



The post-urban hypothesis

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ABSTRACT

There is a growing awareness that the current, almost total domination of cities in the world is an expression of a new stage of human civilization. “Complete urbanization”, “planetary urbanization”, “post-rurality”, “post-metropolitan” and “post-urban world” are some concepts being used to describe this emerging era. This paper aims at 1) form a synthesis of this broad literature, which in each area mark major changes but taken together form component parts of a fundamental transformation; and 2) based on an interaction-cost perspective, analyze the driving forces of the post-urban development. Based on this analysis, an agenda for further research is formulated.

1. Introduction

After an unexpected wave of counterurbanization in the 1970s, the emergence of the knowledge economy in the 1980s and onwards meant a re-urbanization and “a dramatic wave of urban restructuring” (Brenner and Schmid 2015: 151). Already 1970, Lefebvre (2003), English translation) presented an “anticipatory hypothesis” on a “complete urbanization. In the early 1990s, Sassen (1991) and Friedmann (1986) launched concepts of “global cities” and “world city hypothesis” and two decades later, Glaeser (2011) proclaimed “The Triumph of the City”. However, what is a city and what is not a city is a difficult question and the definitions and measures vary between countries. This causes not only empirical problems but also theoretical ones. In particular, the focus on ‘cities’ is hiding one of the most important changes in the spatial economy: the transformation from core cities with surrounding suburbs and rural hinterlands to, on the one hand, polycentric (metropolitan) city-regions with a multitude of activities and land use, including even agriculture, and on the other hand, outer hinterlands that slowly are fading away. This transformation, where cities converge to city regions and rural areas either become included in the region and grow, or are located too far from the region and decline, results in a post-urban world where the traditional urban-rural dichotomy have ceased to exist (Westlund 2014, 2018; Westlund and Haas 2018) .¹

There is also a growing awareness that the current, almost total domination of cities in the world – in an economic, cultural and social meaning – is an expression of a new stage of human civilization. Westlund’s (2018) “post-urban world” or Brenner’s and

Schmid’s (2015) “planetary urbanization” are two of the concepts being used to describe the current, emerging era. Having their roots in different research fields, the contents of the two concepts show many similarities. Brenner and Schmid (2015: 166) has proposed “a new epistemology of the urban” in which “three mutually constitutive moments—(i) concentrated urbanization, (ii) extended urbanization and (iii) differential urbanization” play a decisive role. Westlund (2018) has claimed that the traditional urban-rural dichotomy is being dissolved and replaced by on the one hand polycentric city-regions, and on the other, vast peripheries, whose only role is to supply urban demand with raw material, energy and leisure experiences

Thus, the transformation from cities with rural hinterlands to city-regions in which rural areas and suburbs become integrated parts of cities’ socio-cultural and economic life is a fundamental change in mankind’s spatial organization. This transformation has been described in various terms: complete urbanization, planetary urbanization, post-rurality, postmetropolitan and post-urban world. The different interpretations put emphasis on various expressions of this process but a common denominator can be formulated as that cities’ and/or city regions’ economy and culture dominate the world, and that this has decisive impacts on regional development and urban-rural relations.

Earlier research on this transformation has focused on its expressions in certain fields. However, the various interpretations’ relations to each other and to other literature has not been examined. Neither have the driving forces to the transformation been analyzed. This paper aims at taking a first step in filling these research gaps by 1) forming a synthesis of this broad literature, which in each area mark major changes but taken together form component parts of a fundamental transforma-

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¹ The first use of the concept “post-urban world” seems to be made by Hillis (1998), criticizing, in his view, ‘utopian’ future studies.

tion; and 2) based on an interaction-cost perspective, analyze the driving forces of the post-urban development.

This is being done in the following sections. [Section 2](#) summarizes the main features of the post-urban hypothesis. [Section 3](#) presents and discusses the various theoretical roots of the hypothesis. [Section 4](#) discusses the driving forces of the post-urban development from an interaction-cost perspective. [Section 5](#) elaborates an agenda for further research based on the post-urban hypothesis and [Section 6](#) gives some concluding remarks.

2. Expressions of the post-urban world

Based on [Westlund and Haas \(2018\)](#) four significant expressions of the post-urban world can be emphasized:

- *Re-urbanization*. In contrast to the traditional urbanization that consisted of migration from countryside to cities (and often within the same region) the re-urbanization of the western world has mainly consisted of: 1) migration from smaller towns and cities to the bigger city-regions, foremost the national and regional centers; 2) migration from declining manufacturing regions to city-regions with expanding knowledge- and service sectors; 3) immigration from low-income, or war affected countries, to most city-regions of the western world.
- *Densification* of city-regions, in particular densification of suburbs. [Soja \(2000, 2011\)](#) discussed the transformation of metropolitan regions from dense centers with sprawling low-density suburbs, to polycentric city-regions with relatively high density all over. The result is a 'Postmetropolitan' region; a new spatial framework in which the idea of place is weakened and the limit between what is urban and what is suburban is blurred and tend to dissolve.
- *Region enlargement* by integration of new areas, primarily around the metropolitan regions, but in a smaller scale also around regional centers above a certain (context-dependent) size. This is foremost taking place by extension of labor markets, due to improved transportation infrastructure and public transportation. This means that the city-regions has not only been densified within a given area, but also been 'sparsified' when more distant centers, their suburbs and adjacent rural areas in the urban fringe, have become integrated in the metropolitan and regional centers' transportation networks.
- *Downgrading of the relations between city-regions and their outer hinterlands and the upgrading of their networks to other city regions*. This process has become obvious with the expansion of the knowledge economy. One of the most important differences between the knowledge economy and its predecessors is that human capital has replaced raw materials and physical capital as the main production and location factor. The large, diversified labor markets of city-regions have become a key location factor for both businesses and labor. Small cities, towns and rural areas in the peripheries suffer from lack of sufficient concentrations of the now most important production factor, human capital, which means that their labor markets remain small and the knowledge economy has difficulties to develop there. Raw materials and foodstuffs, that were the peripheries' growth source during industrialization is now capital-intensive industries where less and less labor is needed. Moreover, while external supply of raw materials is still a necessity for the city-regions, its relative share of the economy is decreasing. From the countryside's perspective, this means a division in two parts: one city-close part that is being integrated in the extended city regions, and one peripheral part that in the knowledge economy only is needed as a source for natural resources and energy. Economic activities in these peripheries are governed by the city-regions' demand for raw material, energy and leisure. With the ongoing green transition, this demand has led to a boom in certain peripheral spots, as e.g. in the town of Skellefteå in northern Sweden, where a car battery factory has been built. Other examples of peripheral growth are certain tourism resorts that thanks to the number of visitors are able to offer urban amenities in an amount and

quality that highly exceed their number of inhabitants, and to combine this with supplying unique rural amenities 'around the corner' ([Westlund and Borsekova 2025](#)). However, such examples of 'swimming against the tide' seem to be exceptions, rather than the rule.

- To these four expressions of the post-urban world, we should also add a fifth one, viz. the *growing internal social gaps* that characterize the city-regions of the knowledge economy, but also the new gaps between knowledge regions and regions dominated by manufacturing and agriculture. [Friedmann \(1986\)](#); [Florida \(2017\)](#); [Rodríguez-Pose \(2018\)](#) and [McCann \(2020\)](#). As early as 1991, [Castells and Molenkopf \(1991\)](#) paid attention to the increasing internal inequalities in New York City and predicted that this development would follow in other large cities. At interregional level, in the year 1980, the Swedish coefficient of variation for the Gross Regional Product (GRP) was as low as 0.07. In 2022, it had increased to 0.18, which is the same level as Spain and only slightly lower than Germany, Italy and France ([Enflo et al. 2025](#)).

The five features of the post-urban world that are summarized above are expressions of the dissolution of two dichotomies that have formed much of our thinking on urban development: the urban-rural dichotomy and the urban-suburban dichotomy. Both these dichotomies were based on the well-grounded perception that the urban was something fundamentally different from the rural and the sub-urban, respectively. This is less and less the case. The emergence of city-regions where city-close small towns as well as rural and natural areas are included, while other, more peripheral rural areas and smaller cities and towns ends outside the positive influence fields of the city-regions and gradually fade away, means that the traditional urban-rural dichotomy is being dissolved. The emergence of densified, multinuclear city-regions also signals that the dichotomy between dense city centers and sparse suburbs wither down. Together, these two processes have formed the basis for the post urban world.

3. Driving forces of the post-urban process

The transformation from a manufacturing-industrial economy to a knowledge economy has been the subject of a broad scientific discussion from the 1970s (e.g. [Bell 1973](#)) and onwards. In the context of the post-urban hypothesis, the strongest influence of the knowledge economy seems to be the spatial clustering effect of human activities to city-regions, when human capital and not placebound resources becomes the most important factor of production. There is a substantial literature that suggests the existence of localized knowledge spillovers within science- and technology-based industries ([Acs, 2003](#)). These spillovers occur through networks formed among firms and industries that are concentrated in specific regions. Consequently, the generation of knowledge, which includes a substantial relational and tacit component, requires transfer through learning-by-doing and extensive face-to-face interaction ([Storper and Venables, 2004](#)). Face-to-face contact serves as the foundation for the observed clustering of specialized knowledge producers and the subsequent geographic concentration of talent, which has been supported by numerous studies ([Glaeser 1999](#); [Hanson 2000](#); [Simon 1998](#)). This spatial concentration effect is not only a characteristic of knowledge intensive high-tech industries (see e.g. [Powell and Snellman 2004](#)) but also of a large number of other activities and markets in which learning and matching play important roles (see [Section 4](#) of this paper). In summary, the knowledge economy represents a significant component of the post-urban world, where localized learning and matching processes play crucial roles in fostering economic growth and development.

Strongly connected to the abovementioned, by assuming increasing returns on investment in human capital and positive externalities and spillovers from these investments ([Romer 1986](#)), endogenous growth theory provides a fundamental explanation to the growth of the knowledge economy. Even though the abstract endogenous growth

theory does not explicitly consider space, its spatial implications seem obvious: externalities and spillovers, especially in the form of tacit knowledge, are distance-sensitive and their effects decrease rapidly with distance. The early literature highlighted that knowledge spillovers primarily exhibit geographical limitations (see, e.g., [Acs et al. 2002](#); [Anselin et al. 1997, 2000](#); [Peri 2005](#)). Thus, concentration of knowledge intensive activities in dense regions would create incentives for self-reinforcing growth. Areas with less knowledge activities would not get the same result on investment in human capital.

As stressed above, externalities in the form of spillovers by face-to-face contacts has been considered a main driving force for agglomeration and clustering of innovative activities. However, one of the most extensive expressions of the knowledge economy is the ICT, which also have created innumerable applications that reduce the need for learning to be co-located. During the pandemic, 2020–2022, online networks became the new platform for teaching, supervisions, meetings and other learning activities. Millions of online courses, lectures and practical demonstrations are available for free or for payment. Through these, also tacit knowledge has been transferred. Online communication has replaced or complemented face-to-face contacts in many areas. [Bathelt and Turi \(2011\)](#) pointed out that there is no general predominance of adjacent economic relations over distant ones and that local and global knowledge flows are tightly interwoven. [Weterings and Boschma \(2009, p. 746\)](#) found that “spatial proximity facilitates face-to-face interactions, but it does not strengthen the effect of face-to-face interactions on innovative performance”. Thus, it is no longer a question of face-to-face interaction or nothing, but a question of the quality of the face-to-face interaction: in real life (IRL) or online. It is usually considered that interaction IRL means a higher quality of interaction (see e.g. [Misra et al. 2016](#)), and that this quality is often of high importance when people do not know each other or when practical exercises with extensive supervision are performed. However, incessant improvements of ICT and experience of using it seems to decrease the differences between communication IRL and online. The conclusion seems to be that even in learning, the agglomeration advantages do not only refer to small, spatial clusters (MAR-externalities), but also to social and professional online networks. This does not mean “the death of distance”, but from the post-urban perspective it means that hybrid forms of interaction (IRL and online) can extend to large city-regions from the concentrated clusters necessary for communication that takes place exclusively face-to-face. The agglomeration advantages that previously were considered to favor a spot/center, seem increasingly turn over to become regional phenomena, and thereby become depending on how intraregional networks are optimized.

While mainstream economics has its focus on explaining how market equilibriums arise and neglects spatial aspects, there has ever since [Marshall's \(1880/1920\)](#) observation of external economies, been an underflow in economics that have focused on disequilibrium processes and spatial imbalances. One of the most prominent representatives of this flow is the Nobel laureate Gunnar Myrdal. In contrast to the stable equilibrium theory in which any disturbance causes a counter reaction that restores the equilibrium, Myrdal pointed out the role of self-reinforcing processes and circular causation for both growth and decline of countries and regions. Among the reasons to this self-reinforcing inequalities was according to Myrdal that the spread effects that emerged in the growing regions in general were too weak to influence the stagnating or declining regions. Thereby, Myrdal expressed a much more pessimistic view for lagging regions compared with advocates of unbalanced growth strategies like [Perroux \(1955\)](#) and [Hirschman \(1958\)](#). [Krugman \(1991\)](#) integrated the theories of increasing returns and positive external economies with the hypotheses of Myrdal et al., formalized them in equations and laid the foundation to the New Economic Geography.

The New Economic Geography and its predecessors constitute a theoretical foundation for the post-urban hypothesis. Cumulative causation, initial advantages and externalities whose effects decrease over space

provide fundamental explanations for the emergence of spatial agglomerations and their growth, and why their spatial spread effects are limited. However, progress in ICT, including IA, might have a dampening effect on the concentration tendencies and further facilitate the online working that became a necessity during the pandemic 2020–22.

In 1969, Jane Jacobs pointed out that “...no city economy – seems to have grown in isolation from other cities.” ([Jacobs 1969](#), p. 35). Jacobs' remark can be considered as a starting point for the works on city networks by [Taylor \(2004\)](#) and [Taylor and Derudder \(2016\)](#). As a modern complement to [Christaller's \(1933\)](#) central-place theory, [Taylor and Derudder \(2016, p. 42\)](#) suggest a central flow theory with a “...horizontal spatial structure linking non-local interactions”, i.e. a theory of city networks and cities' 'hinterworlds'. If we replace 'cities' with 'city-regions', the association with the post-urban hypothesis is apparent.

Still another component of the post-urban hypothesis is found in parts of the New Urbanism literature, within the disciplines of architecture and planning. In their book *The Regional City*, [Calthorpe and Fulham \(2001\)](#) argued that a new “metropolitan form” was emerging, in which they observe three trends: the rise of a new, networked, poly-centric regional structure, the maturation and remaking of the suburbs, and the revitalization of older urban neighborhoods.

For decades, there has been a debate on diversity vs. specialization as drivers of regional economic growth. The discussion has centered on whether 'Jacobs externalities' (stressing diversity) or 'MAR externalities' (Marshall, Arrow, Romer; underlining specialization) are the best factors in explaining regional growth. In their seminal article, [Glaeser et al. \(1992\)](#) analyzed 170 U.S. metropolitan areas (SMAs) 1956–1987 and found that diversity favored regional growth the most. Using data at such low level as ZIP code, [Rosenthal and Strange \(2003\)](#) noted strong positive effects of local specialization, but also that this effect attenuated rapidly already after 1 mile.

The post-urban city-regions are by definition diversified with regard to both economic activities and land use. The post-urban region gains from diversity in the region as a whole, since it both creates potentials for knowledge spillovers across sectors (i.e. Jacobs externalities) and thereby supports innovation, and it serves as an insurance against sectoral crises, which would severely hit a specialized region. However, a diversified metropolitan region does not need to be diversified at district or neighborhood level. On the contrary, a diverse city-region implies most often the existence of a number of specialized sector clusters at district level, in which knowledge spillovers of the MAR type take place ([Andersson et al. 2019](#)). This ability to gain from both diversity and specialization makes the post-urban metropolitan regions economically resilient.

An expression parallel to the post-urban concept is the notion of “post-rural” by scholars like [Murdoch and Pratt \(1993\)](#); [Hopkins \(1998\)](#); [Halfacree \(2009\)](#) and [Conn \(2023, 2024\)](#). Even if the concept of post-rural is used in different ways in their contributions, it is in retrospect possible to interpret their various use of the concept as reactions on the change in urban-rural relations that the post-urban development has caused. Both [Halfacree \(2009\)](#) and [Hopkins \(1998\)](#) discusses post-rurality as a concept either for the 'effaced rurality' as the effect of contemporary capitalism or for the 'constructed rurality' that takes place both in tourism and housing development, where 'the rural' is about forming the environment in response to (positive) expectations of what is rural. The foundation for this post-rural discourse is, in our perspective, the dissolution of the traditional urban-rural dichotomy.

[Lefebvre's \(1970/2003\)](#) 'anticipatory hypothesis' on 'complete urbanization' describes several features of the emerging post-urban world. With the concept of complete urbanization, Lefebvre did not only mean agglomeration of population but also that urban forms of production and consumption completely dominated society. With his description of how villages and smaller cities become dependencies of the metropolis and that the regions that are untouched by this development are stagnant or dying, Lefebvre articulates the core of the post-urban hypothesis and the 'planetary urbanization': When the complete urbanization has

occurred, the traditional urban-rural dichotomy ceases to exist and is replaced by on the one hand metropolitan regions, and on the hand, stagnant or dying areas.

Even if the city-regions' dependency on each other have increased in comparison with the city-regions' dependency on their peripheral hinterlands and even if the city-regions' demand on the peripheries' resources employ an ever smaller part of the local labor force, the city-regions need the peripheries' products. They need wood and paper products from the forests, minerals and metals from the grounds and bedrocks and they need electricity from hydroelectric plants and wind turbines. The sustainability of the city-regions is dependent on exploitation of the resources of the peripheries, but this does not promote sustainability in the peripheries. This is in line with [Brenner's and Schmid's, \(2015\)](#) 'planetary urbanization' and [Lefebvre's \(1970/2003\)](#) statement that these areas become part of the urban fabric, but this exploitation does not prevent the peripheries from stagnating or dying. This unequal relationship between the city regions and their peripheries is also a component part of the post-urban world.

From the perspective we have here depicted, the concept of the post-urban world can be considered a synthesis of fundamental changes that characterizes the knowledge economy. Separately, these perspectives each illuminate a development trend. Together they form a synthesis, the basis for a general hypothesis on spatial socioeconomic development in our time. Finally, it can also be claimed that the 'post-urban world' constitutes a synthesis in the more fundamental way that Hegel expressed. Hegel's famous framework is that an original idea, the thesis, within itself also contains the seed to its counterpole, the antithesis. Eventually, the interplay and the frictions between the thesis and the antithesis transform them to a synthesis, something new.

In the post-urban perspective, the rural can be regarded as the original thesis. Over time, small 'islands' of urban agglomerations (antitheses) emerged in the rural 'oceans', but they mainly stayed small and scattered, and the interaction between them was most often negligible. Some empires succeeded in creating big cities, but when the empires fell apart, the big cities shrank (like e.g. ancient Rome). There are estimations saying that as late as the year 1800, only 3 percent of the world's population were living in cities ([Raven et al. 2011](#)). The agricultural and the industrial revolutions changed this dramatically during the next 200 years and today, in the knowledge economy with highly developed ICT, both the 'rural' and the 'urban' archetypes are ceasing to exist, and are replaced with multifunctional city-regions and declining peripheries. The synthesis from this point of view is the post-urban world, with a new thesis (city-regions) and a new antithesis (vast, outer peripheries).

4. The driving forces of the post-urban world

The former section presented research on a number of development trends that together, in combination forms the basis for the post-urban hypothesis. This section takes its starting point in an interaction-cost perspective and analyses driving forces behind interaction-cost changes that have contributed to the emergence of the post-urban world.

The concept of interaction costs can be used to explain the giant reductions in spatial interaction costs that was a fundamental part of the industrial economy, but that have developed to a new level with the emergence of the knowledge economy. The concept of interaction costs is described in [Fig. 1](#) and can be defined as the sum of all costs that are connected to interaction in or across space.

The industrial economy revolutionized production, transportation and communication with the use of fossil fuels and electricity; all this in a cumulative interplay with technological development that reduced interaction costs. The knowledge economy has brought a new revolution in these fields by digitization and digital technology, which both have been a cause and a prerequisite for a new, dramatic reduction in the interaction costs. For cities, the first wave meant the rise of agglomeration economies through growth of new industries, spatial extension

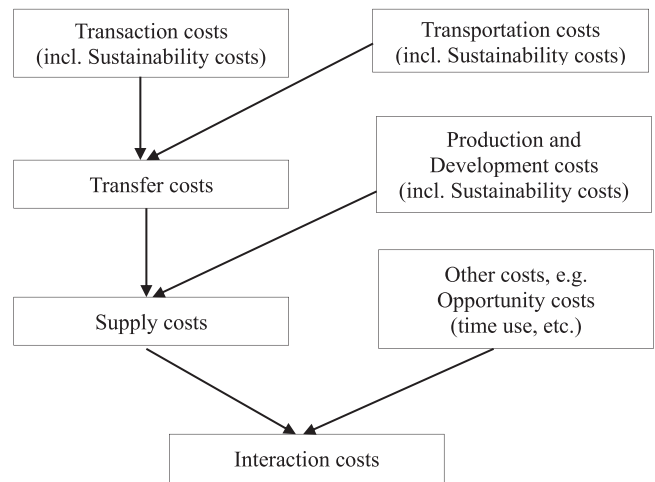


Fig. 1. Costs that are connected to interaction in or across space.

in the form of suburbs, substantially enlarged hinterlands, and positions in national (and international) networks of trade. The second wave, the knowledge economy with a new, digital economy and high-speed intraregional and interregional transportation has meant a new echelon of agglomeration economies. The result is densification of suburbs, enlarged, polycentric city-regions with a mosaic of activities and land use, a global economy of city-regions – but also a decreasing importance and decline of the areas outside the city-regions ([Westlund 2018](#); [Westlund and Haas 2018](#)). The concept of interaction costs plays a significant role in understanding the transformative changes in spatial interaction costs observed in the transition from the industrial economy to the knowledge economy. The emergence of the knowledge economy has facilitated the reduction of interaction costs, enabling new forms of communication, collaboration, and innovation (see, e.g. [Boschma and Frenken 2011](#); [Brynjolfsson and McAfee 2014](#); [Nordhaus 2005](#)).

The increased awareness of global warming, environmental problems and other sustainability issues has also meant that a new group of costs, sustainability costs, has gained significance in the interaction cost perspective. Awareness of sustainability means *ceteris paribus* increased transaction costs before a decision is taken. Taxes on CO₂ producing fuels and other fuels having negative impact on the environment means higher transportation costs. Costs for production and development are often influenced by the material and energy being used and might thereby increase the sustainability costs.

From a principal perspective, sustainability costs seem to be costs of the same type as costs for workers' security and social welfare and for maintaining the local environment free from destruction. The new feature that has developed in line with the knowledge economy, is the global perspective; the insight that what we do today has repercussions for the whole planet and for the long-term future.

However, the latter means that there are strong reasons to question sustainability costs as being a cost of the same type as the other costs in [Fig. 1](#). In a long-term perspective, 'costs' for reducing CO₂ emissions means less risks for rising sea levels, and thereby huge global cost savings in the future. These examples can be multiplied and the conclusion points in the direction that 'sustainability costs' exists in a short-term perspective, but that they in a longer perspective should be considered cost-saving investments for a better future. From a theoretical point of view, this might seem an almost self-evident conclusion, but in the short-term investment perspective it still is a cost problem for the individual firm. Local, regional and national adaptations of the UN's Sustainable Development Goals (SDGs) are here of utmost importance for transforming 'sustainability costs' to investments for the future.

In facing the multifaceted challenges of the 21st century, effectively integrating environmental, economic, and social goals is paramount for

Table 1
Factors that generate interaction costs within and between networks, grouped by potential for change.

Rapid				Very slow
<i>Technical-logistical</i>	<i>Political-administrative</i>	<i>Economic-structural</i>	<i>Cultural-historical</i>	<i>Geographical & biological</i>
Production and goods transportation costs	National/regional rules and regulations for goods & services	Economic structure	Language	Physical distance
Passenger transport costs	Custom duties & similar	Economic development level & demand patterns	Religion Mentality Ethnicity	Natural Geographical obstacles
Capital and capital transfer costs	Tariff zones	Educational levels	Population density	Times zones
Information and communication costs		Compatibility & standard of infrastructure	Power structures & property rights	Human biology

Source: Adaptation of Westlund (1999)

sustainable progress. While sustainability measures often entail short-term costs, reframing them as long-term investments aligned with the Sustainable Development Goals (SDGs) is crucial to ensuring enduring resilience and prosperity (see, e.g. Baffo et al. 2024; Guler and Aydinbas 2024). Table 1 presents a scheme for analyzing the transformation to a post-urban world based on the concept of interaction costs. The table is based on the idea that factors that contribute to changes in interaction costs can be graded after their potential for change.

With support from the mainstream of economic history research, the technical-logistical factors are assumed to be the group in which the most frequent changes occur. The everyday, small, incremental improvements of methods of production, transportation and communication, as well as the applications of them, which emerge both spontaneous and as results of deliberate actions, are the basic drivers of economic and social changes. It should be noted that the relative importance of the changes in the various technical-logistical factors have varied over time. The technical-logistical costs have evolved differently for different sectors and thereby resulted in relative price changes, supply and demand changes and pressure for change on other factors that generate interaction costs. From the urban development perspective, the most important impact of these uneven processes is that they give various supports to the processes of agglomerations and thus give various effects in various regions, depending on their sectorial composition.

If we take high-speed trains as an example, it is obvious that they require big cities within a certain distance to be competitive, while the market for them is too small among the scattered population on the countryside. On the other hand, the motorcar benefits the countryside even more than it benefits the city, as the countryside benefits from the advantages but avoid the traffic-congestions that fall upon the metropolitan cities. Thus, in a spatial context, the technical-logistical development is not neutral, since the prerequisites for taking advantage of the development, among others their 'regional absorptive capacity' (Cohen and Levinthal 1990), differ between region types.

From the perspective of the city-region, the important circumstance is that it, due to its population size, has the potential to gain from complementary networks of all means of transportation: air traffic, trains from high-speed to commuter trains, trams, subways, motor vehicles and bicycles. This potential combination of a multitude of external and internal transportation networks is one of the explanations to the growth of city-regions, and which makes it possible to integrate areas of very different characters into the region. Far from all city-regions has come up to optimal utilization of this potential, but good examples show the advantages of improved intra-city networks (e.g. Brandily and Rauch, 2024; Segi et al. 2024). Outside the city-regions, the interaction costs for reaching workplaces, goods and services of the city-regions, are higher, which increases the development gap between the city-regions and the peripheries (cf. e.g. Myrdal 1957 and Krugman 1991).

The column for technical-logistical factors also includes "information and communication costs". This factor can be considered the key to the growth of the knowledge economy and the post-urban city-regions. The shift from a manufacturing-industrial economy to a knowledge econ-

omy meant that human capital became the most important production factor, and thereby the most important location factor for firms. Cairncross (1997) observed that with the advent of digital communication technologies, there has been a profound reduction in spatial interaction costs, leading to what she referred to as the "death of distance." This phenomenon has facilitated seamless communication, collaboration, and knowledge exchange across vast distances, revolutionizing the modern economy. Brynjolfsson and McAfee (2014) echo this sentiment, arguing that the second machine age marked by brilliant technologies has further diminished transaction and interaction costs, propelling the knowledge economy forward.

From the view that agglomerations economies can be summarized in the three concepts of "sharing, matching and learning", elaborated by Duranton and Puga (2004), human capital has a central role regarding both matching and learning. While the result of the two processes is the same, i.e. increased productivity, there could be reasons to hypothesize that their spatial extensions vary.

Matching on the labor market (i.e. matching of supply of and demand for human capital) is for obvious reasons taking place within a labor market region, whose boundaries are extensible and delimited by labor's commuting patterns. Thus, the spatial labor market forms one of the most important components of the post-urban region. *Learning*, on the other hand, has been assumed to decrease rapidly with distance, as it to a certain extent is dependent on face-to-face contacts. Spatial concentration has been the solution for keeping interaction costs for learning as low as possible. However, continual development of ICT has made online face-to-face communication an alternative to face-to-face communication onsite. In the hybrid solutions that after the pandemic are frequent, this means that the spatial extension of learning tends to reach outside the limited clusters of IRL face-to-face communication, to the whole, or at least parts of, the city-region. Thus, the spatial extensions of learning and matching tend to resemble each other and approximate the whole city-region.

Moreover, learning is one of the key components behind one of the most essential features of the knowledge economy: innovation. Innovation, in its economic sense, is not only about creating new knowledge through new combinations of old knowledge. It has also a second step: to commercialize the new knowledge to a product that can be sold on the market. The increased competition brought by globalization has made innovation a necessity for all agents that are producing for the market and thus face competition.

Innovations take place in all sectors and city-regions, but most research point in the direction that innovation is not spread out evenly but concentrated to spatial and sectoral clusters. Such clusters have the best potential to emerge and develop in city-regions that are large enough to accommodate a sufficient large number of bearers of the necessary human capital that forms the foundation for production of new knowledge and innovation in these clusters. Successful individual clusters may of course also emerge in smaller city-regions, but such regions lack the diversity and consequently the resilience potential that big city-regions have.

Returning to [Table 1](#), political-administrative factors are the second group of factors. In contrast to the technical-logistical group, these factors do not change spontaneously but as a result of formal decisions. On the one hand, they act as a type of stabilizing institutional infrastructure in relation to the continuous changes of the technical-logistical factors, but on the other hand, they restrict and delimit the spontaneous development by creating administrative borders in space, within and between organizations, and thus increase the costs of interaction within and between city-regions.

In practice, this means e.g. that administrative borders might increase the costs for commuting if the ticket system is not adapted to the labor market region, that planning decisions on land use might increase the costs for creative learning by restricting the emergence and growth of certain clusters, etc. Based on these examples, it can be claimed that political-administrative decisions often lag behind the technological-economic-social-spatial development and adapt only when changes are necessary. Still, forethoughtful political-administrative decisions might also reduce future interaction costs and thereby support socioeconomic development and spatial reconstructions of city-regions.

The effects of political-administrative factors are not restricted to the local and regional levels. Even if globalization is driven by technical-logistical factors like digital communications of global networks and lowered transportation costs, these factors find themselves in an interplay with politics, policies, international rules and regulations, in which they simultaneously confront and collaborate with each other. Free trade and mobility of people are results of political decisions and underpins globalization, but free trade can also be abolished, with higher interaction costs as a result. Thus, international city networks are dependent on favorable political-administrative conditions.

The third factor group, economic structures, can in the short-term perspective be regarded as given, but in the longer term, they undergo great changes. They are results of technical-logistical and political-administrative changes, but once established they form the basis for city-regions' internal and external networks. The more advanced economies are, the more diversified they are, the more city-regions interact with each other. The economic-structural factors also form the basis for a city-regional hierarchy, in which New York, London and Tokyo stand out as truly global, followed by other leading metropolitan regions ([Taylor and Derudder 2016](#)). At the lowest levels in these hierarchies, we find small centers and their surroundings, having such a limited size that they normally lack potential for endogenous growth. These city-regions are on their way out of the hierarchies to become peripheries.

The economic-structural factors constitute the core of the transformation of urban-rural relations to a post-urban world. In the pre-industrial era, cities were in general small, with the exception of the capitals of strong, well-organized empires. Agriculture's productivity set a limit for the share of non-agricultural population it could feed. The industrial and agricultural revolutions changed the urban-rural relations dramatically. Natural population increase and productivity growth in agriculture created a rural population surplus that was absorbed by industries and services in the growing cities. Industrialization and urbanization brought not only demand of labor from the countryside, but demand for food and rural natural resources and raw materials as well. As long as the exploitation of raw materials was labor intensive, urban demand for the hinterlands' products also induced growth for natural resource rich rural areas.

Over time, and in particular with the breakthrough of the knowledge economy, agriculture, forestry and other natural resource based industries has become capital intensive, high-tech using industries with a minimum demand for local labor. Even if city-regions' demand for the products still is high, it means very limited demand for labor in the traditional rural industries. Instead, increasing shares of the knowledge intensive city-regions' trade is directed towards other knowledge intensive city-regions. Networks between metropolitan regions take over as the main networks when the city-hinterland exchange decrease in relative importance ([Taylor and Derudder 2016](#)).

The fourth group of factors is the cultural-historical ones. Being created and reshaped over hundreds of years, these factors have on the one hand reduced the interaction costs within a group, but on the other hand augmented the interaction costs between groups. People have formed groups based on ethnicity, language, religion and long-term institutions (i.e. what [Williamson \(2000\)](#) denominates as institutions of level 1). These factors have facilitated interaction, communication and social capital building within each group, but obstructed interaction across groups.

For the post-urban development, the most important impact of the cultural-historical factors is in the establishment and development of links in the networks of city-regions. [Johansson and Westin \(1994\)](#) used the term "affinity" for describing the degree of potential interaction between nodes in a network. Cultural-historical factors (but also economic-structural ones) create affinity between city-regions based on common denominators. Leading European city-regions like London and Paris act as main nodes of global city networks for city-regions in their former colonies, and both language and other cultural ties but also economic ties form the links of the networks.

The fifth and last group consists of geographical and biological factors. Physical distance and geographical obstacles have throughout history created interaction costs, but changes in the other groups of factors of [Table 1](#) have over time reduced the costs induced by geography and distance. Still these factors play a major role for the forming of city-regions and their internal and external networks. Distance, in the form of direct and indirect (time) travel costs constitute the basic obstacle for city-regions' spatial extension and for densification within existing functional regions. Distance also contributes to the shaping of city-regions' external networks. It is not a coincidence that the number of world city regions is limited to just a few, while most city-regions have their main connections with other city-regions within their own continent or even sub-continent (see [Taylor and Derudder 2016](#)).

The analysis in this section was based on an economic perspective in which interaction costs and reductions in them were considered the driving forces for the post-urban development. A tentative conclusion of the exposition is that it is changes in the most rapidly changeable factors, those in technology and logistics that are the basic drivers of change. The more to the right in [Table 1](#) we get, the slower, or less frequent, are the changes. However, when changes in the more sluggish factors occur, these changes might lead to fundamental changes of both the play list and the rules of the game.

As shown in the analysis above, the emergence of a post-urban world is influenced by factors in all the five groups. At the same time, the post-urban conditions are in themselves active, self-reinforcing factors, mainly belonging to the economic-structural and cultural-historical groups. That is, when the post-urban conditions are constituted, they will act as self-fortifying factors.

5. An agenda for further research

By combining theories and approaches, the post-urban world hypothesis forms a new theoretical framework for social, economic and spatial research on the impact of technological development. This means that even if there are a large number of issues for further research within each of the approaches, there are also issues that span across several of the components of the hypothesis. By outlining the proposed agenda in three broad fields – within city-regions, between city-regions, and between city-regions and the peripheries – the potential connections within these research fields are indicated.

5.1. Research on processes and changes within city-regions

Several of the already mentioned expressions of the post-urban situation are obvious study areas of processes within city-regions. The current processes of on the one hand densification of city-regions and on the other hand, region enlargements are such areas of study, which both

deals with changes in the urban form. Land use, its patterns and its driving forces, as well as urban form in general, public space and livability of city-regions, are other related topics within this category. Also, urban agriculture and other forms of use of non-built-up land are topics under the land use study umbrella. The livability issues are strongly connected to the spatial, social and economic gaps within city-regions and their driving forces and counteracting forces. From an economic point of view, several study areas fall under the internal conditions of city-regions. Some examples are clusters of growing industries, local growth policy, the spatial distribution and redistribution of human capital and other resources in the city-region, the knowledge intensities of various industries and services and their spatial variations and changes, and the type of functions that companies have located to the city-region (headquarters, R&D and design centers, marketing, administration, customer support and manufacturing), in line with the pioneering work of Taylor (2004).

Taken separately, there is in various degree already research going on about all the above mentioned topics. However, to discern their possible connections with each other, the post-urban hypothesis provides a framework for not only analyzing individual phenomena, but also their relatedness to each other. One important example is how to plan and form policies for (sustainable) growth clusters (which *ceteris paribus* increases socio-spatial inequalities in the city-region) and simultaneously induce measures in the rest of the region to spread the growth and reduce the socio-spatial inequalities. Another planning and policy related issue is so called place-making, which in the post-urban perspective inevitably becomes an issue of “region-making” for well-functioning, sustainable regions.

Often, the study of processes and changes within city-regions is restricted by the lack of data. However, a few, northwest European countries have extensive, geocoded micro databases over individuals and companies that make detailed analyses possible. Research in other countries is most often dependent on own data collection and focused on case studies.

5.2. Research on networks and interaction between city-regions

While there is a plethora of statistics on trade, financial transactions, migration and other forms of exchange between countries, corresponding figures for exchange between city-regions are largely missing, in particular when it comes to international interchange. Thus, the study of interaction between city-regions is so far mainly limited to studies of a few cases of regions or activities.

In principle, interaction between city-regions can be studied by the infrastructural links between them, these links' capacity, and by the contents and frequency of flows between the city-regions. Moreover, the impact of factors that generate or reduce interaction cost (see Section 4), on the networks and their flows, is another broad topic for research in this field, not least in the current wave of economic and political nationalism.

Another subject in this study area, with roots in both central place theory (Christaller 1933) and the city network approach (Taylor and Derudder 2016) is the hierarchies in the relations between the city-regions. Depending on their population size, economy, and economic and administrative functions, city-regions can be hierarchically ordered, and their hierarchical positions can be compared with their networks, their capacity, reach and flows.

5.3. Research on the relations between city-regions and the peripheries

The peripheries, defined as areas located outside the positive growth influences of the city-regions, produces raw materials and energy, without which city-regions would not function, even if increased incomes and negative income elasticities have decreased the relative importance of raw material based products compared with a large group of service products. Thus, the role of the current peripheries has not changed very

much the last 100 years. However, city-regions' current use of the peripheries differs in a fundamental way from the situation a decade ago. The production of raw materials and energy 100 years ago was labor intensive, whereas it today is capital intensive and hardly needs any labor. 100 years ago, urban demand promoted employment and local development in the peripheries. Today, city-regions' access to the peripheries' raw materials and energy forms the basis for the city-regions' sustainability, while the exploitation of the peripheries' resources makes them even less attractive and sustainable (Brenner and Katsikis 2023).

Even if the main trend is that city-regions are growing and representing a larger and larger share of the world economy, while their interactions with the peripheries are declining in a relative sense, this does not mean that all peripheries are doomed to become remote controlled spots for natural resource exploitation. First, there is a large lack of statistics to illuminate these processes in detail and observe possible exceptions to the general pattern for the raw materials and energy producing peripheries. Second, certain peripheral regions, whose economies are based on place-bound resources, grow and thrive. The majority of these regions have tourism as their main activity. Expressed in other words, by exploiting another type of natural resources (beaches, seas, lakes and rivers, forests, mountains and views) these regions are able to absorb urban demand to such an extent that they can survive and develop.

The place-bound resources that successful peripheral tourist resorts base their growth on are a form of amenities. A hypothesis is that one of the few potentials that peripheral areas have to attract urban demand that makes the peripheries grow, is to exploit their place-bound amenities, and by investments and innovations reshape them and make them accessible for the customers. How do successful peripheries get access to know-how and financial resources? How do they build a supporting social capital? Which agents act as leaders in the social networks and what are their strategies? How to avoid overexploitation of the amenities? These are a few questions on an understudied field where much more research can be done in order to create new knowledge on peripheries' possibilities.

6. Concluding remarks

This paper has analyzed the theoretical roots for the hypothesis on a post-urban world. Based on an interaction cost perspective, the driving forces of the post-urban development have been analyzed as well. The proposed research agenda shows a large number of potential study areas that falls under the post-urban umbrella, but also that the lack of statistics is a big problem.

The post-urban hypothesis is a general hypothesis that covers a broad range of issues in the current spatial development of the world. The mere emergence of the hypothesis indicates changes in the spatial order that policy must consider and adapt to. From a policy perspective, an important implication of the hypothesis is that single issues cannot be treated isolated from each other. Social gaps and segregation cannot be solved by separate actions, but need coordinated measures. Growth and development of the rural peripheries cannot be achieved by subsidies to a single, shrinking industry (agriculture), but need coordinated development of new industries.

A general hypothesis as the post-urban one suffers from simplifications and generalizations. There are always exceptions to general trends, as e.g. the successful development of certain peripheral places, but these exceptions are not necessarily contradicting the hypothesis. In the case of successful peripheries, their growth is still dependent on the city-regions' demand. A methodological objection to the hypothesis could be that it might seem to be an eclectic combination of scattered schools of thoughts and theories. However, a counterargument to this might be that these theories and ideas have not been able to combine to a synthesis before, but that the emergence of the knowledge economy and its spatial consequences now have made this new combination of knowledge, theories and approaches possible.

The post-urban hypothesis contributes to explaining the current spatial world development. From a macro perspective, it may seem very deterministic and leave little room for alternatives. At the micro level, individuals take decisions and actions “as usual”, not always reflecting over the invisible structures that influence them. However, as pointed out in the introduction, there are currently strong reactions against the global trends of which the post-urban development is a part. The post-urban world generates not only gains but also problems, and strong forces preach nationalism to be the solution. There is also another global issue, whose solution tends to question several aspects of the post-urban development, viz. the global warming and climate crisis.

Although very different in their nature and visions, both the nationalist and the environmental movements have emerged as reactions against consequences of the free, global market. Both movements demand stronger policies and actions against undesired development tendencies. As discussed above, global and national institutions and policies have over time adapted to, and during periods supported, the post-urban development but there have also been periods of reaction. It cannot be excluded that nationalism and/or environmental concerns will result in political measures that reduces various kinds of exchange and movements, as e.g. international trade and transportation between city-regions. On the other hand, other features of the post-urban world, like the growth of diverse metropolitan, multi-nuclear regions, in which ‘everything’ is produced and consumed, might even be strengthened by such political measures. Thus, even if certain traits of the post-urban development – like the international city-networks – might be hampered by political decisions, most features of the post-urban development probably will continue to grow.

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

Hans Westlund: Writing – review & editing, Writing – original draft, Visualization, Project administration, Investigation, Formal analysis, Conceptualization. **Kamila Borseková:** Writing – review & editing, Visualization, Validation, Conceptualization.

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