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MISTA
Metropolitan Industrial Spatial Strategies & Economic Sprawl

Targeted Analysis

Interim Report

Interim Report

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Abbreviations

AA	Agglomeration Areas
ARDECO	Annual Regional Database of the European Commission
COVID-19	Coronavirus disease 2019
DG REGIO	Directorate General for Regional and Urban Policy
EC	European Commission
ELFS	European Labour Force Survey
ESPON	European Territorial Observatory Network
ESPON EGTC	ESPON European Grouping of Territorial Cooperation
EU	European Union
EU 15	European Union countries that were member states prior to 2004 (incl. UK)
EU 13	European Union countries that joined after 2004
FDI	Foreign Direct Investment
FUA	Functional Urban Area
GDP	Gross Domestic Product
GVA	Gross Value Added
HR	Human Resources
IAB	Institut für Arbeitsmarkt- und Berufsforschung, Die Forschungseinrichtung der Deutschen Bundesagentur für Arbeit (Institute for Employment Research) The Research Institute of the German Federal Employment Agency)
ICT	Information and communication technologies
ISTAT	Istituto Nazionale di Statistica (Italian National Institute of Statistics)
JRC/EC	Joint Research Centre of the European Commission
LAU	Local administrative units
KIBS	Knowledge intensive business services
LQ	Location quotient
MISTA	Metropolitan Industrial Spatial Strategies & Economic Sprawl
MR	Metropolitan Regions
NACE	Nomenclature of Economic Activities for Statistics
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
POLIMI	Politecnico di Milano
R&D	Research and Development
SME	Small and medium-sized enterprises
SBS	Structural Business Statistics
SWOT	Strengthens, Weaknesses, Opportunities and Threats
US	United States
WIFO	Austrian Institute of Economic Research
WIOD	World Input Output Database
1st Metros	First-tier metropolitan regions

1 Introduction

This Interim report presents the most recent methodological development and preliminary results of Task 1 and 2 of the MISTA Project. It also presents some preliminary results of Task 3 and provides some first insights in the organisation of T2 (futures workshops) and T4 (inspirational cases).

The report begins with a critical scientific literature review on the relationship between the city and the industry (Chapter 2). It continues with **baseline data analysis of the past and current trends of locational preferences of the productive sector bases of European city regions** based on available EU level data sources (Chapter 3). **The aim is to provide an original contribution** particularly in exploring the economic, social and environmental impacts of these global trends.

This second step of the analysis focused on cities and has resulted in an **interim baseline analysis of three of stakeholder cities and their functional regions regarding spatial trends and the locational preferences of their productive sector bases** (Chapter 4). This involved integrating EU scale data with local databases and was limited by the availability of data at the date of the Interim report. The baseline analysis allowed the MISTA project to structure the in-depth exploration of current spatial trends, technical and production forecasts and future planning and policy conditions, as expected in Task 2, to be co-produced with local stakeholders through the interactive approach presented in Chapter 6 of this Interim Report. These first results can be read against the qualitative analysis of local actors, collected in the months of January and February 2020 in the stakeholder city-regions as part of Task 3 of the Project (see Chapter 5).

The report references all the source files for the maps and figures included in the delivery (in vector format) and is complemented by a **series of Annexes** (see the Index) produced to present in full detail the **Methodology used under T1 (see Annex 2 and 3) and a preliminary collection of synthetic reports of the interviews produced for the Case Studies (Annex 5).** The Report, includes **a database of stakeholders** (Annex 4), an important basis for the organisation of the **Futures Workshops in (Task 2)** and an **Action Plan of Task 2 (Annex 6)** related to timing, location, justification and approach for the focus groups to be held in the selected cities whose date have to be agreed with the Steering Committee and discussed in terms of feasibility under the current exceptional conditions related to COVID 19 pandemic (in the occasion of SC3).

This Interim Report has been written under very special circumstances. The spread of the CoViD-19 pandemic has impacted not only the workflow and organisation of the project, but also in a more fundamental and challenging way regarding the relevance of the results when the socio-economic fallout becomes more apparent.

The Project has experienced some delays regarding data collection due to travel restrictions (particularly for Berlin and Stuttgart). Furthermore, the Steering Committee meeting had to be

held online, in a two days meeting on the 18-19th of March (2020). This has limited the possible discussion and also expected interactions, including the fact that the team was forced to cancel a site-visit and an outreach event designed to generate a first important debate on the project main hypothesis and first results. Finally, the futures workshops (T2) have been postponed, which delays the possible open interaction and co-design with local stakeholders until conditions become clearer. Alternative measures have been proposed in chapter 6.

A more challenging consequence of the COVID-19 pandemic involves the changing context for industrial areas and manufacturing. Much of Europe is experiencing the most challenging economic crisis since the 2nd world war and is throwing the fundamental socio-economic order of the contemporary world into flux. While individual behaviour and rights have been completely redefined since the arrival of the pandemic, a new extraordinary role of public policies has emerged where state-led initiatives have seen unprecedented (but uneven) investment to stimulate an economic recovery. From March to May 2020 it has been very difficult to anticipate the future of both European cities and their productive sectors for the near and longer term. Policymakers and decision makers are now deeply engaged in an unprecedented effort to re-think the future. Under the current state of uncertainty, expert knowledge is required not only to react to deal with pressing challenges but also to produce new ideas and visions about the future.

Based on these considerations, this interim report presents the main results of the baseline analysis of current trends, while cautiously anticipates addressing future scenarios (T2). The team would like to complete the project at hand, but aims to do it based on the lessons gained during these exceptional times. The interconnected and interrelated nature of contemporary global socio-economic systems has shown their vulnerability but also the indispensable role of local production. It has also exposed the consequences of material and immaterial rights: first the right to health, then the right to an income, the right to the city (meant as the right to enjoy urbanity in all its dimensions), the right to the rule of law.

The main results of this interim report show that metropolitan areas across Europe have had their economic base stressed and tested, exposing a possible new relationship between the industry and the city. Based on the literature review and the baseline analysis, this report shows how industrial activities in large metro-regions in EU15 have experienced a serious downward trend, in particular at the expenses of their metropolitan core cities. The reason for this being mainly related to upgrading technology and reorganisation of work. This has resulted in a reduction of employment but due to productivity gains, it has not necessarily meant a reduction in manufacturing output.

In the lead up to the COVID-19 spreading across Europe, it was difficult to expect a reverse in declining trends for industry and manufacturing. Some sectors had grown rapidly in urban regions, including: high-tech industries, logistics and utilities, some divisions in consumer goods production and other less technology intensive sectors (such as hand-crafted, design oriented, high quality production for local high-income demand). In some cases, industry and

manufacturing losses have stabilized. From an economic policy perspective, these empirical results could allow a cautiously optimistic view on the further development of industry in European city regions. Based on accepting this new role for industry in the city, there is a need to innovatively design the use of urban spaces and to manage competing activities with other strategic urban functions. The fallout from the COVID-19 experience may change national attitudes to industry and manufacturing, yet time will tell how this affects cities.

The results of the baseline analysis highlight **the need to adopt new lenses when trying to grasp the nature of contemporary manufacturing**, which are different from the past, that feed city-regions with a series of activities that are not traditionally considered part of the production cycle, but are particularly crucial for the functioning of large urban areas as those that have been analysed (see Inception Report). This brings in the need to consider the specific nature of goods and services of contemporary urban areas, providing space for a new **relationship between the city and the industry**.

Finally, on this note, the interviews with local stakeholders highlight a quite different conditions among the stakeholder cities, both in experiencing and perceiving the changing relationship between production and the city. This confirms the **need for a more complex and articulated definition of the research and policy problem**, being not merely a problem of conflict between different potential land use scenarios, but a more complex policy issue related to the future of manufacturing, with its linkages to urban social perspectives and the structure of the local labour market and the competitiveness of the whole metropolitan area.

2 The city and productive activities: a literature review

2.1 The changing role of industry in highly developed economies

Since the end of the 1970s, the production of physical goods in developed countries has lost considerable importance in terms of output and employment shares. The process of deindustrialisation was even more pronounced in metropolitan areas than at the country level, with empirical evidence mainly focusing on the United States (e.g. Friedhoff et al. 2010, Helper et al. 2012, Davis 2020, Freeman 2018). In the aftermath of the "Great Recession" of the late 2000s, interest in a "new" industrial policy has emerged among scholars (e.g. Aghion 2011, Rodrik 2011, Pisano and Shih 2012) and in the EU (European Commission, 2010, 2012, 2020). The potential of automation and new digital technologies for returning manufacturing to Europe have fuelled the debate further (e.g. Eurofund 2019).[1] Also disruptions in international trade caused by the current COVID-19-crisis are likely to reinforce the ambitions for a solid European, national and regional industrial base and shorter international value chains.

Deindustrialisation trends can be explained by internal (domestic) and external (global) factors. Among internal factors, declining industry shares can be attributed to i) decreasing relative prices due to higher average productivity growth compared to services (e.g. Baumol 1967, Saeger 1997), ii) changes in consumption patterns towards services with rising incomes (e.g. Falvey and Gemmel 1996, Echevarria 1997, Peneder and Streicher 2018), iii) increasing interdependence between and hybrid forms of industry and services, increasing demand for knowledge intensive business services (KIBS) with increasing complexity of productive activities (e.g. Ciriaci and Palma 2016, Di Berardino and Onesti 2020), and iv) outsourcing of former in-house service departments of large industry companies to legally independent service companies (e.g. Tregenna 2009, 2010) “artificially” shifting employment and output from industry to services in economic statistics. Among the external factors (globalisation) put forward are i) the offshoring of production stages and longer value chains in increasingly fragmented production networks leading to a relocation of activities and knowledge transfer towards regions with lower costs of production (e.g. Baldwin and Venables 2010, Baldwin 2011), and ii) emerging export bases outside manufacturing, such as KIBS (urban regions) or tourism (rural regions) (e.g. Palma 2005, 2008).

2.2 City regions and their role in industrial development

The mechanisms explaining deindustrialisation in cities are the same as those in highly developed countries.[2] In fact, cities are particularly exposed to each of the internal and external

[1] See also the ongoing ESPON project “Technological Transformation & Transitioning of Regional Economies at https://www.espon.eu/transregecon

[2] Still, metropolitan regions typically account for the majority of all industry production because of their large absolute numbers in population and employment. In the EU, metropolitan regions still accounted for about 64% of industry gross value added and 55% of industry employment in 2017 according to the results of chapter 3.2.

factors listed above. Large cities typically enjoy agglomeration advantages for tradable services (Fujita and Thisse 2002, Duranton and Puga 2004) rather than for large-scale manufacturing production because of high land and labour costs as well as unfavourable conditions for the transport of bulky physical goods. Therefore, less productive and land-intensive productive activities have been decentralised or offshored from urban to cheaper suburban or peripheral locations. This process leads to activities with higher productivity (growth) remaining in urban centres (Mistry and Byron 2011). This in turn leads to relative productivity-driven declines in industry employment shares in cities and again to an increase in local demand for complementary knowledge intensive business services. Similarly, statistical effects from the outsourcing of highly productive servo-industrial activities (e.g. Headquarter-, R&D- or ICT-functions) of large industry companies to legally independent service companies seems to be particularly relevant for large urban centres and capital cities such as the case study cities covered in the MISTA project. In addition, income levels in urban regions are typically higher (OECD 2018), implying a high local demand for services rather than physical goods.

Still, several arguments justify a more optimistic view of future industry development in cities, making a further decline of the productive base quite unlikely. First, large factories that could do so have already moved away from high value city locations. Those factories that have remained are often the ones that benefit from their specific urban location (Ferm and Jones 2017). Second, changes in preferences among consumers for increased customisation, locally produced varieties and increased sustainability are likely to increase the demand for many traditional producers in consumption goods industries, the traditional trades and in repair services while the disruptive effects of modern ICT (Information Communications Technology) and ICT-infrastructure are likely to have strong effects on the location of economic activities for the mostly high productivity firms using and developing these technologies.

In addition, Modern ICT is also likely to have important indirect effects on industrial location patterns as it continues to facilitate the unbundling of individual parts of the production process in a wide range of industries. According to Baldwin and Evenett (2015), this may lead to a “reshoring” of productive activities to city regions and to job gains in previously non-competitive sectors of cities (and job losses in previously competitive urban sectors). Baldwin and Forslid (2020) refer to recent developments in ICT, big data and artificial intelligence as the phase of “globotics” (globalisation and robotics).[3] This age is characterized by automated and robotic large-scale industry production, vanishing face-to-face communication costs and increased telemigration (foreign-based online service work) allowing a geographic separation of labour and labour services: a robot in Germany can, for instance, be controlled and maintained by a teleworker based in India. The vanishing importance of wages in automated production will lead

[3] Specifically, Baldwin and Forslid (2020) describe three phases of grand economic transformation with respect to the geographic distribution of economic activities: i) the industrial revolution (factories unbundled from consumers), ii) globalisation (production stages unbundled across nations), iii) globotics (geographic separation of labour and labour services).

to a relocation of manufacturing to high-wage countries but will not create many new jobs. At the same time globotics also implies that the decline communication costs over distance may move comparative advantages in many (knowledge intensive) services from European cities to low-wage countries.[4]

Of course, this scenario is highly stylized as it abstracts from a number of important determinants of location choices (such as land prices) as well as general equilibrium effects and also more likely to disproportionately impact on the location of branches with a higher potential for automatization (think of automotive industry vs. hand-crafted bakery). However, it illustrates both chances and limits of technological progress on the industry potential for cities. While globotics facilitates the (re-)location of production back to metropolitan areas, the limited availability of land as a production factor as well as the higher transportation costs of bulky physical goods will continue to disadvantage large-scale production in cities. However, if understood as functional urban areas in which the core cities are economically integrated with their hinterland, metropolitan regions have and will even more so continue to be a fertile ground also for large-scale production in higher-technology industries that benefit from proximity to urban agglomerations.

2.3 Main trends in productive activities of city regions

On the one hand, because of agglomeration advantages (i.e. cost savings arising from the co-location of related industries arising from large and specialised labour markets, skill-abundance, easy access to (tacit) knowledge, large local markets and low transport costs) large cities are typically specialised in skill-intensive productive activities (Davis and Dingle 2020) with dispositive functions in the value chain, such as R&D, innovation and design. On the other hand, specifically "urban" (customised and small-scale) manufacturing activities at the end of the value chain (e.g. in the production of furniture or the garments industry) have experienced substantial growth in cities, such as hand-crafted consumer products because of high local “urban” demand for high-quality, sustainable and regionally produced design-oriented products (Brandt et al. 2017). Accordingly, for Spanish cities Jofre-Monseny et al. (2014) illustrate that industries with the highest benefits from urban agglomeration are mainly knowledge intensive or creative industries.

Hernández-Murillo and Marifian (2013) as well as Burggräf et al. (2019) argue that the large pool of highly educated workers, universities and science parks localised in cities are becoming increasingly incorporated into business strategies of manufacturing firms. This is particularly relevant for firms benefiting through knowledge spillovers from R&D activities of other companies and public-sector research in close spatial proximity (Belitz and Schiersch 2018). Physically close, collaborative relationships are of general importance for innovative manufacturers (particularly for SMEs). This was less important when firms were vertically

[4] Baldwin and Forslid (2020) conclude that high-wage regions may become “sheltered service societies” with jobs mostly remaining in (non-tradable) services that are sheltered from international competition.

integrated (i.e. their supply chain was mostly provided within the firm). To become more competitive in today's fragmented value chains, manufacturers choose locations that best support early stages of production (Schmidt, 2014). As highlighted by Mistry and Byron (2011) and Belitz and Schiersch (2018), such knowledge spillovers in urban collaborative networks make manufacturers in urban areas more productive than those in less dense areas. Also, the closeness to KIBS and firms in similar or related industries are crucial locational advantages of urban regions (e.g. Daniels and Bryson 2002, Helper et al. 2012).

The concept of proximity can also be viewed in terms of closeness to markets. Transport connections have always been key for manufacturing. Cohen (2000, for Chicago) and Friedhoff et al. (2010, for other US metros) found that for high-tech companies the (higher) cost of a "brownfield" renovation in a depressed inner-city location was often more than offset by the proximity to good amenities and convenient transportation. By studying ten cities across the globe, van Winden et al. (2011) finds that executives stressed the growing importance of international air and train connections for their businesses. An increasingly important factor in manufacturers' urban site selection choice is the speed of delivery to customers (Hatuka et al. 2017). Moreover, proximity to final consumption and/or good access to supply chain networks is crucially important for the integration of production and design (customization) and of "just in time" production, allowing firms to serve urban niche markets (Marsh 2012, Ferm and Jones 2017).

As Helper et al. (2012) illustrated for the United States, metropolitan manufacturing plants were already relatively small in the past. Future primary costs for small-scale manufacturer's will be machine tools (e.g. 3D printers or robots) rather than labour or land. These tools will increase opportunities for producing prototypes by only using computers and 3D printers and enable quiet and space-efficient manufacturing without burdening the environment (Erbstösser 2016). This will further empower small to medium-sized firms or even individual entrepreneurs in urban agglomerations (Hatuka et al. 2017).

Gornig and Werwatz (2018) investigate the location patterns of start-ups in Germany, concluding that more industrial start-ups were created in cities than in other regions between 2012 and 2016. They found that urban agglomerations with relatively low property prices and well-developed research infrastructure, such as Berlin, Leipzig or Dresden, attract more start-ups in high-tech industries. Their results again suggest that proximity to research institutions as well as to customers makes cities attractive start-up locations. Also, for Germany Audretsch et al. (2011) found that, distinguishing three types of cities according to their functional specialization, cities with integrated smaller industrial firms are more conducive for manufacturing entrepreneurial activities than cities dominated by large stand-alone production plants in one sector or by headquarters and service firms.

2.4 Economic, social and environmental effects of the changing relationship between cities and productive activities

Deindustrialisation led to declining job security and increased poverty rates and intra-city income inequality (e.g. Doussard et al. 2009, Clark et al. 2019). Friedhoff et al. (2010) found empirical evidence that, among the 114 deindustrializing metropolitan areas in the US, the economies which were more economically (sectorally) diversified at the outset of deindustrialisation experienced faster wage growth than the less diverse economies. Ostry et al. (2001) focused on the long-term consequences of deindustrialisation on Canadian workers, finding that workers who are not re-employed or re-employable over the long term were at higher risk for ill health. Recently, Lee and Rodriguez-Pose (2020) illustrate that particularly entrepreneurship in tradeable (but not in non-tradable) activities reduces poverty and increases incomes of non-entrepreneurs in US cities.

Hutton (2009) identified the following impacts of emerging re-industrialisation trends following recent technological innovations and the rise of new business models (e.g. the "servitisation" of manufacturing) on inner city districts: i) economic impacts, such as new investment, business start-ups and entrepreneurship, employment training and relations (complementary, competitive or conflictual) with traditional or established industries; ii) social impacts, such as new occupational opportunities and income benefits, reformation of social class, displacement tendencies and the re-imaging of local areas; iii) environmental impacts, such as adaptive re-use of heritage buildings, the redevelopment of heritage urban landscapes, stimulus for innovation in urban design and the reconfiguration of the built environment, creating a positive re-imaging of areas previously abandoned.

Hill et al. (2020) identified four key areas for urban manufacturing that need the city and vice versa. Firstly, urban manufacturing supports a thriving economy in terms of providing a vital service for the local economy, helping replace imports, develop tradable goods and helping cities to adapt to the future. Secondly, it helps stimulate innovation by producing solutions to urban problems which involve design, capital and local production capabilities. Thirdly, manufacturing can help cities address climate change and environmental impacts by helping achieve the most efficient use of available resources. Finally, it helps provide economic and social inclusion through offering alternative types of work to predominant service-related jobs and provides jobs that are easily accessible.

Freeman et al. (2017) explore the role of the so-called "re-distributed manufacturing" (i.e. manufacturing done at a small-scale, often using new production technologies). The potential benefits of this manufacturing type include i) an improvement in cities' productivity; ii) the use of new materials, or existing materials used in a new way; iii) the reduction of the region's dependence on the global supply networks; iv) the improvements in the economic sustainability of a region through increased diversity of economic activity. Kostakis et al. (2016) refer to the "design global, manufacture local" model, also known as 'glocalism'. Hatuka et al. (2017) found that bringing manufacturing back to the city core offers a chance "to locate living-wage jobs

where people live". This may also have environmental benefits by reducing traffic emissions through shortening commutes and delivery distances (Westkämper 2014). In addition, it raises the potential for the formation of local value chains and higher resource efficiency (Schonlau et al. 2019). Similarly, Ciaramella and Celani (2019) discuss the reuse of spaces for technology-driven industry in modern cities and increasing opportunities to intensify production through vertical production, since many modern production systems are space-saving and have low emissions.

2.5 How cities are accommodating new forms of production

Cities that are undergoing growth are likely to experience development pressure on land that is either currently zoned industrial or functions as mixed-use areas. Few cities have the capacity to intervene against market forces or are capable of considering the impact of land use changes on the long-term economy. Those cities that have considered manufacturing and productive activities as essential to the local economy have shown three approaches for managing change.

First, some cities have selected stronger zoning on specific areas. These have been given a range of titles such as 'opportunity zones' across the US, 'Planned Manufacturing Districts' in Chicago, 'zones for economic mixed use' in Brussels and more generally as 'innovation districts' (Katz and Wagner 2014). These zones may get additional public investment, branding or support and therefore attract a cluster of public and private activities. Sites may be focused on a particular kind of theme or topic which help them cluster business or improve branding (Tajdar 2019).

For cities struggling with pressure to provide affordable housing (or housing in general) and additional social services, industrial land is often the 'least-worst' site for development considering possible political consequences. This gives public authorities two obvious pathways in order to prevent the relocation of industries from the core city to other regions. The first is industrial intensification, whereby industrial land is so expensive that multi-story buildings become viable. Industrial intensification could include a mix of business types (such as heavier manufacturing on the ground floors and lighter functions on the upper floors) or it could be a mix of activity types (such as a mix of manufacturing and logistics). The second option is referred to as industrial co-location, whereby a traditionally industrial activity co-habits the same building or block as other non-industrial activities (such as housing, social services such as a school or commercial activities). Both options are being explored in a number of cities notably New York, Vienna, Brussels and London (see Rappaport (2015), Haselsteiner et al 2019, Department of City Planning 2018, We Made That 2018, Muir & Kerimol 2017).

While traditional manufacturing could be accommodated in both industrial intensification and co-location projects in practice there are few built contemporary examples due to modern norms, development costs and assumed real estate values. Furthermore, private developers will aim to avoid the mix.

2.6 Policy implications from the existing literature: emerging challenges

Retaining and attracting manufacturing and productive activities helps the city to be more economically diverse and therefore more economically and socially resilient. Due to the proximity to demand and requirements for space-efficient production, retaining industry in cities is also fundamental to promoting environmental sustainability (Ferm & Jones, 2017). In particular high-wage industries matter for metropolitan wages as a whole. Therefore, retaining such industries should be part of a strategy of local policy makers to maintain high wages in general. To promote growth of these industries it is key to identify activities that have remained and/or are growing in a specific city and to understand the nature of these activities and why they were successful (Friedhoff et al. 2010, Ferm & Jones, 2017). Industrial policy is therefore a search process in unknown territory, which should be open to new solutions, experiments, and learning. Policy makers are unlikely to have the necessary information to identify those (potentially new or still very small) sectors that have a specific advantage in their city. Therefore, organizing and engaging in an intensive dialog with businesses as well as other interest groups with the aim of screening information, is an important policy task for urban industrial policy (Aiginger and Rodrik, 2020). The results of this dialog a will be city-specific, targeted approaches rather than a one-size-fits-all approach

Furthermore, higher-tech manufacturing and advanced services have a complex and interdependent relationship. Thus, policymakers rather than engaging in “choosing the winner” type policies that favour one sector over the others should not ignore or try to repel one of these two sectors even if their development strategy favours the other (Friedhoff et al. 2010). Rather, structural policy must consider the strategic importance of the organization of the economy as a whole (Di Berardino and Onesti 2020).

Some of the major causes for deindustrialisation in highly developed economies lie outside the reach of meaningful policy interventions (Peneder and Streicher 2018). These include decline in the domestic final expenditures on (local) manufacturing value added and the higher growth of productivity in manufacturing. Thus, policy makers should rather focus on factors that are fundamental to the economic health of the area as a whole and on promoting its general competitiveness. This will imply organising regional development plans along large topical themes, that provide ample room for new or potentially still small but growing economic activities as well as a strong focus on cross-cutting policy topics such as workforce skills, infrastructure, excellence in advanced schools, tertiary education and R&D, an innovation system fostering radical innovations and the like, as a sound economic ecosystem is more relevant for growth in the long-run than sectoral composition (Friedhoff 2010, Aiginger and Rodrik 2020). This becomes even more relevant in the future, with employment in productive activities moving towards more small-scaled production and entrepreneurial or even single-person companies, with less stable jobs compared to larger-scale factories. As highlighted by Baldwin and Forslid (2020: 35), it is necessary to stop thinking factories, but to “start thinking cities, people and training, … [and cities as] productive platforms”.

Finally, from an urban planning perspective, identifying and developing sites that are appropriate for manufacturers at various stages (e.g. the prototyping stage, the start-up stage, the scale-up stage, the small and medium-sized enterprise stage) based on regional strategic objectives could encourage the return of industry to the city. However, first cities should update their regulatory regimes, which currently encourage the conversion of industrial land into other uses (Hatuka et al. 2017). From a planning perspective, models of mixed use of urban spaces compete with issues such as affordable housing and new housing construction (Schonlau et al. 2019): As urban neighbourhoods gentrify, manufacturers are faced with displacement because their space has become attractive to higher-paying businesses or developers seeking to convert industrial spaces into residences (Curran 2007, Kunk et al. 2014).

2.7 Main takeaways

1. **Interlinkages between industry and services are increasing.** In general, de-industrialisation is a process that affects all developed economies, albeit to varying degrees. While the literature mentions a variety of driving factors, there is a broad consensus that decreasing industry shares are mainly the result of weaker? productivity growth compared to services, increasing importance of services in consumption, and globalisation (trade and outsourcing). However, the 21st century is showing that services and production are becoming increasingly interlinked.
2. **Incompatible industrial activities have (largely) left European cities.** The mechanisms for deindustrialisation in cities are basically the same as at the global level. However, cities are particularly affected by high land and labour costs. Furthermore, the burden for relocation at the regional level (from the city to the periphery) is lower than at the national level (from a highly developed to a developing economy). Accordingly, employment-, land- or emission-intensive production companies have largely moved away from the big cities. In this way, a close functional relationship has developed between large cities and their surrounding regions.
3. **A future for creative, knowledge intensive and customised production.** In general, knowledge-intensive tasks (such as headquarters, R&D, design), creative industries and consumer-oriented (customised, high quality, hand-crafted) small-scaled production have remained or are even growing in cities. So do industries with local supply functions. In addition, there are also historical qualities of particular industries growing in specific cities.
4. **Strengthening links between industry and cities offers socio-economic opportunities.** Technological developments are changing the spatial distribution of locational advantages (due to a decreasing role of labour costs and an increasing role of web-based production such as 3D printing, both resulting in a growing importance of geographical proximity to demand). In addition, consumer preferences and consumption habits are changing (with a trend towards individualised, local products, and an increasing importance of environmental aspects). Both trends may be permanently reinforced by the current COVID-19-crisis.
5. **Urban manufacturing offers choice and responsive production.** The above may contribute to a certain re-industrialisation of cities. Such developments have economic (new investment opportunities, increasing numbers in industry start-ups and entrepreneurship, training and relations with established industries), social (new occupational opportunities and income benefits in disadvantaged neighbourhoods) and environmental (adaptive re-use of heritage buildings, reconstruction of heritage urban

landscapes, stimulus to innovation in urban design and reconfiguration of the built environment, creating a positive re-imaging of areas previously abandoned) impacts.

6. **Cities need clear tools for managing productive activities.** In the past industrial land operated with relative independence of public planning regimes and was driven by standard market dynamics, only requiring support for the development of new infrastructure. Therefore, now that productive activities have become the 'weaker' activity (compared with housing, recreation, offices and commercial activities), public authorities have relatively little contemporary experience with how to manage or support productive activities. Some cities have released development strategies to encourage densification. Others have supported financing for education or incentives for businesses to address certain urban issues (such as the circular economy and resource management).
7. **Productive activities should grow from historical processes.** To promote productive activities in cities in the long-run, it is essential to understand the nature of the activities that have remained in a specific city and why they have done so. Also promoting an economically healthy environment for the total local economy as a whole that fosters innovation and entrepreneurial activities is conducive to productive activities in the long-run. This requires city-specific solutions based on intensive dialog between policy makers, businesses, economists and urban planners, and a change in perspective from factories, capital equipment and technology towards a people-based view of cities as productive platforms.

3 Baseline empirical analysis of major trends in European city regions

3.1 Central analytical concepts: What is a city region? And what data are available?

As already explained in more detail in the inception report of the MISTA project, a comparative analysis of urban trends in Europe cannot build on cities in a purely administrative logic: Urban regions (whether defined by settlement or interdependence parameters) usually cross political-administrative boundaries or sometimes fall short of them. Since this is the case to a very different extent from city to city, comparisons based on the usual regional nomenclature can be massively distorted.

Table 3.1: Definition of city regions in this report

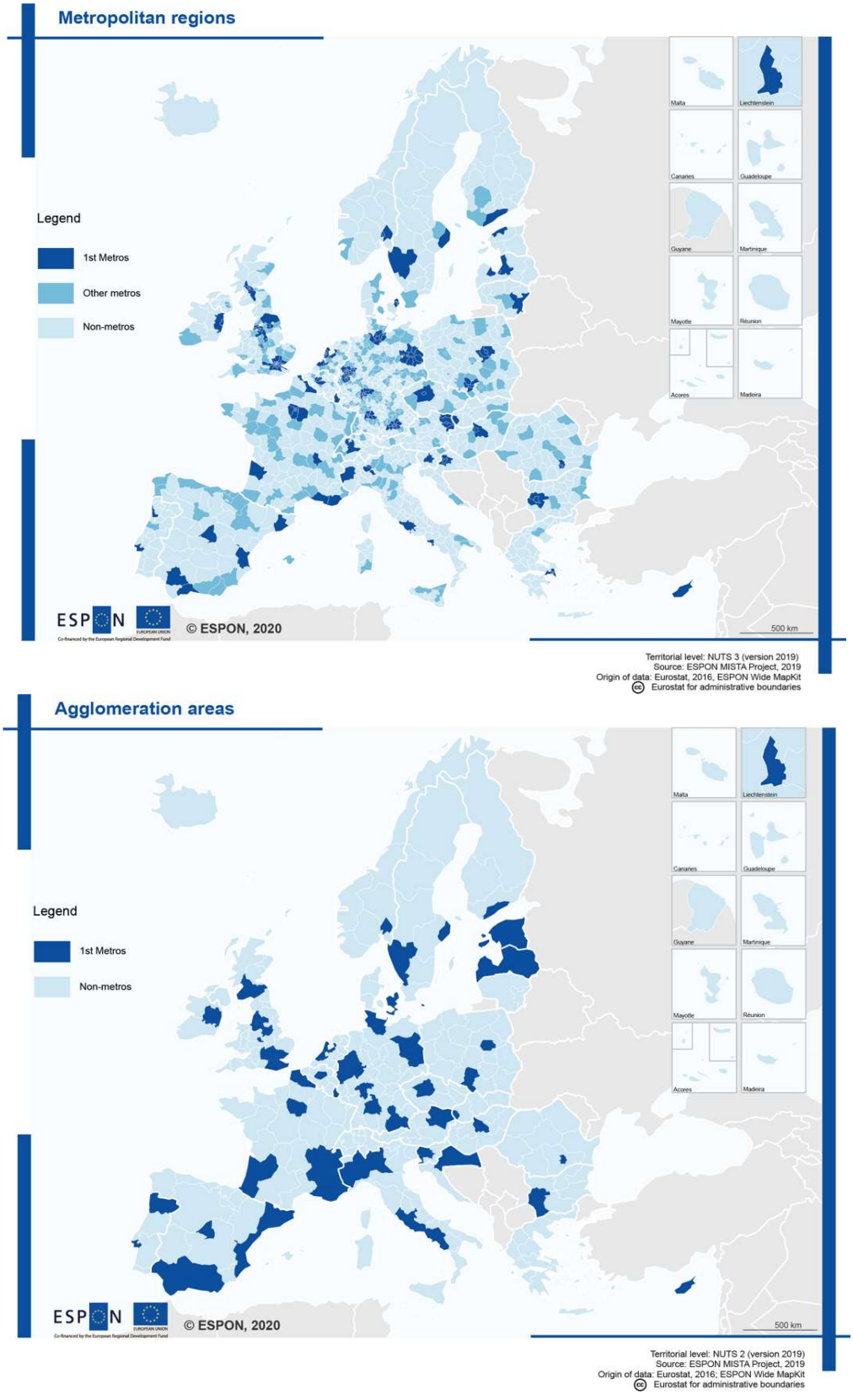
Delineation used	Defining criterion	Source	Use in this report
Functional Urban Areas (FUA)	City and its surrounding travel-to-work-area (commuting zone), defined at the grid-cell and/or LAU level	Guidelines from Eurostat (2019: 49-60), implementation by stakeholder cities	Detailed analyses for the stakeholder cities (Case studies); Ch.4
Metropolitan Regions (MR)	One or more NUTS 3 regions with at least 50% of their population living inside a FUA; at least 250.000 inhabitants; Approximation of FUA at the NUTS 3 level	Eurostat (2019: 83-88)[5]	Comparative analyses of general long-term trends in industry in all European MRs and MR sub-groups; Ch. 3.2.2
Agglomeration Areas (AA)	NUTS-2 region(s) that constitute (or include) the Metropolitan Region of interest; Approximation of MR at the NUTS 2 level	Own definition; see annex table A.3.1 for NUTS2 correspondence	Analyses of disaggregated industry specific developments; Ch. 3.2.3

Source: WIFO illustration.

Furthermore, the search for a meaningful delineation of the Metropolitan Areas must take into account that our work aims to compare the 7 urban Areas involved in the study (Berlin, Oslo, Riga, Stuttgart, Torino, Vienna, Warsaw) with each other, but also with (all) other comparable urban areas in the European Union. Thus, as discussed in the inception report in the following, an urban area is classified as "comparable" if it is either a capital city and/or a city region with more than 1.5 million inhabitants in the agglomeration area. This thus ensures that these urban areas compared to the case study cities of the MISTA project - despite (as will be shown below) still differing in terms of sectoral specialisation and growth trends - are broadly similar in terms of population size and role in the urban hierarchy to the case study cities.

[5] See http://ec_europa.eu/eurostat/cache/metadata/en/reg_typ_esms.htm for methodological details and https://ec.europa.eu/eurostat/web/metropolitan-regions/background for NUTS3 correspondence.

Map 3.1: Metropolitan Regions and Agglomeration Areas in the EU and Norway



Due to data limitations at the small-scale level[6], we must rely, however, on three different delineations, based on considerations relating to the size of functional urban areas[7], to approximate the city region, depending on the research question and thus data requirements (see Table 3.1). In particular the FUA delimitation places great demands on data availability. It is not available for all regions by far and can thus only be approximated in the in-depths analysis of individual stakeholder-cities (see chapter 4). The comparative analyses of general long-term developments of industry in a broader sense (i.e. NACE B-E) can be implemented at the NUTS 3 level (MR definition). The detailed industry specific analysis of all productive activities must be carried out at the NUTS 2 level (AA definition). The regional manifestations of the MR and AA level are illustrated in map 3.1.

The MR level analysis (chapter 3.2.2) is based on harmonised NUTS 3 time series data on essential economic accounts indicators (incl. employment and GVA) measured at the establishment level from the new **A**nnual **R**egional **D**atabase of the **E**uropean **Co**mmission's DG Regio (ARDECO), released by the Joint Research Centre of the European Commission (JRC/EC) in February 2020. We combined this dataset with Eurostat's typology on (functional) metropolitan regions with more than 250.000 inhabitants (Eurostat, 2019: 83-88) in order to construct data on the (289) metro regions in the EU and Norway, covering the longest period possible with complete data, i.e. 1995-2017. The resulting project dataset allows to distinguish different metro region types, including (58) "first-tier" metropolitan regions (1st metro regions) as a suitable benchmark for the project's (7) stakeholder city regions[8]), as well as a rough distinction into 6 economic sectors, including industry (NACE sectors B-E).

For the detailed industry specific analyses NUTS 2 level data from Eurostat's Structural Business Statistics (SBS) on (40 of a total of 68) NACE-2-digit industries and WIFO's Regional

[6] An "ideal" dataset should relate to functional metropolitan regions and provide large regional and sectoral detail to allow for analyses of trends within metropolitan regions and at a disaggregated industry level. In addition, it should be comparable across EU countries and offer long time series to adequately reflect structural change. In practice, however, considerable trade-offs exist between regional and sectoral granularity, and between these and international comparability as well as the lengths of time series. These trade-offs require certain flexibility in the delineation of city regions.

[7] While both the Metropolitan Regions as well as the Agglomeration Areas typically exceed EUROSTATs Functional Urban Area definition, in terms of the territory covered both region types relate to the Functional Area (FA) principle insofar as they are characterized by interdependencies or links within territories. They are also highly suitable for our analysis as interdependencies in production through e.g. input-output linkages, and supplier networks as well as knowledge spillovers typically exceed the geographic extent of commuting flows that are used or the definition of FUAs.

[8] In our definition, the (58) 1st metro regions include all capital cities and all other metro regions with more than 1.5 million inhabitants in the conurbation. The other typologies used differentiate the (289) metro regions by size (population terciles; large – medium – small), income level (terciles in GDP per head; high – medium – low), their position in the city hierarchy (Dijkstra and Poelman, 2011; capital cities – 2nd tier metro regions – smaller metro regions) and their affiliation to the old or new member states. (EU15 – EU13). All indicators are weighted averages of the metropolitan regions in the respective metro type. See annex table A.3.2 on the assignment of all (289) metro regions to the metro region types distinguished.

Structural Database at the NACE-3-digit level[9] are available for the 58 first tier metro regions at the AA level for the time period 2010 to 2016.

3.2 Development of "productive activities" in city regions: general trends of industry (since 1995) and sector specific developments (since 2008)

3.2.1 Main research questions and methodology used

The research questions in the following empirical parts of this chapter are guided by the results of the literature survey in chapter 2.

The first set of questions concerns long-term evolutions of industry in European city regions in an MR definition (Ch. 3.2.2). We conduct an empirical analysis to ask: a) to what extent a (stronger) deindustrialisation trend in metropolitan regions is evident according to various indicators, b) whether such a trend is broadly uniform among (different types of) European metropolitan regions, and c) whether there are significant discrepancies in developments in industry between metropolitan core regions and their wider environment. Further, we add to the literature on the determinants of industrial development in cities (surveyed in chapter 2) by d) identifying its drivers empirically with a newly developed decomposition approach, and e) looking for potential indications of an end to the secular deindustrialisation trend.

The second set of questions concerns specific developments in productive activities in city regions in an AA definition (Ch.3.2.3) The central research questions to be addressed are: f) on which productive activities city regions are specialised in terms of employment with respect to other European regions, g) which productive activities have grown above/below average in city regions relative to other regions. In addition, we h) investigate differences between different types of city regions with respect to specialisation and growth patterns.

3.2.2 Main results on general trends in European metropolitan regions

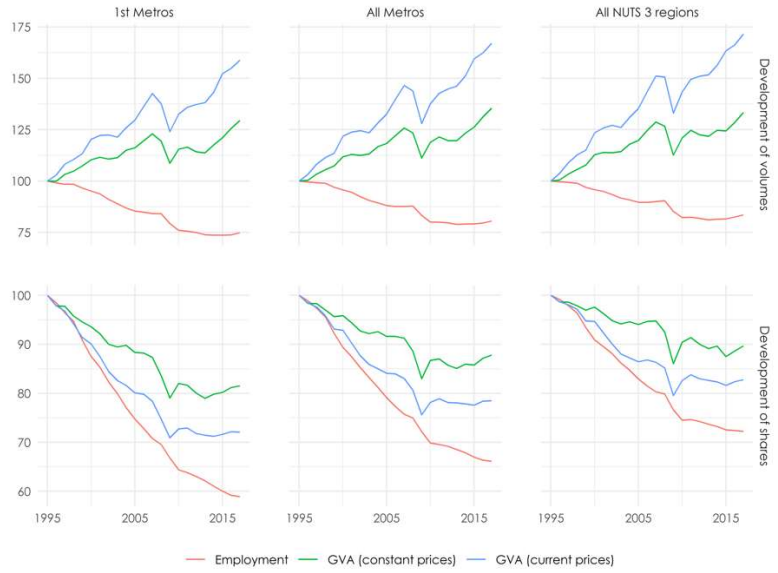
The analysis provides a wide range of results on general trends in industry (NACE sectors B-E) in European metro regions[10]. These sectors account for 10.4% of the employment in the average city region (relative to 15.3% in the EU average) and 14.2% of the value added produced in city regions, with both of these indicators, however, not taking into account the important and sizeable forward and backward linkages caused by these sectors. The key findings, summarized in this chapter, start with Figure 3.1. This shows the development of industry in the (58) first-tier metropolitan regions (1st metro regions), all (289) metropolitan regions and all (1348) EU (NUTS3-) regions since the mid-1990s in index form (1995 = 100), using different indicators. From this Figure, first, a clear longer-term deindustrialisation trend is evident for employment but not for output, irrespective of the regional level observed: while

[9] This data was estimated by the Austrian Institute of Economic Research (WIFO) based on SBS and geocoded Amadeus firm-level data provided by Bureau van Dijk. A previous version of this was used in earlier EU-projects (e.g. Unterlass et al., 2015)

[10] These findings will be published in detail in the background report.

industry employment decreased since 1995 in terms of both volumes (upper panel) and shares (lower panel), gross value added (GVA) has risen significantly in volume but decreased in terms of shares. Further, this relative decline is stronger in nominal (based on current prices) than in real terms (based on 2015 prices). This indicates that part of the nominal decline in shares is due to lower price increases for industrial goods than for services, which implicitly also points to higher productivity gains in industry than in other sectors.

Figure 3.1: Development of Industry in European (metro) regions due to different performance indicators; 1995-2017; Index 1995 = 100



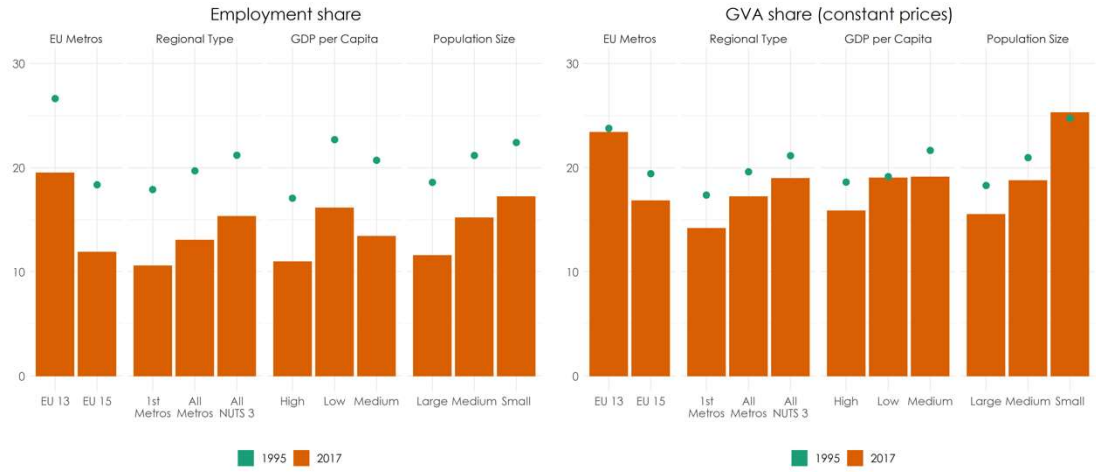
Source: ARDECO (JRC/EC); MISTA team calculations.

Second, the basic patterns of development in industry are similar between metropolitan regions and all EU regions. However, irrespective of the indicator used, industry developments in the 1st metro regions are somewhat weaker than in all metro regions, and the latter in turn show a less favourable development in industry than all EU regions. This confirms the importance of specific locational disadvantages for some (land and wage cost sensitive) industries in conurbations and generally a greater exposure of cities to the drivers of deindustrialisation already stressed in the literature survey.

Third, these findings also support the literature in its expectation of an end to deindustrialisation in urban areas. In fact, the downward trend of industry in all regional types considered has flattened out over the observation period in both GVA shares and employment (level) and has been largely stable since the mid-2000s (except for the years of the great recession 2008-2010). However, the industry share in employment continues to decline (slightly), which contradicts hopes for a "re-industrialisation" also in terms of employment[11].

[11] This should not hide the fact that industry can be very important for the economy of a metro region, beyond its own importance as an employer, also through its role as a consumer of intermediates and complementary (business) services. See the results in Chapter 4 on this point.

Figure 3.2: Share of Industry by Type of Metropolitan Region
1995 and 2017 in %



Source: ARDECO database (JRC/EC); MISTA team calculations.

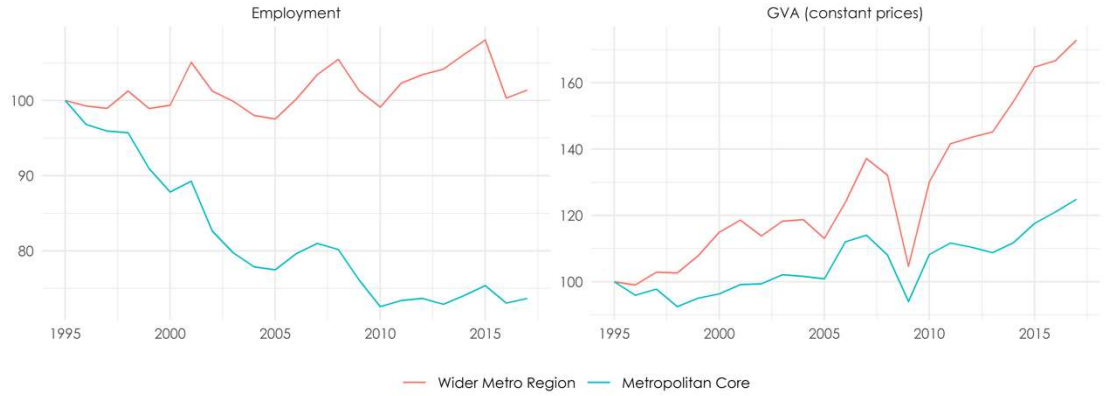
As shown in Figure 3.2, however, over the entire period 1995-2017 a decrease of the industry shares was a common feature of all types of regions considered. This decline was more pronounced in employment than in (real) output and led to higher output (compared to employment) shares of industry throughout. This again indicates higher productivity gains in industry than in the economy total, but also reflects higher productivity *levels* in the sector at present.

Further, as also shown in Figure 3.2, there is substantial variation in industry shares by city characteristics with respect to population size and income level. Industry employment shares (in 2017) amount to 11.6% in large and 17.2% in small metro regions as well as to 11.0% in high-income and 16.1% in low-income metro regions. Accordingly, disadvantages in an orientation towards industry exist for the EU15 versus the EU13 metro regions (11.9% vs. 19.5%) and for 1st metro regions compared to other metro regions (10.6% vs. 13.0%).

In addition to these differences between metro regions, there is also some heterogeneity in the developments *within* a typical metro region, due to different functional orientations of their subspaces (Figure 3.3).[12] In particular, the results obtained indicate a more favourable development of industry in the wider metro regions than in the metropolitan cores, reflecting better location conditions for (large scale) productive activities in the former. This applies to the development of employment and value added.

[12] This can be verified for those (52) metro regions that consist of at least three NUTS3 regions, so that a clear distinction between core and wider metro region is possible. Among them are 5 stakeholder cities of the project, whose intra-metropolitan development can be seen in annex table A.2.3.

Figure 3.3: Development of industry in Core and wider Metro Region
(52) European Metro Regions with at least 3 NUTS3-Regions; 1991=100

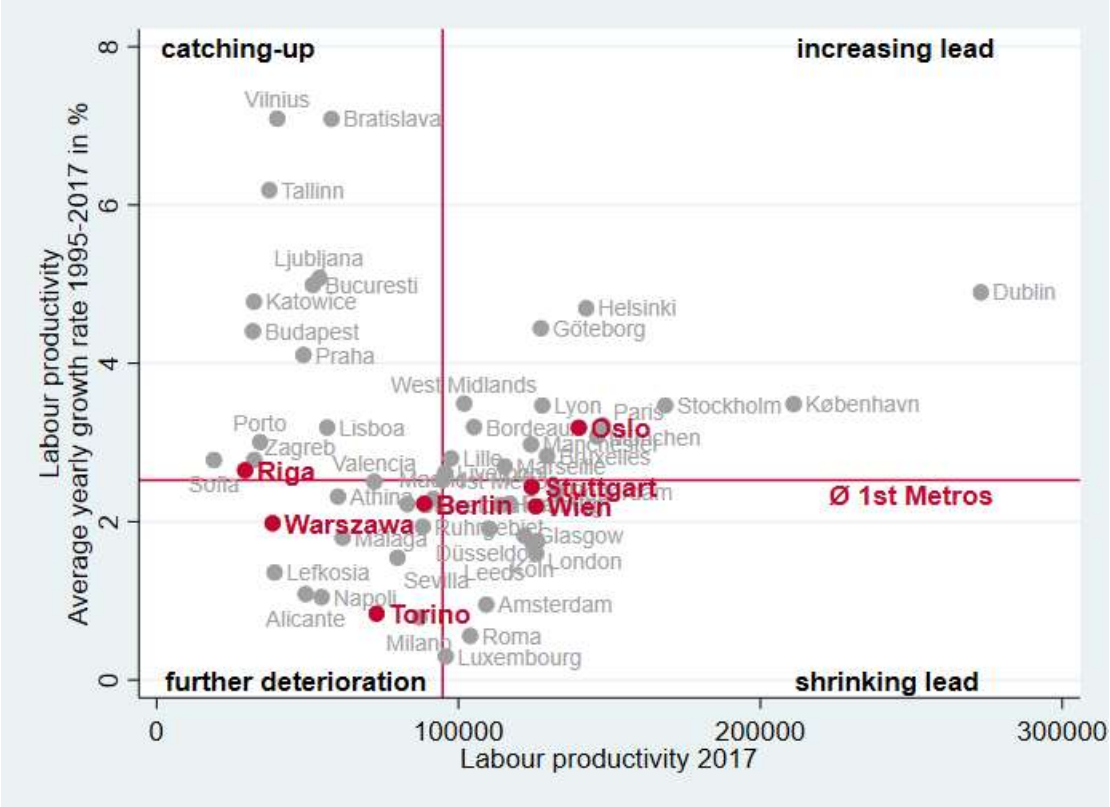


Source: ARDECO (JRC/EC); MISTA team calculations.

Further, as observed in the previous figures, a substantially more favourable trend in industry value added than in industry employment is evident, which once again underlines the good performance of metro regions with respect to efficiency. Indeed, the results impressively confirm the role of industry as a "productivity machine" especially for metropolitan regions: while cumulative productivity gains in industry over the period 1995-2017 (measured in constant prices and per employed person) amounted to +70.1% in the 1st metro regions, +64.4% in the other metro regions and +59.7% in all NUTS3-regions of the EU and Norway, the corresponding figures for the respective economies as a whole (including services) were much lower at +24.3%, +27.1% and +28.7%. The resulting advantage of the (larger) metro regions in their current industry productivity level is quite impressive. A GVA per employed person in industry of (2017) € 94.776 at constant prices in 1st metro regions and of € 79.321 in other metro regions is contrasted by € 72.935 in all NUTS3-regions. Thereby the productivity lead of industry over the economy total is particularly large in 1st metro regions (+€ 22.711 or +31.5%) and other metro regions (+€ 20.321 or +34.4%; all NUTS3-regions +€ 14.025 or +23,8%).

These facts suggest that the outstanding productivity performance of industry in metro regions results in a reduction in industry related jobs in metro regions. The same is true for explaining differences in these trends between individual metro regions, as disparities in productivity performance are quite substantial even within the group of 1st metro regions. This is shown in figure 3.4, which depicts the longer-term productivity growth (ordinate) and the current productivity level (abscissa) of industry in the individual 1st metro regions compared to the average of this metro group (red lines).

Figure 3.4: Labour Productivity in Industry – current status and longer-term development
GVA per employed person (constant prices)



Source: ARDECO database (JRC/EC); MISTA team calculations. The red lines indicate the weighted averages for all 1st metropolitan regions.

According to this, productivity differences within the group of 1st metro regions with a range of more than 1:10 in common currency are still huge in 2017, with metro regions in northern (and north-western) Europe tending to be favoured over those in the east and south of Europe in productivity levels as well as productivity growth. This can probably be explained by higher labour costs and a resulting greater pressure to rationalise in the former. Over time, several northern metro regions have been able to further improve their efficiency lead[13]), whereas the majority of the highly productive metro regions show up in the group with a shrinking lead. In contrast, the southern and eastern European 1st metro regions show rather heterogeneous productivity developments, with some of them (mainly the eastern ones) catching up and others (more likely in the south) falling further behind. The majority of our stakeholder cities achieved productivity gains in line with the (weighted) average of the 1st metro regions (indicated by the red horizontal line). Oslo, however, was able to extend its productivity lead, while Torino lost further ground.

In order to quantify the effects of the different productivity evolutions on the overall trends in industry employment in relation to other factors, the project team has developed a new

[13] Not least this refers to metro regions that are also considered innovation leaders according to relevant rankings, e.g. the EU regional innovation scoreboard of the EU (European Commission, 2019).

approach that also contributes to the ongoing discussion on the determinants of deindustrialisation in the literature. Its basic idea is that a negative employment trend in industry in a metro region can result from different underlying factors: it may be an indication of a shrinking industry sector implying “real” deindustrialisation. However, it may also be the result of productivity gains with a stable or even rising output level in industry – a situation driven by labour-saving (e.g. technological and/or organisational) innovations and therefore better described as "industrial up-grading", whereby industry loses in employment shares due to high productivity (or efficiency) gains in cities rather than real deindustrialisation. In addition, the specific performance of the total metro region's economy can impact employment trends in industry in a metro region, as will the economic development in its parent country[14]).

Based on these considerations, we disentangled the contributions to employment change in metropolitan industry of a) productivity gains, b) "real" deindustrialisation, c) the relative performance of the metro region's economy total, and d) the economic growth in its respective country, using a newly developed shift-share-like decomposition approach[15]). Applied to the (289) European metropolitan regions as well as the metro region groups distinguished in our study, this approach yields some key insights into the mechanisms behind metropolitan industry evolutions in 1995-2017 (Table 3.2)[16].

First, the **contribution of productivity growth is large and negative for all metropolitan region groups**, indicating that efficiency gains really played a key role in the downward employment trend of industry in the European metro regions from the mid-1990s. Second, also "real" deindustrialisation (as a shrinking industry share in value added) contributed negatively to employment evolutions in most of the metro region groups. However, its impact was always much smaller than that of efficiency gains, indicating that actually it **was industrial upgrading (i.e. improvements in technology or production processes) rather than "real" deindustrialisation that drove the erosion of metropolitan employment in industry** in the observation period. Finally, the contribution of the performance of the metro region was mostly positive and seem to increase with the size of the respective metro region group, which speaks

[14] The (net) effects from the development of the metropolitan as well as the national economy on industrial employment dynamics in a metro region can only be determined empirically due to potentially opposing influences: From a demand-side perspective, a positive correlation between these developments and industry employment is likely as an upward trend of the (local and/or national) economy total leads to increased demand for industrial products from consumers and firms. However, the sign of supply-side effects is less clear: On the one hand, a good economic development can lead to a deeper and broader supply of inputs and complementary services that metropolitan industry needs to produce and prosper. On the other hand, a booming metropolitan and/or national economy can be associated with higher wages, which in turn may reduce incentives to job creation in industry. Our decomposition approach can reveal which of these influences is dominant.

[15] See the technical supplement in Annex 2 for a detailed description of the derivation and the application of this approach.

[16] The results of a similar application to the industry employment change in the 7 stakeholder-cities of our project can be found in annex table A.2.4.

in favour of agglomeration economies assumed in the literature also for productive activities in (large) city regions[17].

Table 3.2 Components of Employment Change in Industry
4-way-decomposition; by metro region groups; 289 metro regions, cumulative growth in 1995-2017

	Employment Change (%)	Contribution to Employment Change of …. (percentage points)			
		Productivity growth	"Real" deindustrialisation	Performance of Metro Region	Country growth
All Metro regions	–19.5	–48.1	–12.2	+6.0	+34.9
1st Metro regions	–25.2	–49.1	–18.5	+8.2	+34.3
Capital Cities	–26.4	–53.2	–22.5	+12.8	+36.6
2nd tier Metro regions	–22.4	–50.1	–11.6	+2.4	+36.9
Lower tier Metros	–14.1	–44.4	–3.9	–0.9	+35.1
Large Metro regions	–22.1	–48.2	–15.3	+7.6	+33.7
Medium-sized Metros	–17.2	–48.2	–10.5	+4.0	+37.5
Small Metro regions	–12.0	–49.5	+2.1	+0.2	+35.2
High-Income Metros	–18.1	–48.1	–15.1	+9.5	+35.6
Medium-income Metros	–21.3	–41.3	–11.5	–1.6	+33.1
Low-income Metros	–19.4	–62.6	–0.7	+6.2	+37.6
EU 15 Metro regions	–19.9	–44.9	–13.3	+4.4	+33.9
EU 13 Metro regions	–18.7	–98.7	–1.7	+1.8	+79.9

Source: ARDECO database (JRC/EC); MISTA team calculations.

In addition, the results in Table 3.2 reveal further differences between the metro region groups in terms of both employment trends and their driving factors. These are discussed in more detail in the currently emerging background report for Task 1 of the MISTA project. In a short summary, they show that different factors were responsible for the longer-term employment trends of industry in European metro regions, implying that the respective regional context should be considered when designing efforts to strengthen the metropolitan industrial base. However, irrespective of the metro group considered, productivity gains seem to have a much greater impact on employment losses in metropolitan industry in 1995-2017 than a shrinking industrial sector, referred to as "real" deindustrialisation. According to additional analyses, this is not least due to a significant decrease in the contribution of the latter since the mid-2000s[18]).

[17] In addition, a positive economic growth effect is ubiquitous across all metro region groups. However, this fact is only partially informative, as it only indicates that (all) EU countries have grown over the last two decades, albeit with a considerable growth bonus for the new EU member states.

[18] Separate decompositions of industry employment change for different time periods will be documented in detail in the emerging background report.

3.2.3 Main results on sector specific developments in productive activities

Productive activities are marked by a huge internal heterogeneity and - as discussed in the literature survey (see chapter 2) – have been marked by substantial internal restructuring in the last decades. To uncover these structural trends the current section focuses on the 58 first-tier city regions on a wider delineation of agglomeration areas (AAs) used as a benchmark in the current project, (see chapter 3.1) using data from Eurostat's structural business statistics as well as WIFO structural analysis database. Through these data we are able capture the development of all sectors covered by the SBS[19]. To be more concise, in the current document we only report statistics for the productive activities analysed as they were agreed upon in the inception meeting and report of the MISTA project (i.e. Transport and logistics (NACE H), wholesale and storage (NACE 46 + 45), Competitive production (NACE C), Production for local market (NACE C), Material services including the building sector (NACE F), general workshops, repair services (NACE 95)and the NACE 1 digit groups D and E (Energy and Water and Waste management)).

Localisation

A first look at this data is provided in figure 3.5. This plots the share of employment in the 40 NACE 2-digit divisions of the productive activities analysed in this project in the European AAs against their employment share in the European average.[20] Thus, divisions located above the 45-degree line have a higher share of employment in the European AAs than in the EU average and are thus regarded as "localized" in the European AAs. This applies to 10 divisions[21] among the 40 considered. Among these only three belong to the manufacturing sector[22], while the remainder **are related to either transport and logistics**[23], **public utilities and waste management**[24], and general workshops and repair services (S95) as well as wholesale trade (G46). These specialization patterns therefore clearly illustrate the function of urban AAs as

[19] SBS covers the 'business economy' (NACE Rev. 2 Sections B to N and Division 95) which includes industry, construction, and distributive trades and services, while agriculture, forestry and fishing, and public administration and (largely) non-market services such as education and health are not or only very imperfectly covered.

[20] NACE (**N**omenclature générale des **A**ctivités économiques dans les **C**ommunautés **E**uropéennes) is an acronym for the statistical classification of economic activities in the EU.

[21] These are manufacturing of coke and refined petroleum products (NACE 2 digit C19) ,manufacturing of chemicals and chemical products (C20), manufacturing of pharmaceutical products and pharmaceutical preparations (C21), electricity, gas, steam and air conditioning supply(D35), remediation and waste management services (E39), wholesale trade (G46), water transport (H51), air transport (H52), warehousing and support for transportation (H53), office support and other business support activities (S95).

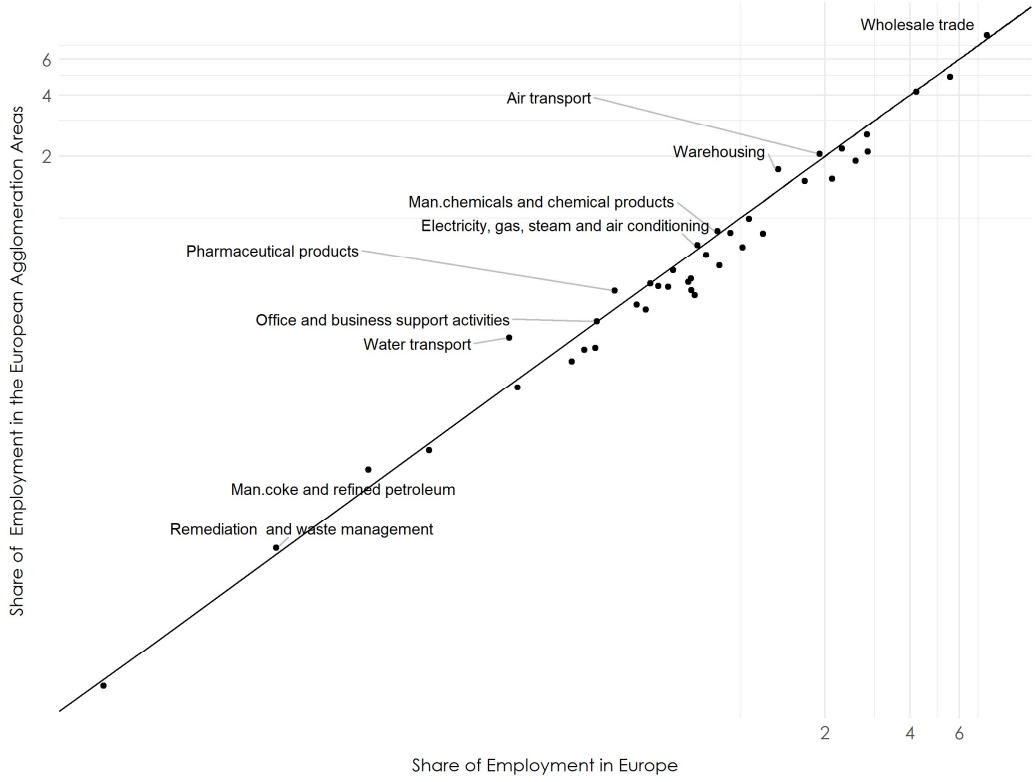
[22] These are manufacturing of coke and refined petroleum products (NACE C19), manufacturing of chemicals and chemical products (C20), manufacturing of pharmaceutical products and pharmaceutical preparations (C21))

[23] These are water transport (H51), air transport (H52), warehousing and support for transportation (H53)

[24] These include electricity, gas, steam and air conditioning supply(D35), remediation and waste management services (E39)

central transportation hubs and central locations for international trade and business support activities. They also reflect the high importance of public utilities serving the demands of the large populations in these densely populated areas. By contrast European AAs (shown in Map 3.1) have rather low relative employment shares (and thus localisation) in the manufacturing sector.[25] Further next to profiting from population growth some sectors such (as e.g. logistics, but also utilities and the knowledge intensive business services that is not discussed in detail here), profit from forward and backward linkages as well as knowledge spillovers from the production sector.

Figure 3.5: Localisation of productive activities in the European Agglomeration areas



Source: Eurostat, Structural Business Statistics. Share in Europe is measured as the share of the respective sector in total employment of the EU28 and Norway according to SBS data. Horizontal axes – share of the sector in European employment (in %). Vertical axes Share of employment in European AAs (in %). Dots represent the NACE 2-digit industries. Labelled sectors are those with above average localisation in AAs.

In addition, European AAs are also usually specialized in productive sectors that have an overall small employment share. Among the sectors localized in European AAs only three (air transport, warehousing and wholesale trade) hold an employment share of more than 1% in total European employment. Among these in particular wholesale trade, with a share of 7.5%

[25] As discussed in detail in section 3.2.1 this may in part due to a higher productivity in AAs. Note, however, that here we focus on employment in narrow NACE industries, such that such differences can only arise from a potentially different specialisation of AAs even within NACE 2-digit industries.

in total Europe wide employment sticks out. The 7 others account for a combined 3% of total EU wide employment.

This analysis, however, hides the substantial differences between AAs and the NACE 2-digit industries considered.

With respect to the heterogeneity within 2-digit divisions, a more detailed analysis at the level of NACE 3-digit industries reveals a slightly larger set of industries with above average localisation in the European AAs. In this analysis 33 out of 139 NACE 3-digit groups have an above average localisation in the European AAs.[26] Once more the employment share of these industry groups is, small, as they combine for 12.7% of total EU wide employment and 14.2% of the employment in the AAs considered. This analysis also allows for a more detailed consideration of sectoral diversity and structural change, which suggests that in general **AAs have a more diverse structure of productive activities** and have also experienced substantially more structural change in the last decade than other European regions.

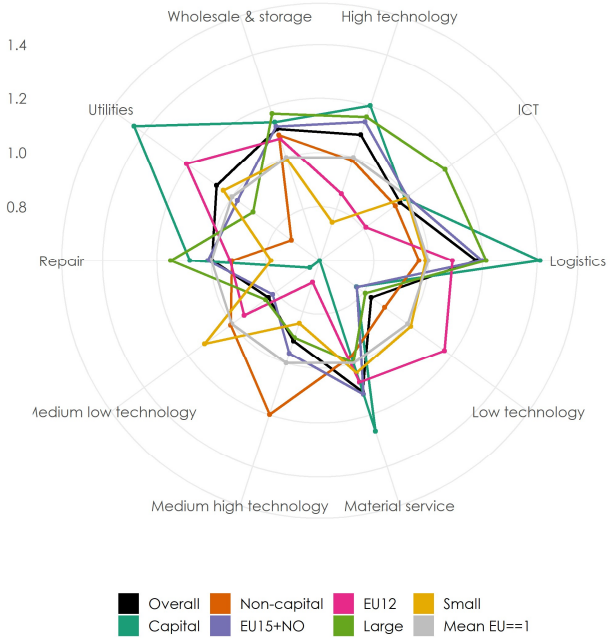
More importantly, however, the consideration of the more detailed industry groups at the NACE 3 digit level allows for an analysis of productive activities by the functions of interest for the current project (i.e. manufacturing, transport and logistics, wholesale and storage, material services, general workshops and repair services, and public utilities (i.e. energy and water supply and waste management) and for a further differentiation of manufacturing by the type of technologies used (into high, high-medium, medium-low and low technology). This grouping (displayed in Figure 3.6) across NACE categories therefore allows **for a slightly better approximation of the hybrid servo-industrial production in cities than aggregations at lower industrial levels.**

On the one hand this analysis clearly shows that within the manufacturing sector the agglomeration areas on average are **more strongly specialized in high-tech sectors** than the European industry and less so in low-tech sectors (see Figure 3.6). On the other hand, the figure also underscores the **substantial heterogeneity of the specialization across different types** of AAs. As will be discussed in greater detail in the background report to Task 1 of this project, this heterogeneity between different city types inter alia depends on the size and location of the AAs. For instance, with respect to location the aggregate picture is largely determined by AAs in countries that joined the EU before 2004 (plus Norway), while AAs located in EU member states that joined the EU after 2004 – mirroring their overall higher industrialisation - have a much larger number of industrial sectors with an above average

[26] The ten most heavily localized groups at this level of disaggregation are manufacture of magnetic and optical media (C286), freight air and space transport (H512), passenger air transport (H511), postal activities (H53), manufacture of air and spacecraft machinery (C303), Wholesale of communication and communication equipment (G465), manufacture of pharmaceutical products (C211), manufacture of cleansing materials (C204), transportation in pipelines (C495), manufacture of refined petroleum products (C192). These also illustrate the function of many cities as a headquarter location for many larger scale enterprises, as a number of these groups (e.g. pharmaceutics, petrol) are characterized by very large international enterprises.

localization. This applies in particular to manufacturing and in particular low-tech manufacturing. In addition, AAs in the EU 13 countries have an above average localisation in many industries closely related to consumer demand[27] as well as in some divisions of mechanical engineering and chemicals industry[28]. Similarly, **smaller AAs have a broader industrial base than larger AAs (i.e. are more diverse)**.[29] The former also show stronger localization in consumer goods industries and medium-high technology. The same applies to the AAs that are not national capital city regions. These non-capital AAs mainly stick out through an above average localization of the metal, machinery and vehicle production. In sum, thus, a large part of the aggregate picture related to the small industrial base of AAs, is mainly related to AAs containing capital cities and in the EU 15 countries.

Figure 3.6: Localization of types of productive activities the agglomeration area



Source: Eurostat, Structural Business Statistics and WIFO regional structure data base. Note: The Figure shows the localisation coefficient of the respective sector groupings among the European AAs. If this is larger than unity the respective group has a higher employment share than the European average in that group (i.e. is localized). If it is smaller than unity the opposite applies (see Table A.2.2 in the annex for a definition of the industry types).

[27] These are manufacture of food products (C10), manufacture of beverages (C11), manufacture of tobacco products (C12), manufacture of wearing apparel (C14), manufacture of leather and related products (C15), manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (C16), printing and reproduction of recorded media (C18), manufacture of furniture (C31))

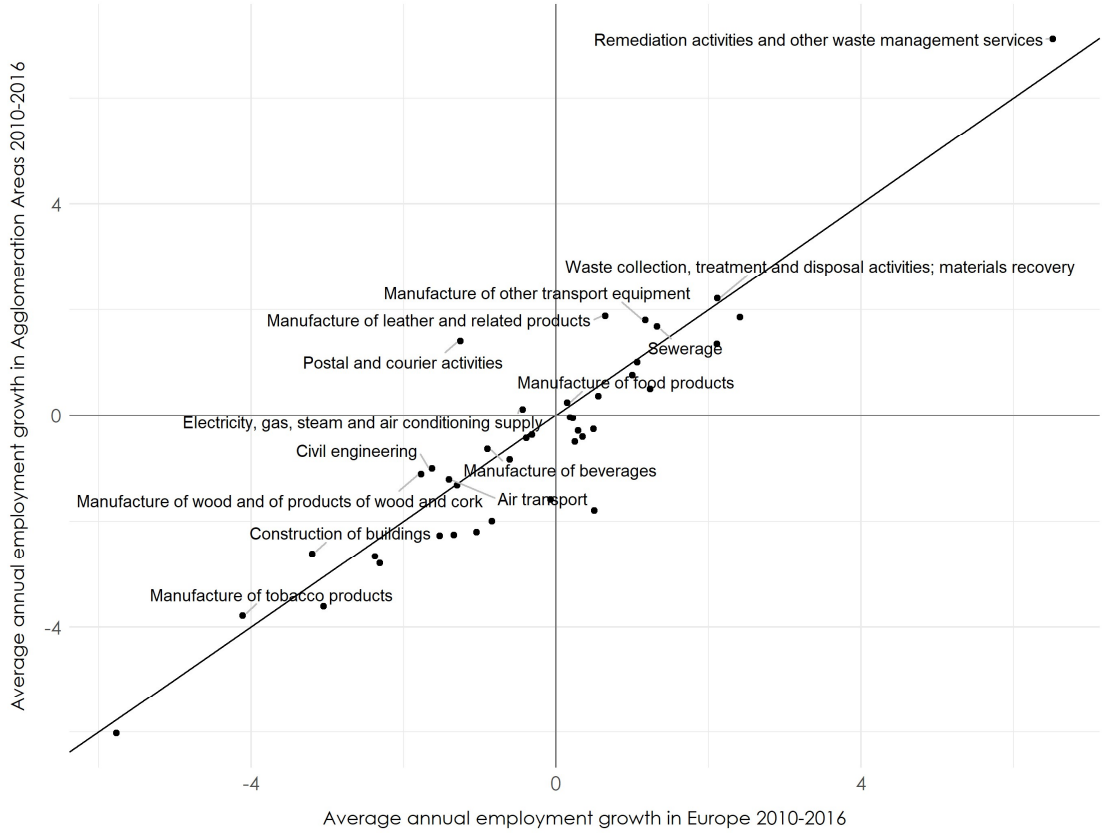
[28] Manufacture of rubber and plastic products (C22), manufacture of other non-metallic mineral products (C23), manufacture of electrical equipment (C27), manufacture of motor vehicles, trailers and semi-trailers (C29)

[29] The most diverse cities in our data are some smaller capita cities (e.g. Ljubljana and Zagreb), but also some of the smaller stakeholder cities such as Torino and Warszawa.

Growth

The sectoral growth performance of the European AAs in the years 2010 to 2016 is equally diverse (see Figure 3.7). Overall, over a third (14) of the 40 NACE 2-digit divisions in the productive activities analysed in this project increased employment more rapidly in the AAs than in the European average.[30] In addition, next to logistics some of these divisions are affiliated with the manufacturing sector, in particular in consumer goods industries (e.g. manufacture of food products, manufacture of beverages, manufacture of tobacco products, manufacture of leather and related products). This may thus be an indication that – as also suggested in the literature survey – **some of the manufacturing sectors are increasingly returning to urban spaces in Europe**.

Figure 3.7: Relative growth performance of European agglomeration areas.

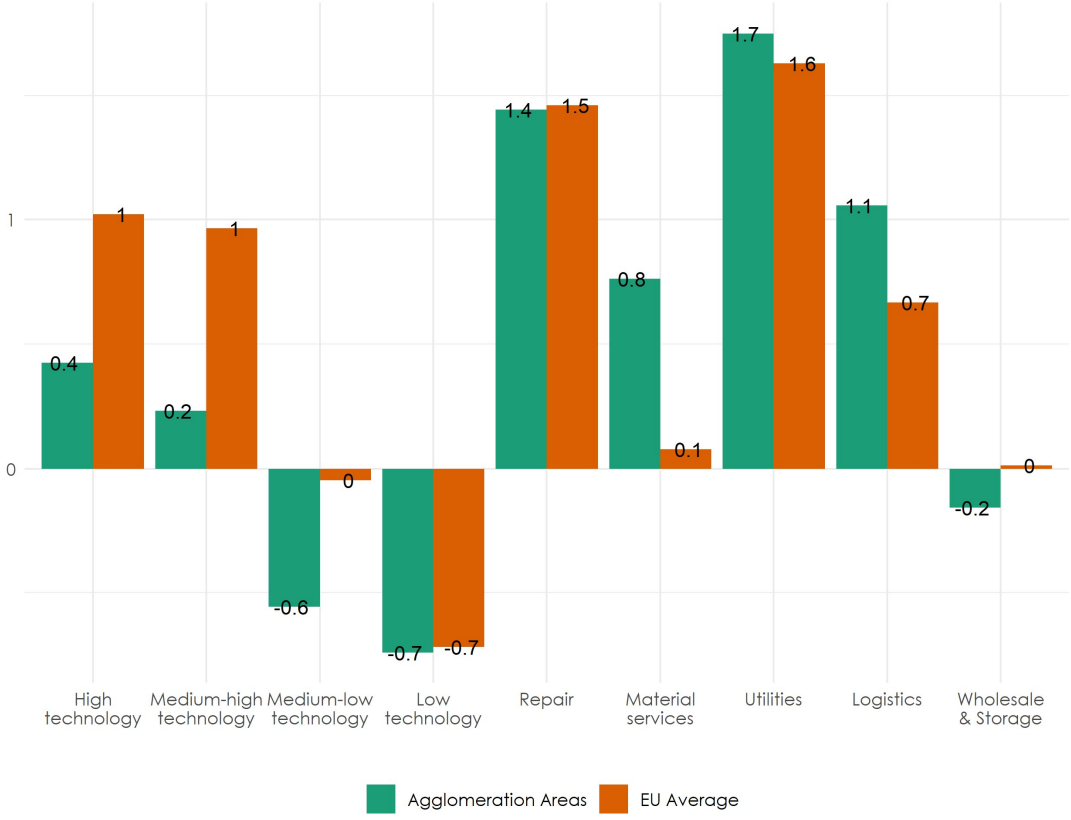


Source: Eurostat, Structural Business Statistics and WIFO regional structure data base. Notes: the figure shows average annual employment growth rates in the period 2010 and 2016. The horizontal axis measures the EU wide growth rate. The vertical axis the average growth rate in the European AAs. Thus, divisions located above the 45-degree line.

[30] These are manufacture of food products, manufacture of beverages, manufacture of tobacco products, manufacture of leather and related products, manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials, manufacture of other transport equipment, electricity, gas, steam and air conditioning supply, sewerage, waste collection, treatment and disposal activities; materials recovery, remediation activities and other waste management services, construction of buildings, civil engineering, air transport, postal and courier activities.

In terms of employment, however, these sectors are still these sectors are still small, as their combined share in employment is 10.0% in the AAs and 10.9% in the European total. Although this may understate the economic importance of these sectors in term of economic importance of these growing sectors and may also differ in terms of land use, this implies that employment growth in manufacturing in the European AAs is still slower than in the European average in high tech and high-medium tech sectors and declining – although in parallel with the European average – in medium and low-tech sectors. In this aggregation therefore the only non-manufacturing productive activities with **an above average employment growth in the AAs are material services, utilities, and logistics,** of which in particular logistics is a sector of high land intensity**.** As with these indicators there is, however, substantial heterogeneity in growth performance among European AAs. In particular smaller city AAs show a larger number of productive activities growing above the European average as well as a higher share of employees in these sectors. While in larger cities, employment growth hinges much more strongly on the service sectors that has not been considered in this summary. Similarly, urban agglomerations located in the EU 13 countries have a larger portfolio of divisions growing above the average and also a larger share of employment in such faster growing industries than AAs located in the EU 15 countries or Norway.

Figure 3.8: Average annual growth 2010-2016 of types of productive activities the AAs



Source: Eurostat, Structural Business Statistics and WIFO regional structure data base.

3.3 Main takeaways

Concluding, an empirical analysis of the development yields the following 8 take-aways:

1. **Industry Employment levels are reducing but not output.** Although there has been a clear downward trend in industry (i.e. NACE sectors B to E) employment in most European urban areas developments were far from uniform but influenced by city characteristics. According to our results, larger metro regions and those in the EU15 were more exposed to a downward trend in employment.
2. **Production is favouring urban fringes.** Within metropolitan regions, industry developed more favourably in the wider metro environs than in the metropolitan core cities, reflecting better location conditions for (large scale) productive activities in the former.
3. **Industrial upgrades dominate employment trends.** Higher efficiency was a central factor behind the employment trends of metropolitan industry according to our findings. In fact, productivity gains - and thus industrial upgrading - contributed much more to employment developments in the European metro regions in 1995-2017 than "real" deindustrialisation, i.e. a shrinking industrial sector also in terms of output.
4. **Declines in industry gave way to a stable development.** In addition, downward trends in metropolitan regions flattened out over the observation period and have been replaced by a largely stable development of GVA-shares since the mid-2000s, except from the years of the Great Recession. However, the industry share in employment has continued to decline slightly (because of the fast growth of employment in services), which contradicts hopes for a "re-industrialisation" also in terms of employment.
5. **High-tech specialisations growing in urban areas.** In part due to the long-term reduction in employment in manufacturing, the current specialization patterns of European urban regions within productive activities analysed in the MISTA project are rather focused on logistics and utilities than on manufacturing. Among the manufacturing divisions on average only high-tech sectors that need to exploit urban agglomeration economies and the advantages of the large city with respect to knowledge flows and communication channels are still localized in these areas.
6. **There may be a return of certain forms of production to city regions** as recent growth trends, also suggest that some sectors of production activities (in particular high-tech industries and industries such as food and beverages production that re producing consumer goods) have been growing more rapidly in urban regions than in the European average, although this tendency starts from a rather low level (as more rapidly growing sectors account only for 14% of total employment).
7. **Cities are demanding greater levels of customisation** as average growth is not restricted to logistics, utilities and some high-tech industries, but also applies to some divisions in consumer goods production and other less technology intensive sectors. In conjunction with the results of the literature survey these sectors should be mainly affiliated with the hand-crafted, design oriented, high quality production for local high-income demand.
8. **Smaller city regions are more diverse.** This said there is also substantial heterogeneity across regions. There is notable difference in production between capital city regions in EU 15-countries on the one hand, and similar cities in general. Small AA represented a higher level of diversity than the capitals.

In an economic policy perspective, these empirical results allow a cautiously optimistic view on the further development of industry in European city regions.

Due to our findings, decreases in industrial employment in city regions were primarily triggered by the particularly high productivity gains in metropolitan industry. At the same time, however, it is precisely these productivity advantages that will determine the competitiveness of city regions despite high incomes, especially in technology- and knowledge-intensive productive activities. Moreover, there are some signs of a secular end to de-industrialisation, which the literature expects as a result of changes in preferences and the effects of technological upgrading and productivity growth.

Both of these factors point to fertile ground for efforts to strengthen the metropolitan industry base. However, "one size fits all" solutions are unlikely to yield success here, given the large heterogeneity that our evidence reveals in industry evolutions in both regional and sectoral terms. Rather, it will be necessary to consider the respective regional context when designing measures to foster productive activities in a certain city region.

In a structural policy view this will mean building on existing sectoral strengths of the respective city region and expanding these towards cognitively "related" but new activities (through e.g. encouraging spill-overs and spin-offs) that are particularly accessible to knowledge spillovers. Our network analyses in chapter 4 will provide detailed information on existing opportunities in the stakeholder cities in this respect. In highly developed city regions, such starting points will be found above all in technology-oriented and knowledge-intensive productive activities. At the same time, it will also be necessary to make optimum use of the different location conditions *within* the city region. It will therefore make sense to use the advantages of the wider metropolitan area in (large scale) production, while focusing more on the creative industries and (small scale) production of high-quality products for local demand in the metropolitan core.

4 Transposing spatial trends to the stakeholder cities – A data-driven SWOT analysis

4.1 Introduction and Methodology

In this chapter, a SWOT analysis will be introduced that follows the approach of an analysis of the regional network of branches by Otto et al. (2014) and Neffke et al (2017A, 2017B). The basis for this approach is the common recognition that innovation (and thus growth) is driven by the exchange of knowledge between firms. According to increasing empirical evidence[31], knowledge exchange (and thus innovation) does not occur primarily within branches along narrow technological paths, as assumed by traditional approaches to agglomeration theory (beginning with Marshall, 1890) – and as referred to by a long tradition of "picking-the-winner" approaches to identifying sectoral strengths or "lead branches", which shaped regional economic policy until the 1980s. More recent results rather show that sectoral diversity is more likely to be positive for knowledge spillovers, because a broad spectrum of branches offers access to different knowledge bases and innovations are often generated by applying existing technological solutions (from one branch) to new problem areas (in another branch) – i.e. by recombining knowledge from different areas (initially Jacobs, 1969). At the same time, however, companies can only absorb and process new knowledge if this knowledge is not too far away from their own knowledge base. Knowledge spillovers therefore require cognitive proximity between the participating firms in order to enable effective communication and interactive learning as the basis for knowledge transfer. At the same time, however, a certain cognitive distance is necessary so that (for the recipient) "new" knowledge is available at all and the transferred information does not increase the danger of a cognitive "lock-in" into predefined technological paths (Grabher 1993; Martin and Sunley 2006). According to Nooteboom (2000), knowledge spillovers should therefore be particularly large at an "average cognitive distance" between sender and receiver – an expectation which he later also substantiated empirically (Nooteboom 2007). Since then, positive growth effects from a diversity (technologically or cognitively) of "close" or "related" branches ("related variety") have subsequently been empirically proven by a growing body of literature.[32]

[31] For an overview of the results of the meanwhile numerous relevant studies see, for example, Baudry and Schiffauerova (2009) and Boschma (2017).

[32] Initial evidence of the advantages of such a sectoral orientation compared to broadly diversified and/or specialised structures was provided by Frenken et al. (2007) for the regions of the Netherlands and subsequently confirmed for several countries and time periods. Examples include Boschma and Iammarino (2009) for Italian regions and Boschma et al. (2012) for Spanish regions; with differences according to branch groups and/or region types also Bishop and Gripaios (2010) for British regions Hartog et al. (2012) for Finnish regions as well as Van Oort et al. (2015) and Caragliu et al. (2016) for the regions of the European Union. Corresponding results for the small-scale level were also presented for Austria (Firgo and Mayerhofer, 2018). The latter study further illustrated that diversity of technologically or cognitively "close" branches is particularly beneficial to urban regions. A rich environment of technologically or cognitively "related" branches is thus likely to be highly relevant for the development of the respective region.

Against this background, the main assumption in the present analysis is that the development potential of a productive branch in a region is determined not only by its own "critical mass" (i.e. its degree of specialisation, but also by the extent to which it can rely on a fertilising environment of complementary, (technologically or cognitively) "related" branches. Thus, according to Otto et al. (2014), in addition to its own location quotient (LQ_{ir}) – as a measure of the relative regional of branch *i* in region *r* – the embeddedness of a specific branch *i* in such an environment will also play a role in assessing its development potential. Thus, similarly to its own location quotient, the regional specialisation in related branches (LQ_{ir}^{rel}) can be calculated as an indicator for the embeddedness of branch *i* in the economy of region *r*. If the value of this degree of embeddedness is > 1, then branch i is well embedded in the regional economy, as it can draw on a large pool of "related" branches with a similar knowledge base. Values < 1, on the other hand, denote branches that do not have such a regional "ecosystem" of related activities, which can affect their stability and resilience.

Table 4.3: Categories of the empirical SWOT analysis
Development potentials according to degree of specialisation and embeddedness

		Regional embeddedness of branch *i*	
		low $LQ_{ir}^{rel} < 0{,}9$	high $LQ_{ir}^{rel} > 1{,}1$
Regional degree of specialisation in branch *i*	low $LQ_{ir} < 0{,}9$	Weakness (W)	Opportunity (O)
	high $LQ_{ir} > 1{,}1$	Threat (T)	Strength (S)

Source: Otto et al. (2014), MISTA team original illustration.

Overall, both the degree of specialisation and the embeddedness in the regional sectoral structure are decisive for an assessment of the development potential of a branch. In an empirical SWOT analysis, according to Otto et al. (2014), four different categories can thus be distinguished, into which the individual branches can be classified regarding their development potential, according to the value of both indicators calculated for them (Table 1): If the region under consideration is particularly specialised in one branch (LQ_{ir} > 1.1) and if this branch is also particularly well embedded in "related" branches (LQ_{ir}^{rel} > 1.1), the probability is likely to be high that it will continue to develop favourably. Such a branch should therefore be seen as a regional "strength". On the contrary, a branch with a low degree of specialisation and embeddedness (LQ_{ir} as well as LQ_{ir}^{rel} < 0.9) will, ceteris paribus, only have a low development potential. It should therefore be regarded as a regional "weakness" and will hardly be the focus of structural policy initiatives to build up sustainable fields of strength. On the other hand, the latter will very likely be the case for branches that are still weakly developed in the region (LQ_{ir} < 0.9), even though a favourable regional environment of technologically or cognitively "close" branches (and thus diverse opportunities to use a common knowledge base) would be available for them (LQ_{ir}^{rel} > 1.1). Such branches will thus offer special "opportunities" to develop new

strengths through structural policy initiatives. Ultimately, branches which are highly specialised in the region (LQ_{ir} > 1.1), but which are not well embedded in complementary branches in the region (LQ_{ir}^{rel}< 0.9), tend to be seen at risk ("threat") which could be reduced simply by strengthening complementary branches through structural policy initiatives. Location quotients > 1.1 and < 0.9 are used to define significantly higher or lower values in both dimensions. For branches with indicator values between 0.9 and 1.1, therefore, no specific SWOT-profile is assumed.

Several approaches have been developed in the literature to identify this (cognitive) “branch proximity".[33] However, most of them are only able to identify proximity and define relatedness within the manufacturing sector or within the service sector, which makes them unsuitable for the present project. For this reason, the present analysis relies on an approach by Neffke and Henning (2013) which attempts to derive proximity from flow data between branches of the entire spectrum of branches across all economic sectors. This is the only approach that allows to consider the integration of and interdependencies between industry and services in the definition of proximity and relatedness, which is one of the central topics of the present project. More information on this approach and on the definition of related branches is provided in annex 3. The annex also illustrates cities’ branch networks and a summary table with the NACE codes and names of all productive activities as well as their SWOT profiles for each city.

For the purpose of this interim report, the analysis illustrates the approach ***exemplarily*** for the metropolitan regions of Oslo, Turin and Vienna as data was available for these three stakeholder cities at the time of reporting. The same analysis can be carried out for the remaining stakeholder cities in the further course of the project according to the availability of corresponding data. Subsequently, the analysis can be further deepened in two dimensions going beyond the scope of this interim report: First, a comparison of the subregions (core city vs. surrounding functional area) within the individual metropolitan regions can be drawn to illustrate the structural interdependencies and potential synergies from increased cooperation between the city and the surrounding municipalities. Secondly, changes in the SWOT profile of metropolitan regions over time can be examined and conclusions drawn about positive or undesired trends regarding productive activities. The applicability of these extensions again depends on the availability of relevant data for the individual metropolitan regions. This is still open for some regions at the time of reporting.

The definition of regions used approximates the functional urban area definitions as closely as possible but relies on the availability of data at a highly disaggregated spatial level (functional urban areas are delimited at the grid or LAU level, see Chapter 3.1). Regions analysed thus delineate "pragmatic" functional urban areas that were defined according to data availability and in consultation with the stakeholder cities based on data obtained from the national

[33] For a more detailed description of these approaches and their methodological advantages and disadvantages see Firgo and Mayerhofer (2018).

statistical offices (see footnotes in chapters 4.2.1 to 4.2.3). Maps of the areas included are illustrated in Annex 3.

Two types of analysis are presented in this chapter. The first represents the sectoral employment shares and growth rates of productive activities at the level of NACE 3-digit branch groups. In the corresponding diagrams presented in annex 3, the 45° line implies equal employment shares of a branch in the metropolitan region and in the country. All branches to the left of the 45° line have a higher share in the metropolitan region than in the country. The further the distance to the 45° line to the left, the stronger is the degree of specialisation of the metropolitan region in a particular branch. Similarly, figures comparing average annual employment growth between 2012 and the most recent available year (which varies between cities) are presented in annex 3. Again, the distance to the 45° line indicates by how much the branch has grown faster (left) or slower (right) in the metropolitan region than in the country. This analysis illustrates which productive activities the specific metropolitan regions are specialised in, whether these are large or niche branches, and which parts of the productive economy have or have not been deindustrialising in the specific metropolitan regions compared to the respective country. The second type of analysis presents the SWOT profiles for productive activities. It allows to identify viable sector specialisations and areas of opportunity for innovation-driven economic growth in the stakeholder regions. The results thus provide essential direct inputs for structural and cluster policy.[34]

4.2 The SWOT profiles of productive activities in three stakeholder cities

4.2.1 Oslo

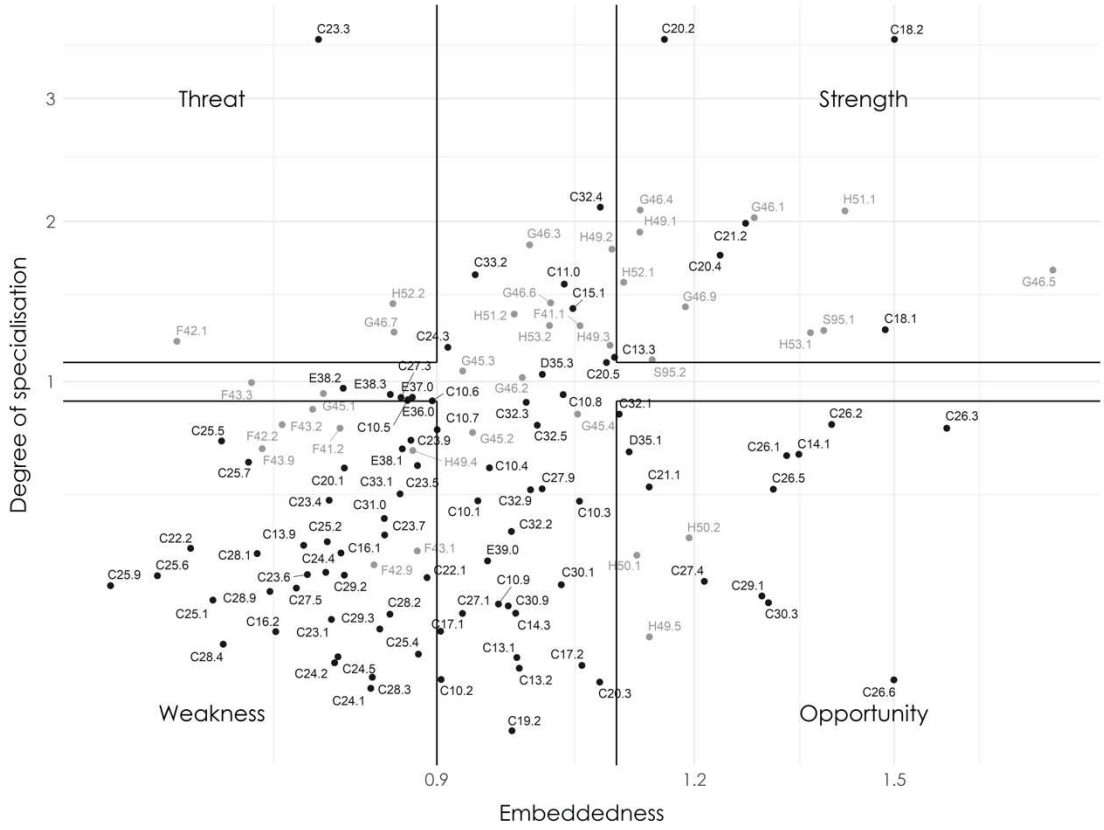
The largest productive branches in the metropolitan region of Oslo[35] are found in wholesale trade (NACE G46), construction (NACE F) and in transportation and storage (NACE H), as illustrated in Figure A.3.3 in annex 3. Among the largest branches Oslo shows most notable specialisation in several parts of wholesale trade (G46), passenger rail (H49.1) and air (H51.1) transport. Among the larger industry branches, Oslo enjoys the highest degrees of specialisation in manufacture of beverages (C11.0), printing and printing services (C18.1), manufacture of soap, detergents, cleaning, etc. products (C20.4) and manufacture of pharmaceutical preparations (C21.2). Some of the small (niche) industries with large degrees of specialisation are the reproduction of recorded media (C18.2), manufacture of pesticides and other agrochemical products (C20.2), and manufacture of clay building materials (C23.3).

[34] Note that strengths, weaknesses, etc. are identified according to their degree of specialisation and embeddedness in the regional economy and not based on their degree of technology, R&D intensity and other factors evaluating the complexity and sophistication of a branch. Rather, being labelled as a "strength" can be regarded as a measure of revealed competitiveness of a branch in a specific region. Employment is reported at plant level and not at company level. This means that their assignment is to branch and region of the plant and not to that of the company headquarters.

[35] The functional urban area is approximated by aggregating the city of Oslo and the municipalities of Akershus county (see Map A.3.1 in annex 3).

Figure A.3.4 in annex 3 shows advantages in employment growth for Oslo in large parts of construction (F) and wholesale trade (especially for that of agricultural raw materials and live animals, G46.2), as well as for sea and coastal passenger water transport (H50.1). The figure additionally illustrates substantial heterogeneity in growth of manufacturing industries compared to Norway. While a number of branches that are shrinking in Norway show substantial growth rates in Oslo, also the opposite is true for several branches. This also holds for the development within NACE 2-digit industries, with many of them consisting of well- and poorly-performing NACE 3-digit branches. Only for the manufacture of electronics (C26) mainly all 3-digit branches exhibit above average growth rates in Oslo.

Figure 4.9: SWOT-Profile for Oslo



Source: Statistics Norway, MISTA team calculations; Industry (service) activities in black (grey); For NACE codes and branches see Table A.3.1 in annex 3.

As illustrated in Figure 4.9, not all of the productive activities with the highest degrees of specialisation can indeed be regarded as strengths of the regional economy of Oslo. While some of the highly localized major branches are supported as “strengths” by the analysis, such as printing and printing services (C18.1), detergents, cleaning, etc. products (C20.4), and pharmaceutical preparations (C21.1), some important branches or minor branches with high specialisation only have an average degree of embeddedness in the knowledge base of the regional economy and are therefore lacking a clear SWOT-profile, or are even weakly embedded (for instance, clay building materials (C23.3) and the construction of roads and railways (F42.1) and are thus regarded “threatened”. Among the most notable “opportunities”

are the manufacture of wearing apparel (C14.1), various branches within the manufacture of computer, electronic and optical products (C.26), manufacture of motor vehicles (C29.1), and manufacture of air- and spacecraft and related machinery (C30.3). Those activities have a rather low degree of localization in the region but show a high degree of embeddedness, meaning that they have good preconditions in the region benefiting from the agglomeration of cognitively related branches.

4.2.2 Turin

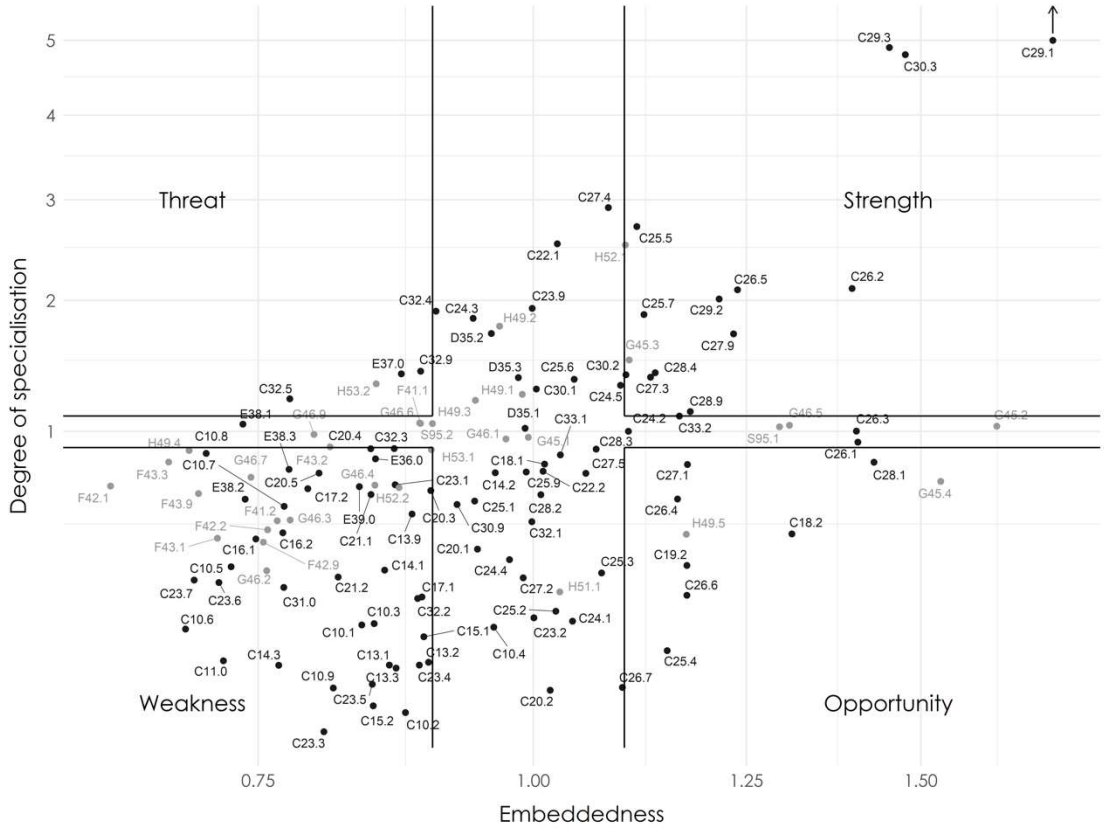
In contrast to Oslo, the metropolitan region of Turin[36] does not show specialisation among the largest productive branches in services according Figure A.3.7 in annex 3. However, this figure shows the high importance of manufacturing for the region with respect to sector size. The manufacture of motor vehicles (C29.1) and parts and accessories for motor vehicles (C29.3) are the largest productive branches. The manufacture of air and spacecraft and related machinery (C30.3) has both a notable sector share and localization in the city. Similarly, parts of the manufacture of fabricated metal products (C25) are large and highly localized productive branches in the region. Productive services with notable sector shares and specialisation are warehousing and storage (H52.1) and – in line with the importance of the manufacture of motor vehicles – the sale of motor vehicle parts and accessories (G45.3). Warehousing and storage (H52.1) also are among the fastest growing branches in Turin, as illustrated in Figure A.3.8. Other branches with exceptionally high employment growth in the region are the manufacture of footwear (C15.2), manufacture of tanks, reservoirs and containers of metal (C25.2), remediation activities and other waste management services (E39.0), and passenger rail transport (H49.2). Similar to Oslo, also Turin exhibits heterogeneous developments compared to the country within manufacturing. While a number of branches show growth rates way above average – most notably within the manufacture of other non-metallic mineral products (C23), manufacture electronics (C26) and electrical equipment (C27), the manufacture of transport equipment other than for motor vehicles (C.30) – parts of the industry also perform poorly, especially the manufacture of food products (C10) and beverages (C11).

As Figure 4.10 illustrates impressively, the "strengths" among productive activities in the Turin metropolitan region are primarily in manufacturing. Particularly prominent here are the automotive industry (C29) and manufacture of air and spacecraft and related machinery (C30.3). In addition, parts of the manufacture of fabricated metal products (C25), as well as the production of electronic (C26) and electrical (C27) products, are also showing substantial strengths. Distinct "threatened" industries are rare in Turin. Among the industries with above-average specialisation, only the manufacture of medical and dental instruments and supplies (C32.5) is poorly embedded in the regional economy. Among those branches considered "opportunities", sale, maintenance and repair of motorcycles and related parts and accessories

[36] The functional urban area is approximated by analysing the Turin SLL region (see Map A.3.2 in annex 3).

(G45.4), manufacture of general-purpose machinery (C28.1) and reproduction of recorded media (C18.2), show considerable potential in terms of their high degrees of.

Figure 4.10: SWOT-Profile for Turin



Source: Istat, MISTA team calculations; Industry (service) activities in black (grey); For NACE codes and branches see Table A.3.1 in annex 3.

4.2.3 Vienna

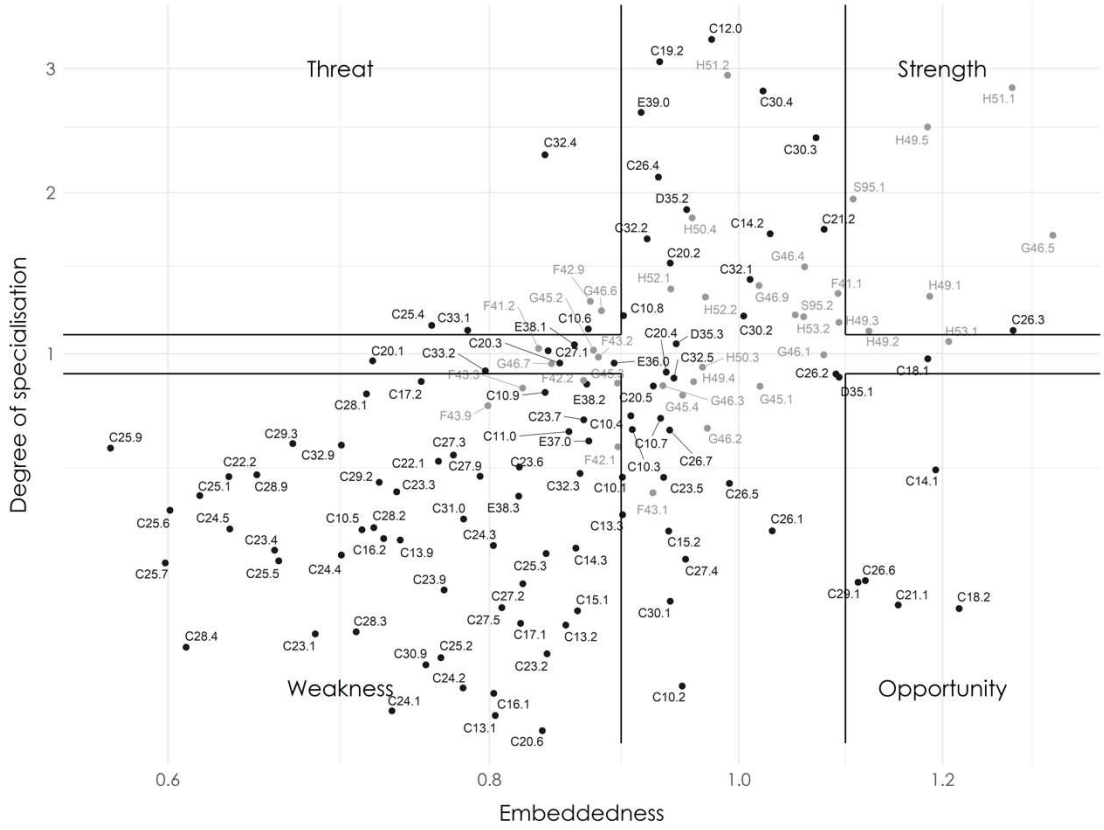
The economic structure of Vienna[37] within productive activities is even more fragmented than in Oslo and Turin, as illustrated by Figure A.3.11 in annex 3. Hardly any branch reaches an employment share of more than 1%. The largest NACE 3-digit branches can be found in construction (F), vehicle trade and repair (G45), wholesale trade (G46) and in parts of transportation and storage (H). Among those, Vienna has above average specialisation in wholesale of food (G46.3) and of machinery and equipment (G46.6), passenger land transport other than rail (H49.3) and passenger air transport (H51.1). Among the larger industry branches specialisation is found in manufacture of refined petroleum products (C19.2), of pharmaceutical preparations (C21.2), manufacture of games and toys (C32.4) and in steam and air condition supply (D35.2).[38] With respect to recent growth (2012-2017), Figure A.12 illustrates substantial

[37] The functional urban area is approximated by analysing the "Stadtregion+" region (see Map A.3.3 in annex 3).

[38] The branch with the highest degree of specialisation (see Figure 4.11) – manufacture of tobacco products (C12.0) – is of very limited size as Figure A.3.11 reveals.

growth rates for Vienna in several very small manufacturing branches, such as manufacture of steam generators (C25.3), and manufacture of batteries and accumulators (C27.2). Moreover, substantial growth advantages compared to Austria are revealed for one of the largest productive branches, i.e. the construction of buildings (F41.2), for the construction of utility projects (F42.2), fright rail transport (H49.2) and several manufacturing branches, such as non-footwear leather products (C15.1), manufacture of paper and paper products (C17.1) and manufacture of games and toys (C32.4).

Figure 4.11: SWOT-Profile for Vienna



Source: Statistics Austria, MISTA team calculations; Industry (service) activities in black (grey); For NACE codes and branches see Table A.3.1 in annex 3.

As Figure 4.11 reveals, the number of productive branches to be considered as "strengths" of the Vienna metropolitan region is rather low in general. In addition, nearly all strengths are classified outside industry. The greatest strengths in terms of specialisation and embeddedness in the regional knowledge base are found in transportation and logistics, specifically in transport via pipeline (H49.5) and passenger air transport (H51.1), as well as in wholesale of information and communication equipment (G46.5) and repair of computers and communication equipment (S95.1). The only industry branch considered as strength in the analysis is the manufacture of communication equipment (C26.3).[39] Printing and printing services (C18.1) and manufacture of

[39] The latter three branches reflect the strong specialisation of Vienna in ICT services (not considered as productive activities by the project).

pharmaceutical preparations (C21.2) – both do not have a clear SWOT-profile according to Figure 3 – are at the edge of becoming a strength. In addition, several highly embedded manufacturing branches with low localisation exist in the region and are thus regarded as "opportunities", most promising the manufacture of wearing apparel (C14.1).

4.3 Main takeaways

1. **This chapter has introduced an innovative analytical toolkit for regional case studies**. The core element is a network space mapping skill-relatedness links between industries. Based on this and by using indicators of branch specialisation and embeddedness, the growth perspectives of the economy of the stakeholder regions can be examined in a SWOT analysis. The exemplary analysis of the stakeholder metropolitan areas of Oslo, Turin and Vienna has revealed similarities and differences between the regions.
2. **Overall, the number of productive activities labelled as "strengths" and "opportunities" is rather low**. Branches labelled as "weaknesses" and branches without a specific SWOT-profile make up the majority of branches in all three cities. This is in line with the findings of chapter 3.2.3 and can be attributed to the fact that large city regions tend to specialize in (knowledge intensive) services (see chapter 2) that are not regarded as productive activities by the project and are thus outside the scope of the analysis.
3. **Large differences exist between the three regions analysed with respect to strengths identified**. While Turin shows strengths only in specific manufacturing branches, and Vienna almost only in specific productive services, Oslo has strengths in both sectors. This also confirms the results of chapter 3.2.3 concerning specialisation patterns of metropolitan regions in Europe of different size and administrative functions (such as national capitals).
4. **A small number of branches are labelled as strengths or opportunities in all three regions.** Besides a number of city-specific strengths and opportunities, a few branches seem to be associated with activities of great potential in metropolitan regions, irrespective of the specific function or sectoral structure of a city (see Table A.3.1): i.e. the production of recorded media, manufacture of irradiation, electromedical/-therapeutic equipment, manufacture of motor vehicles, and transport via pipeline. In addition, activities in manufacture and repair of computer, communication and related equipment, passenger transport, warehousing and storage are identified as opportunities or strengths in two of the three without being a weakness or threatened in the third region. This confirms the findings of chapter 2 with respect to locational advantages of city regions in high-tech and creative industries and of chapter 3.2.3 with respect to transport and logistics activities.

5 Exploring case studies, some preliminary indications from interviews

In the course of February-March 2020 extensive, 2-3 days' long study visits were performed to each of the seven case-study metropolitan areas. The results of these very intensive visits together with desk research and data analysis are summarized in the seven city case study interviews' reports, to be found in the appendix. This chapter provides a synthesised first insight into the main comparative statements.

Although all the case study cities are affected by the same macro-trends of capitalistic development in the last decades, there are substantial differences in their earlier history of economic development. Stuttgart and especially Turin can be classified as cities dominated by one strong industry, where changes came with the difficulties of the dominating automotive industry. Berlin and Vienna have more diversified economies which also have gone through changes, partly due to the collapse of socialism – having a direct effect on East Berlin while changing the position of Vienna from marginally to a centrally located European city. The political change from socialism to capitalism had direct and dramatic effects on the development of Riga and Warsaw. Oslo is the only city which did not have such abrupt changes in city development.

5.1 Population dynamics and spatial development trends, the nature of the growth pressure

Most of the case study metropolitan areas (except for Stuttgart) are monocentric, dominated by the core city, which is surrounded by much smaller settlements. Suburbanisation can be observed in all of the cases, thus, the relative position of the case study metropolitan areas is very similar to that of their core cities in the comparison. The seven metropolitan areas have been affected differently by growth pressures and competition for land:

- The population development dynamics of the core cities show very different patterns: in broad terms and with some simplification Oslo and Vienna are quickly growing; Stuttgart, Berlin and Warsaw are growing relatively moderately; Turin is around stagnation; while Riga is very different from the others with a strong decline in population. Population growth in most stakeholder cities (except for Riga and Turin) results in a push for rezoning industrial areas to residential use. In Warsaw the housing shortage inherited from the socialist past is an extra factor to crowd out industrial activities.
- Brownfield areas are extensive in Turin and Riga, and are present also in other stakeholder cities (except for Oslo, Vienna and to some extent the Stuttgart region where there are no significant brownfield opportunities of sizable plots). These are the reserves for spatial development, which are however expensive to develop because of contamination and are complicated to utilize.
- Stakeholder cities and urban areas have different environmental protection regulations, which might lead to low share of buildable land against the strictly protected non-buildable areas (e.g. Vienna, Oslo, Stuttgart). There are different levels of competition for buildable land. Oslo may have the biggest problems with high growth pressure, limited amount of buildable land in spatial plans and practically non availability of brownfield areas. The other extreme is Turin, where there is no substantial growth pressure while big areas are devoted for development and brownfield space is available, thus the competition for land is limited.

5.2 Main trends in the development of the economy and manufacturing and factors for location choices

The main trends affecting changes to manufacturing and the economy at large are rather similar, following globally influenced deindustrialisation, in the course of which many manufacturing activities, especially those occupying large surface areas and which are environmentally sensitive, have left the city while ICT and knowledge industry based activities have gained ground. These trends are also relevant to the automotive industry that have dominated Stuttgart and Turin, but manufacturing is still substantial in these metropolitan areas. According to the interviews, the internal restructuring of the whole manufacturing sector is leading towards more automated manufacturing processes, a focus on innovation and creativity and towards higher value-added activities which all require better educated labour force.

Manufacturing in the case study cities is distributed across the metropolitan area, metropolitan belts have a higher share of manufacturing in all cases. The shift of manufacturing from the core city to the agglomeration area was not directly named as a problem in most cases. The major problem with manufacturing may not specifically be the fact that it is moving out from the city, rather the problems with limitations for growth within the metropolitan area. These limits may be employee related (shortage of skilled or unskilled employees) and place related (not enough space for more efficient locations in some urban areas due to high price of land or zoning/administrative issues).

Interviewees in all seven stakeholder areas cited similar reasons for companies relocating from the city core to the agglomeration area, to other parts of the country or off-shore. Reasons for relocation include: high land prices in the inner areas, high costs of redeveloping brownfield sites, lengthy administrative procedures, problems with logistics in dense urban areas, rental insecurity or instability of long-term leases, higher cost of labour within the metropolitan area or due to the protests of residents.

In some of the cities, an additional factor is the lack of suitable land available for larger development projects. This can be a problem even at a metropolitan level, for example in the Stuttgart region, due to the resistance of smaller municipalities against rezoning land for industrial development. Another factor is the stricter environmental regulation in urban cores and surrounding settlements that result in polluting industries leaving the metropolitan area.

5.3 Main challenges and conflicts of future development in manufacturing

To a certain extent, all the case study cities are concerned about the present tendencies of the development of industry and manufacturing. The reasoning of the cities, however, are different:

- The dispersed location of manufacturing results in commuting that can cause traffic problems (all stakeholder areas).
- For foundational forms of manufacturing (manufacturing that the city depends on), the movement away from the city results in direct deficiencies (Berlin, Oslo).
- Strong population growth and related (housing) development are consuming industrial land which threaten with reduction of job diversity (Oslo, Vienna).

- Growth of larger businesses requires suitable space for new development, while contiguous developable land is limited (Stuttgart).
- Demand for and supply of labour in manufacturing do not match. This results in unemployment of low or unsuitably skilled labour on the one hand and a demand for specific skilled workforce on the other (all stakeholder areas).
- Industry has left, or has undergone a strong re-organisation of production, and the resulting abandoned brownfield areas are causing problems but providing also opportunities, if turning into creative quarters, scientific parks, entertainment venues, places for small businesses (Turin, Riga).

5.4 Public sector visions for the development of manufacturing

All interviewees noted that it is not easy to develop a well-defined vision for the future of manufacturing inside the metropolitan area. There is serious competition for scarce resources, such as available developable land, especially in growing cities. It is a matter of political consideration what priority the preservation of manufacturing gets. In addition, it has to be noted that keeping manufacturing within metropolitan areas is not a political priority for leaders who prioritize residential (housing) and office related activities over the existing forms of manufacturing. Often also residents are protesting against industrial use or even the development of mixed-use areas. Cities mostly support only clean and knowledge-intensive industrial activities (innovation hubs). Among the stakeholder cities Warsaw is the closest to this thinking and in a given period this was also the strategy of Turin.

There are, however, cities (Vienna and Berlin) where there is a growing recognition for the need to keep some manufacturing related activities inside the city, to support foundational forms of manufacturing, facilities related to logistics and public services. Oslo has embraced this position, emphasizing the importance of manufacturing jobs for lower skilled city residents.

5.5 Tools for the municipality to influence spatial development processes of manufacturing

In the majority of European cities, the main actors in industrial development processes are the (mostly private) landowners and private developers. Municipalities usually do not interfere directly into the negotiations between these actors. However, there are some tools available for municipalities to influence development programs in urban areas.

Direct public ownership of land on a large scale is not common nowadays. Vienna still has land reserves (mainly for residential development), while Berlin and Oslo had already sold most of these on the market. Recently their strategy has changed and started to purchase land. In Berlin land has been purchased for foundational activities, start-ups, and innovative hubs. The city offers land on a long-term lease basis to entrepreneurs, often below market rates. The Senate of Berlin recently introduced a rent cap for not only the housing sector but also for industrial land. This is seen as a radical tool and is highly contested.

A more indirect tool to regulate the dynamics of the real estate market is through planning and zoning procedures, linked to financial and taxation systems. All stakeholder cities have well developed planning systems, including strategic and binding/detailed planning regulations. Most commonly zoning regulations determine the possible functions in given areas, but these

operate more as protecting rather actively encouraging structural change. In some cities there are several legal possibilities for exemptions (such as in Warsaw, where national legislation enables developers to ignore the local zoning plan in order to accelerate investments), in others land owners simply do not sell land or do not start investments until the land has been rezoned to a more profitable category. The interest of cities to rezone land might be constrained when national regulations limit the taxation of land value increase or make this impossible at a local level (as in the case of Oslo).

In many cities there are interesting experiments with more flexible land use categories, such as the mixed-use zoning category (Oslo and Berlin) or the conditional zoning (Vienna). The development of local spatial frameworks (a masterplan) within dynamic areas provides an opportunity to make planning more participatory and focused on the desired functions by involving potential stakeholders. Such or similar practices (e.g. planning guidance for public space) are experienced in Oslo, Vienna and in a bottom-up form in Warsaw.

The taxation systems, even if being determined mostly on national level, offer tools and also influence the motivations of local municipalities to intervene into the processes between private actors. There are huge variations in the regulations of the main forms (such as personal income tax, real estate tax, business tax) and what opportunities they create for local municipalities (Tosics, 2013). For example, in Latvia municipalities cannot levy any local business-related taxes, thus municipalities' prevailing interest relates to the personal income tax. In Poland municipalities can lower local business tax to attract enterprises into their area. In Stuttgart local revenues are based on jobs, while in Oslo national taxation dominates, any forms of local tax revenues are insignificant. Depending on these taxation forms, in each city there are different attempts existing to sign development agreements with developers to get contributions from them.

There are some initiatives in the stakeholder cities on bottom up networks of local enterprises in order to represent their interests more efficiently. Such is the Motzener Strasse initiative in Berlin, consisting mainly of traditional trades and repair businesses which joined their forces to more efficiently resist crowding out effects. In Oslo, Paadriv is a more recent initiative, a social hub with enterprises and individuals networking for sustainable development.

Such innovative tools can provide a more flexible framework to enhance desired industrial activities, but experiences are varied to what extent the cities can achieve in reality the result wished for.

5.6 Potentials for metropolitan cooperation

The dynamics and strengths/efficiency of metropolitan cooperation is very different across the stakeholder areas. Stuttgart has a strong (elected) metropolitan level government but individual municipalities can't be pressed for growth beyond their will. Turin, despite its strong legal metropolitan structure, does not function optimally in terms of delivering projects, due to its territorial differentiation and its limited competences and resources for implementation. Oslo

previously had well-functioning cooperation between the city and its metropolitan area, which has changed due to reorganization of the region. Berlin and Brandenburg have a joint planning authority (with limited competencies) while the regional administrations are separated. Warsaw has only lately started metropolitan cooperation within the framework of EU Cohesion Policy funding, using the Integrated Territorial Investment (ITI) instrument. Vienna has only very vague metropolitan cooperation and separated regional administrations in the metropolitan area. Riga and its surrounding area constitute one official planning region, however without proper spatial scale and competencies (the real metropolitan area has an approved Development Plan since January 2020).

As a consequence of weak or inexistent governance mechanisms for cooperation between the core city and the surrounding area, neither spatial planning nor economic development strategies are jointly elaborated. Even in those cases where the metropolitan area has greater competencies (e.g. Stuttgart), coordinated actions remain hard to enact. Even if the regional zoning plans allow for industrial development, municipalities do not support new industrial investments because of local opposition from residents. Furthermore, municipalities can have very different preferences in economic development supported by very different tools. Thus, the fragmented systems also affect the implementation of higher-level economic development strategies. There are some good examples for cooperation between municipalities in the metropolitan areas, but these mostly concern transport systems and public services and less economic development.

It does not seem as realistic to change the generally fragmented governance systems of metropolitan areas in the near future. Even so, some examples show that common interests and smart incentives may lead to cooperation between the core municipality and the municipalities within the larger metropolitan area. A few strategies include:

- Municipalities in the metropolitan area can jointly develop future vision of specific industries which can be followed by planning and implementing concrete actions. A good example is the aerospace district in Turin metropolitan area, an innovation hub, which developed from a committee to an institutionalised cooperation. Also, in the Turin region, the regional policy supported the I3P incubator to invest into an innovative industrial supply-chain.
- Within Berlin a good example on cooperation is the Tegel airport area development
- In the Stuttgart region, a strategic dialogue has been launched on the future of the automobile industry as a new form of institutionalised collaboration. Furthermore, the regional government has its own Stuttgart Region Economic Development Corporation which supports networks of SMEs in order to facilitate the development of clusters in the region.
- Vienna established an agency, called SUM, to enhance cooperation among its districts and surrounding communes through regular informal meetings. A concrete result was the establishment of a joint enterprise zone of 8 municipalities in Lower Austria.
- In Poland, there are examples for establishing joint Development Agencies across municipalities in the metro area. Such agencies, e.g. in Krakow, Wroclaw, do the marketing to attract new investments, which might be located in the surrounding communes, while the core city plays a key role in the provision of highly qualified professionals. Warsaw does not have such an agency but had positive experiences

from the Integrated Territorial Investment cooperation which provided the framework for joint EU funded transport and infrastructure developments.

In the course of the current interviewing process it became clear that in all of the case study areas there is a view that more metropolitan cooperation is needed to handle different problems related to the protection and development of manufacturing. Most cities also agree that besides joint metropolitan planning, a well-positioned, strong metropolitan agency is needed which could actively step up solving concrete problems. This could include creating a link between economic development and related infrastructure needs and promoting economic development in privately owned areas. Stuttgart already has a strong metropolitan organisation, while in Oslo, Berlin, Turin and Warsaw there are discussions about the establishment of such agencies.

5.7 Main takeaways

1. **Competition vs available space for foundational activities**. The stakeholder areas (being major metropolitan areas of Europe) are all undergoing similar restructuring of their economies that result in decreasing share of manufacturing in employment. However, this restructuring process, under increasing growth pressure in most of the stakeholder areas, has different spatial and structural consequences, linked to the differences in the competition for industrial land. In those stakeholder areas where the growth pressure is lower and there are brownfield areas available (e.g. Turin), the major challenge is making the local industry more competitive. While in areas where there are no land reserves and the growth pressure is intense, manufacturing may leave the urban core causing deficiencies with regard to foundational activities and to the lack of jobs for the lower skilled (e.g. Oslo).
2. **Dependence on strong metropolitan governance**. Seen from outside metropolitan areas are the economically feasible territories of productive industries. From local perspective, the optimal distribution of activities, supported by proper land use, labour force capacity and transport patterns, is of crucial importance. In reaching this local optimisation, even the strong metropolitan areas turn to be weak in terms of lacking effective governance systems. The different interests of individual municipalities in the metropolitan space make the coordination on metropolitan level rather complicated – but a must in order to boost innovation and keep basic industrial functions in the metro areas.
3. **Finding smart local strategies**. Several good initiatives were revealed in stakeholder cities also on the metropolitan level to ensure more balanced development of different functions and modernisation of industry though they still play marginal role. Smarter use of financial incentives, planning and taxation tools and making the process of spatial planning and economic development more participative on local and metro level might lead to more favourable results in terms of keeping and modernising industry.

6 Strategies for metropolitan areas - future steps

Chapters 2-5 of this report have shown knowledge generated through statistical, qualitative and desk research. The MISTA project includes two steps to develop 'strategies' for industrial areas and to manage economic sprawl, namely: through the futures workshops held with the stakeholder cities and the development of an atlas of inspirational cases. The MISTA team considers these two steps as a key learning experience, not only to develop the output of the project but also to present an alternative approach for addressing the complexity of MISTA's key objective noted in the Terms of Reference: 'enhancing [the city's] spatial and economic governance strategies in respect to industrial and manufacturing sectors…'. More precisely, this section addresses the project objective of creating a framework of good practice. Over the following pages, the building blocks of these two steps will be described, informed by experiences noted in chapters 2-5. See the annexes for more information on the process.

6.1 Adapting the paradigm

As a result of work done in chapters 2-5, **three main challenges** emerged that are affecting public authorities even if they are well aware of the complexity of industrial and urban manufacturing activities. The workshops and inspirational cases will be limited in their impact unless they open up a new paradigm for industrial areas and urban manufacturing by addressing barriers such as the three illustrated here.

1) **Overcoming cognitive dissonance**

Until recently, urban and metropolitan authorities played a light hand in developing industrial areas. It is uncommon for public authorities to actively support their urban manufacturers or to embrace their productive economy, yet as noted in chapter 5, all cities interviewed have expressed the need to protect industrial land and support productive activities in the future. Many cities have tabled topics like circular economy, low carbon mobility and food resilience, all which depend in some way on industrial areas and the productive sector. In practice the stakeholder cities are finding this easier said than done as most are either struggling to fight hard-wired development trends that are focused on profitable short term outcomes (such as housing and commercial) or they instinctively invest available finance in improving public infrastructure (like schools, roads or healthcare) rather than boosting their local economy. This tension is resulting in *cognitive dissonance* (Festinger 1957) which occurs when two or more conflicting beliefs, ideas or values are held. In many cases, because manufacturing activities and industrial land is far from the general public's concerns, other activities (such as housing or open space) have taken priority. One manifestation of attempts to deal with cognitive dissonance has been the development of industrial co-location projects (mixed use housing and productive space), which is often not ideal for both residential and productive activities, resulting simply in the gentrification of industrial space. Another manifestation is the compensation of lost jobs with social housing. The challenge therefore is to find solutions that do not result in poor compromises and unintended consequences.

2) **Distinguishing between the personal and the institutional**

Cities are increasingly faced with taking responsibility for bigger crises and more complex challenges. In numerous examples of crisis, from health pandemics to natural catastrophes, mayors and metropolitan area governors have proven greater levels of leadership and trust from their constituents than on offer from their national level counterparts. Cities are very well equipped to deal quickly with complex challenges by accessing local expertise, skills and technology. Yet, as stated in chapter 5, adopting an official longer-term vision which embraces manufacturing or the productive sector is fraught with problems due to institutional mind-sets, political agendas and fierce competition for available resources (such as available space and finances). Some public institutions are limited in their capacity or interest to collaborate for numerous reasons (mandate, budgets, political friction, lack of trust…). Regardless, most individuals at face value will agree that cities depend on many forms of industrial and urban manufacturing activities. This contradiction between the individual's perspective and the organisation's mindset is the source of tension. The challenge is to find ways to overcome institutional friction.

3) **Adjusting the role of the public sector**

In the past it has been the responsibility of the national level government, with implicit or explicit, direct or indirect industrial and developmental policies to help drive innovation and regulate the market. The public sector in cities has long supported industry and manufacturing through funding education and providing basic infrastructure (roads, sewers, water pipes, electricity…). At the advent of formalised land use planning, industrial zoned land provided a form of subsidy by reducing land use values while trying to organise the city according to compatible functions. During the aftermath of the second world war, an innovation partnership became increasingly common, where public authorities financed research organisations to develop knowledge which could be commercialised by the private sector. This was referred to officially in the 1990's as the triple-helix model (Etzkowitz & Leydesdorff 1995) and led to new types of hybrid knowledge and production spaces including science parks university technology campuses. In recent years, cities have shown a more active role in supporting manufacturing and industrial areas in a range of other ways. For example, public investment has been made to stimulate business development of local start-ups, funding research and innovation that suits local clusters (Tierlinck & Spithoven 2018), subsidising low skilled job creation and investing in space for businesses foundational manufacturing businesses that the city depends on. This shows that some public authorities are prepared to 'correct' the market and diversify local economies. The challenge is to refresh the possible roles and tools available to public administrations in addressing ambitions for industrial areas and manufacturing.

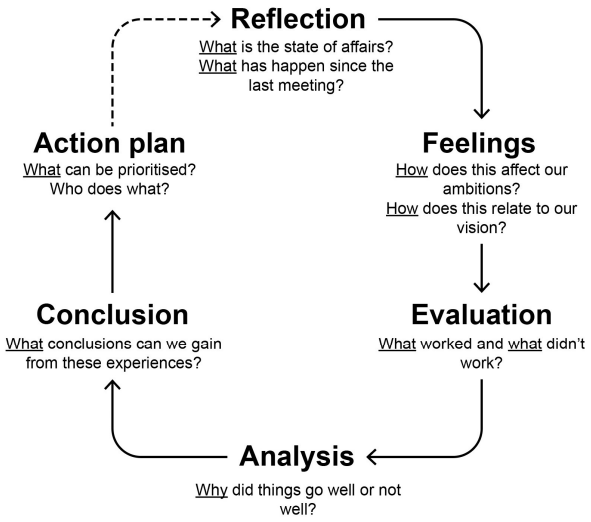
6.2 A learning process

Industrial areas and urban manufacturers need significant incentives to adapt or change, yet change is a sensitive topic. Public authorities cannot simply set a planning framework and expect it to be realised if businesses are not signed onboard or if policies have unintended consequences for the productive (or other) sectors. Furthermore, links are needed to stimulate

exchange between research organisations, designers and distributors to get the most effective value from the industrial areas and manufacturers. Industrial areas and manufacturing are in constant flux, evolving according to the supply and demand of technology and materials. Public authorities must also be adaptive, observe changes, be prepared to test and evolve.

Cities can embrace a reflexive approach which employs short cycles of self-examination and action at the heart of the process, thus parting from traditional rigid planning approaches. This sets the scene to implement the most suitable strategy according to the challenge at hand in order to be both proactive and suitably prepared for the ebbs and flows of the market. A simple method involves 'learning by doing', known also as 'experiential learning' (Gibbs 1988). Refer to Figure 6.12, showing the six-step method that will be used during the 'futures workshops' and will be elaborated in the following steps of the project.

Figure 6.12: Six step method for futures workshops



Source: MISTA team original illustration, diagram based on Gibbs 1988.

The workshops conducted in all stakeholder cities will be used as a precursor to test this method, which cities can embrace in the longer term. The stage will be set for collaboration within institutions but also across institutions and with external experts. The inception report provided a first overview of the methodology that will be used. Refer to the annexes of this report where the methodology is further developed.

6.3 Seeking inspiration

Industrial areas, urban manufacturing and productive activities in European cities are exposed to similar trends and challenges (as noted in Chapter 2 and 3). However, the strategies required to support and strengthen local economies and business dynamics are often unique to a city's history, culture, urban form and financial health (as noted in Chapters 4 and 5). As stated above, the role of the public authority in addressing how this topic is evolving. The focus of the MISTA project will result in a palette of strategies. Nevertheless, all the spatial strategies that could be employed will depend on a range of variables such as political ambition and leadership, the

competency and resources of the city's institutions, the capacity for collaboration from the private sector, available infrastructure and the intensity and density of collaboration among the networks of its industrial businesses and public actors (as indicated in Chapter 5).

Strategies for metropolitan industry and economic sprawl at the disposal of public authorities and policy makers will fall into three categories (Hill et al 2018) which will be used to select and categorise the inspirational cases:

1. **Vision**. In order to create momentum or to galvanise a movement, a vision is vital. A vision may be translated into governance framework and/or policy. A mission-oriented approach (Mazzucato 2018) may target specific issues such as the circular economy or low carbon mobility. Visions generally depend on soft power and therefore require stakeholders to sign up to the vision for it to be enacted, which may be politically challenging to achieve. If vision documents are credible, they can replace official policy. A vision may result in plans or concrete projects. Strategic planning processes try to channel stakeholders towards shared or at least in common definition of the problems and possible spaces for cooperative focussed action, often entering in the economic development sphere (strategic planning).
2. **Plans and Programs**. Plans are developed to structure or channel investment into a particular site or to address a particular issue. Neighbourhood development programs or an urban design plan could focus on an area or on a piece of infrastructure like a road and will define proposed interventions. Public authorities often develop plans that are executed through private investment and controlled by zoning regulation or development conditions. Programs, such as a circular economy plan, will focus on rolling out a particular issue. Programs may also be attached to financial instruments such as taxation or investment into projects which will result in or fashion projects.
3. **Projects**. Public investment is often needed to cover essential infrastructure, to pioneer new technology and showcase new development approaches. Projects can involve services such as training, education, research and development in order to activate spaces. Projects may be public or private-led.

Based on these three typologies, an atlas of Inspirational cases will be built. The role of Inspirational cases will help share knowledge and create a common language to tackle the problems and opportunities presented in this interim report.

The inspirational cases will be selected for policy design and the policy process. Cases will be selected primarily subject to the relevance and application to the specific features and conditions of the seven stakeholders. However, considering the diversity of the stakeholder cities, it is assumed that the inspirational cases will be relevant to a vast range of other European cities. The inspirational cases will be selected in their capacity to stimulate the production of a reflective learning cycle. In this sense they will be used also in the occasion of Future workshops and Inspirational cases workshop (see inception Report) in order to produce not only a simple process of knowledge transfer, but a process of innovative, situated, strategic and place-based knowledge co-production among the stakeholders involved. A list of criteria to be included can be found in annex 6.

6.4 Working with uncertainty

As a result of the COVID-19 pandemic, there are concerns with the capacity for the futures workshops to be carried out. The MISTA team has taken these considerations into account when developing the workshops and have defined alternatives which will deliver suitable results. Refer to annex 6 for more information on both the workshop structure and the proposed adaptations to deal with possible travel restrictions for meetings.

List of Annexes

Annex 1: References

Annex 2: Additional information on chapter 3

Annex 3: Additional information SWOT analysis (chapter 4)

Annex 4: Database of stakeholders

Annex 5: Case studies reports

Annex 6: Futures Workshops

Annex 7: Data (indicators and sources used in the report)

For annexes see separate files