loughlin 2017). Other examples include the Italian Solidarity Economy Districts and other eco-industrial cooperatives (D'Alisa, Demaria, and Cattaneo 2013).

Clustering, sharing, matching, and learning can all be used to increase resource use efficiency and reduce new resource requirements. These ideas are central to the concepts of the circular economy and industrial ecology, with flagship initiatives such as eco-industrial parks. Although the circular economy is sometimes associated with mainstream neoclassical economics and green growth, it does promote alternative ownership models (product-service systems) and multiple other ideas that complement degrowth (Ghisellini, Cialani, and Ulgiati 2016). Indeed, previous research on planning and redesigning industrial symbiosis complexes can now support new ideas on the purposeful co-location of (or at least ensuring virtual connections between) companies aimed at minimising their environmental impacts. Within the limits that industrial activity will fit into the degrowth economy, eco-industrial parks can serve as a valid model for the location of such activities. Similarly, to reduce the need for new production at least partly, the broad stream of second-hand products should be managed more formally than is presently the case to ensure a similar symbiosis between consumers. There is a need to create clusters of consumers, shops, platforms, initiatives, and firms to support the repair and reuse of products as long as possible (Khmara and Kronenberg 2018).

Finally, there is evidence from urban economics that, after local facilities reach an optimum size, further agglomeration may become difficult or expensive and is replaced by deglomeration, i.e. the movement of an industry away from agglomerations (Werker and Athreye 2004). In cases of infrastructure overload, lack of workforce, water, housing, vacant spaces, or deteriorating natural environment, this process can be steered. Purposeful industrial deglomeration may be applied to areas where ecological boundaries have been transgressed. If some industries indeed have to shut down or shrink as a result of the degrowth transition, it needs to be reflected in urban planning strategies. Industrial buildings and facilities which are no longer used must be repurposed for fulfilling socially and environmentally useful functions (Kuzmanic 2017; Prats 2017) or serve as a resource for urban mining, which could partly replace the acquisition of primary resources (Wallsten et al. 2013).

3.2.4. Housing and housing policy: in line with social and environmental justice

Urban economists address microeconomic issues related to the demand for housing in narrow terms, such as preferences for housing (and moving between houses) depending on housing quality and consumers' income. In this sense, they assume that although consumers may be diverse, their decisions are driven by the perceived utility of staying in a given property. It is only in the context of the broader housing policy that urban economists admit that not all consumers can afford any housing at all, and that additional interventions are necessary to satisfy housing needs. Unlike urban economics, degrowth considers housing to be a public good rather than a commodity, with a strong interest in decent and affordable housing that has minimal environmental impacts. Indeed, as an elementary need, housing has received much attention in the context of degrowth (see in particular Nelson and Schneider 2018). The character of this issue is mostly political, although it also clearly refers to the potential use of economic mechanisms.

To provide affordable housing for all socio-economic groups, rent controls and rent subsidies, as well as more social housing (Parrique 2019; Schneider et al. 2015), are desirable for degrowth, alongside an increased share of non-profit housing developers (e.g. cooperatives, housing associations, trusts, co-housing projects). Such housing organisations may be understood as urban commons. Huron (2015) draws on the example of limited-equity cooperatives (LECs) from Washington, D.C. The difference between typical housing cooperatives and LECs is that LEC members purchase their membership shares at very low rates; they must sell those shares for similarly low rates to leave the cooperative. This provides home-ownership opportunities for low-income people while also keeping the housing affordable for future residents.

In the 1990s, Denmark applied a similar commons-based approach to housing provision. The Danish alternative to owner-occupied and private rental housing was an association-based housing model consisting of non-profit housing associations and private cooperatives. In the case of the former, property ownership remains with an association, with residents as its tenants; meanwhile, in the latter, residents own a share in the common property and have a use-right to a dwelling. Before members were allowed to mortgage their shares, which resulted in rapid and large-scale commodification, the cooperatives provided affordable housing. In contrast, non-profit housing associations, with their "collective private property structures", have so far withstood the flow of neoliberal reforms and "may be something to consider as inspiration for alternative urban imaginary" (Larsen and Hansen 2015, 272).

An even more advanced form of urban housing commons which should be promoted and enabled to operationalise degrowth in cities is co-housing initiatives (Chatterton 2016; Lietaert 2010). What is of particular relevance for degrowth is that co-housing incorporates sharing and a cooperative way of living in its design and implementation.

Enabling and promoting the abovementioned forms of housing is closely related to planning regulations which often oppose the mixed development of spaces. Such regulations need to be smoothened for effective and compact use of urban space, providing various types of housing and preventing urban sprawl.

As it is impossible to fully decouple growth in housing stock from the related environmental impacts (Xue 2013), less new construction should be built, and as much of the existing housing stock as possible should be refurbished and reused. It is crucial to adapt legislation for easy state appropriation of abandoned dwellings to efficiently use what is already built. They could be renovated into low-energy and low-emissions dwellings by the public sector or public-private partnerships and be provided as public housing or transferred into the ownership of housing cooperatives or other non-profit housing organisations. Some European countries, e.g. Spain, have already taken the first steps to creating incentives for urban renovation (instead of new constructions) along with supporting the rental market (instead of home ownership) (Arriba and Cabrero 2018). There are estimations that proper refurbishment policies could reduce energy needs by up to 80% and hot water energy requirements by 60% by 2050 (Cuchí and Sweatman 2011).

Better use of existing housing stock may also be forced by various forms of growth controls meant to decrease the number of new houses that can be built. However, a criticism of urban economists is that it drives the growth of prices and limits the ability of households to meet their needs for new houses (O'Sullivan 2012). Nevertheless, it is compatible with degrowth when combined with the abovementioned alternative housing provision mechanisms.

In order to finance the refurbishment and renovation and to provide subsidies to make housing affordable, the government needs substantial tax revenues. They may be received from a tax on empty owner-occupied dwellings. If a maximum quota of floor space per capita has to be set to reduce the unsustainable use of space, then a tax may be imposed on occupying the space bigger than the respective quota.

3.2.5. Transport: how and how far do people need to travel?

As in the case of housing, urban economics deals with microeconomic issues related to the efficiency of various modes of urban transport, consumers' demand and preferences, and internalising

externalities that include congestion, pollution, and accidents. However, the theme of transport is where urban economics and degrowth approach each other most closely. Until recently, urban economists did not refer to climate change at all, but now the situation has started to change (Jones 2021; Sieg 2020). Also, discussions on various modes of urban transport did not include cycling, which has now started to be considered an independent alternative mode of transport (Jones 2021). Various policies and instruments analysed in urban economics regarding reducing congestion and emissions from urban transport may be used to accelerate degrowth transitions in cities.

In degrowth terms, excessive urban (private) motorised mobility is one of the most unsustainable domains of urban life. It leads to intense resource use as well as significant amounts of waste for both the production of vehicles and for mobility itself. As for reducing urban private motorised mobility, the most popular proposals are to increase the availability and quality of public transport and to increase non-motorised modes of mobility, such as walking and cycling (Alexander and Gleeson 2018; Brossmann and Islar 2020; Kuzmanic 2017; Lehtinen 2018; Marletto 2008). Non-motorised mobility requires appropriate and safe infrastructure (pavements, bike lanes), so there are calls to redirect both private and public investments from private car-based models of transport to non-motorised ones (Cosme, Santos, and O'Neill 2017; Marletto 2008; Sekulova et al. 2013) and even to convert some existing car infrastructure to walking and cycling infrastructure (Kuzmanic 2017). There are examples of such conversions from the past, e.g. creating bike lanes and pavements on former roads in Detroit (Van Mead 2016). There are multiple other examples related to the current COVID-19 crisis, with cities extending cycling and walking infrastructure at the expense of cars to enable social distancing and safe mobility (Rannart 2020; Rowlatt 2020), which is reflected in urban economics research (Jones 2021). Such urban revival initiatives may reduce overall mobility time. Indeed, Braess's paradox (Duranton and Turner 2011; Small, Verhoef, and Lindsey 2007) suggests that additional roads increase traffic and congestion by creating the incentive to drive more.

Alexander and Gleeson (2018) put forward the idea of increased use of electric bikes and cargo bikes. So enhancing and subsidising the production of such bikes, if needed, may be one more step toward a transport transition. Cargo bikes are already used in Cargonomia, the degrowth-fuelled initiative in Budapest (Khmara and Kronenberg 2020). Other solutions on the supply side may be bike-sharing, community-run and operated transport, along with popularising alternative enterprises for eco-mobility, such as Riversimple (Wells 2018).

As demand for transport is a derived one, its reduction requires substantial changes in other modes of urban life, i.e. city planning (planning for polycentricity, the proximity of work to home, mixed spaces, walking and cycling infrastructure) (Kuzmanic 2017) or the organisation of jobs (wider use of online work, where possible) (Marletto 2008). Again, the COVID-19 crisis showcased many such changes.

The abovementioned transformations would significantly reduce the negative externalities of transport. The question is how to create incentives (economic, among others) for such infrastructural, institutional and perception-related transformation to happen. Subsidies for public transport and the high level of its regulation are undoubtedly relevant for degrowth. Other monetary incentives, widely analysed in urban economics and internalising the externalities (e.g. parking fees, gasoline and pollution taxes, congestion charges) can also be used, along with more radical ideas, such as regulated petrol consumption caps per capita, which could be traded similarly to carbon emissions caps and incrementally decreased. Internalising external costs and imposing caps are other solutions from formal economics which may be relevant for the degrowth transition.

4. Discussion

4.1. Degrowth operationalisation in an urban context

To make the so far utopian concept feasible, degrowth proponents need to go beyond the critique of capitalism and suggest actions that are implementable on a broader scale, here and now, at least as a transition to the desired future.

Table 2 highlights the proposals that we formulated to support the degrowth transition in cities with regard to the key themes addressed in urban economics. Following the classical definition of economics as "the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses" (Robbins 1935, 16), we emphasise the linkages between economics and degrowth. Although following some kind of Chinese whispers game, and in line with the pursuit of growth, the "limited resources" have sometimes been suggested to serve unlimited wants and needs, the core idea of the efficient use of resources available seems to be relevant to degrowth. Our proposals confirm this approach.

Intriguingly, the efficient allocation of scarce resources to satisfy human needs permeates the degrowth interpretation of urban economics themes even more than it does in the case of urban economics textbooks. Cities should not grow because of the need to protect the surrounding resources. The respective urban policies should highlight the efficient use of land, housing and other infrastructures. Even agglomeration economies refer to the efficient use of various resources.

Table 2. Proposals for degrowth operationalisation in relation to the key themes addressed in urban economics.

Theme	Proposals
1. Urban growth and city size	• Restricting further urbanisation, preventing sprawl • Urban containment policies that are planned and implemented at the level higher than local • Limiting building and development permits, introducing trading zones for such permits • Relaxing of zoning regulations
2. Urban land rent and land use patterns	• Land treated as a resource, not as a commodity • Conceptualising and governing land as commons • A greater role for local government (as a facilitator, mediator, and trustee for commoners) • Community land trusts • Including private land in the green infrastructure through economic incentives
3. Industrial location, agglomeration and clustering.	• Enabling industrial democracy and socially useful production and services • Policy support for creative communities aiming at developing alternative visions of an urban economy • Eco-industrial parks as a model for industrial location – purposeful co-location of firms or ensuring virtual connections with regard to the exchange of by-products • Reducing the need for new production by supporting the exchange of second-hand products and clusters of repair services • Steered deglomeration when needed
4. Housing and housing policy	• Reducing housing-related environmental impacts while simultaneously providing affordable housing for all • Housing as a public need, not a commodity • Refurbishing the existing housing stock before building new housing • Adapting legislation to extend local government capacities to manage abandoned buildings • Safe rental market – rent controls, rent subsidies; support for public housing • Increased share of non-profit housing developers (cooperatives, housing associations, trusts etc.) and co-housing communities – promoting housing commons • Taxes related to living areas
5. Transport	• Reducing urban private motorised mobility and increasing the availability and quality of public transport, car sharing and non-motorised modes of mobility through redirecting investments • Converting part of the existing car infrastructure into walking and cycling infrastructure • Changes in city planning towards polycentricity, mixed space use, proximity • Monetary incentives internalising the externalities – parking fees, gasoline and pollution taxes, congestion charges, regulated petrol consumption caps

Ultimately, all of these issues highlight reduced environmental impacts. Indeed, in all of these cases, resources are understood broadly, synonymous with the broader environment that cities ultimately need to exist.

Just like introductory economics textbooks (Green 2013), urban economics textbooks place little emphasis on the environment and sustainability, let alone discussing the limits to urban economic growth. They barely address dilemmas of wealth distribution, inequality, and ethics, while normalising profit and utility maximisation as the main drivers for particular choices. There is an urgent need to reform urban economics and embed its research into a wider social and environmental context, and there have been attempts to do that (Obeng-Odoom 2016; Rees 1992). Although degrowth proponents and urban economists may have a similar stance on some issues, they put them in different frames and are not likely to meet. For example, many urban economists recognise the negative consequences of urban sprawl (Section 3.2.1), the potential of land-use mix and public transit accessibility to reduce car trips (Kim and Parent 2016), and that building additional roads may be a false solution to traffic congestion (Section 3.2.5). Some of the solutions to these issues developed within urban economics, as well as various economic incentives and disincentives, may be mobilised to operationalise urban degrowth. In this article, we attempted to point out such solutions and mechanisms along with proposals for new, more radical ones.

The efficient use of resources translates into circular strategies, such as minimising waste, establishing sharing infrastructure (including eco-industrial parks) and second-hand shops, as well as online marketplaces and repair services to extend the life cycles of products, cooperation with business to enable upcycling of products which cannot be repaired, and setting up clusters of food waste processing companies. These aspirations resonate with our proposals to reduce the need for new products and enable socially useful production and services (Section 3.2.3). What also resonates with our image of a degrowth city is stimulating circular renovation in private and social housing and transforming former industrial areas into living and working spaces for experimentation with circularity and sustainability (Sections 3.2.3 and 3.2.4).

Many other issues related to promoting local economies also relate to efficiency and effectiveness, albeit again not in terms of minimising costs of production but minimising environmental pressures. For example, shortening the food supply chain means increasing the consumption of regional products compared to imported ones and more localised production and consumption, which was also highlighted in our analysis.

Finally, the efficient use of resources sometimes only requires changes in governance mechanisms. One form of governance that reappeared in our degrowth interpretation of all the urban economics themes is commoning, although it is absent in urban economics. Commoning relates to the decommodification of some urban domains (e.g. land and housing) and to empowering the local communities that manage the commons. Emphasis on decommodification reflects the movement's aspiration to transition from a market economy to an economy with markets, i.e. an economy where markets "are always embedded within limiting extra-economic customs" (Parrique 2019, 301). This, along with empowering and supporting creative communities with alternative visions of the economy, would enhance the social economy domain in cities (cf. Murtagh 2019).

Degrowth is normative, with ecological sustainability and social equity as overarching guidelines. These guidelines are supported by values of conviviality, a sense of community, care, direct democracy, and autonomy. Such normativity is reflected in our analysis. Implementing the proposals in each of the five domains will require strong political will and heavy regulations, including new taxes, steering agglomeration and deglomeration processes, and more active engagement in urban planning. Local governments' powers and authorities should be significantly extended, e.g. to more quickly and easily manage abandoned buildings or to mediate the process of commoning and protect the commons from enclosures. However, this process must go along with enhancing direct democracy.

4.2. Urban degrowth economics and barriers to its operationalisation

Our suggestions indicate directions for a more comprehensive programme of urban degrowth economics. The degrowth movement faces internal tensions between the "reformist and state-based approach and the one envisioning a radically altered, non-capitalist future" (Mastini, Kallis, and Hickel 2021, 7). Many degrowth proponents explicitly claim that degrowth is not compatible with capitalism and the market economy (Liegey and Nelson 2020; Parrique 2019; Schmid 2019), but there are also opinions that capitalism does not necessarily need to grow, and it depends on the institutional framework (Daly 2018; Lawn 2011). Some degrowth thinkers explicitly involved in debates over capitalism argue that "capitalism should not be fetishised as the principal object of critique: it is rather the economistic and "productivist" imaginary which underpins it that should be targeted" (Andreucci and McDonough 2015, 62). Indeed, the new socio-economic system called for by degrowth proponents requires a discussion about what needs to change.

Our argument is that if degrowth has ambitions to establish a new socio-economic system, it needs to propose concrete operationalisation methods that also refer to economic mechanisms, though embedded in a heterodox approach. While fully abandoning wage labour, profit motives, and markets may remain far-reaching values of degrowth, it needs to seek compromises, at least at the transitional stage, in order to be appealing to the broader society. Systems are not likely to change from day to day.

As Mocca (2020, 86) pointed out, "contributions on degrowth fall short of providing a thorough (and convincing) explanation of how cities, especially big urban agglomerations, which are the hubs of the capitalist system, could be converted from "growth machines" to degrowing places", and "cities are the key places in which to start a radical change in the consumerist mindset". With this article, we contribute to filling this shortage. Typically general and macroeconomic, the degrowth proposals need to be adjusted to an urban context. Only by addressing urban issues in an orderly manner will it be possible to create a coherent degrowth programme for cities.

This is preliminary research that aims to start creating an image of what a degrowth city could look like and find ways to get there. Further research is needed, dealing with every studied area in more detail, including an analysis of selected case study cities or urban phenomena that could potentially inform the discussion, such as circular cities or Transition Towns. Moreover, further research should involve more domains of an urban economy (such as labour and employment or the role of business). We did not cover some other themes from urban economics, such as crime and education, because there is a lack of discussion of these themes in the degrowth literature, among other reasons. Also, to restrict further urbanisation and growth of cities, it is important to reduce the incentives for rural-urban migration, which again exceeds the scope of the present article.

Our analysis highlights the need to redistribute wealth in different ways and redirect investment flows to satisfy different priorities. Governments would need significant funds to implement the many policies suggested in this article, as well as others that appear in the degrowth literature (Kallis 2015; Kallis, Kerschner, and Martinez-Alier 2012). However, this cannot imply even more burdening of the lower income groups; instead, degrowth proponents emphasise the relevance of progressive taxation and shifting taxes from labour to production and consumption (Hickel 2019; Perkins 2019). Such reforms in the tax system require a high level of consciousness and dedication from both local and national governments, which could be a significant barrier (Hornborg 2019). However, in countries with corrupt political institutions and weak civil society, such experiments are far less likely. A strong civil society is particularly important for a bottom-up grassroots approach, which is often emphasised in the degrowth literature, as making changes from the bottom requires solidarity and responsibility for the public interests.

Another barrier to operationalising degrowth may be a negative perception of the relevant policies by the broader society, as reflected, for example, by the "Yellow Vests" objecting to the imposition of new taxes in France (Douenne and Fabre 2020). It also reveals one of the internal contradictions in the degrowth movement, namely between the call for an overall reduction in

production and consumption and the political implementation of the respective incentives and for radical democracy that involves people in decision making (Muradian 2019). Romano (2012, 584) captured it as "degrowth advocates [claiming] that a given political and territorial architecture (the localist one) necessarily generates a specific political agenda, a direct (ecological) democracy one". This may be a delusion unless a broad educational and awareness-raising campaign manages to change people's attitudes or an immediate crisis happens.

5. Conclusions

This article attempted to outline an alternative urban development narrative – an urban degrowth storyline. We referred to urban degrowth economics with the idea of making cities better "places for living, working and playing". In essence, urban economics focuses on the efficient use of scarce resources. We posit that the efficient allocation of scarce resources to satisfy human needs permeates the degrowth interpretation of urban economics themes even more than it does in the case of urban economics textbooks. However, this requires a proper definition of resources – the broader environment on which cities ultimately depend. This can be translated into specific provisions regarding the efficient use of land, housing, and other infrastructures, as well as the broader environmental flows used to create them. As degrowth is normative and requires radical changes in the organisation of society and the economy, greater regulation will be needed to complement its guiding principles of ecological sustainability and social equity. The operationalisation of degrowth in an urban context would need simultaneous macropolitical and macroeconomic changes, e.g. those related to work, taxes, and redistribution policies, as well as a broad cultural change – stepping back from consumerism. We propose taking what is relevant from economics, ensuring the transition to the desired future, instead of radically changing everything from scratch. Indeed, many important issues have already been addressed in urban economics, and they can be promoted further to reform the existing system. Finally, further and more detailed research is needed, e.g. covering other themes from urban economics or creating quantitative models and indicators of urban degrowth economics to bring closer the possibilities of building and sustaining urban economies without growth.

Note

1. https://www.mheducation.com/highered/product/urban-economics-o-sullivan/M9780078021787.html

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Article 3

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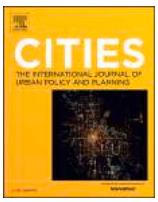

On the road to urban degrowth economics? Learning from the experience of C40 cities, doughnut cities, Transition Towns, and shrinking cities

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ABSTRACT

Cities have special importance and the potential to serve as places for social, economic, and ecological transition experiments. They create organisations and networks to collectively address various sustainability challenges. One of the broad transformational ideas that can guide a far-reaching transition and address the key sustainability challenges is degrowth. We postulate that a new narrative of 'urban degrowth economics' is necessary to operationalise degrowth on a larger scale. Analysing the strategies and policies of cities that represent selected networks or phenomena through the lens of such a narrative can demonstrate which of the current approaches to urban development are the closest to degrowth values. By juxtaposing degrowth proposals with the main themes analysed in urban economics, we propose criteria for urban degrowth economics. We then apply these criteria to assess selected case study cities that represent the following networks and phenomena: C40 (Copenhagen), Transition Towns (Totnes), doughnut economics (Amsterdam), and shrinking cities (Detroit).

1. Introduction

Degrowth is the idea which emphasises that – in the face of the current environmental catastrophe and global social injustices – there is a pressing need for equitable downscaling of production and consumption and the overall rejection of the growth paradigm in economic policies. According to its proponents, this is the only feasible scenario on a planet with finite resources (Research & Degrowth, 2010). Multiple ways of tackling the negative consequences of economic growth have been explored in cities that already host almost 60 % of the world's population and may hence act as key places for social, economic, and ecological transition experiments (Crane et al., 2021; Seto et al., 2017). Although degrowth has been explored relatively rarely in this context, recent years have seen increasing interest in degrowth in cities (Kuzmanic, 2017; Prats, 2017; Savini, 2021; Xue, 2014, 2022; Xue & Kębłowski, 2022). Indeed, even the key international bodies that deal with the most pressing crises of climate change and biodiversity loss – the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) – argue for the use of degrowth policies to address these challenges (Hickel et al., 2022).

Implementing degrowth proposals would necessitate radical changes, and indeed it can be considered one of the most far-reaching forms of sustainability transitions (Khmara & Kronenberg, 2020). Still, not enough has been written on what these policies really are or should be, and what exactly they should build on (Barlow et al., 2022). Some of the measures highlighted in the IPCC and IPBES reports, such as improving public services, including housing and transportation, explicitly link to life in cities. Indeed, a degrowth transition should be based at least partially on existing instruments and initiatives, as redeveloping cities from scratch is hardly possible.

We suggest that a new narrative of 'urban degrowth economics' is necessary to operationalise and implement degrowth in cities. To achieve this, it is important to juxtapose degrowth proposals with the main themes analysed in urban economics, i.e. the dominant approach to managing and analysing the economics of modern cities. By doing this, in our previous research, we proposed criteria for urban degrowth economics (Khmara & Kronenberg, 2023). Here, we apply these criteria to assess the selected case study cities that represent the following four prominent urban networks, initiatives, and phenomena (hereafter collectively referred to as phenomena): C40, doughnut economics, Transition Towns, and shrinking cities. With this research, we attempt to contribute to the operationalisation of degrowth, which is highly necessary given the still rather elusive character of this concept.

The key to selecting these phenomena was that they are widely known and address at least some issues related to degrowth, although

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never explicitly. For example, C40 is committed to fighting climate change, doughnut cities embrace the doughnut model of an economy that respects planetary and social boundaries (Raworth, 2017), Transition Towns support local economies and fight peak oil (Hopkins, 2008), and shrinking cities have been considered to have the potential to use transformative development policies (at least in some domains) instead of "business as usual" (Stellmacher & Brecht, 2017).

We aim to figure out how these phenomena relate to degrowth and how they can support an urban degrowth transition. The analysis involves four exemplary cities: Copenhagen, Amsterdam, Totnes, and Detroit, selected as the most representative of each phenomenon. Hence, the aim of this article is to assess which of the analysed phenomena has the biggest potential to support degrowth transition in cities.

Indeed, Hickel et al. (2022: 402) suggested that researchers "should learn from sustainable 'transition towns', cooperatives, co-housing projects or other social formations that prioritise post-growth modes of living." This is exactly what we aim to achieve with this article. There has been rich scholarship regarding issues such as just sustainability in urban communities that promote environmental protection, social needs satisfaction, and a vibrant local economy rather than the idea of economic growth that does not link specifically to the term degrowth but represents similar values (Xue, 2022). Interestingly, there have been attempts to use degrowth-related branding for city marketing, e.g., in the case of the Slow City movement. However, upon a critical assessment, such claims may have been rejected (Islar & Gulbandilar, 2019). In a similar way, we investigated cities that can be associated with specific phenomena, partly for branding. However, in our case, we sought case studies that were already well-established in the context of the studied phenomena.

At the same time, we make an effort to avoid excessively simplistic reasoning that takes some of the developments, e.g., from the mainstream eco-modernist approach, and neglects their broader and indirect negative consequences (for a criticism of this approach in the context of degrowth, see Xue (2022)). Instead, the broader and more comprehensive perspective of what we call urban degrowth economics (Khmara & Kronenberg, 2023) weaves together various issues that are of key importance for urban planning and development.

In this way, we add to the ongoing, more specific debates on how to implement degrowth in the urban context, a field that has recently started to develop with a focus on certain aspects, such as mobility (Cattaneo et al., 2022; Dillman et al., 2021), urban planning (Lehtinen, 2018; Xue, 2022), housing (Cucca & Friesenecker, 2022; Martínez Alonso, 2022) or, indeed, certain cities and their respective policies (Krähmer, 2021; Rutt, 2021; Savini, 2021).

The article is structured as follows. Section 2 presents the materials and methods used, including our set of urban degrowth economics criteria. In Section 3, we discuss our case study cities in relation to each criterion. In Section 4, we present a synthesis of the results and, based on them, rank our case study cities. Section 5 contains a discussion and conclusions.

2. Materials and methods

We assess four case study cities and the four broader urban phenomena that they represent from the perspective of a set of criteria that focuses on urban degrowth economics. The criteria are derived from our previous research (Khmara & Kronenberg, 2023) in which we attempted to operationalise degrowth in an urban context by juxtaposing degrowth proposals with the main themes analysed in urban economics. These criteria represent an attempt to create an alternative urban development narrative – urban degrowth economics – and suggest what cities undergoing a degrowth transition should look like and which issues they should prioritise. The criteria refer to five main themes: (1) urban growth and city size; (2) urban land rent and land use patterns; (3) industrial location, agglomeration and clustering; (4) housing and housing policies; and (5) transport, as summarised in the 24 proposals for degrowth operationalisation presented in Table 1.

To assess whether the analysed cities comply with our criteria, we conducted a content analysis of strategic documents, reports, and the websites of local governments and civic organisations, along with academic literature and media materials. The documents were selected according to content-related suitability to our criteria and included planning documents, climate roadmaps, circular strategies, sustainability agendas, housing strategies and reports, comprehensive development plans (Detroit), business plans, and strategies on mobility and

Table 1
Proposals for degrowth operationalisation regarding the key themes addressed in urban economics.

Theme	Proposals
1. Urban growth and city size	1.1 Restricting further urbanisation, preventing sprawl
	1.2 Urban containment policies that are planned and implemented at the level higher than local
	1.3 Limiting building and development permits, introducing trading zones for such permits
	1.4 Relaxing of zoning regulations
2. Urban land rent and land use patterns	2.1 Land treated as a resource, not as a commodity
	2.2 Conceptualising and governing land as commons
	2.3 A greater role for local government (as a facilitator, mediator and trustee for commoners)
	2.4 Community land trusts (CLTs)
	2.5 Including private land in the green infrastructure through economic incentives
3. Industrial location, agglomeration and clustering	3.1 Enabling industrial democracy and socially useful production and services
	3.2 Policy support for creative communities aiming at developing alternative visions of an urban economy
	3.3 Eco-industrial parks as a model for industrial location – purposeful co-location of firms or ensuring virtual connections for the exchange of by-products
	3.4 Reducing the need for new production by supporting the exchange of second-hand products and clusters of repair services
	3.4 Steered deglomeration when needed
4. Housing and housing policy	4.1 Reducing housing-related environmental impacts while simultaneously providing affordable housing for all
	4.2 Housing as a public need, not a commodity
	4.3 Reasonable management of existing housing before building new houses: refurbishment and distribution based on household size, taxation of excessive living areas
	4.4 Adapting legislation to extend local government capacities to manage abandoned buildings
	4.5 Safe rental market – rent controls, rent subsidies; support for social housing
	4.6 Increased share of non-profit housing developers (such as cooperatives, housing associations, trusts) and cohousing communities – enhancing housing commons
5. Transport	5.1 Reducing urban private motorised mobility and increasing the availability and quality of public transport, car sharing and non-motorised modes of mobility through redirecting investments
	5.2 Converting part of existing car infrastructure for walking and cycling
	5.3 Changes in city planning towards polycentricity, mixed-use space, proximity
	5.4 Monetary incentives internalising the externalities – parking fees, gasoline and pollution taxes, congestion charges, regulated petrol consumption caps

urban greening, i.e., documents determining development strategies and patterns for the analysed cities. These documents were scanned in the search for key terms related to our criteria (e.g., growth, limits, sprawl, containment, zoning, commons, rent, industrial symbiosis), with a careful reading of particular chapters or sections (if directly related to some criterion). The overall goals were to define the vision of development of the selected cities and to identify particular policies, instruments and initiatives to implement this vision. All materials were searched using the Google search engine. Most of the analysed strategic documents were adopted not earlier than 2019, except Detroit Future City, which was created in 2013 for the following 50 years.

Based on the analysis of the five criteria of urban degrowth economics, we ranked our four case study cities. We assessed each city with regard to each subcriterion and assigned points to them accordingly (from 0 to 3, see Table 2). The ranking is based on the sum of points received by each city. The maximum score a city could get is 72. For details on the assessment process and scoring, see electronic supplementary material (ESM) 1 and 2.

2.1. The motivation behind choosing the urban phenomena

2.1.1. C40

The C40 network ties together cities committed to addressing climate change. It promotes the idea of cities as leaders of change in terms of climate policy ("C40 Cities"), with some of the members in countries that have not even ratified the Kyoto Protocol (Lee, 2013). As a network, C40 has its own agenda, in part formed by its member cities. However, cities may have their own specific agendas that might differ from that of the network (Heikkinen et al., 2019). C40 is a well-known network with important objectives, such as drastically reducing carbon emissions, which can be seen as related to a degrowth transition, at least to some extent.

2.1.2. Doughnut cities

Doughnut cities represent a recent phenomenon that encompasses cities which embrace the doughnut economics model (Raworth, 2017) in their development (Fanning et al., 2020). Doughnut economics and degrowth share many ideas. The safe operating space for humanity proposed by Raworth has to be ecologically sustainable (within planetary boundaries) and socially just (no one should fall below a social foundation of well-being). Raworth (2017) explicitly called for being agnostic about growth, and some degrowth scholars (Barca, 2018) note that some of the ways to redraw the economy in doughnut terms explicitly reject the growth paradigm.

2.1.3. Transition Towns

Transition Towns is an international network of grassroots initiatives that support local economies, fight peak oil and climate change, build resilient communities and promote inclusivity and social justice. Although there is no explicit evidence that the Transition Towns movement was directly fuelled by degrowth ideas, it is often discussed in the context of degrowth, and its principles are closely related to those of degrowth (Demaria et al., 2013; Escobar, 2015; Gibbs & O'Neill, 2017; Johanisova et al., 2015; Kunze & Becker, 2015; Longhurst et al., 2016; Trainer, 2010, 2012).

Table 2
Scoring criteria.

Score	Explanation
0	No activities; activities in the opposite direction; no information available.
1	Incidental developments, independent of the decisions of local authorities or residents; marginal initiatives.
2	Some relevant initiatives and policies, but not integrated into a coherent policy.
3	Coherent, intentional degrowth-related policies.

2.1.4. Shrinking cities

Shrinkage is a phenomenon related to significant population loss by a city and the associated economic downturn. Clearly, this is not the same as degrowth, and there are various approaches to shrinkage – from business-as-usual pro-growth policies to smart decline and right-sizing (Weaver et al., 2016). Still, some authors state that shrinking cities may serve as a fruitful ground for experimenting with alternative and transformational policies that prioritise residents' social and ecological well-being over returning to growth tracks (Schindler, 2016). Indeed, the halt of growth tracks in shrinking cities seems to provide possibilities for more non-profit-oriented uses of spaces, implementing new economic options and pathways, and creating niches for experimenting and innovation. This is where shrinking cities and degrowth potentially coincide.

2.2. The motivation behind choosing the case study cities

2.2.1. Copenhagen

Copenhagen is a large European capital city and was one of the first members of C40 (since 2006). It has a goal to become carbon-neutral by 2025 – the most ambitious officially adopted goal so far. It is well-known for being an environmentally friendly and green city, receiving international awards and recognition, e.g., the European Green Capital in 2014 and a Green Economy Leader (LSE Cities and London School of Economics and Political Science, 2014). Despite these achievements, Copenhagen has received criticism from a degrowth perspective (Krähmer, 2021; Xue, 2018). The critics suggested that many of these activities were driven by a desire to maintain the city's (green) growth potential.

2.2.2. Amsterdam

Amsterdam is also a large European capital city and the first that embraced the doughnut economics model in its development strategy, which received broad media coverage. Additionally, it is also a member of C40, has a strategy of transitioning to a circular economy (City of Amsterdam, 2020a), and is well-known for its environmental action and for fostering social innovations (Turolla, 2021). Amsterdam was the first city to publish its City Portrait based on the doughnut. Embracing the doughnut model can be seen as crowning its previous actions and efforts in relation to social-ecological transitions.

2.2.3. Totnes

Totnes in southwest England's Devon county is the town where the Transition Towns movement started in 2006 (Hopkins, 2008). The local community is still quite strong and carries out various initiatives. The local development plan is influenced by Transition Towns ideas and acknowledges this network's activities (Totnes Town Council, 2020). Moreover, Totnes is the only small town among the analysed case study cities, which may allow us to ascertain whether the size of the area matters for enhancing degrowth transitions.

2.2.4. Detroit

Detroit is an iconic and well-studied example of a shrinking city. The city has adopted the strategy of smart shrinkage guided by a 50-year development plan proposed by a coalition of developers and philanthropic foundations, with political support from the municipality, titled Detroit Future City (hereafter referred to as DFC). Some authors argue that this is a case for a "degrowth machine politics" (Schindler, 2016), while others claim that the document actually promotes economic growth (Berglund, 2020b). This, along with the fact that it represents a different political context, makes it particularly interesting to analyse from a degrowth perspective.

3. Case studies – results

In the following sections, we summarise the findings for our case study cities and highlight specific examples where the different cities scored best in a given criterion. Detailed results that justify the scoring for each city can be found in ESM 1 and 2. ESM 1 contains a table with a detailed assessment of the case study cities with regard to each subcriterion of urban degrowth economics based on the analysis of the relevant documents. ESM 2 provides a table with the scoring of each city regarding every subcriterion and the reasoning behind it.

3.1. Urban growth and city size

None of the analysed cities applies restrictions to further urbanisation. Detroit is the only one that shrinks (US Census, 2021), albeit unintentionally, while others experience population and economic growth. Regarding urban containment, the UK is the leader in coordinated top-down planning policies (Dawkins & Nelson, 2002; Millward, 2006). The Danish planning system is characterised by a high degree of decentralisation. However, even the national legislation acknowledges that Copenhagen must be planned according to the principles of the well-known Finger Plan (Olesen, 2021). In Amsterdam, there is supra-local cooperation in the Amsterdam Metropolitan Area (Janssen-Jansen, 2011). Meanwhile, Michigan lacks state-level urban containment policies and does not require communities to formally adopt land-use plans (Boyle & Mohamed, 2007). None of the case study cities explicitly limits urban development permits or has introduced trading zones for such permits. However, Amsterdam has the majority of urban land and thus controls much development, while Totnes imposes certain criteria restricting allowed developments. All cities support higher-density policies. Detroit's zoning ordinances have already been amended to sanction urban agriculture in unused areas, and the city wants to go a step further to allow, e.g., tiny houses and eco-villages (giving it a score of 3 for subcriterion 1.4).

3.1.1. Copenhagen (overall score: 7/12)

The 1947 Finger Plan, which is still central to the development of the Greater Copenhagen Area, is highly recognisable in the international planning community as an example of a successful planning approach that integrates "urban development, transport infrastructure, and preservation of 'green spaces' for recreational use" (Olesen, 2021, p. 2; Sørensen and Torfing, 2019). The Plan indicates areas for development ("the fingers"), and between them, green wedges for agricultural and recreational activities. In compliance with the Plan, "overall land-use policy goals in Copenhagen follow the compact city planning aims of promoting higher density urban form, mixed-use development, pedestrian-friendly neighbourhoods, brownfield regeneration and reducing urban sprawl" (LSE Cities and London School of Economics and Political Science, 2014: 117), giving it the score of 3 for subcriterion 1.4. However, recently, the Plan "has been loosened to accommodate municipal requests for urban development and economic growth" (Olesen, 2021: 2). Overall, Copenhagen is very much growth-oriented, both in terms of population and economy (City of Copenhagen, 2015a, 2019b).

3.1.2. Amsterdam (overall score: 10/12)

Amsterdam grows with around 11,000 new inhabitants and 5000 new homes each year. However, the 2020 doughnut strategy commits the city to "[strengthening] the social foundation of the city without exceeding planetary boundaries", hence "growth will be permitted only inside the current city limits." This may be achieved by converting light industry districts into mixed-use areas, implementing smart densification and high-rise buildings where possible (City of Amsterdam, n.d.-b). An example here is Buiksloterham, a former industrial area which has been transformed into a circular city district for living and working (City of Amsterdam, 2020a). Another thing which distinguishes Amsterdam from the other analysed cities is that the city owns most of the urban land and "has a long tradition of active land policy by acquiring raw building land, servicing it and disposing [of] it as ground lease to developers and housing associations" (Korthals Altes, 2019: 16). In 2012, option contracts were introduced to ensure timely development. Despite the use of the aforementioned market mechanisms, there is a strong emphasis on building affordable housing. Overall, despite its commitments to a circular strategy and doughnut economics principle, Amsterdam still believes in "separating […] economic growth from the pressure on the environment" (City of Amsterdam, 2020a: 11).

3.1.3. Totnes (overall score: 11/12)

The Totnes Neighbourhood Plan acknowledges that "in the future there will be further growth outside the administrative boundary of Totnes" (Totnes Town Council, 2020: 9), but it also highlights environmental limits to the expansion of Totnes. Additionally, the Neighbourhood Plan aspires to cooperate with adjacent local governments to prevent coalescence between them that could result in the loss of agricultural land, and affect landscape and nature conservation (Totnes Town Council, 2020). The Plan sets certain criteria for new development, such as meeting local needs or enhancing local services and facilities, making efficient use of the site in terms of layout, density and mix of uses, and incorporating measures to reduce adverse impacts and deliver environmental benefits (which is why Totnes is the only city to score a 3 for subcriterion 1.3). As for economic growth, the Plan points to fostering local economic innovations to support the "healthy growth" of the local economy (Totnes Town Council, 2020: 37), but it does not put much emphasis on growth.

3.1.4. Detroit (overall score: 4/12)

While Detroit has adopted the strategy of "smart shrinkage" and plans to return districts with excess vacancy rates to nature (Detroit Future City, 2013), its shrinkage is accompanied by the sprawl of the surrounding municipalities (US Census, n.d.). Among other things, this is related to the lack of state-level urban containment policies. So far, the regional and sub-regional efforts to establish cooperation between jurisdictions in terms of land-use planning have been somewhat unsuccessful (Boyle & Mohamed, 2007). However, Detroit has made progress in modernising its zoning regulations, for example, allowing urban gardens and farms in all residential and business districts (Carlet et al., 2017), and ZoneDetroit, the project of the City Planning Commission, that works to incentivise affordable housing, reduce the amount of car-related transport, provide mixed-use areas and allow for various housing choices (e.g., tiny houses and eco-villages). Despite these innovations in planning, the long-term goal is still to restore economic growth (Detroit Future City, 2013).

3.2. Urban land rent and land use patterns

There is no explicit evidence for any city that it treats land as a resource, not as a commodity, or that it conceptualises it as commons. However, there are some preliminary steps in this direction. For example, Amsterdam owns most of the land, and it explicitly supports various urban commons initiatives and participates in related international movements. The Totnes Neighbourhood Plan strongly emphasises the need to support community-led development and community asset ownership as a way to achieve sustainable development. Detroit plans to reuse its significantly depopulated land for agricultural purposes or return it to its (semi)natural state. Recently, community land trusts (CLTs) have been established in all of the analysed cities except for Copenhagen (the only city to score 0 for subcriterion 2.4). Amsterdam and Copenhagen use financial incentives to support private initiatives aimed at creating more urban greenery. In Totnes, cooperation with private land owners and community groups is included in the broader green infrastructure strategy (South Hams District Council, 2015). As for Detroit, implementing green infrastructure solutions is of high priority; however,

incentives for citizens are mostly provided by non-profit organisations.

3.2.1. Copenhagen (overall score: 4/15)

As some authors claim, Copenhagen follows the tradition of using land value capture to raise funds for municipal activities, and it seems to act like a private investor (Bruns-Berentelg et al., 2020). The only evidence regarding commons is related to housing commons, which have been weakened by neoliberal policies in recent decades (see Section 3.4). Still, Copenhagen has particular achievements in terms of its strategy for private green spaces: the city plans to establish by 2025 an urban nature fund to support private initiatives aimed at creating more urban nature, and to create partnerships on non-municipal land (City of Copenhagen, 2015b).

3.2.2. Amsterdam (overall score: 11/15)

Amsterdam's land lease system is growth-dependent (as it is a source of income for the city budget), and it pushes the city to lease more at higher prices. Still, Savini (2017: 871) argued that Amsterdam is "a particular case because it combines a high degree of public spending and direct public control on land prices." There are many different urban commons in the city, related to food, housing, community services and energy transition (Hagenbeek, 2021). Amsterdam actively engages in facilitation and cooperation with various commons initiatives and networks as part of its "democratisation" agenda (Turolla, 2021), giving it 3 points for subcriterion 2.3 (additionally, this is the only city that scored 3 points for subcriterion 2.3). A municipally supported coalition of actors from the social innovation sector established CLT Bijlmer, an advisory and knowledge hub, to facilitate the scaling of the CLT model (Nelissen & Kramer, 2020). It has launched its first pilot project – CLT H-Buurt – aimed at providing affordable housing on municipal land, mainly for residents with an immigrant background and specific segments and incomes.

3.2.3. Totnes (overall score: 8/15)

Although the local development plans and the Transition Town Totnes materials do not explicitly refer to commons, the Totnes Neighbourhood Plan aims to support community-led development and community asset ownership as a way to achieve sustainable development (Totnes Town Council, 2020). Transition Town Totnes's initiatives related to making the economy local (e.g., local food production) require access to land, hence also active support of the municipality for community activities. Its recent initiative is Transition Homes CLT. It aims to provide housing that is ecologically sustainable and permanently affordable (Transition Town Totnes, n.d.).

3.2.4. Detroit (overall score: 8/15)

DFC (p. 45) considers land to be the "greatest – and most challenging – asset … for long-term development." Now, significantly depopulated areas must become alternative-use spaces allowing for either agricultural use or ecosystem restoration. However, given that central districts are considered development assets that are highly attractive for investors and that repurposing depopulated land will most probably entail displacing the remaining residents, these plans received criticism (Berglund, 2020a, 2020b; Hackworth, 2014; Kirkpatrick, 2015). DFC (p. 271) also places "greater emphasis on holding rather than selling public land, and on making it more costly for private entities – often speculators – to hold onto vacant parcels instead of using them productively or relinquishing them." Unfortunately, speculation remains a problem for the city (Akers, 2017). In response to the tough situation, the first CLT was established in Detroit, promising to provide permanently affordable housing, more green spaces, and affordable locations for (worker-owned) businesses (Savitch-Lew, 2016). Finally, most of the existing community gardens and urban farms are managed by groups or organisations that have informally reclaimed vacant space in an act of commoning that resulted in adopting the Urban Agriculture Ordinance to secure agricultural activities (Paddeu, 2017).

3.3. Industrial location, agglomeration and clustering

No evidence was found about any official requirements for using eco-industrial parks as a model for industrial locations. Amsterdam, with its ambition to become a complete circular city by 2050, is the closest to meeting this criterion, while Copenhagen has promised to investigate "whether there are any openings for industrial symbiosis" (City of Copenhagen, 2019a). Deindustrialisation in Detroit, Amsterdam and Copenhagen occurred spontaneously, following broader trends (Alderson, 1999), while there has never been large-scale manufacturing in Totnes. Denmark and the Netherlands represent the best performing countries in terms of industrial democracy (Sanz de Miguel et al., 2020). A service-oriented economy creates the potential for enabling socially useful production and services in all of the analysed cities. However, it is hard to assess its potential scale.

All of the local governments encourage recycling and the exchange of second-hand products; however, clusters of repair services and recycling constitute part of Amsterdam's and Copenhagen's circular economy strategies, giving them both a score of 3 for subcriterion 3.3 (City of Amsterdam, 2020a; City of Copenhagen, 2019a). The Totnes Neighbourhood Plan promises to support development that will enable the green economy, including the circular economy, local food production, waste reduction, and social and community-supported enterprises. Regarding support for communities developing alternative visions for the local economy, Amsterdam is unique in actively cooperating and supporting its local commons initiatives. At the same time, Totnes Neighbourhood Plan recognises and supports the Transition Towns movement, which gives it a score of 3 for subcriterion 3.2.

3.3.1. Copenhagen (overall score: 9/15)

Denmark is developing and promoting clean technologies, and Copenhagen has the ambition to become carbon-neutral by 2025. It has built a waste-to-energy power plant combined with a recreational area (City of Copenhagen, 2018). The city seeks to create clusters of businesses working on green, healthy and creative solutions; however, it clearly states that this is aimed at contributing to economic growth (City of Copenhagen, 2015a). At the same time, Copenhagen has the highest concentration of social enterprises in the country. They receive support from the municipality, and the city aims to help establish more of them (Hulgård & Chodorkoff, 2019). It also provides flexible possibilities for temporary activities in most of the area (City of Copenhagen, 2019b).

3.3.2. Amsterdam (overall score: 10/15)

The plan for the circular transition of the Port of Amsterdam makes indirect reference to industrial symbiosis by stating that businesses can use one another's waste streams or those from elsewhere (City of Amsterdam, 2020a). Amsterdam is a home for ethical companies and civic organisations that aim to improve workers' conditions in global supply chains and raise consumers' awareness about these issues and environmental values. Ensuring the availability of sharing and second-hand platforms, along with repair and restoration services, is part of its circular economy strategy. By collaborating with urban commons initiatives, the municipality demonstrates an openness to the learning process and adapting governance decisions. Such a declaration of cooperation and support for urban commons from the local government is unique among the analysed cities, resulting in a score of 3 for subcriterion 3.2. Even after squatting was criminalised in 2010, some squatting communities in Amsterdam scaled up their creative social and economic activities, with additional support from the municipality (Hixson, 2018).

3.3.3. Totnes (overall score: 9/15)

Most employment in Totnes is in retail, health and social care, education, and other public services. Local and family-owned firms often collaborate with each other (Totnes REconomy Project, 2017). The Totnes Neighbourhood Plan also expresses support for "green" and

"ethical" businesses and their local networks and clusters (Totnes Town Council, 2020). The Local Entrepreneur Forum and REconomy Centre are other organisations that enhance network building and cooperation between enterprises and the community. In general, an alternative milieu around Totnes has existed for decades (Longhurst, 2013), and the aforementioned organisations, along with initiatives such as Transition Towns, enjoy support from the Totnes Town Council and South Hams District Council (Totnes REconomy Project, 2017; Totnes Town Council, 2020).

3.3.4. Detroit (overall score: 5/15)

DFC envisions master-planned industrial hubs, but it does not specifically mention industrial symbiosis. However, it plans to address the underutilisation of industrial space and land through the creation of a market for subletting unused space to smaller companies or, in extreme cases, through "right-sizing" them by moving to smaller sites. DFC points to education, medical care, and local food production as the priority industries to develop, along with encouraging artisanal manufacturing and local entrepreneurship (Detroit Future City, 2013). Cooperative businesses have appeared in the city along with non-profit organisations that provide support and information on sustainable businesses and enable networking. The Detroit Sustainability Action Agenda contains plans to increase recycling possibilities in Detroit, but for the time being, Detroit performs worse than its peer American cities (City of Detroit, 2019).

3.4. Housing and housing policy

All the analysed cities, except for Detroit (where affordable housing is a problem), suffer from overall housing shortages, especially the steadily urbanising Amsterdam and Copenhagen. The latter cities make an effort to reduce housing-related emissions through retrofitting and informational campaigns (City of Amsterdam, 2020b; City of Copenhagen, 2012), while Totnes is subject to the Devon Carbon Plan, which has housing retrofitting among its tasks (Devon Climate Emergency, 2020). Energy inefficiency, significant utility expenses and urgent repair needs are common issues in Detroit, and there are some declarations from the municipality to solve this situation (City of Detroit, 2019). To some extent, all cities suffer from insufficient or a lack of affordable housing and have plans to provide it. As for the decommodification of housing, Amsterdam has produced some respective legislation, while the Totnes Neighbourhood Plan emphasises that its central concern is meeting housing needs rather than satisfying demand. No similar actions are evident for Detroit or Copenhagen, with even the opposite taking place in the latter (i.e., the commodification of housing commons).

Taking into consideration immigration trends, building new housing stock is inevitable in Copenhagen, Amsterdam, and even Totnes. Taxes related to excessive living space are not used in any city, except Totnes, which is subject to the UK-wide "bedroom tax" and to the Tenants Incentive Scheme adopted in South Hams and West Devon. As for managing abandoned and vacant properties, Copenhagen, Amsterdam, and Totnes are subject to national legislation aimed at effective use and preventing vacancies due to housing scarcity. Detroit is a particular example due to high vacancy rates and many abandoned properties (the only city to score a 3 for subcriterion 4.4). The safe rental market in Amsterdam and Copenhagen performs better than in Detroit and Totnes. The rental markets in Detroit and Totnes are rather unsafe and expensive, while Copenhagen and Amsterdam have a long tradition of non-profit housing developers. Both the Totnes Neighbourhood Plan and the South Hams & West Devon housing strategy express plans to provide opportunities and support for alternative providers of affordable housing. Meanwhile, in the face of economic decline, some community-led housing developments have started to appear in Detroit (e.g., co-housing for the elderly, cooperatives, the first CLT). However, they are without evident support from the local authorities or acknowledgement in strategic documents.

3.4.1. Copenhagen (overall score: 8/18)

Around 20 % of housing in Copenhagen is social. Two primary alternatives to owner-occupied and private rental housing are private cooperatives and private non-profit housing associations, and both types have been historically strong (resulting in a score of 3 for subcriterion 4.6). However, recently, legislation has been changed, and members of cooperatives were allowed to mortgage their shares, resulting in the commodification of cooperative housing (Larsen & Hansen, 2015). Some types of housing in Copenhagen are subject to rent control, though less than previously, as the respective regulations were recently eased (Bonde-Hansen, 2021). Researchers have noted that housing in Denmark has been transformed from a pillar of the welfare state to an engine of national growth (Bonde-Hansen, 2021; Larsen & Hansen, 2015). Still, Copenhagen has a goal to ensure that non-profit housing constitutes a minimum of 20 % of housing and that a minimum of 25 % of new housing in the city is non-profit (City of Copenhagen, 2019b). The Copenhagen Climate Plan (2012) includes plans to retrofit buildings to reduce heat and electricity consumption, and the city carries out campaigns and workshops regarding, e.g., water consumption in housing. Overall, since the 2000s, the supply of housing has not kept up with population growth in Copenhagen. As a result, the city plans to revise the housing size regulation so that it will become possible to build various types of homes (City of Copenhagen, 2019b). Additionally, Danish regulations require that no home is vacant for longer than 180 days a year (with certain exceptions) (Hallmann, 2017).

3.4.2. Amsterdam (overall score: 12/18)

Three-quarters of new housing that is planned to be built by 2025 has to be affordable to various groups (City of Amsterdam, n.d.-a). A number of cooperatives in various forms already exist in the city (Kazimowicz, 2020), and the municipality plans to invest in developing more of them (Kok, 2021). The Amsterdam Circular Strategy requires the use of more circular materials and that more buildings have a material passport. To prevent speculations, Amsterdam has imposed a ban on letting new-build homes, which means that anyone buying a new-build home in Amsterdam is obliged to live in it themselves, with few exceptions (City of Amsterdam, n.d.-b). For this reason, it is the only city which scored a 3 for subcriterion 4.2. Another state-level legislative amendment is expected to take effect soon that will allow municipalities to designate neighbourhoods where investors will not be allowed to buy cheap and medium-priced homes and rent them out. Amsterdam has promised to use it (Times, 2021). The Squatting and Vacancy Act of 2010 was intended to provide municipalities and property owners with ways of preventing a property from falling vacant or ending vacancy as quickly as possible (Mees-Bolle, 2011).

3.4.3. Totnes (overall score: 10/18)

The lack of affordable housing is a state-level problem for the UK. The rental market is somewhat unsafe, including the social housing sector (South Hams District Council & West Devon Borough Council, 2021). Despite the stable population in Totnes (Office for National Statistics, 2021), its image of an "alternative place" attracts people from outside, driving up housing demand and prices (Mills, 2021). The Plymouth and South West Devon Joint Local Plan (South Hams District Council, West Devon Borough Council and Plymouth City Council, 2019) proposes a total of 528 new homes for Totnes over the period 2014–2034, with a target of 30 % on-site affordable housing for all schemes of 11 or more dwellings. The Transition Homes CLT mentioned above is one of the answers to the housing shortage, and support for more alternative developers and custom building is expected in the future (South Hams District Council & West Devon Borough Council, 2021; Totnes Town Council, 2020). It results in a score of 3 for subcriterion 4.6. The Totnes Neighbourhood Plan explicitly states that its concern is to meet local housing needs rather than satisfy demand, with particular attention to the needs of young and older people. It also seeks to ensure that new housing developments meet rigorous environmental

criteria (Totnes Town Council, 2020).

3.4.4. Detroit (overall score: 7/18)

Perhaps Detroit's biggest problem in terms of housing is its affordability. Around a third of the city's properties have been subject to tax foreclosures since 2008. Residential property taxes are among the highest in the country (in relative terms) because of the low property values. Additionally, the municipality failed to bring them down after the Great Recession, so Detroiters have been significantly overtaxed (The Detroit News, 2020). More than half of renters are rent-burdened, and there is a significant number of homeless people and squatters, with a lack of regulated treatment from the side of the local authorities. Another significant problem for Detroiters is blighted housing in need of repair. There are some municipal loan programs for repairs and various non-profit programs for housing renovations. Although the Detroit Sustainability Action Agenda (City of Detroit, 2019) promises action related to affordable housing, local comprehensive plans lack sufficient affordable housing policies (Jun, 2017). In response to this tough situation, various local initiatives have appeared, such as Tiny Homes Detroit. It plans to build 25 different tiny homes connected to a local solar power grid (Kozlowski, 2020) for low-income residents, with an opportunity to own the property after seven years. Other initiatives are co-housing for the elderly, a number of housing cooperatives, and Detroit Cultivator – the first CLT in the city.

3.5. Transport

All analysed cities include public transport in their strategic documents. Currently, Detroit is in the worst situation, where 91 % of journeys were made by car as of 2019 (Deloitte, 2019). With regard to their ambitions to become emission-free, Copenhagen and Amsterdam are focusing on decarbonising transport through electrification and biofuels. All cities have plans or have already converted some car infrastructure into green, walking or cycling infrastructure. However, in Totnes, actions undertaken thus far were related to the COVID-19 pandemic, and it is yet to be decided whether these arrangements will be permanent (News centre, 2021).

In general, European cities are characterised by better access to public transport than American ones, and this is reflected in the analysed cities. Amsterdam and Totnes support only those new developments that may be easily accessed by public or non-motorised transport; Copenhagen, overall, follows the principles of compact city planning. However, Detroit also has made changes in its zoning regulations to allow for mixed-used developments, and DFC (2013) recommends adding Live+Make neighbourhoods that allow living and (clean) production to be combined. Thus, all analysed cities scored a 3 regarding subcriterion 5.3. Copenhagen and Amsterdam use some economic incentives to reduce car travel, but there was no such evidence found for Totnes and Detroit.

3.5.1. Copenhagen

Copenhagen is famous for being a world leader in terms of the number of residents who use bicycles as their primary means of transportation (it is the only city that scored a 3 for subcriterion 5.1). To become carbon-neutral by 2025, it is estimated that 75 % of all trips in the city must be done on foot or by non-motorised or public transport (City of Copehnagen, n.d.). The city plans to expand the metro line, and some parking spaces have been given over to plots of land with greenery (Birnbaum, 2019). Among the monetary incentives, higher annual resident parking fees and free parking for car-sharing in the paid parking zones are used.

3.5.2. Amsterdam (overall score: 9/12)

More than half of journeys in Amsterdam currently are made by public transport, walking or cycling (Deloitte, 2019). Further improvements in the public transport system are planned along with the creation of more space for walking and cycling. There are strategies to enable more journeys by public transport than by car. Although more emphasis is put on providing incentives and infrastructure for electric vehicles rather than reducing the total number of cars (the "greening" of polluting vehicles), there are plans to make at least the central streets car-free (Gemeente Amsterdam, 2019b). Monetary incentives include subsidies and privileges for e-drivers (e.g., parking permits) (Gemeente Amsterdam, 2019a), higher parking charges, and incentives to use public transport for children (e.g., free weekend metro transit for children under 12) (de Vries, 2019).

3.5.3. Totnes (overall score: 6/12)

The Totnes Neighbourhood Plan promises to plan for people, not for cars. Some immediate measures include that parking and charging facilities for electric vehicles, car club/pool vehicles and autonomous vehicles will be preferred over parking for normal private cars. Transition Homes CLT also plans to design minimal parking on site and include a community car share scheme to discourage car use. Emergency Active Travel Funding was used in Devon to provide new cycle routes, cycle crossings and pedestrianised areas, but it is not yet clear whether this will remain permanent. The Neighbourhood Plan (Totnes Town Council, 2020, p.45) states that new development should be located and designed in a way "to reduce the likelihood of motorised travel, make best use of more sustainable modes, and contribute to a more sustainable and effective local transport network for the town as a whole."

3.5.4. Detroit (overall score: 6/12)

DFC (2013) acknowledges the inaccessibility of good quality public transport and states that by 2030, the Detroit metropolitan area will have an integrated regional public transportation system, and public transport within Detroit will create better connections among neighbourhoods and Detroit's seven primary employment districts. The plan suggests incorporating multi-modal transit design into all street improvements. At the same time, improving public transport needs a careful approach. This has been demonstrated by the QLine, a tram that runs along part of one of the central roads in the city. One criticism is that it is operated by private actors and is aimed at the economic development of the districts it runs through rather than providing affordable transportation for all income groups of residents (Lowe & Grengs, 2020). DFC's plans to create more landscape infrastructure include converting portions of under-used roads to swales and bike lanes. For this reason, it is the only city to score a 3 for subcriterion 5.2.

4. Synthesis of the results

The maximum score a city could get in our urban degrowth economics ranking is 72. The results fall within the following ranges:

- Range 1: 0–24 – on average, there are some activities in a city, albeit incidental, marginal, or independent of the decisions of local authorities or residents;
- Range 2: 25–48 – on average, there are some relevant initiatives and policies, but not yet integrated into a coherent policy;
- Range 3: 49–72 – a city must have a substantial amount of consciously enacted policies explicitly aligned with some of the 24 subcriteria.

Amsterdam scored best in our analysis, and it was the only city that fell into the third range. It has the largest number of conscious and far-reaching policies, e.g., local government support for commons and social innovations, investing in housing cooperatives, and a ban on letting new-build homes. The next in our ranking is Totnes. Although it was problematic to find any evidence regarding some subcriteria, it scored second because its local strategic document has some far-reaching declarations and propositions, e.g., regarding future development. The influence of the Transition Towns initiative is also felt. Copenhagen came

third. Despite its much-praised image as a green, sustainable city, it is directed at growth and many policies and approaches important for the degrowth transition are absent. For example, it was the only city without a community land trust, and there are also some disturbing tendencies, e.g., the commodification of housing commons. Finally, the last in the ranking is Detroit. Although shrinkage is considered to have the potential for degrowth transition, and some of it is indeed used in the city, Detroit still hopes for growth and largely follows the business-as-usual approach to planning and development. Totnes, Copenhagen, and Detroit all fall within the second range. However, they are evenly distributed within it, with the difference between Totnes and Copenhagen equaling 6 points and the difference between Copenhagen and Detroit equaling 8 points, which is shown in Fig. 1.

Based on the assessment, we have put the cities on a spectrum (adapted from Gibbs and O'Neill (2017)) with "fit and conform", i.e., approaches to development aimed at paradigm fixing on one side of the spectrum, and "stretch and transform", i.e., approaches aimed at a paradigm shift, on the other (see Fig. 1).

5. Discussion

5.1. From cities to phenomena – reflections on their convergence with degrowth ideas

Taking into account path dependencies, which still dominate urban development, so far, no city in the world has fully and explicitly embraced a degrowth transition. However, some offer a more fertile ground to introduce the necessary changes than others, and they have even started to do so, as our analysis indicates. The position of each city in the ranking reflects the broader situation regarding the phenomena they represent.

Amsterdam took first place in our ranking, scoring 52 points out of the potential 72, and it is the only city which fell into the third range. It is the first city to embrace the doughnut economic model, which has received significant international media coverage (Boffey, 2020; Meredith, 2021; Nugent, 2021). Embracing the "doughnut" means putting the following unprecedented question as its guiding principle: How can an urban settlement promote the well-being of its inhabitants while respecting the wider living communities in which it is embedded (Raworth, 2020)? Rephrasing Rees (1992), such a city's goal is to minimise its appropriated carrying capacity while at the same time ensuring that its inhabitants enjoy a good life. Amsterdam already had the prerequisites for introducing the doughnut model, taking into account its record of technical and social innovations related to sustainability. It is also known for its transport and environmental solutions and its long-developed circular economy program (Jonkhoff, n. d.), to which the doughnut framework was added as overall guidance (City of Amsterdam, 2020a). A number of other cities followed Amsterdam and embraced the doughnut model. However, Amsterdam remains the most advanced and visible in its doughnut journey, and enjoys government and research support (Goodwin, 2021). This phenomenon is new, and Amsterdam's high score seems to result from a plethora of past sustainability transitions, commitments and initiatives, which resulted in the many policies and measures that we analysed, and for which the doughnut model is the crowning achievement.

Totnes ranked second, scoring 44, missing out on the third range by only five points. Although it differs significantly from the other analysed cities in terms of area and population size, we argue that it is an advantage in terms of showcasing the potential of different urban scales for a degrowth transition. Since the Transition Towns initiative emerged in 2006, it has spread to all continents and involves more than a thousand groups around the globe. While it is considered by some as one that has a promising potential for urban sustainability transitions (Alexander & Rutherford, 2018), it has been criticised for not being compatible with large cities, as it promotes towns and neighbourhoods as prime units of transition (Taylor, 2012). Indeed, research showed that the least successful or non-active Transition Towns initiatives are located predominantly in large cities, where the members' place attachments are weak, and the levels of diversity representation and inclusivity are the lowest among urban transition initiatives (Feola & Nunes, 2014). However, at the local scale, the movement remains fairly successful in towns and smaller cities. It offers a very practical bottom-up approach to global threats and acknowledges the need for political engagement between initiatives and local governments. All of this is manifested in Totnes, which makes it an inspiring place for experimentation with small-scale degrowth transitions.

Despite its image as a highly sustainable and green city, Copenhagen scored 38, also falling into the second range. Its much-praised sustainability efforts accompany its dedication to sustaining economic growth. Indeed, Copenhagen has already been criticised for this reason from the degrowth (Krähmer, 2021) and the environmental justice perspectives (Rutt, 2021). These processes are accompanied by the alarming national trends of commodifying housing commons (Larsen & Hansen, 2015) and ecological gentrification (Rutt, 2021), which lead to skyrocketing housing prices in this already expensive city (Bonde-Hansen, 2021). As an active C40 member (one of the first participants of this network, hosting the organisation's permanent office responsible for global business, economy and innovation programme since 2017), Copenhagen

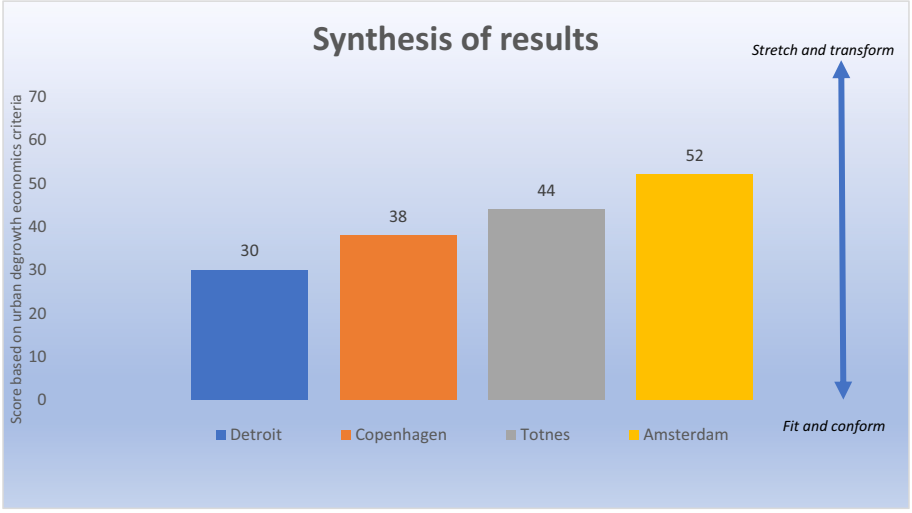

Fig. 1. Visual representation of the ranking of the case study cities with regard to our criteria for urban degrowth economics.

reflects the broader approach of the network, i.e., viewing economic growth as an unchallenged goal and considering climate change action to create economic opportunities (Davidson & Gleeson, 2015).

Indeed, research shows a lack of transformational changes in economic and social structures in C40 member cities, i.e., changes in sensemaking, political and power relations (Heikkinen et al., 2019), and such changes are crucial for a degrowth transition. Following the C40 rhetoric, climate action is reduced to incremental fixes in technology and infrastructure, which are connected to maintaining prosperity and economic growth, and creating new opportunities for business and investments (Davidson & Gleeson, 2015; Heikkinen et al., 2019). Still, the C40 plays an important role in bridging the gap between its Northern and Southern members through knowledge transfer, capacity building and financial aid (Lot, 2021), as well as in overall maintaining cities' ambitions to act and in conditioning urban climate experiments (Nguyen et al., 2020). Interestingly, downscaling the doughnut approach to cities is the result of Doughnut Economics Action Lab's collaboration with C40 cities, of which Amsterdam is also a member. To some extent, being a C40 member laid the foundation for Amsterdam to embrace the doughnut approach. Ultimately, the interpretation of the city's commitments to various phenomena depends on many additional factors.

Finally, Detroit scored 30, still falling into the second range. It did not meet many of our subcriteria, and it scored 0 more often than the other cities in our analysis. Some commentators optimistically considered the DFC plan to be a case for "degrowth machine politics" (Schindler, 2016). However, the city is still struggling with speculations, housing injustices, blight and poverty. Some researchers consider these negative phenomena to be the result of a rightsizing strategy that merely continues the trend of austerity urbanism and prioritises private investments over socially-minded policies (Akers, 2015; Hackworth, 2015). As Berglund (2020b: 233) pointed out, "despite the rich histories of community organising and self-provisioning of services in Detroit's neighbourhoods… narratives propagated by growth coalitions treat Downtown and Midtown as development assets in the midst of nothingness."

All in all, shrinking cities are very complex and multidimensional phenomena, and discussing their diversity goes beyond the scope of this article. What can be stated, however, is that managing shrinkage is very context-dependent. This is evident in Detroit, which functions in the American neoliberal political-economic context, mainly without appropriate state economic assistance and relying on private actors and market mechanisms. Still, there are positive examples of community action related to land-use, housing, local business, and other initiatives reflected in our analysis, but so far it has been insufficient for a degrowth transition.

5.2. Contribution to degrowth discourse

Degrowth is a bold proposal that attracts increasing interest in academia. However, it remains a broad constellation of various ideas and postulates, an umbrella term for visions and strategies for a future socially just and ecologically sustainable society. So far, few attempts have been made to operationalise degrowth, especially in an urban context, mostly from a planning perspective (Kuzmanic, 2017; Prats, 2017; Xue, 2022). There is a lack of concrete proposals for a degrowth transition in big cities (Mocca, 2020; Xue, 2014, 2022). And indeed, policies that at first may look connected to degrowth ideas may turn out to be only superficially related when subject to critical analysis (Cucca & Friesenecker, 2022; Martínez Alonso, 2022). In our previous research, we attempted to imagine what an urban degrowth economy should look like (Khmara & Kronenberg, 2023). However, between the unwanted present and the desired future, there is always some transition, i.e., the way of getting from the former to the latter. With the analysis of case study cities, we contribute to the search for such a way.

As transition always starts from what already exists, we wanted to investigate what existent phenomena of urban development have the highest potential to go further and embrace a degrowth transition. Our results indicate that doughnut cities are the closest to this aim. This is not surprising, as overall, Raworth's ideas include the rejection of the growth paradigm and the economics orthodoxy (Barca, 2018; Raworth, 2017). The power of a doughnut tool is that it creates a comprehensible metaphor that may speak to a large coalition of social forces, and it still has a lot in common with degrowth, i.e., suggesting that human well-being can only exist within limits that are both social and ecological (Barca, 2018). Another advantage of the doughnut model from a degrowth perspective is that it has primarily attracted big cities.

Meanwhile, as Mocca (2020) pointed out, contributions to degrowth lack thorough and convincing proposals for big urban agglomerations on how they could be converted from the hubs of a capitalist system to degrowing places. At the same time, the Transition Towns approach offers useful proposals of what can be done here and now in smaller communities without the capacity to use the doughnut tool. Indeed, the doughnut tool requires financial resources and the involvement of stakeholders, which facilitate the transition of larger structures. Meanwhile, the Transition Towns approach is more flexible and adaptable, including for local communities, offering a simpler selection of issues to consider and implement. Due to easy communication of its proposals and guidelines for interested communities (Hopkins, 2008), it has been fairly successful in replicating.

In turn, C40 and shrinking cities showed much less potential for enabling a degrowth transition. Detroit underlined the high context-dependency of pathways for shrinking cities. As they are economically weak, they very much depend on state politics or private foundations and companies, so it is often external institutions that influence their future development paths. And these institutions function in the current growth-oriented paradigm, even though some welfare policies may be added to urban development (Haase et al., 2021). As for C40, research indicates little evidence of transformational change in cities' strategies (Heikkinen et al., 2019). However, transformational change can still take place in cities, perhaps in longer time scales. Even within C40, there are stakeholders involved in promoting alternative futures, such as the Thriving City Initiative, which is a collaboration between C40 Cities, the Doughnut Economics Action Lab and Circle Economy. It creates City Portraits based on doughnut (Fanning et al., 2020). However, there is the question of the extent to which Amsterdam's willingness to embrace the doughnut economics model results from its previous engagement in C40.

The overall degrowth operationalisation is also context-specific. The doughnut approach is top-down; hence it requires progressive and collaborative local government. In turn, as a bottom-up approach, Transition Towns need strong, responsible and solidary communities. As we pointed out elsewhere (Khmara & Kronenberg, 2023), these approaches are far less likely in countries with corrupt political institutions and a weak civil society. This constitutes an overall barrier to broader degrowth operationalisation. After all, cities are not independent political entities. Regardless of the political system, they all depend on national governments, at least in terms of legislation and budget.

This leads to one of the limitations of our research. We have assessed cities with regard to urban degrowth economics criteria. However, many of these criteria were met (or not met) due to state policies; hence it is hard to distinguish how much of a city's progress was made due to the political will of its local government or community engagement rather than outside enablers, and vice versa.

As there are four cities in our analysis and the criteria themselves are quite vast, and considering the overall complexity related to the topic of degrowth, this is a rough preliminary analysis. Further research is needed, with a more detailed look at the cities' policies and perhaps with more concrete criteria, or even indicators of urban degrowth economics. However, our research allows for the first general insight into which city and, more broadly, which urban phenomena have the highest potential for a degrowth transition.

6. Conclusions

Degrowth needs operationalisation strategies in various contexts and domains, one of which is an urban setting. This article sought to identify the potential of four urban phenomena to embrace the degrowth transition by analysing representative case-study cities with regard to urban degrowth economics criteria. No city in our ranking scored the maximum or close to the maximum, which shows that many actions, instruments, and changes in policies and approaches are still needed. Amsterdam scored best, showcasing the potential of the doughnut economics approach for implementing a degrowth transition. At the same time, many of Amsterdam's actions and initiatives result from its previous social and environmental sustainability efforts, and doughnut can be seen as their crowning achievement. The same refers to the other case-study cities, i.e., not all policies and initiatives analysed in the article result from the phenomena they represent. Further research is needed regarding the continued development of urban degrowth economics criteria, and more cities and phenomena should be analysed with regard to their potential for embracing a degrowth transition.

CRediT authorship contribution statement

Yaryna Khmara: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing, Visualization, Funding acquisition. **Jakub Kronenberg:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of competing interest

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

Data availability

Our analysis is based on publicly available secondary data.

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Appendix A. Electronic Supplementary Materia

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Discussion and conclusions

The main goal of my PhD thesis was to create a set of comprehensive proposals for the operationalisation of degrowth in cities. By juxtaposing degrowth postulates with the main themes analysed in urban economics, I put forward a set of criteria for urban degrowth economics – the 24 proposals for the operationalisation of degrowth in cities. I applied these criteria to the case study cities that represent selected city networks and phenomena in order to figure out how these phenomena relate to degrowth and how they can support an urban degrowth transition. I also applied conceptual frameworks from the sustainability transitions field of studies to degrowth to propose ways of how degrowth initiatives may break through the level of niches and contribute to regime change. In this way, in my series of closely related articles, I suggested what degrowth should mean in an urban context and how to get there and checked if some of the existing urban phenomena and networks have the potential to spearhead the implementation of degrowth proposals.

The main conclusions from my articles are summarised in Table 1. They are discussed in the following paragraphs.

Table 1. Goals and main conclusions from the three articles

Article	Goals	Conclusions
First article: Degrowth in the context of sustainability transitions: In search of a common ground	To study how the analytical frameworks of sustainability transitions can help to make degrowth more specific and operational	Sustainability transitions analytical frameworks and conceptual notions proved to be helpful interpretative lenses for looking at degrowth, and they can help to structure the main postulates of degrowth systematically.
	To investigate the linkages between sustainability transitions and degrowth to formulate a common ground for both of them	Sustainability transitions and degrowth are closely related. They have a number of similar visions and approaches to socio-economic development, which converge in most aspects. What distinguishes them the most is the role of technology – rather "instrumental" in the case of sustainability transitions and not clear so far in the case of degrowth.
Second article: Urban degrowth economics: making cities better places for living, working, and playing	To find ways to operationalise degrowth in cities through juxtaposing degrowth proposals with the main themes analysed in urban economics	I formulated 24 proposals to support the degrowth transition in cities with regard to the key themes addressed in urban economics.
Third article: On the road to urban degrowth economics? Learning from the experience of C40 cities, doughnut cities, Transition Towns, and shrinking cities	To assess which of the analysed urban phenomena have the biggest potential to support degrowth transition in cities.	No city in my ranking scored the maximum or close to the maximum, which shows that many actions, instruments, and changes in policies and approaches are still needed. Amsterdam scored best, showcasing the biggest potential of the doughnut economics approach among the analysed phenomena for implementing a degrowth transition.

The results from the first article showcase that sustainability transitions and degrowth are indeed closely related. They also support the thesis that degrowth would benefit from the

formalisation within the sustainability transitions analytical framework. This is evidenced by the case studies of two initiatives related to degrowth (Cargonomia and Transition Towns) described using the transition experiments analytical framework. With these case studies, I suggest that degrowth initiatives may be understood, designed and planned as grassroots transition experiments, with the application of transition management and mechanisms of replicating. The fact that both case studies of degrowth practices used in this article take place in cities links degrowth with the emerging field of urban sustainability transitions and suggests that cities may serve as niches for experimenting with sustainability transitions. Hence, investigating what degrowth would mean at the level of a city is of high importance, which brings us to the second article.

In the second article, I attempted to create an alternative urban development narrative – an urban degrowth storyline. I juxtaposed the normative ideas of degrowth with the main themes analysed in urban economics. The argument for this was that many important issues have already been addressed in urban economics. If embedded in a heterodox approach, they can be promoted further to reform the existing system. Degrowth may take what is relevant from economics to ensure the transition to a desired future instead of radically changing everything from scratch. This resulted in 24 proposals for urban degrowth economics, which may become the new urban regime – instead of the urban regime of a "growth machine" (Molotch, 1976). Indeed, my criteria, through changes in particular regimes (such as transportation, housing, and land-use), contribute to the *meta-regime* change (Khmara and Kronenberg, 2020, p. 5).

In the third article, I applied the criteria from the second article to analyse the strategies and policies of cities that represent several networks or phenomena to demonstrate which of the current approaches to urban development are the closest to degrowth values. I created a ranking of four case study cities (Figure 1) and, additionally, put them on a spectrum (adapted from Gibbs and O'Neill (2017) with "fit and conform", i.e., approaches to development focused on paradigm fixing on the one side of the spectrum, and "stretch and transform", i.e., approaches aimed at a paradigm shift, on the other. The "stretch and transform" end of the spectrum indicates the biggest potential to disrupt the dominant regimes. Taking into account path dependencies, which still dominate urban development, so far, no city in the world has fully and explicitly embraced a degrowth transition. However, some offer a more fertile ground to introduce the necessary changes than others, and they have even started to do so, as my analysis indicates (like Amsterdam, which took first place in the ranking, scoring 52 points out of the potential 72).

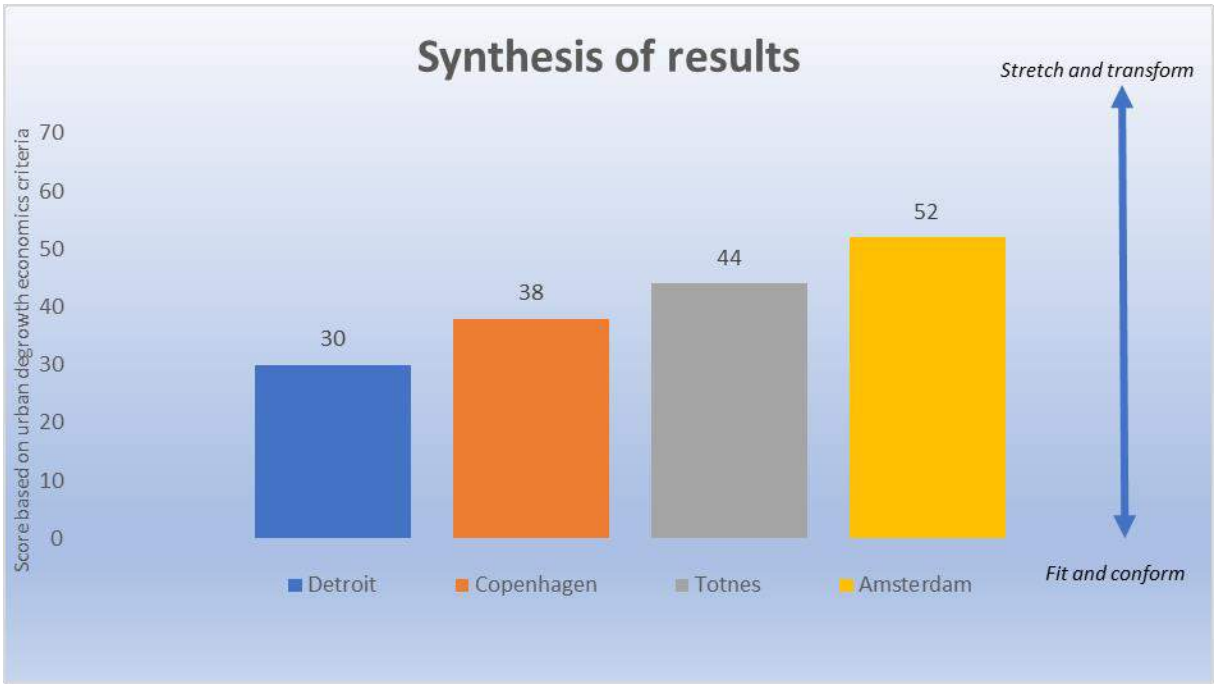

Figure 1. Visual representation of the ranking of the case study cities with regard to the criteria for urban degrowth economics

With this PhD thesis, I contribute to the operationalisation of degrowth, which is highly necessary given the still rather elusive character of this concept. Reports published last year by the Intergovernmental Panel on Climate Change (IPCC, 2022) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2022) suggest that degrowth policies should be considered in the fight against climate breakdown and biodiversity loss, respectively, which underlines that finding ways of the operationalisation of degrowth is highly topical (Hickel et al., 2022). Indeed, interest in degrowth is rapidly increasing, including with regard to how to operationalise it in an urban context, and two recent special issues on urban degrowth are evidence of that (Kaika et al., 2023; Xue and Kębłowski, 2022). However, not enough has been written on what degrowth policies really are or should be, what exactly they should build on and how to bring them to life (Barlow et al., 2022). My case for urban degrowth economics is a contribution to filling that gap.

So far, the most advanced approach to urban transitions that could serve as inspiration for degrowth involved creating city portraits within the Thriving Cities Initiative. These city portraits were based on the doughnut economics concept and acknowledged that cities are embedded in both local and global ecological and social systems (Fanning et al., 2020). The authors suggested that their "City Portrait methodology" represented "the most holistic approach so far to address the issues of both local and global relevance (p. 7). They also suggested that city portraits should "be locally relevant, rather than comparable between cities,"

highlighting the local specificity of sustainability challenges and opportunities (p. 8). Most importantly, the authors saw the city portrait as an opportunity to initiate transformative action in cities. The nine aspects of this transformative action that they distinguished involved mirroring the current state of the city, creating a compelling vision, mobilising stakeholders to bring about change, mapping existing initiatives to build on, changing the mindset to support the transition, drawing on additional tools that accompany the portrait, creating an iterative process that involves transformative policy and action, monitoring progress, promotion. This approach differs from what I applied in this PhD thesis in that it is rather managerial. In contrast, that applied here are rather normative proposals regarding the five domains of the urban economy.

The first city portrait was created for Amsterdam (Raworth et al., 2020), presenting Amsterdam as a leading city adopting the doughnut economics concept. Nevertheless, given that it was meant to serve, at least partly, as a promotional tool – both for the doughnut cities concept and the city of Amsterdam – it is perhaps not objective enough. At the same time, given that the city portrait for Amsterdam was created by a large team of experts working directly with the city office, the scope of their analysis was broad, and it relied on the data provided directly by the city office. By definition, city portraits should be co-created with multiple local stakeholders, which aligns with the degrowth philosophy. Still, in the case of the Amsterdam city portrait, even this analysis was necessarily selective. However, it referred to a broad set of social and ecological criteria at different levels of analysis. While my urban degrowth economics framework focuses on issues addressed within urban economics, the doughnut city portraits refer to broader frameworks, such as the Sustainable Development Goals or the planetary boundaries framework. Indeed, as shown by my assessment, doughnut cities do not necessarily conform with degrowth, although they may be the closest to this idea, as shown by the example of Amsterdam.

Degrowth is indeed one of the most radical, revolutionary and far-reaching concepts of socio-economic transformations. It does not mean, though, that other approaches cannot complement and enrich it. This is showcased in this PhD thesis by demonstrating its linkages with sustainability transitions, by referring to urban economics (and to planning concepts, such as compact cities) and by the case of doughnut cities as an approach that might have the biggest potential to implement degrowth policies. Amsterdam embraced the doughnut approach as a guiding principle for its circular economy strategy (City of Amsterdam, 2020). Indeed, while there are different discourses within the circular economy, with different degrees of radicality

(Calisto Friant et al., 2020), it is sometimes considered complementary to degrowth (or at least moving towards degrowth principles) (Charonis, 2021; D'Amato et al., 2019; Ghisellini et al., 2016; Hobson and Lynch, 2016; Schröder et al., 2019). Similarly, decoupling is definitely needed to live within planetary boundaries, but it is not enough (Hickel and Kallis, 2020). It is necessary to find ways of decoupling prosperity and development from growth (Jackson, 2009), and here is where degrowth can contribute. Finally, the steady-state economy is considered to be the result of a degrowth transition (Kerschner, 2010; Khmara and Kronenberg, 2020; Mironowicz and Skrzypczyński, 2022).

Degrowth is a novel and radical concept, the implementation of which encounters a lot of barriers and dilemmas. My PhD thesis proposes an original concept of urban degrowth economics and contributes to research on degrowth operationalisation in an urban context, which is still relatively thin. Further research is needed, both related to the urban scale and one connecting this scale to broader socio-political changes which are necessary for degrowth. Most policy proposals for degrowth are studied separately, in parallel, or in competition (Fitzpatrick et al., 2022), and there is an urgent need for more holistic approaches.

Indeed, this PhD thesis indicates important avenues for further research. For example, it would be useful to study more domains of an urban economy from the perspective of degrowth, such as labour and employment or the role of business. Both the domains that I addressed in my articles and these additional domains should be studied in more detail. There is a need for research on adapting the proposed criteria in different political and geographical contexts and to answer the questions of how tax systems and investment policies should be reformed to make urban degrowth transition possible. As for testing the proposed criteria for urban degrowth economics in reality, there is a need to study more urban networks and phenomena (e.g., Slow Cities and Zero Waste Cities) and select more case study cities and use both secondary and primary data where possible.

Finally, there is a need for interdisciplinary studies on how to educate and prompt broader societies to accept policies related to degrowth, as the scale of necessary changes is so drastic in comparison to what we have now that relevant policies risk facing rejection and social unrest (Mironowicz and Skrzypczyński, 2022). This issue also relates to the need to overcome one of the degrowth internal contradictions, namely between the call for an overall reduction in production and consumption and the political implementation of the respective incentives and for radical democracy that involves people in decision-making (Muradian, 2019), as many people would not willingly refuse from the comfort of their current way of living.

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Appendix 1 – Supplementary Material 1 to Article 3

Table 1. Detailed information for the assessment of case study cities with regard to each subcriterion of urban degrowth economics

Cities / Criteria	Copenhagen	Amsterdam	Totnes	Detroit
1. Urban growth and city size				
1.1. Restricting further urbanisation, preventing sprawl	On the one hand, the Finger Plan remains central to the development of the capital region. On the other hand, it was revised in 2017 and 2019. Some of the more significant changes in the Finger Plan 2019 include extending the urban fingers and relaxing the principle of station proximity in the five towns at the end of the fingers (Olesen, 2021). No restrictions to urbanisation are envisaged, as Copenhagen seeks to provide further growth and jobs creation (Iotkowska, 2021)	The city is growing by around 11,000 additional inhabitants and 5000 homes each year. The city government acknowledges that Amsterdam "has outgrown its borders". Amsterdam is expanding into the surrounding green belt, at the same time, increasing housing density and transforming existing built-up areas.	Totnes' developmental plan – the Totnes Neighbourhood Plan (submitted to the regional government, but not yet accepted) – acknowledges that "in the future there will be further growth outside the administrative boundary of Totnes" (Totnes Town Council, 2020, p. 9). At the same time, it emphasises that there are obvious environmental limits to the expansion of Totnes.	Physical growth is not a problem for the city itself. However, the city's shrinkage is accompanied by the growth of its metropolitan area (US Census), resulting in the sprawl of its surrounding municipalities.
1.2. Urban containment policies that are planned and implemented at the level higher than local	The Danish planning system is characterised by a high degree of decentralisation. There are no specific national directives on urban containment policies, except that the Danish Planning Act foresees that the Greater Copenhagen Area must be planned according to the principles of the Finger Plan (Olesen, 2021).	The lack of space for expansion necessitates supra-local cooperation and making decisions (on housing, transport, environment etc.) in terms of the Amsterdam Metropolitan Area.	The UK has coordinated top-down planning policies to secure agricultural land from development (Dawkins and Nelson, 2002; Millward, 2006). The Neighbourhood Plan expresses the aspiration to cooperate with adjacent administrative units to prevent coalescence between them and to secure agriculture, landscape and nature conservation (Totnes Town Council, 2020)	Michigan lacks state-level urban containment policies. Furthermore, it does not require communities to formally adopt land-use plans. While there have been some regional and sub-regional efforts to establish cooperation between jurisdictions in terms of land-use planning, they are somewhat unsuccessful (Boyle and Mohamed, 2007).
1.3. Limiting building and development permits, and introducing trading zones for such permits	Not used.	Other instruments are used. The city owns the majority of the land, which allows it to steer development. The option agreements were introduced in 2012 to utilise the building land. It is important to note that if a location is designated for building in this formal sense, the local authority will take the initiative to promote development.	According to the Neighbourhood Plan, new development within the town will be permitted only after meeting certain criteria directed at community and environmental benefits; development outside the town will be permitted if it meets the same criteria plus if it meets "a proven local need which is neither being nor likely to be met in the town, and cannot reasonably be met inside the boundary" (Totnes Town Council, 2020, p. 26).	Not used.
1.4. Relaxing of zoning regulations	Not relevant, as "overall land-use policy goals in Copenhagen follow the compact city planning aims of promoting higher density urban form, mixed-use development, pedestrian-friendly neighbourhoods, brownfield regeneration and reducing urban sprawl" (LSE Cities and London School of Economics and Political Science, 2014)	The strategy for increasing housing density within the city includes building within existing urban areas and using infill and re-zoning where possible (Gemeente Amsterdam, 2011). Buiksloterham, a former industrial area, is being transformed into a circular city district for living and working (City of Amsterdam, 2020a).	Although the Neighbourhood Plan does not set specific requirements for density, in general, the community supports higher densities as a means of limiting greenfield development. Exceptions to regular policies on housing provision are possible: innovative, smaller and individual alternative housing may be considered for sites within the settlement boundary (Totnes Town Council, 2020).	ZoneDetroit, the project of the City Planning Commission, aims to modernise the existing Zoning Ordinance, among others, by incentivising affordable housing, reducing the number of car-related transport, providing mixed-use areas and allowing various housing choices (tiny houses, eco-villages). Urban agriculture amendments to zoning ordinances allowed urban gardens, urban farms, greenhouses, and high tunnels in all residential and business districts.

2. Urban land rent and land use patterns	Copenhagen	Amsterdam	Totnes	Detroit
2.1. Land is treated as a resource, not as a commodity	The city follows the tradition of using land value capture to raise funds for municipal activities and seems to act like a private investor (Bruns-Berentelg et al., 2020).	Most of the land is publicly owned. Plots are formally leased for all types of uses. The leases represent a stable source of income for the city budget. However, such a system is growth-dependent and pushes the city to lease more land at higher values (Savini, 2017). At the same time, "Amsterdam is still a particular case because it combines a high degree of public spending and direct public control on land prices" (Savini, 2017, p. 871).	No evidence found.	The Detroit Future City Plan considers land to be the "greatest – and most challenging – asset … for long-term development"; significantly depopulated areas become "alternative use spaces," allowing for either productive use of land (including urban agriculture, biomass production and wood products) or returning it to a maintained version of its natural state (in places with excessive vacancy). At the same time, Downtown and Midtown are considered highly attractive development assets for investors. A significant amount of property, including historic buildings, belongs to billionaires Daniel Gilbert and Michael Illitch.
2.2. Conceptualising and governing land as commons	The only evidence found regarding commons is related to housing commons (see subsection 4.6).	Although land is not conceptualised as commons, other urban commons do exist: related to food (e.g., urban farms, CSA, food cooperatives), housing (CLT Bijlmer, De Nieuwe Meent housing cooperative), community services (27 *stadsdorpen* – urban villages) and energy transition (e.g., Zuiderlicht, Westerlicht, and Amsterdam Energie energy cooperatives) (Hagenbeek, 2021).	Although commons are not explicitly spoken about in the local development plans or on the Transition Town Totnes (TTT) website, the Neighbourhood Plan strongly emphasises the need to support community-led development and community asset ownership as a way to achieve sustainable development (Totnes Town Council, 2020). TTT's initiatives related to local food production and the overall relocalised economy also need relatively free land access. Neighbourhood gardens and garden sharing exist.	DFC places "greater emphasis on holding rather than selling public land, and on making it more costly for private entities—often speculators—to hold onto vacant parcels instead of using them productively or relinquishing them" (Detroit Future City, 2013, p. 271) Most existing community gardens and urban farms are managed by groups or organisations that have informally reclaimed vacant spaces; these farming practices were included in DFC and supported by the legislation on urban agriculture (Paddeu, 2017a)
2.3. A greater role for local government (as a facilitator, mediator and trustee for commoners)	The past approach to housing as commons has been weakened by neoliberal policies in recent decades (Bruun, 2015; Larsen and Hansen, 2015)	The "democratisation" agenda was adopted by the city in 2018 to practise new forms of local-democratic citizenship and agency. The agenda includes facilitating the local commons. Amsterdam cooperates with Commons Network collaboratory, supports commons initiatives of citizens and is open to the learning process and adapting governance decisions.	The Neighbourhood Plan strongly emphasises the need to support community-led development and community asset ownership as a way to achieve sustainable development (Totnes Town Council, 2020)	The adoption of the urban Agricultural Ordinance "to help secure existing illegal agricultural operations and avoid potential destruction of gardens and farms" (Paddeu, 2017b, p. 113) may be considered an act of facilitation.
2.4. Community land trusts (CLTs)	Do not exist.	And The People (ATP), a consultancy and innovation agency in sustainable and inclusive urban development, has developed a Community Land Trust (CLT) association in the Bijlmer H-neighbourhood – the first CLT in the Netherlands. It brings together residents, neighbourhood business owners, and landowners (including the city) with the goals of preventing gentrification in the neighbourhood and creating affordable housing for and by the communities (Hagenbeek, 2021)	Transition Homes Community Land Trust is developing a scheme of 31 eco-homes on a site, Clay Park, in Dartington parish (Transition Town Totnes, n.d.). The project integrates affordable housing built with local natural materials, sustainable food and fuel production, and high energy efficiency with reduced energy consumption. The site will be landscaped to promote bio-diversity and encourage wildlife, with a wetland area, ponds and a substantial woodland area planted to coppice for fuel. Minimal parking on-site and	Detroit Cultivator Community Land Trust – the first CLT in Detroit was created in 2020. It owns more than 30 city lots, held in perpetuity for the North End, and it promises to provide permanently affordable housing, more green spaces and affordable locations for business.

			a community car share scheme will be designed to discourage car use and encourage walking, cycling and the use of public transport (Transition Town Totnes, n.d.)	
2.5. Including private land in the green infrastructure through economic incentives	Urban Nature Strategy (2015a, p. 7) aims to support "green initiatives on non-municipal land by inspiring, motivating and engaging in partnerships with private actors and landowners". It also plans to transform some of the privately owned streets into cloudburst ones; establish an urban nature fund to support private initiatives aimed at creating more urban nature; and create partnerships on non-municipal land (City of Copenhagen, 2015a)	Encouragement for residents from the city to work on green spaces; provision of subsidies, where possible, e.g., for the planting of wall gardens, green façades or roof gardens, to grow vegetables or increase the neighbourhood green space. The Amsterdam Rainproof programme included in the Climate Adaptation Plan is staging garden campaigns to remove paved surfaces from gardens and create green spaces.	South Hams Green Infrastructure Framework includes cooperation with private land owners and community groups in Totnes and providing grants for that purpose.	Occasional grants from non-profit organisations and foundations to citizens for introducing elements of green infrastructure (Ignaczak, 2016). Pressure on commercial landowners by charging them monthly drainage fees. Workshops and funding to create rain gardens for citizens by Friends of the Rouge and partners (Friends of the Rouge, 2021). The Detroit Stormwater Hub – a tool for individuals and organisations to understand, collaborate around, and track the city-wide progress and impact of Green Stormwater Infrastructure (Detroit Stormwater Hub, n.d.).
3. Industrial location, agglomeration and clustering.	Copenhagen	Amsterdam	Totnes	Detroit
3.1 Enabling industrial democracy and socially useful production and services	There is an overall strong tradition of industrial democracy in Denmark (Mikkelsen, 2017). Copenhagen has the highest concentration of social enterprises in the country (25 in 2019). They receive support from the municipality (Hulgård and Chodorkoff, 2019). Copenhagen's economy consists mostly of services, finance, culture, NGOs and public administration. Although Denmark is famous for its specialisation in clean tech sectors, and the city of Copenhagen seeks to create more space for businesses working on green, healthy and creative solutions, all this is aimed to contribute to economic growth (City of Copenhagen, 2015b)	The Netherlands is one of the best-performing countries in the EU28 in terms of industrial democracy; the level of social dialogue at company level is very high (Sanz de Miguel et al., 2020). Amsterdam is a home for companies (e.g., Fairphone, Tony's Chocolonely, Moyee Coffee) and civic organisations (e.g., The Clean Clothes Campaign, Fairfood, Fashion for Good) which try to improve workers' conditions in global supply chains, raise awareness of social and ecological values in business, and offer shoppers ethical alternatives (DEAL et al., 2020)	Retail, health and social care, education, and other public services make up some of the largest employment groups in Totnes. The Neighbourhood Plan encourages and supports "green" and "ethical" businesses and their local networks and clusters. It also aims to provide more opportunities for food to be grown and consumed locally (Totnes Town Council, 2020). The Local Entrepreneur Forum brings together local stakeholders and enhances "community supported entrepreneurism" (REconomy Centre Totnes, 2014).	No evidence was found on industrial democracy. According to DFC, education, medical care, and local food production are priority industries to develop. Artisanal manufacturing and local entrepreneurship are also encouraged. Incipient cooperative businesses are developing along with support organisations (Wdet 101.9 fm, 2019; "Worker-Owned Detroit," n.d.); Greeningdetroit.com – a website providing information on local, sustainable businesses and enabling networking.
3.2. Policy support for creative communities aiming at developing alternative visions of an urban economy	The city aims to help establish more social enterprises (City of Copenhagen, 2015b). The city provides flexible possibilities for temporary activities in most of the city (e.g., new temporary youth housing, food fairs or new culture initiatives) (City of Copenhagen, 2019a).	The city aims to nurture social innovations and "wants to identify possibilities for the civic use of assets or the support of municipalities in different areas: energy, food, poverty/care, public space/housing, finance and sharing knowledge" (Turolla, 2021). Amsterdam cooperates with Commons Network collaboratory, supports commons initiatives of citizens and is open to learning and adapting governance decisions. After squatting was criminalised, some communities were scaled up, legitimised and received support from the municipality (Hixson, 2018)	Creative communities are very evident and strong in Totnes. The Neighbourhood Plan (2020, p. 43) mentions the Transition Town movement and expresses the commitment "to making the transition towards self-sufficiency and a stable local economy with reduced reliance on fossil fuels". The REconomy Centre (a co-working and meeting place for ethical local enterprises) receives support from South Hams District Council (Totnes REconomy Project, 2017). Various TTT initiatives receive the support of Totnes Town Council.	Support is mainly from grassroots or non-profit initiatives: Eastern Market Partnership – a non-profit organisation which supports local food producers and connects them to consumers; there are Community Supported Agriculture farms and other urban food-growing initiatives. – Cass Green Industries – an initiative by the non-profit organisation Cass Community Social Services linking vulnerable social groups to green jobs.

3.3. Eco-industrial parks as a model for industrial location – purposeful co-location of firms or ensuring virtual connections for the exchange of by-products	Despite Denmark's image as a country that promotes clean technologies and Copenhagen's ambitions to become carbon-neutral by 2025, there are no official requirements for using industrial symbiosis as a model of production. Copenhagen's circular economy strategy aims to collect 70 % of household waste and light industrial and commercial waste for recycling. As one of the measures to achieve this, it promises to investigate "whether there are any openings for industrial symbiosis" (City of Copenhagen, 2019b, p. 42). Copenhagen has also built a clean waste-to-energy power plant combined with a recreational area (City of Copenhagen, 2018).	Plans for the circular transition of the Port of Amsterdam: "Here, businesses can use one another's waste streams, as well as those from elsewhere. In addition, circular innovations can flourish on an industrial scale in the port." (City of Amsterdam, 2020a, p. 29) Overall, Amsterdam's ambitions to become a complete circular city by 2050 may contribute (City of Amsterdam, 2020a).	There is no big manufacturing industry in Totnes (mainly agriculture and tourism). Local and family businesses make up almost 70% of all businesses, and many are relatively long established. The green economy made up 17% of 82 enterprises in 2017 (Totnes Town Council, 2020). Many local enterprises support and collaborate with each other (Totnes REconomy Project, 2017).	Among its implementation actions, DFC has a plan to create master-planned industrial hubs, but it is unclear if they are planned to be ecologically sustainable. The importance of shared space is recognised for the small-scale industrial sector (food sector, creative/digital sector) (Detroit Future City, 2013).
3.4 Reducing the need for new production by supporting the exchange of second-hand products and clusters of repair services	One of the city's targets is to provide most Copenhageners with the possibility to make use of sharing, exchanging or recycling schemes (City of Copenhagen, 2018). There is a municipal recycling and reuse centre, Sydhavnen, which contains a repair shop, a second-hand shop, an exchange for construction and demolition materials, and teaching facilities (LSE Cities and London School of Economics and Political Science, 2014). The city is working with a circular economy and aims to collect 70% of waste for recycling and to support residents and companies in swapping, repairing and reusing things (City of Copenhagen, 2019b).	This comprises a part of Amsterdam's circular strategy: "the City will work with businesses, local initiatives and universities and research institutes to establish a well-functioning and easily accessible infrastructure of sharing platforms, second-hand shops, online market places and repair services" (City of Amsterdam, 2020a, p. 56). The city commits to running informational campaigns to encourage its residents to change their consumption habits.	ReFURNISH – an organisation from Dartington that provides refurnishing and repair services and sells products for reuse with a shop in Totnes. Town Council prioritises support for recycling and re-use (Totnes Town Council, n.d.) The Neighbourhood Plan (2020, p. 43): "New development enabling the green economy in Totnes will be supported and encouraged. This includes development which enables circular economy, re-localisation, the local food economy, reducing waste, generating renewable energy, and social and community-supported enterprise".	Detroit Dirt – a citizen-led business that collects local organic waste and transforms it into high-quality compost for local urban farmers and gardeners. No other evident efforts from the local government except for the city's voluntary recycling program.
3.5. Steered deglomeration when needed	No evidence found.	No evidence found.	Not relevant.	The deindustrialisation that took place in Detroit in the second half of the 20th century was related to various external and internal factors and was detrimental to the city's economy and its inhabitants; it was not planned and steered, as this criterion suggests. DFC plans to address the underutilisation of industrial space and land by creating "a market for subletting unused space to smaller companies and entrepreneurs and, in extreme cases, to "right size" companies by moving them to smaller sites in the city". (p.192).
4. Housing and housing policy	Copenhagen	Amsterdam	Totnes	Detroit
4.1. Reducing housing-related environmental impacts while simultaneously providing affordable housing for all	There are plans to retrofit buildings to reduce heat and electricity consumption (City of Copenhagen, 2012). The city carries out campaigns and workshops regarding, e.g., water consumption in housing. Around 20% of housing in Copenhagen is social. Current national planning	Amsterdam suffers from a housing shortage. This, along with steady urbanisation, made the city plan to build 52,500 houses by the end of 2025, 75% of which will be social housing, medium-priced rental properties, and affordable homes and rooms for students and young	Transition Homes CLT integrates affordable housing with strict environmental criteria (using local natural materials, providing the possibility of sustainable food and fuel production, and enhancing high energy efficiency and self-sufficiency) (Transition	Not sufficient affordable housing policies in municipalities' comprehensive plans (Jun, 2017). The situation with LIHTC[i] program projects is worse than in national surveys. More than half of renters are rent-burdened.

	law allows municipalities to require that up to 25% of new housing construction should be social housing, and this was used in Copenhagen at least once. It is planned to revise the housing size regulation so that it will become possible to build more small homes. Overall, a wide variety of homes are planned (City of Copenhagen, 2019a). At the same time, Copenhagen is the city with the highest housing prices, and housing continues to become less affordable (Bonde-Hansen, 2021).	people (City of Amsterdam, n.d.). The city's circular strategy requires that more circular materials be used and that more buildings maintain a material passport.	Town Totnes, n.d.). The Neighbourhood Plan (2020) seeks to ensure that new housing developments are affordable and meet rigorous criteria regarding design, construction, renewable energy, the need to travel and food production etc.	There is an initiative by Cass Community Social Services – Tiny Homes Detroit: building 25 different tiny homes for low-income residents. At first, the residents will rent the homes. Anyone who remains for seven years will be given the opportunity to own the home and property. The project also aims to facilitate residential interaction and community building, and all tiny homes will be connected to a local solar power grid (Kozlowski, 2020)
4.2. Housing as a public need, not a commodity	No, the process is actually the opposite. If, previously, housing was a pillar of the welfare society, at the beginning of the 21st century, the housing market was envisioned as an engine for national growth. Through political interventions, homes in housing cooperatives were commodified when members were allowed to mortgage their shares (Larsen and Hansen, 2015). Housing is seen as an investment opportunity.	In July 2020, Amsterdam imposed a ban on letting new-built homes. Anyone buying a new-built home in Amsterdam is obliged to live in it themselves, with exceptions related to renting the property to a first-degree relative or during a temporary stay abroad. The property can also be rented out as social housing or a mid-priced rental home at a monthly rent of up to a maximum level imposed by the city (City of Amsterdam, n.d.). The legislative amendment took effect in January 2022 and it allows municipalities to designate neighbourhoods where investors will not be allowed to buy cheap and medium-priced homes and rent them out. Amsterdam declares it will use such purchase protection ("Dutch cities want to ban property investors in all neighborhoods," n.d.).	The Neighbourhood Plan (2020, p. 57) explicitly states that "a central concern of this NP is meeting local housing need rather than satisfying demand for housing. This includes meeting known needs for housing in terms of size, tenure and affordability, and specifically increasing the number of smaller homes to meet the needs of local young and older people".	Housing is not conceptualised in that way.
4.3. Reasonable management of existing housing before building new houses: refurbishing and distribution according to the size of households, taxation of excessive living areas	Since the 2000s, housing construction has not kept up with population growth in Copenhagen. It is estimated that around 50,000 to 55,000 homes will be needed from 2019 to 2031 to match the expected population growth of 96,000 people (Bonde-Hansen, 2021). Taxes related to the excessive living areas are not used, only property tax and land value tax.	Taking into consideration the immigration trends, the building of new housing stock is inevitable in Amsterdam. Taxes related to living areas are not used.	Considering the careful planning for housing in accordance with local needs, excessive building does not seem to be an issue for Totnes (as long as the UK planning reform is not put into force). The UK's "bedroom tax" is used. Additionally, the Tenants Incentive Scheme supports households in downsizing to smaller accommodation (Better Homes, Better Lives, 2021).	The Detroit Sustainability Action Agenda suggests that demand for housing is growing, and over 2000 new multifamily residential units were completed in 2016 and 2017. However, a large amount of blighted housing and occupied houses in need of repair still remain a problem. There are municipal loan programs for repairs and various non-profit programs for housing renovation. DFC proposes reusing industrial buildings for residential, artistic and entrepreneurial purposes. Taxation of surplus living areas is not relevant due to the high vacancy rate. Residential property taxes are one of the highest in the country (in relative terms) because of the low property values, and Detroiters have been significantly overtaxed (The Detroit News, 2020).
4.4. Adaptating legislation to extend local government capacities to manage abandoned buildings	Vacancy and abandonment is more of a problem in smaller cities and rural areas in Denmark. Since 2010, national programs have existed that address housing	The Squatting and Vacancy Act of 2010 is intended to provide municipalities and property owners with more ways of preventing property from falling vacant or, in	The Empty Dwelling Management Order applies in England and Wales enabling local authorities to return unoccupied property to use as housing. Taking	Detroit Land Bank Authority (quasi-governmental) was created in 2008 to manage vacant lots, abandoned property and other structures.

	vacancies (by giving state subsidies) (Jensen, 2017). The Danish system for property ownership and effective use ensures that no home is vacant for longer than 180 days a year (with certain exceptions) (Hallmann, 2017).	any event ending vacancy as quickly as possible through intensive cooperation between the authority and the owner. According to the legislator, the rights of ownership must be weighed against the public interest in preventing nuisance, blight, urban decay and the decline in value of neighbouring properties, as well as against the fact that space is a scarce resource in the Netherlands and structural vacancy is unacceptable (Mees-Bolle, 2011). No evidence was found about abandoned properties.	into consideration housing shortages, especially for locals due to its unaffordability, this sub-criterion is of low relevance for Totnes.	The city also has a strong property receivership law that can be used to crack down on delinquent slumlords (Hackworth, 2014).
4.5. Safe rental market – rent controls, rent subsidies; support for social housing	Yes, there are types of housing under rent control (Bonde-Hansen, 2021).	The Netherlands has the largest share of social housing in Europe – 30%. In Amsterdam, the share of social housing is 42% and remains the most popular tenure sector (Housing Europe, 2019). No information on reduced rent is available.	The UK has a general problem with affordable housing. The rental market is somewhat unsafe: according to South Hams & West Devon housing strategy, "the local rented housing market has become increasingly expensive, including the social housing sector, and the proportion of net income required to cover housing costs for low-income households has increased" (South Hams District Council and West Devon Borough Council, 2021, p. 17). The Plymouth & South West Devon Joint Local Plan proposes a total of 528 new homes for Totnes over the plan period 2014–2034. It includes a target that 30% of on-site affordable housing will be sought for all schemes of 11 or more dwellings (Totnes Town Council, 2020).	More than half of renters are rent-burdened. A significant amount of homeless people. Unregulated treatment of squatters in Land Bank-owned[ii] houses.
4.6. Increased share of non-profit housing developers (cooperatives, housing associations, trusts, etc.) and cohousing communities – enhancing housing commons	There are two primary alternatives to owner-occupied and private rental housing: private cooperatives and private non-profit housing associations. Both types have been historically strong, though cooperatives recently are experiencing marketisation. Cooperative housing constituted 33% of all housing units in Copenhagen (Clark et al., 2016). The city has a goal to ensure that non-profit housing constitutes a minimum of 20% of housing in Copenhagen and that a minimum of 25% of the new housing in the city is non-profit (City of Copenhagen, 2019a).	Amsterdam is the European leader for social housing supply. Cooperatives have been researched and encouraged recently by the municipality. There are several cooperatives in the city; their forms include social housing buildings that are given collective autonomy, cooperatively built new housing, and jointly purchased existing buildings that are converted into cooperatives (Kazimowicz, 2020). The city plans to invest in the development of housing cooperatives, aiming for 10% housing cooperative houses out of the total supply of homes in 2040 (Kok, 2021).	Transition Homes CLT is developing a scheme of 31 eco-homes on a site in the Dartington administrative unit. The majority of the homes (70%) are affordable rentals and shared ownership for local people, with a proportion of market housing required for cross-subsidy. The Neighbourhood Plan (2020) puts community-led development and community asset ownership as ways of achieving sustainable development. There are existing community-led and owned projects (the Leechwell Gardens and the Lamb projects). The South Hams & West Devon housing strategy (2021) also plans to provide opportunities for people interested in custom-build or self-build developments and to support alternative providers of affordable housing (cooperatives, community land trusts).	Senior Cohousing initiative; a number of cooperatives, including Fountain Court – a black-owned co-op. Detroit Cultivator Community Land Trust – the first CLT in Detroit.
5. Transport	Copenhagen	Amsterdam	Totnes	Detroit
5.1 Reducing urban private motorised mobility and increasing the	In 2016, 62% of Copenhageners used their bicycle as the primary means of transport to and from school and work. It is	Amsterdam aims to become emission-free by 2030. Amsterdam's Mobility Plan includes strategies to enable more journeys by public	Transition Homes CLT plans to design minimal parking on-site and a community car share scheme to discourage car	As of 2019, 91% of journeys in the Detroit metropolitan area were made by car (Deloitte, 2019). DFC acknowledges the problem

availability and quality of public transport, car sharing and non-motorised modes of mobility by redirecting investments	estimated that at least 75 per cent of all trips must be done by foot, bike or public transportation to meet the 2025 goals (City of Copenhagen, n.d.). The city wants to promote car-sharing, expand infrastructure for electric cars and expand metro lines. There is a plan to make all city transport carbon-neutral by 2025 (through electrification or biofuels) (City of Copenhagen, 2013)	transport than by car (e.g., limiting parking permits, encouraging car-sharing), improve rail transport and prioritise public transport over cars (City of Amsterdam, n.d.)	use and encourage walking, cycling and the use of public transport. The Neighbourhood Plan (2020) promises to promote walking, cycling, public transport and shared car use and to plan for people, not for cars. Parking and charging facilities for electric vehicles and car club/pool vehicles will be preferred to parking for normal private cars.	and declares that by 2030, the Detroit metropolitan area will have an integrated regional public transportation system. Non-motorised and shared vehicles are also prioritised in the plan. At the same time, there is criticism of the QLine – a streetcar which started to operate in 2017 and runs along part of one of the central north-south roads in the city. The criticism is that the streetcar is operated by private actors and is aimed at the economic development of the districts it runs through rather than providing affordable transportation for all income groups of residents (Lowe and Grengs, 2020)
5.2 Converting a part of existing car infrastructure into walking and cycling one	To make the urban landscape more absorbent, parking spaces on some streets in the district of Osterbro have been given over to plots of land with greenery.	Plans to make at least central streets car-free (Gemeente Amsterdam, 2019a)	New cycle routes, cycle crossings and pedestrianised areas were provided via Emergency Active Travel Funding during the COVID-19 pandemic. Whether this will be permanent is yet to be decided (News centre, 2021)	DFC plans to create landscape infrastructure, among others, by converting portions of under-used roads to swales and bike lanes.
5.3. Changes in city planning towards polycentricity, mixed-use space, proximity	Overall planning in Copenhagen follows the principles of a compact city. Measures for the city's development include good public transport and conditions for cyclists in new developments; density in existing and new urban areas; proximity to functions, and proximity to train stations (City of Copenhagen, 2013).	The city only participates in the development of offices if they can be reached easily by public transport (City of Amsterdam, 2020b)	The Neighbourhood Plan (2020, p. 45) states that "new development in Totnes should therefore be located and designed to reduce the likelihood of motorised travel, make best use of more sustainable modes, and contribute to a more sustainable and effective local transport network for the town as a whole". Development which would prioritise travel by car will not be supported.	Changes in zoning ordinances were made to enable mixed-use developments. DFC recommends adding Live+Make to land use typology.
5.4. Monetary incentives internalising the externalities – parking fees, gasoline and pollution taxes, congestion charges, regulated petrol consumption caps	To reduce cars in the city centre, Copenhagen has raised the annual resident parking fee, and car payers pay significant taxes on any car purchases in Denmark (Birnbaum, 2019). There is free parking for car-sharing in the payment zones.	Subsidies and privileges for e-drivers (e.g., parking permits) (Gemeente Amsterdam, 2019b); incentives to use public transport for children (free weekend metro transit for children under 12) (Vries, 2019).	No evidence found.	Not used

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[i] Low-Income Housing Tax Credit

[ii] Detroit Land Bank Authority - governmental authority aimed at returning the city's blighted and vacant properties to productive use (source: https://buildingdetroit.org/overview).

Appendix 2 – Supplementary Material 2 to Article 3

Legend:

0	No activities; activities in the opposite direction; no information available.
1	Incidental developments, independent of the decisions of local authorities or residents; marginal initiatives.
2	Some relevant initiatives and policies, but not integrated into a coherent policy.
3	Coherent, intentional degrowth-related policies.

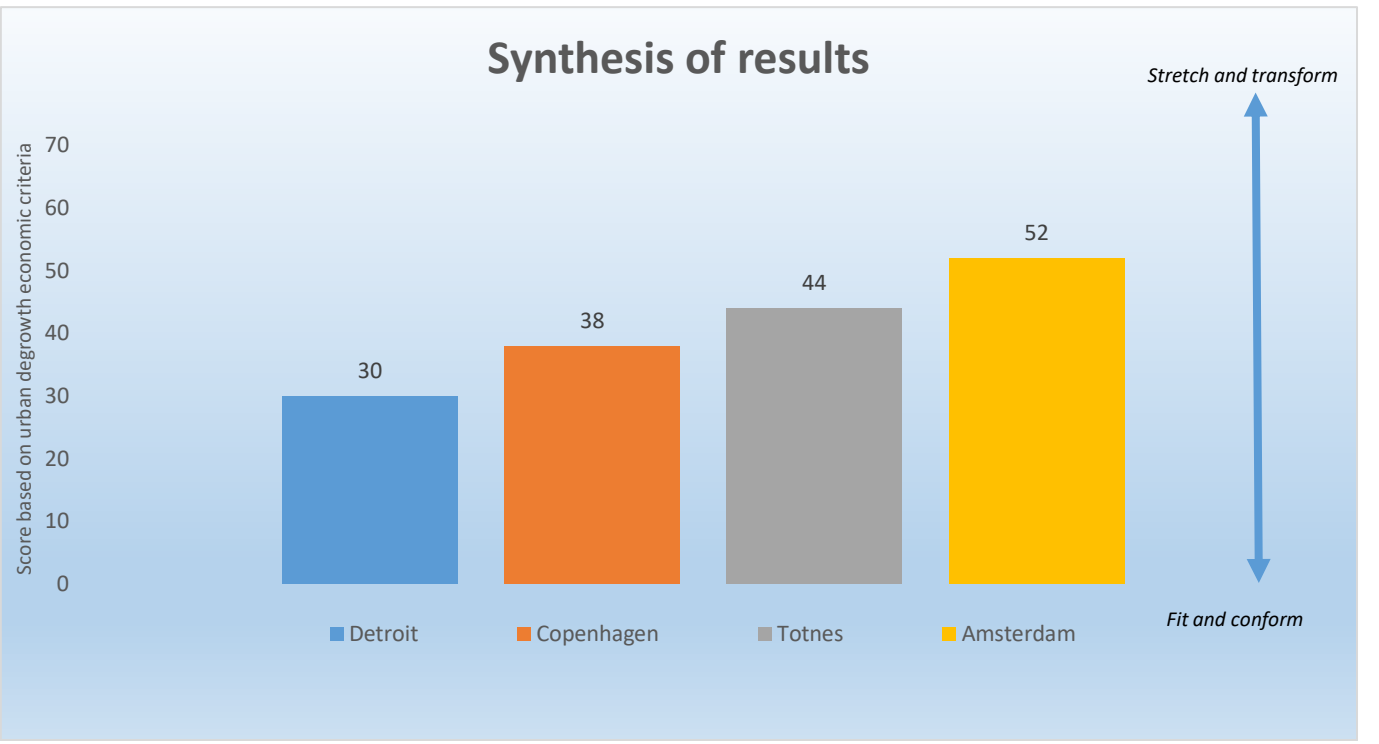
Acronyms:

CLT	Community Land Trust
NP	Neighbourhood Plan
TTT	Transition Town Totnes

Cities / Criteria	COPENHAGEN		AMSTERDAM	
	Points	**Arguments**	**Points**	**Arguments**
1.Urban growth and city size	7		10	
1.1. Restricting further urbanisation, preventing sprawl	2	Finger Plan remains the central for the development of Copenhagen, but recently the Plan "has been loosened to accommodate municipal requests for urban development and economic growth" (Olesen, 2021: 2)	2	The city prevents sprawl through urban development
1.2. Urban containment policies planned and implemented at the level higher than local	2	National legislation foresees that the Greater Copenhagen Area must be planned according to the principles of the Finger Plan	3	The city promises cooperation with other municipalities in the meropolitan area
1.3. Limiting building and development permits, introducing trading zones for such permits	0	Not used	2	The city controls development by posessing the majority of urban land
1.4. Relaxing of zoning regulations	3	Planning policies follow the compact city planning principles	3	Urban development within city boundaries necessitates re-zoning
2. Urban land rent and land use patterns	4		11	
2.1. Land treated as a resource, not as a commodity	0	Does not exist	2	Most of land is publicly owned
2.2. Conceptualizing and governing land as commons	1	Housing commons exist	2	Though not explicitly land ones, other commons exist some of which related to land (urban farms, urban villages)
2.3. A greater role for local government (as a facilitator, mediator and trustee for commoners)	1	Long tradition of housing commons is hardly possible without facilitation from local government	3	The city explicitly expresses support and the will to cooperate with urban commons
2.4. Community land trusts	0	Do not exist	2	There is a CLT, the first in the Netherlands
2.5. Including private land in the green infrastructure through economic incentives	2	There are plans to transform some of the privately owned streets into cloudburst streets and there is support to private initiatives regarding urban nature	2	There is encouragement and financial support for residents to provide green spaces
3. Industrial location, agglomeration and clustering.	9		10	
3.1. Enabling industrial democracy and socially useful production and services	2	There is a strong tradition of industrial democracy in Denmark; Copenhagen has the highest concentration of social enterprises in Denmark and it seeks to create more space for businesses working on green, healthy and creative solutions.	2	The Netherlands is one of the best-performing countries in the EU28 in terms of industrial democracy; Amsterdam is home to many ethical businesses
3.2. Policy support for creative communities aiming at developing alternative visions of an urban economy	2	The city aims to help establish more social enterprises	3	The city explicitly expresses support for social innovations and urban commons
3.3. Eco-industrial parks as a model for industrial location	2	In terms of its circular economy strategy, the city promises to investigate whether there are possibilities for industrial symbiosis.	2	The circular transition of the port of Amsterdam an overall Amsterdam's ambitions regarding circular economy
3.4. Reducing the need for new production by supporting the exchange of second-hand products and clusters of repair services	3	The city has a circular economy strategy and it aims to collect 70% of waste for recycling and to support residents and companies in swapping, repairing and reusing things; there is already a municipal recycling and reuse centre.	3	This consists a part of Amsterdam's circular strategy.
3.5. Steered deglomeration when needed	0	No evidence found	0	No evidence found
4. Housing and housing policy	8		12	
4.1. Reducing housing-related environmental impacts while simultaneously providing affordable housing for all	2	There are plans to retrofit buildings to reduce energy consumption and around 20% of housing is social; however, the prices are highest in the country and housing continues to become less affordable	2	Most new-build housing in Amsterdam should be various types of affordable housing; the circular strategy requires that more circular materials mut be used
4.2. Housing as a public need, not a commodity	0	No, the process is the opposite	3	Amsterdam is the only analysed city that has imposed a ban on letting new-build homes; it also promises that it will prevent investors' speculations with buying cheap or medium-priced property and renting it out
4.3. Reasonable management of existing housing before building new houses: refurbishing and distribution according to the size of households, taxation of surplus living areas	0	Immigration trends make building new housing inevitable; taxes related to living areas are not used.	0	Immigration trends make building new housing inevitable; taxes related to living areas are not used.
4.4. Adaptating legislation to extend local government capacities to manage abandoned buildings	1	Vacancy and abanodnment is more of a problem in smaller cities and rural areas; there is Danish system for property ownership and effective use that prevents vacancy	1	There is national legislation that provides ways of preventing property from falling vacant and ending vacancy as quickly as possible; no evidence found about abandoned properties
4.5. Safe rental market – rent controls, rent subsidies; support for social housing	2	There are types of housing coming under rent-control in Copenhagen	3	The Netherlands has the largest share of social housing in Europe and in Amsterdam it consists almost half of the housing stock and remains the most popular tenure sectror
4.6. Increased share of non-profit housing developers (cooperatives, housing associations, trusts, etc.) and cohousing communities – enhancing housing commons	3	There are historically strong non-profit housing developers and the city has a goal to ensure that non-profit housing constitutes a minimum of 20% of housing in Copenhagen	3	Amsterdam has a big share of social housing, a CLT and a number of housing cooperatives; moreover, the city plans to invest in housing cooperatives
5. Transport	10		9	
5.1 Reducing urban private motorised mobility and increasing the availability and quality of public transport, car sharing and non-motorised modes of mobility through redirecting investments	3	Copenhagen scores the best among analysed cities in terms of using non-motorised modes of mobility and there are further plans to reduce private motorised mobility and to make all city transport carbon-neutral by 2025	2	There are strategies to enable more journeys by public transport than by car
5.2 Converting a part of existing car infrastructure into walking and cycling one	2	Some parking spaces have been given over to plots of land with greenery to make urban landscape more absobent	2	There are plans to make at least the central streets car-free
5.3. Changes in city planning towards polycentricity, mixed space use, proximity	3	Measures for the city's development include good public transport and good conditions to cyclists in new developments; density in existing and new urban areas; proximity to functions and proximity to train stations	3	The city only participates in the development of offices if they can be reached easily by public transport
5.4. Monetary incentives internalizing the externalities – parking fees, gasoline and pollution taxes, congestion charges, regulated petrol consumption caps	2	Higher parking fees in the city cenre and free parking for car-sharing in the payment zones	2	Subsidies and privileges for e-drivers and incentives to use public transport for children
Total	38		52	
How often scored 3	5		9	
How often scored 2	10		12	
How often scored 1	3		1	
How often scored 0	6		2	

Cities / Criteria	TOTNES		DETROIT	
	Points	**Arguments**	**Points**	**Arguments**
1.Urban growth and city size	11		4	
1.1.Restraining further urbanisation, preventing sprawl	2	There is no evidence of significant and rapid sprawl	1	This is related to shrinkage, which happens independently
1.2. Urban containment policies planned and implemented on level higher than local	3	The UK has coordinated top-down urban containment policies	0	Lack of state-level policies
1.3. Limiting building and development permits, introducing trading zones for such permits	3	NP proposes stringent criteria for the new development to be allowed	0	Not used
1.4. Relaxing of zoning regulations	3	NP envisages exceptions to regular policies on housing provision for allowing innovative and alternative forms of housing	3	Project "Zone Detroit"
2. Urban land rent and land use patterns	8		8	
2.1. Land treated as a resource, not as commodity	0	No evidence found	2	Moving part of the land to its natural state may be considered to be treating it as a resource
2.2. Conceptualizing and governing land as commons	2	TTT's projects related to urban food production in public spaces and brownfields necessitate free access to land by residents	1	Informally reclaimed urban farms may be considered to be commons
2.3. Greater role for local government (as facilitator, mediator and trustee for commoners)	2	The abovementioned projects received support from local government; the NP expresses support for community-led development	1	Urban Agricultural Ordinance may be considered an act of facilitation
2.4. Community land trusts	2	There is Transition Homes CLT	2	There is a CLT created in 2020
2.5. Including private land in the green infrastructure through economic incentives	2	South Hams Green Infrastructure Framework includes cooperation with private land owners and community groups in Totnes and providing grants for that purposes.	2	Prioritisation of green infrasructure solutions by local government, grants for individuals by non-profit organisations
3. Industrial location, agglomeration and clustering.	9		5	
3.1. Enabling industrial democracy and socially useful production and services	2	No evidence found on industrial democracy; public services make up some of the largest employment groups in Totnes; The NP expresses the encouragement and support to 'green' and 'ethical' businesses	2	No evidence found on industrial democracy; strategic industries indicated in DFC are socially useful
3.2. Policy support for creative communities aiming at developing alternative visions of an urban economy	3	Creative comunities are very evident and strong in Totnes, Transition Town Totnes is mentioned in the NP and its initiatives receive support	1	Support is mainly from grassroots or non-profit initiatives
3.3. Eco-industrial parks as a model for industrial location	1	There is no big industry in Totnes	0	No information was found on the use of eco-industrial parks.
3.4. Reducing the need for new production through supporting the exchange of second-hand products and clusters of repair services	2	There are declarations regarding this among Town Council's priorities and in the NP	1	Initiatives are small-scale and individual
3.5. Steered deglomeration when needed	1	Deglomeration is not needed	1	Deindustrialisation in Detroit was unplanned
4. Housing and housing policy	10		7	
4.1. Reducing the housing-related environmental impacts and at the same time providing affordable housing for all	2	The NP seeks to ensure that new housing developments are affordable and meet rigorous criteria regarding environmental impact	1	Affordable housing policies are not sufficient; there is an initiative by Cass Community Social Services – Tiny Homes Detroit
4.2. Housing as a public need, not as commodity	2	The NP explicitly states that its central concern is meeting local housing need rather than satisfying demand for housing	0	Housing is not conceptualised in that way.
4.3. Reasonable management of existing housing before building new houses: refurbishing and distribution according to the size of households, taxation of surplus living areas.	1	The UK's "bedroom tax" is used and Tenants Incentive Scheme that supports households to downsize to smaller accommodation; the city suffers from housing shortages, especially for locals	1	There are municipal loan programs for repairs and various non-profit programs for housing renovation.
4.4. Adaptation of legislation for extending local governments' capacities to manage abandoned buildings	1	England and Wales have legislation enabling local authorities to return unoccupied property to use as housing ; due to housing shortages, this subcriterion is of low relevance for Totnes	3	The city also has a strong property receivership law and Detroit Land Bank Authority was created to manage vacant lots, abandoned property and other structures
4.5. Safe rental market – rent controls, rent subsidies; support for social housing	1	There is some support for social housing, but the rental market is somewhat unsafe	0	The rental market is not safe
4.6. Increased share of non-profit housing developers – enhancing housing commons	3	Transition Homes CLT is developing eco-homes and local strategic documents express plans to provide opportunities for community-led development and community asset ownership	2	There is a number of housing cooperatives, an elder cohousing initiative and a CLT
5. Transport	6		6	
5.1 Reducing urban private motorised mobility and increasing the availability and quality of public transport, car sharing and non-motorised modes of mobility through redirecting investments	2	Planning for people and not for cars is promised by the NP and facilities for electric or car club/pool vehicles will be preferred over facilities for normal private cars	1	So far there are only declarations regarding public and non-motorised transport; most journeys are still made by car
5.2 Converting a part of existing car infrastructure into walking and cycling one or to natural state	1	New walking and cycling areas were provided via Emergency Active Travel Funding during pandemic, but it is not clear whether it will be permanent.	3	There are plans to create landscape infrastructure by converting portions of under-used roads to swales and bike-lanes
5.3. Changes in city planning towards polycentricity, mixed space use, proximity	3	The NP states that new development should be located and designed to reduce the likelihood of motorised travel; in other cases it will not be supported	2	Changes to local legislation were made to enable mixed use developments and there are propositions to add Live+Make to land use typology
5.4. Monetary incentives internalizing the externalities – parking fees, gasoline and pollution taxes, congestion charges, regulated petrol consumption caps	0	No evidence found	0	Not used
Total	44		30	
How often scored 3	6		3	
How often scored 2	10		6	
How often scored 1	6		9	
How often scored 0	2		6	

Detroit	Copenhagen	Totnes	Amsterdam
30	38	44	52



Appendix 3 – Authors' declaration (Article 1)

Yaryna Khmara
imię i nazwisko
Uniwersytet Łódzki
afiliacja

Łódź 09.03.2023
miejscowość i data

OŚWIADCZENIE

Oświadczam, że w pracy:
Autorzy: mgr Yaryna Khmara, dr hab. Jakub Kronenberg
Rok publikacji: 2020
Tytuł: Degrowth in the context of sustainability transitions: In search of a common ground
Czasopismo: Journal of Cleaner Production
Tom: 267
Strony: 1–13

mój udział polegał na:

Przygotowaniu koncepcji i metodologii artykułu, przeprowadzeniu badania, przygotowaniu manuskryptu, wizualizacji wyników, wprowadzaniu poprawek po recenzjach oraz redagowaniu. Mój udział w powstaniu artykułu szacuję na 90%.

Imię i nazwisko współautora	Procentowy udział	Podpis
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dr hab. Jakub Kronenberg	**10%**	Jakub Kronenberg

Appendix 4 – Authors' declaration (Article 2)

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OŚWIADCZENIE

Oświadczam, że w pracy:

Autorzy: mgr Yaryna Khmara, dr hab. Jakub Kronenberg

Rok publikacji: 2023

Tytuł: Urban degrowth economics: making cities better places for living,working, and playing

Czasopismo: Local Environment

Tom: 28

Strony: 304–321

mój udział polegał na:

Przygotowaniu koncepcji i metodologii artykułu, przeprowadzeniu badania, przygotowaniu manuskryptu, wprowadzaniu poprawek po recenzjach oraz redagowaniu. Mój udział w powstaniu artykułu szacuję na 90%.

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Appendix 5 – Authors' declaration (Article 3)

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Łódź 09.03.2023
miejscowość i data

OŚWIADCZENIE

Oświadczam, że w pracy:
Autorzy: mgr Yaryna Khmara, dr hab. Jakub Kronenberg
Rok publikacji: 2023
Tytuł: On the road to urban degrowth economics? Learning from the experience of C40 cities, doughnut cities, Transition Towns, and shrinking cities
Czasopismo: Cities
Tom: 136
Strony: 1-12

mój udział polegał na:

Przygotowaniu koncepcji i metodologii artykułu, przeprowadzeniu badania, przeprowadzeniu oceny, przygotowaniu manuskryptu, wprowadzaniu poprawek po recenzjach oraz redagowaniu. Mój udział w powstaniu artykułu szacuję na 90%.

Imię i nazwisko współautora	Procentowy udział	Podpis
mgr Yaryna Khmara	**90%**	Yaryna Khmara
dr hab. Jakub Kronenberg	**10%**	Jakub Kronenberg