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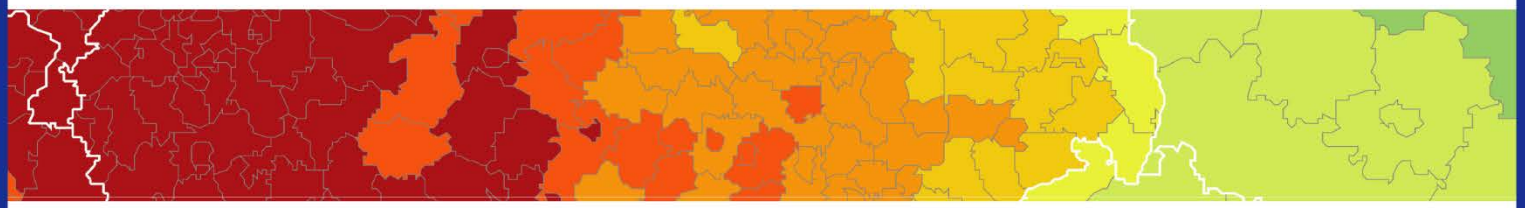

MISTA
Metropolitan Industrial Spatial Strategies & Economic Sprawl

Targeted Analysis

Annex 3.2
Case study report: Oslo (NO)

Annex 3.2 – Case study report: Oslo (NO)

This targeted analysis activity is conducted within the framework of the ESPON 2020 Cooperation Programme.

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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

Executive summary

Over the last half century, Oslo's economy has shifted away from production of physical goods to the provision of services particularly for a strong energy export sector. By today most of the former heavy industry in Oslo has been relocated, while the service sector has grown fast.

The city of Oslo, as an administrative and services centre, has grown by 32% between 2001 and 2018 to 676 000 people and is planning for a further 100,000 new dwellings for the additional 200 thousand residents to be accommodated into the city over the coming 20 years. Economic planning is positioning the city as a business centre. With little policy, political interest or knowledge of how production and manufacturing are embedded into the local economy, strategies are required that provide space for new housing development without impeding the city's basic need for production.

Housing is driving urban development policy. Due to high land values, the pressure for growth, housing affordability problems close to the city centre, low rates of social housing (5%), a tax-regime which favours home ownership and a Norwegian mindset of land ownership, all possible development opportunities are being explored for housing to be expanded. The main conditions for any solution are clear: quick population growth, strong and restrictive zoning policy strictly protecting forest and green areas, non-availability of underused or brownfield areas.

Under these circumstances there are two main alternatives to house the population growth to be expected by 2040:

- densification of the existing urban areas – this is in process done in a "silent" way but there are strong local protests from residents with single family housing which is greatest part of the city.
- pushing out existing industries, which concentrate in the Grorud valley area.

Densification of low-density housing is seen as a slow or challenging option due to NIMBYism and community push-back. This has left industrial land as an attractive target for redevelopment and transition to housing or services-oriented functions.

Although housing is one of the main priorities of the city leadership, politicians agree by now that the loss of manufacturing and the related the jobs should be avoided, partly because it is important to keep foundational economy and jobs for the low educated people within the city. The case study describes this dilemma: how can the strong population increase be handled to avoid that well embedded industrial areas be pushed out from the city?

Oslo is one of those case study cities where the conflict around existing industrial areas is the sharpest. Regarding the transformation of industrial areas a crucial question is the regulation of mixed-use development which usually leads to a spontaneous process, where new developments of housing and office functions step-by-step crowd out industrial activities. The city is looking for innovative ways, to slow down this process, offering a planning framework with no legal power but using it as basis for discussions with developers and landowners.

The gravity towards housing may satisfy pressing needs, but little is known about the long-term consequences for the local economy and how this could affect other kinds of sectors that the city depends on such as food, vehicle maintenance and construction (representing aspects of the foundational economy). Furthermore, with this real estate pressure, low skilled jobs are increasingly being moved out of the city to the urban fringes which could present an accessibility challenge. Experiences to date in developing mixed-use projects, in order to retain some of the industrial activities within the city centre, have been challenging due to design issues or social friction.

Data analysis has shown that the employment structure of Oslo reflects its role as an important transport and infrastructure hub and its gateway function for the Norwegian economy. As a consequence, many of the most important branches of employment are associated with activities in wholesale trade, construction and transport, while only very few of these branches are active in the manufacturing sector. This specialisation pattern applies to both the Oslo's core city as well as to its surrounding area.

The majority of these localised branches are also well embedded in the industrial landscape of the city region and in general show a good growth performance. From a policy perspective this suggests that economic strategies based on these strongholds of the Oslo economy have a good chance to be successful. It also underlines the importance of developing such strategies jointly for the core city and the environs.

Next to these strengths many of the fastest growing sectors in terms of employment in Oslo are operating in public utilities that are active in waste disposal and water and energy supply. These branches mainly profit from a combination of urban population growth, higher demands for high quality municipal services, increasing demand for the cooling and heating and the increased ecological awareness of the population. They are likely to also be important sources of employment growth for the future and will pose additional demands in terms of land use.

In addition, there is a number of fast-growing branches in manufacturing that are mainly either producing consumer goods and/or in high technology and knowledge intensive industries. These branches are also usually well embedded in Oslo's economy. This suggests that these two areas of core manufacturing are facing favourable growth prospects in the region.

Oslo has potentially much to gain from a well-integrated economy which retains productive activities and manufacturing embedded into the urban fabric. The vibrant research and development connected to the universities may require technical skills to develop prototypes and short production runs to support other areas of the economy. Technical clusters could be built and become more vertically integrated, particularly where the cluster produces a physical product (such as the health industry). Employment pathways could be developed to address the social agenda that includes accessible skilled labour jobs in construction, food processing or managing waste resources for a circular or foundational economy. These sites or locations could be linked with training and capacity building. It would be important that these activities

remain within the city border, not leading to increased transport demand, especially in the form of car traffic.

Despite the challenges of sparing industrial land from redevelopment and rezoning, there is a clear need for planners and policy makers to make informed and strategic decisions regarding what sites to focus on and what activities should be embedded within urban areas. Should space be prioritised in the inner city or should production be located on the metropolitan fringes? With high land value and predominantly single-storey industrial zones, industrial intensification could free up land for other activities. Where redevelopment in the form of mixed-use or industrial intensification occurs, it is critical that the spaces have an indication of possible end-users, are fit for purpose and are flexible enough to be adapted in the future. Furthermore, it is essential that industrial land requires suitable protection to ensure that land speculation does not threaten established activities occupying a site. Finally, with production moving increasingly out of the city, leaving behind low skilled workers, it is essential to define what activities need to be located closer to the city centre and which should be more strategically located on the metropolitan fringe.

The whole Oslo-Akershus area is in fact integrated both regarding the housing market and transport and jobs – on the basis of which it´s possible to influence the local distribution of the growth. The continuation of the good cooperation between Oslo and the surrounding Akershus, even after the administrative restructuring of the regions, is of key importance to handle the difficult growth-challenge of the next decades.

In the Futures Workshop the analysis of the research team and the inspirational cases that were presented raised substantial interest. In the course of the discussions many tools emerged, with ideas how these could be localised to different parts of the metropolitan area: where to allow mixture, where to protect industry while allowing further restructuring in a way that the increased attention to manufacturing would not prevent residential development. Besides, ideas were raised for cooperation with the close functional urban area.

The discussion resulted in ambitious ideas for the local economy and a clearer role of production and industrial land uses within it. Suggestions included more clearly defining what kinds of activities to support. This particularly related to foundational activities that the city depends on (such as food, repair, basic infrastructure and construction). In fact, some participants stressed for the city to be more mission driven and present clear ambitions to help align both public and private actors. This would need to involve a greater level of facilitation, particularly from the City of Oslo.

Sites and locations were considered important. For example, the recent ‘innovation clusters’ were considered an important place to start, particularly if they could fit into a larger economic plan for the city. Mixed use areas remain an attractive idea but require more precision, better examples and particularly better design and design processes to conceive them. Some activities that do not depend heavily on the city, should be encouraged to move out of the city.

This would require some facilitation to link businesses with other locations. Finally, for land that should remain industrial, it requires stronger protection than what is currently available.

For productive activities, Oslo needs to invest in stronger efforts to communicate the value that productive activities provide the city, otherwise residents will have little respect for production activities and in turn these activities will not be well integrated into the urban economy. The communication efforts and the activities of the municipality should be supported by some non-municipal organisation(s) which should ensure, through dialogues, the involvement of other players, such as labour unions, business organizations.

Oslo represents a socially sensitive municipality which functions in a strongly market oriented framework, both regarding national policies and industrial processes. It is reassuring that the municipality is open for new initiatives, the planning department has the right to put new ideas onto the table. The MISTA research gave the city arguments, underpinned with international inspirational practices, to continue their efforts towards a more coordinated development, both across sectors/disciplines (housing, industry, social sector, etc.) and across administrative borders. The innovative and pro-active efforts of the municipal departments towards a cooperation policy for the sake of the public good would serve in the long run also the interests of market players and developers.

1 Introduction

The MISTA project aimed to develop an understanding of the current contrasted and complex relationship between the city and industrial land, manufacturing and productive activities. The project does so through producing an updated and critical understanding of how the sector has evolved over the last decades across Europe and in particular in large urban areas.

The project intends to support (re-)developing a strategic relationship with manufacturing and production systems within the contemporary urban economy and life. In this perspective, the project aims at considering critically the complex debate on the consequences of deindustrialization and changing of the urban economic base. In doing so it heavily builds on the experiences of the seven stakeholder cities/urban areas (Berlin, Oslo, Riga, Stuttgart, Turin, Vienna and Warsaw).

In Oslo intensive research and consultation activities were conducted between October 2019 and December 2020. Firstly, a questionnaire was prepared by the research team and filled in by the local stakeholders in November 2019. This was followed by an online interview with the main representatives of the city and urban area in December. On the basis of the desk research, data analysis, the results from the questionnaires and interviews, a summary paper has been elaborated. This served as a starting point for the extensive, 3-day long mission in February 2020, where MISTA researchers visited Oslo and conducted a series of on-site discussions with the local stakeholders. As a result, the first draft of the Oslo case study report has been prepared by May.

According to the original plans this report should have been validated by an on-site futures workshop in Oslo in the course of May-June 2020. However, COVID-19 made this impossible, thus the workshop had to be postponed to October and even then, could only be organised online. Despite this difficulty, the 2-day long workshop gave a good opportunity to critically revise the statements of the report and also gave the possibility to further develop it in a co-creative way, using inspirational cases as the basis for creative, future-oriented thinking.

The final results of the city case studies are used in the MISTA project in two major ways. Firstly, a comparative analysis has been included in the main text of the final report. Secondly, city case study reports are annexed to the final report as self-standing descriptions and critical discussions of the case of the given city/metropolitan area.

The Oslo case study report on the following pages summarises all the knowledge gathered in the different activities during the one year of the research. The report does not intend to provide ready-made suggestions for the city, as the local stakeholders are very well aware of the local situation – even if different local actors have different viewpoints in some issues. MISTA rather aims to investigate the transferability of the major statements distilled from the comparative analysis, and the potential validity of inspiring practices of innovative metropolitan areas of the EU, considering the particular local conditions of the Oslo metropolitan area.

As mentioned, the MISTA research has been conducted under very special circumstances, dominated for more than half of the time by the restrictions caused by the pandemic. The spread of COVID-19 has impacted not only the workflow and organisation of the project, but also in a more fundamental and challenging way the relevance of the results when the socio-economic fallout becomes more apparent. The empirical data, the interviews and also the site visits reflect the situation before the pandemic. Moreover, the longer-term effects of the pandemic, the changing context for industrial areas and manufacturing, are not fully known yet, there are only different hypotheses raised which are partly contradicting each other. From all these it follows that the MISTA report cannot address the most recent challenges and opportunities presented to the urban areas and to the local manufacturing and production activities.

The Oslo case study report begins with the description of the state of manufacturing in the city region. This is followed by the evaluation of the potential of productive sectors, based on sub-sectoral data analysis. The next section summarises the outcomes of the futures workshops. The main body of the report is followed by an annex, including further details of the data driven SWOT analysis.

2 State of manufacturing in the city-region – based on desk research and interviews

2.1 Main demographic/social and spatial development trends

The population of Oslo was 658th in 2016, and is projected to reach 890th by 2040, thus there is 35% increase to be dealt with within 25 years. According to ESPON SPIMA project, the most common definition of the metropolitan area of Oslo is along the formal borders of the City of Oslo and the County municipality of Akershus, with its 22 municipalities. This is the area of the joint regional plan (1,3 mill people).

Outside Oslo there is also population growth, both Oslo and municipalities in Akershus are doing their own strategies to house their own population growth but they do not cooperate about the numbers of homes to be built. There is cooperation in following up the regional plan for transport-oriented development, including also working together with the closest municipalities on development in the functional urban area. The population growth will gradually lessen in the future, by 2040-50 there is a need for 100th new homes in Oslo alone which would cover the population increase. It means 3300-5000 new homes should be built on a yearly average.

Since the 1950s most of the non-residential areas in the city centre have been converted into residential, with some conversions to offices, retail and services. This is partly true also for the western part of the city, where large areas in the western fringe belong to the university and three hospitals (one private and two public). The areas around Majorstuen, Nydalen and also Skøyen further out west are dense mixed uses areas build around transportation hubs. The Western side of the city has the highest land prices in Oslo, neither here nor in the inner-city manufacturing activities remained.

Despite transforming many parts of the city into residential, due to the quick population growth land for further housing construction is scarce. Oslo is facing a worsening housing affordability problem in the market driven, liberal housing system. The densification of the existing low density residential areas is not easy, as only limited density increase is allowed even if rezoning happens, and efforts for densification within established residential areas meet substantial local resistance. For mass housing production the current industrial areas appear as most realistic option, but this creates conflicts with the existing industrial, logistic and other background service activities.

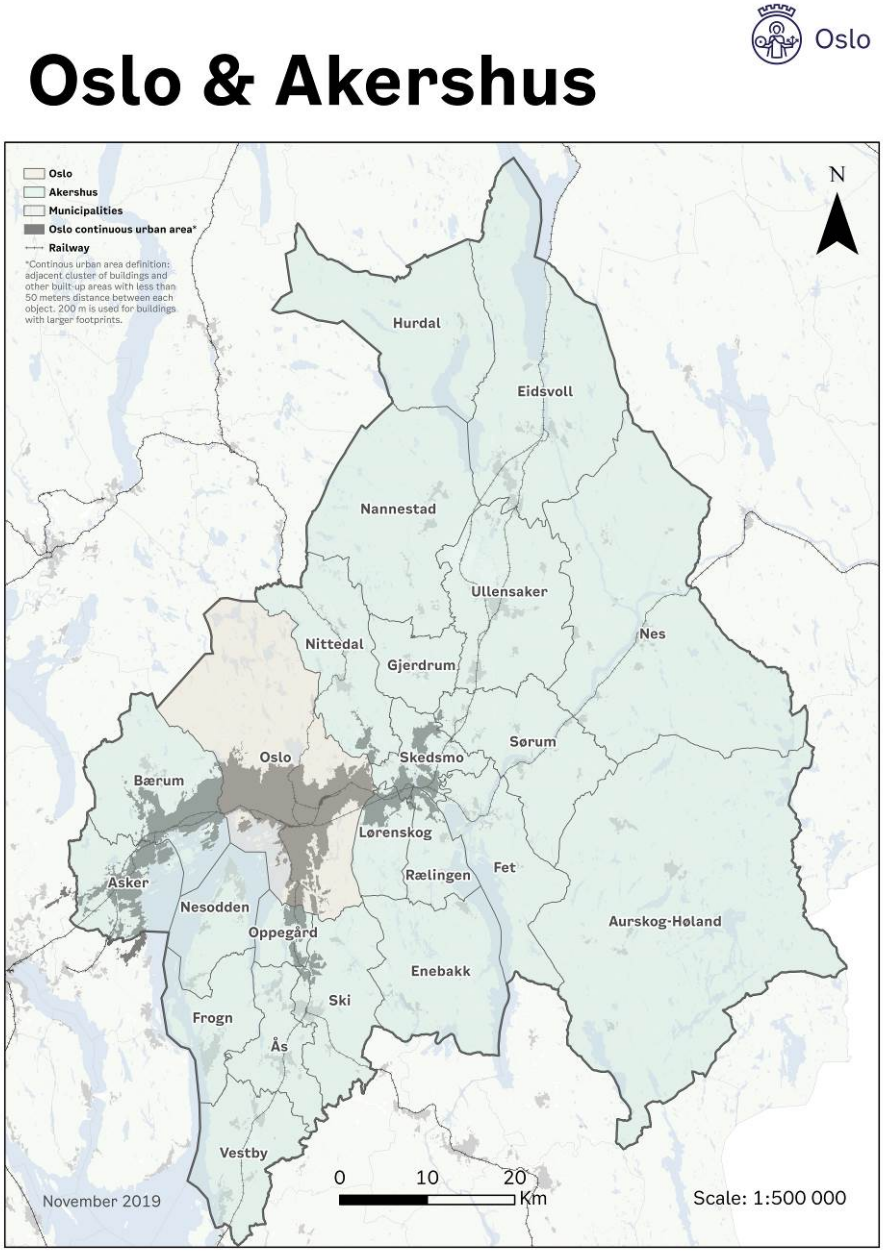
As a consequence of the expansion of the residential functions within the city, the Grorud valley has got its large importance as the last concentration and main place for manufacturing. The Grorud valley is more or less the only place where production, with linked functions, can exist within the municipal boundaries of Oslo.

In Oslo, the problems of transport of people and goods are on the top of the agenda. The metro system is full at peak hours, it gives great access to the centre while less between peripheries and has lower service frequency outside working hours. Parking is restricted in the city centre;

visitors pay a lot in the inner city if they are not residents. In city centre there is almost no street parking, only multi-storey parking with a fee of euro 5/hour.

Regarding goods transport, the main roads are congested in peak hours, for example Alnabru, Alnabru freight terminal is difficult to reach. Efficient solutions for transport avoiding Oslo centre and also better approaches to the logistics centre would be needed.

Map 1: The spatial scale of Oslo and Akershus, covering the metropolitan area).



Source: Oslo Municipality.

Table 1: Main characteristics of Oslo city and Oslo Functional Urban Area.

	Oslo City			Oslo FUA*		
	2001	**2011**	**2018**	**2001**	**2011**	**2018**
Population	508 726	599 230	676 000	1 058 863	1 256 554 (2012)	1 292 000
Activity rate	66.0%	69.4% (2008)	N/A	67.8%	69.3% (2008)	N/A
Unemployment rate	2.6%	3.0% (2009)	N/A	2.0%	2.4 (2009)	N/A
% of mining, energy and manufacturing in employment (NACE 2)	7.7%	4.5%	N/A	N/A	N/A	N/A

*Source: Urban Audit, * The FUA is defined as Akershus county.*

2.2 Main trends in the development of the economy and manufacturing

Industry has changed in the last 20-30 years: traditional industry already moved away, now the second wave is here and even this might change in the future.

The costs for central locations are increasing, standard warehouses are disappearing while more specialized ones are built for food storage, etc. Manufacturing, warehouse and office buildings are most common and dominating in the industrial areas. In fact, only 60% of buildings are places where manufacturing activities are going on in these areas.

Oslo industry (manufacturing, excluding building industry, in NHO registered businesses in Oslo) employs 9600 persons within Oslo in 240 companies, which is a radical decrease compared to 50 years ago.

Deindustrialization changed the situation; transformation is going on. The industrial belt in the Grorud valley continues beyond the city border, where some neighbouring municipalities have got industries which were pushed out from the city, e.g., around road 159, heading to the east, till Strømmen in Lørenskog municipality. Other industrial areas lie to the south, as far as Vestby, mainly those that needed larger space, such as logistics but only little manufacturing.

The moving out of industry from Oslo speeded up 15 years ago, to places up till 15-20 km-s away, but not further. New opportunity would be around the airport, but this is considered to be too far, 60 km from the city.

Not too much process industry was or remained in Oslo – except for food production. Only the building industry is expanding, driven by the large demand to build public and residential buildings, roads, infrastructure.

Another push factor in the East corridor, besides growing housing needs, is the restructuring wish of the large logistical centre in Alnabru. The aim is to increase its capacity, put more on rail from roads. There are many options existing regarding this complex issue. First ideas considered replacement towards outer areas, including satellite areas as well. More recently

expansion of capacity would happen on spot. There is a national transport plan on rail freight terminals. Over half of freight coming here serves the Oslo and Akershus area and the distribution system is very advanced. To increase capacity would need more space. However, there is no more space, thus the capacity increase would need densification, which would be extremely expensive. Some road freight depos have been established outside Oslo, but the main restructuring will go on this spot.

The restructuring of Grorud valley is going on along market lines, without detailed influence of the public sector. This also means that the industry and low-density facilities for technical services are gradually pushed out from the city. The question is who the losers are (from different perspectives, e.g., services needed for the city residents, doing services from here or from one hour distance away). Can public services, e.g., snow cleaning, be done from outside Oslo? On the other hand, for some industries, such as wholesale (30th jobs registered), logistics, it would not be a large problem to move out – despite the fact that some of the businesses registered as wholesale are located recently in the city centre.

The present restructuring produces some spatial mismatch regarding jobs and housing: the tendency is that manufacturing jobs are moving out while low educated people stay within the cheaper parts of the city. For the moment this is not a serious problem as the public transport system is fairly affordable, allowing people to commute between the city and surrounding towns. The transportation system is well structured to handle traffic towards the city centre, but mobility between corridors is more difficult and either requires travelling through the centre or using less frequent bus routes.

2.3 Main factors affecting locational choices of manufacturing

Taxation system is largely centralised in Norway, taxes are collected by national office. A fixed percentage of income tax is held by each local authority and the rest is redistributed to each local according to need. The only significant locally prescribed tax is property tax. Oslo introduced a local property tax in 2016 and some neighbouring municipalities also did it, but not in the western municipalities with stable conservative local leaderships (and also more well-off people). The tax is set as a small percentage of the property value[1]. In case of residential properties, in Oslo only the most valuable properties are taxed. The property tax was introduced by the left-wing city leadership. Debates are only about the residents' tax; companies are not complaining.

Taxation policy and the collection of taxes in Norway are centrally determined. All taxes are collected centrally and then allocated along clear and transparent objectives and indicators, based on needs of local governments.

[1] The tax is 0,3%. The municipality can only increase the tax with 0,1% annually, and the maximum level is 0,7%. In the budget the property tax revenue for housing is estimated at 0,6 billion NOK annually and 1,0 billon NOK for commercial properties.

Wage levels and taxation differentiation do not influence location preferences of companies. Relocation decisions are much more influenced by the land prices and rezoning issues.

Currently the Oslo city Agency for Real Estate and Urban Renewal is preparing a strategy for the role of the industry and manufacturing, which would be more protective to industrial activities. The agency estimates the need for industry in the city, its climate and social (in terms of jobs) consequences. It is known that to move some of the industry outside of the city may have more negative consequences, e.g., because of the increased transport.

The main factors affecting the future development of manufacturing can be summarized as follows:

- Population growth cannot be stopped in an open society (only influenced indirectly, through a restrictive zoning policy).
- Forest areas around the city border cannot be touched (state level policy). Green spaces within the city are also protected (municipal policy).
- Silent densification is going on, but there are strong local protests in single family housing which is greatest part of the city – thus the densification of nice historic areas cannot be achieved to larger extent.
- For all these reasons the main development pressure from the side of the housing construction sector is on the industrial areas.

The main dilemma is: how can population growth be handled to avoid that the well embedded industrial areas be pushed out from the city (which would cause lack of jobs and even harm the smooth provision of public services also causing more environmental harm as important background activities are also pushed out beyond the city boarder)?

One of the potential answers on this dilemma is the densification of existing urban areas. There are many examples on such densification attempts:

- **Ensjø Area development:** transformation from car-city to housing, plan for gradual redevelopment. This was the first framework plan, developed 15 years ago by the city for a whole area which is predominantly in private ownership (city ownership only 15%). The idea was that if landowners see that residential use would also be possible, they will gradually change, not prolonging the licenses of industrial land uses and hand in plans for new housing construction (as this results in higher revenues from the land). In the original framework plan no mixity of functions was envisaged. The plans people got when buying their flats shows totally residential area, with large green areas. However, much of the planned green areas are still not existing, while many industrial buildings got renewed licenses lately. Before recent elections there were big debates and protests: people who moved to here wanted to get the promised parks[2]. Based on these experiences the city makes framework plans now more precise, with deadlines for the different tasks. The city has learnt a lot from this case.
- **Sæter,** in the south of Oslo, traditionally a villa and family house area facing the issue of densification. Developers are the initiators of changing the zoning plan.

[2] One of the underlying challenges is the legal framework for development agreements. According to the current law it is not legal to include financing of already built infrastructure in development agreements, thus if the municipality wants private financing of infrastructure, the infrastructure must be built after the development agreement is signed.

Ekebergveien and Nordstrandveien crossing – around this centre (tram stop and bus stop). After a denser zoning land value increases dramatically. Developers coming in and start to talk to the owners of houses. People face daily different developers offering above market price for the property. Some people became upset about this. Municipality published the plan and got angry remarks: no development is needed as villas are historic, or if development, it should be done by the municipality, not private developers. Other options than demolish the villas might be making them a bit denser. Recently developers bought one by one plots and rebuilding these. In the rezoned area in 2006 the owners organized themselves and protested that denser building will ruin the image of the area. But city insists that TOD is needed for the whole of the city therefore the zoning was changed around the district center along the bigger roads. Gradually 2-3 storey new buildings are built, replacing earlier villas

- **Smestad** in the west part of Oslo is a villa area, among the best-connected areas in Norway and one of the highest prestige areas in the city. There is huge resistance against any plans for densification. The city is proceeding, being aware of the strong local opposition. National road goes through the area. The city offers some increase in quality of life (new park, open a stream…) but for those who are against it, this is not an argument.
- **Kjelsrud, Alfaset location**, an industrial area, where most land is owned (or controlled) by two big landowners. One of them wants to develop it, while the other does not want change and has a lease agreement contract till 2040. Densification ideas include mixed use, even housing, although this is unlikely that anyone would move here to live (without significant change to the overall area). The city is preparing the area zoning plan, even if one of the landowners does not agree. The lease agreement remains valid until no major changes are requested. After the new zoning plan is passed by the city council the real estate developer gains a lot on the land price increase which is not taxed – there are discussions on that though it is not possible for the moment.
- **Økern:** empty high-rise building, and previous shopping center. Large transport investments: subway was here since long, but now total regeneration of subway station, developing it into transport hub, also a new tram lines is planned. All the resources for these transport developments come from the toll-ring revenues of the city. If public transport development is reaching an area, the transformation from industrial to higher-value residential use is speeding up. There are already signs of that: previous liqueur factory transformed into housing. In such cases the city has to intervene if the aim is to keep mixed use: some parts of the existing industrial use have to be protected, otherwise new residential development takes over the whole area. For example, Vienna protects some industrial parts (mixed means that in such areas some parts of the old use have to be kept), while Oslo is not. Vienna experience shows that the best is if mixed use is planned beforehand.

These “area case studies” clearly show the huge conflicts around the densification efforts in residential areas, and also the consequences of allowing mixed-use development in industrial areas, leading in the longer term to the crowding out of industrial activities.

2.4 Development preferences of the city (region) leadership

Up till 5 years ago conservative coalition was leading the city, with strong focus on high-end jobs, consultants, banks, research park around the university. Industry owners in the Oslo east

corridor had the feeling to be under threat, people thought functions in these areas will be pushed out by offices and housing.

For 5 years now there has been a red-green leadership which is re-thinking the situation. Now an economic-planning cooperation started about the industrial areas: why are these areas important, what can be done here? There was little interest in interventions in industrial land in the East corridor by the conservative city government as they did not intervene into economic matters. However, in the Grorud valley there are 80 thousand jobs, many of them relatively low-paid jobs - though only a smaller part of them is in manufacturing (others are more in logistics, warehouses etc.)

The case of the harbour area (10-15 years ago) is a good comparable example for the market-driven development policy: there was a debate in the city, what to use the harbour area for? Market restructuring has resulted in total conversion of the previous harbour into expensive office space and non-affordable private housing. Fortunately, the new harbour is still within Oslo, its capacity has been increased. So generally, this restructuring process went on well, but this model cannot be applied in other areas. The East area is different, there are many low paid jobs and lot of functions what the city needs, thus it is important to revise the market processes and rethink what should happen.

Housing is one of the main priorities of the city leadership: how to secure enough flats for a growing city. Current city leaders have affordable housing on the agenda, however, without an exact plan how to produce this, especially as the scope of public intervention is very limited. Until now Grorud valley has been one of the affordable housing areas in Oslo, prices are moderate as the area has mixed reputation[3]. The price of new housing developments in the valley is lower than the average of the city. This might change as the housing production continues crowding out industrial activities (this already happens in parts of the valley near to the inner city).

Politicians agree by now that although more housing is needed, the loss of the jobs should be avoided! There is also a political view that it is important to keep jobs for the low educated people. This idea was already present under the right-wing parties although they focused more on attracting of highly talented people. Now it is a balanced view about the two ends of employment.

The link between employment and housing is important: how could workplaces and housing be kept within the city for low-educated people. Norway is an egalitarian country; social considerations always play a role (e.g., the big question in road user charges is how poor people can pay for it).

[3] Some areas of Grorud valley have serious wicked problems with unemployment, low income and education-levels and face issues with noise and air pollution etc. But there are also positives in all neighbourhoods, often with a well-established bike and footpath network, green spaces and recreation areas etc. These positives are usually not mentioned when people think about the reputation of the area.

Regarding the vision for the next 20-30 years, the current city plan continues to have a TOD (transit-oriented development) approach, growing from the centre outwards, especially to the Hovinbyen direction. The plan is to build 100thousands new housing in the city. This is not easy as the city's efforts to enable densification in existing low-density residential areas are met with residential resistance especially strong in more prestigious areas (e.g., Smestad). There are many areas in Oslo where family houses and villas are prevailing (wooden low-rise buildings). Even Oslo-wide FB groups are formed as resistance against densification of existing housing in such areas.

Densification of residential areas and transformation of industrial areas are parts of the dual strategy of the city; however, the city has not set any target numbers regarding how many new housings should be produced through densification and through transforming current industrial areas into residential or mix-used areas. As Oslo does not have any areas for green-field development these are the only options to new housing construction. As zoning planning process focuses on specific areas and not for whole city the exact locations and numbers of housing production are defined gradually through the planning stages of certain areas. Detailed planning is made only for the most important areas (see examples in the next chapter) both in cases of densification and transformation of industrial areas. Housing production is done by private actors, but big cooperatives are also on the market since the 1980s as private developers.

Social housing is only 5% of the housing stock in Oslo, and is organized by municipalities, buying into housing built by others. There is a system for building and supplying welfare housing, financed through Husbanken, a government organisation that originally provided social housing, in the allocation of which homes local district councils play a role.

Akershus has also TOD strategy, outside public transport nodes it is forbidden to build, in the hub places some subsidies are given in the form of infrastructure.

A new affordable housing strategy for Oslo is under development but it is unclear how a new approach could be developed which would be accepted by the market players and the population.

Overall, within the 100 thousand targets for new housing, industrial reconstruction is the larger part. But it might be more costly, as decontamination and substantial infrastructure development is needed. Even so, mass housing production can be done only in and around transportation hubs and in larger areas such as current industrial areas, as in the framework of densification in existing areas only lower rise buildings are viable.

During the last 20 years, efforts to rezone sites with low-density housing near selected metro hubs have been made. Plans for densification through re-zoning have often met local opposition, which has raised political challenges. Regarding the densification of low-density residential areas planning tools can be applied, e.g., allowing for higher density and wait until plot-by-plot changes happen on a bottom-up market way.

In some parts of single-family areas, it is allowed already now (since 25 years) that single family plot changes into small condominiums with max 8 units (the rules are not set per apartment, but the effect on plot-ration and height restraints usually leads to 6-8 units in attached houses or low-rise apartment buildings). Few hundred changes already happened. But protests of the neighbours against densification on the plot have sometimes prevented these plans being realised. Larger interventions would be needed to achieve more significant densification. Municipality could buy properties and join them together in order for denser houses. This could be a procedure to rebuild the area not as single-family housing area but in a new way. The city is already testing such strategies and is doing some preparation work but meets several difficulties, such as local resistance. Thus, it might be the reality that changes can only go on through slow developer led process, pretending that the new 4-6 flat units in a building are looking like single-family housing.

Smestad is a case where the city wants to show how densification could be done in a more regulated way, also offering some public developments (community facilities such parks, playgrounds etc.), but families protest: do not take our garden away. A new zoning plan increases the real estate value creating a pressure on the families.

The planning system has three levels in spatial terms: regional, municipal, local area planning. First a joint overall plan is established by the city planning office to a given area. As it was said, two instruments are used:

- formal area plan, legally binding land use plan (area zoning plan), the development and passing it would take 5-7 years. In this the possible functions are stipulated
- guidance plan concentrating on non-available public infrastructure, and potentials (not binding). Even in this case the city gets in touch with landowners (families, entrepreneurs, public institutions…)

As for the transformation of industrial areas to housing and office use, which concerns foremost the Grorud valley, the planning process is going on for some specific areas (see examples in next chapter). During the planning process the city Agency of Real Estate and Urban Renewal plays the role of brokers between different stakeholders, bringing them together. The planning office presents ideas for development in order to spark up different forms of cooperation. Sometimes more resistance and disagreement evolve among actors.

In several areas of the valley mixed-use is allowed resulting in a spontaneous process where new developments of housing and office functions crowd out industrial activities. Developers of new housing projects communicate toward the public that the whole area will be residential, generating conflicts between new home buyers and the remaining industrial and other non-residential/ office actors in the area. The city and district municipalities[4] should also make their communication clearer regarding the future functions of areas under development: This would

[4] Oslo has 15 City districts, with directly elected councils. But the City districts only have a consultative role in planning and urban development, which is a single function for the whole City/municipality.

make a more conscious planning procedure necessary on the part of the city. Therefore, the city has started to make more detailed planning procedure to some bigger areas in the valley including the different stakeholders. They are also surveying the activities and future plans of the industrial actors in the valley.

The transformation of the industrial areas depends very much on the landowner structure. Many industrial actors rent their plots and already big areas were bought up by developers. When rezoning is done and also mixed use becomes possible, land prices increase substantially. Many landowners therefore are interested to make shorter term rent contracts with the industrial actors, which makes industrial activities more uncertain in the area and actually hinder the industrial actors to invest in their business in the city.

The 2015 municipal plan (the first legally binding strategic plan) made the statement about the 100th need for housing. Now the second level of planning is going on, the 100 thousand housing need is still considered as valid by 2050. Thus, 4 thousand new dwellings per year are needed. Discussions with the region are also needed in order to harmonize the construction plans between the city and its agglomeration.

The present strategy of the new city government is that the city starts to increase the low portfolio of public land, with the aim to secure sufficient land for social infrastructure and also contribute to new construction. The city is studying how to build cheaper housing for the poorer people which would require for 20% discount on final price. It is a question whether the city should build housing itself. The city has a political decision that the land itself should not be subsidized compared to other potential uses. If so, the city should create a construction capacity or develop a scheme to build 20% cheaper than currently the private sector, based only on increased efficiency (lower financing cost and lower required return), as any form of subsidisation is not possible.

Five pilot projects are planned to test the idea, one of them is a rent to ownership scheme, for a part of the project built by the city. The political aim is to facilitate within 4 years the creation of at least 1000 housing units. OBOS, one of the biggest housing cooperatives can for instance be included as private developer. In one of the industrial areas currently under development such an experiment will go on.

There is also a scheme[5] existing to avoid full house price inflation, in exchange for the lower sales price (which is around 15% less than that of the average new construction in the city). The landowner/developer has the right of first refusal on a price which follows average property value increase if the property is going for sale. Such a scheme is being under implementation in one of the OBOS development project in Ulven. Here affordable housing is created in the 9-10 floor buildings and prices will be much cheaper than in other parts of Oslo. 10% of the flats

[5] https://www.obos.no/privat/ny-bolig/bostart

will be according to this „Bo Start" scheme (selling with 10-15% discount but if re-selling it can only be sold to OBOS and get only low-price increase).

2.5 Tools through which the municipality can control the development processes

In the 1980s right-wing government took power and changed the left-wing attitude to regulation, opening up the market towards liberalization, also in the housing sector. (The share of owner-occupied housing is relatively high in Norway). There are no fixed rents, no fixed housing prices. The philosophy was to ensure that everyone has a job with a decent income instead of trying to create/maintain a subsidized housing market.

In the 1990s the city did not grow fast, and the view was that the municipality should not own real estate which it does not need (after the WWII the city purchased large agriculture lands). Along this line the city real estate department has got a very high sales targets, had to sell public property to get money into the budget from the sales. Since then, a large part of the city owned properties have been sold.

However, already at the end of the 18 years of right-wing city leadership the market-oriented view started to change, and properties have to be bought again in order to ensure plots for social infrastructure, public services – but not for housing. This has been further strengthened by the incoming left wing city council 5 years ago. The city real estate agency has now a 1 bn NOK annual target to buy property in the next 4 years.

Oslo could, but is not directly building social housing apart from the 5% of the stock serving the vulnerable groups. This stock is spread out across all areas of the city in an attempt to prevent segregation (rich neighbourhoods do not like it). The city cannot provide land for housing on reduced price without a system for regulating prices for consumers and who should be eligible for the subsidised housing. Furthermore, it cannot apply inclusionary zoning (e.g., requiring 20% affordable housing from developers) as this is against the law.

Land price increase due to new zoning decisions passed by the city council is not taxed. At the state level there are discussions on how to finance public infrastructure and if new models are needed.

Thus, only the „development agreement" approach is available. Infrastructure needs derived for densification or development made possible by a zoning plan can be secured by rules of succession that make establishing infrastructure a prerequisite to obtain building permits. Based on the zoning plan the developer and the municipality can make a development agreement. The agreement clarifies the responsibilities for building and financing the infrastructure. Development agreements are voluntary– the process, prerequisites and limitations connected to development agreements are regulated in the planning and building act. Oslo is very bureaucratic; thus, corruption is not a real danger.

The city has to consider how much infrastructure levy to put on the developers due to the legal framework and to reduce the risk of reducing the building activity significantly. The city has no

tools to intensify new development – if 1000 flats can be built, developers will develop in the pace they consider most financial advantageous, many times resulting in doing it slowly in order to sell on the highest price. The city is discussing with the state level to change the law on how to finance infrastructure developments.

Housing affordability is a growing problem: the „nurse test" shows that many people have growing difficulties to get housing in Oslo on affordable prices, especially in the central areas. Families when having first or second child are more or less forced to leave Oslo, going to Akershus, to find larger accommodation.

Transport costs are rather cheap: a monthly ticket in the inner zone costs 70 EUR, in the outer zone with longest distance 100 EUR per months. The whole Oslo-Akershus area is in fact integrated both in housing market and regarding transport and jobs.

The planning system consists of different level of plans[6].

- municipal plan is a strategic plan.
- zoning plan defines the land use of the area.
- guiding plan examines the needs for schools, parks, services, etc. and also includes environmental impact.
- detailed plans are for smaller areas and define the road and infrastructure network of the area.

It is important that Oslo does not have a planning system which covers the whole city with zoning plan as it was decided that they go for less specific planning. Instead, the city makes zoning plans for specific areas where it is important – e.g., where the municipal masterplan sets out new use and densification, creating the need for new zoning- or guiding plans. In the process of making zoning plans they examine the demands and show different possibilities for the area, but in the end the politicians decide (all plans have to be approved the city council).

When during planning the city Agency for Real Estate and Urban Renewal negotiates with the stakeholders, they also ask ideas of the developers and negotiate with the landowners but mostly they put new ideas on the table.

2.6 Potentials for metropolitan area cooperation

The whole Oslo-Akershus area is in fact integrated both in housing market and regarding transport and jobs – on the basis of which it´s possible to locally influence the local distribution of the growth. Relocation of some industries from Grorud towards the airport area is a normal procedure and outside Oslo the municipalities are increasingly prepared for that. As many people moved here and substantial housing construction development also happened in

[6] A brochure about Urban development in Oslo and the Oslo planning system: https://bit.ly/2UpDvXs

A good overview of the planning system in Norwayhttps://www.regjeringen.no/en/topics/plan-bygg-og-eiendom/plan--og-bygningsloven/planning/id1317/

addition to new jobs, many employees do not have to commute any more as they can find affordable housing in the area.

The cooperation between Oslo and Akershus is good in area planning (e.g., waste management and other public services) but there are some conflicts regarding the transport system development and housing and economic development. One of the most debated transport development plans is the new motorway from the west which has been planned for 30 years. The municipalities of Asker and Bærum want a tunnel while the present political leadership of Oslo is sharply opposing it as it would lead to an increase of road traffic towards Oslo. Instead, they suggest that the local traffic in Baerum and surrounding settlements should be improved, taking down the local transport from the motorway. This debate is very sharp now, but many experts share that time has changed, the original solutions for new motorway and new tunnel are not needed any more instead the public transport should be developed.

An important element of financing urban development is the „Oslo package" on the use of toll ring revenues. There are negotiations every two years, 80% goes to public transport, while 20% to road-related developments, mainly for buses, etc. Recently no part of the money goes into road investments which would increase the road capacity. The biggest debate is around the western access to the city. Lorries are avoiding crossing the city in rush hours…

Transport development priorities of the city are to expand metro system to the west (Fornebu, discussing in the last 25 years…) and to the north-east (to Lørenskog), plus new tunnel below central Oslo. All these issues are connected to the Oslo package, negotiating how much the government should contribute. Government share would be 50%, congestion charge (which is a road charge) would cover the rest. However new negotiations are needed as the revenues of the city are declining (as electric vehicles are too successful, i.e., less people pay road charge) while infrastructure costs are increasing. Thus, either the central government should contribute more, or the counties (including Oslo) should find other sources, as toll revenues cannot be increased. Every two years the package is renegotiated between the political leaders in Oslo and Viken (previously Akershus), and the final proposal must be approved by the national government for its own matching-funding[7].

Neighbouring municipalities took more strategic position only in the last few years, earlier they were just reacting on industrial changes. Recently a joint strategy has been established by surrounding 7 municipalities in order to prepare for the transformation caused by the outflow of industrial and other business activities from Oslo. The initiative was implemented by a voluntary cooperation board and part-financed by the Ministry of Municipalities. Their vision is to locate the high-tech jobs in their centres, while establish new industrial areas outside the settlements.

[7] The Oslo package is being renegotiated during April-May 2020 and the final conclusion is still anticipated. The challenges remain and have been reinforced by strong differences between some of the political groupings about which projects should be prioritised, and more recently due to dramatic falls in toll-revenues with the lock-down under Covid-19.

Joint strategy was developed for places where industrial concentration could be settled down, but implementation is still a question.

Conflict lines are between the government and the region. The former good link between Oslo and Akershus is now replaced with new interests raised by the changed, larger region, Viken which now encompasses also rural areas and several secondary urban areas beyond the metropolitan area of Oslo. The strengthening of the regional level in its new setup is changing the lines of conflicts.

Earlier the joint Oslo-Akershus plan went into more details and municipalities were asked to follow the requests: regional growth centres were assigned – without exact numbers how many flats etc. should be built. Clear guidelines were given for each municipality, e.g., 80% of growth within each municipality should be around the designated growth area, normally the main railway station or bus terminal. If the municipality did not act in that way, a „red card" was given, which stops the plan being approved without being changed: the regional governor (representative of national government) tries to broker a deal between the stakeholders and, if a local deal is not reached, the minister decides.

The regional plan (2016) sets out some areas outside Oslo to be developed as regional business center, regional logistics satellites, but not all of the affected municipalities are completely happy. The regional plan deals with large businesses while small ones are considered to be the task of municipalities.

Both in Oslo and in Viken political changes happened but the main earlier agreements have been followed as they were based on strong collaboration between municipalities, employment and other groups.

Although agreements with Akershus will automatically be transferred to the newly established larger region, Viken, the spatial reality of the much larger region and new political majorities are expected to bring changes. The realities of legal agreements are in place but Viken needs some time to find its new direction and priorities, thus Oslo waits what will happen, the city does not want to provoke and lead to worse development. Many of the important industrial centres are outside Akershus thus the restructuring of industry can be of interest for Viken.

Viken has red-green government now, same as in Oslo. The newly elected leaders of Viken themselves want to go back to the previous situation, i.e., to dissolve the larger region to three, as it was before. To reverse the regional reform would require new national decision but the national government is the same and does not want it. This problem sucks energy out of the system.

Restructuring of municipalities (1 Jan 2020, together with regional reform) led to some cooperation but sometimes strange ways of merging (there was some financial stimulation from government side but not too much). It was a voluntary reform, resulting in merge from 430 to 350 municipalities, the smallest ones were least wanting to merge.

2.7 Potential inspirational cases from the stakeholder city-region

In the area of Ensjø a new method to influence development was experimented in fragmented privately owned area, with small industrial ventures. Tobacco factory closed down. City invested in putting high voltage airline underground. Then city real estate officers contacted landowners one by one. City offered a coordinated plan, leading to higher land value, if landowners contribute to the costs. Planning agreements were offered, including costs of initial investments (to put off the electric power wire). By now 60-70% of area is converted from small car sale area into modern housing. However, tensions are large, as it was not clarified that mixed use will remain in the area. Most of the tension comes from the fact that some are reluctant to change land use, or are waiting, resulting in a much wider mix of uses that anticipated.

The essence of the approach was to initiate first a planning framework with no legal power but using it as basis for discussions with developers and landowners. This framework-model has later been used in several areas currently under redevelopment, such as Løren, Vollebekk, Bryn and Breivoll that are part of Hovinbyen. And plans are ongoing for areas Halse (Hovinbyen) and Rommen /Strovner (outer upper part of Grorud valley). It is still an open question whether such a framework model can be offered to other parts of Grorud valley, where larger players exist, putting more emphasis on detailed planning of future functions, what functions should be achieved in what timeframe?

The 2015 municipal masterplan plan opens up for the transformation of Grorud valley: the aim is that industrial areas should become mixed used, without specifying which uses or minimum or maximums of any use. However, recognizing that if residential is possible, industry will be pushed out, a strategic plan was made for part of the area, called Hovinbyen, to secure functions which would otherwise not being built under market circumstances. This would lead to very different value of the same land.

The planning agency is working on following up the strategic plan, and the real-estate agency contributes with calculations. A good model should also contribute to the climate goals, for which there is a special climate budget available. This will also lead to a discussion about the „desired city" regarding what functions should be kept inside the city to ensure the necessary supply of goods (logistic functions), background activities of public services and other industrial activities (mainly small productions) also in order to minimize environmental harms and ensure low skilled jobs.

Paadriv, an interest organization of industrial and other sectors, operating on cross-sectoral basis: Paadriv brings together all actors to think about the future of the development of the valley, they are trying to develop new ways of cooperation among different stakeholders. Its current project is the temporary use of plots which are currently not in use and new developments will not start in the coming years. They developed temporary school, temporary swimming pool, co-working centre, while also bringing life to the area with mobile small houses.

Paadriv organises regular seminars which are attended by all the CEO-s, the city's planning director was also there. People all express interest in cooperation, until it comes to concrete self-interests. Inside Padriv every actor has 1 vote.

Previous planners' alternative idea on spatial directions of development: place the national functions from Alnabru closer to the airport (and develop the link to Stockholm instead of Gothenburg). If the central logistical functions are moved away, 300 ha-s would be freed in Alnabru for other functions, which can be turned into logistics related to the city. If some emptied area in Alnabru would be available, develop railway also to the northern areas, instead of building extremely costly new tunnel under the inner city.

3 A data-driven SWOT analysis for Oslo

3.1 Introduction and methodology

The following chapter provides an analysis of the employment structure of the Oslo metropolitan area. It is based on the analysis of shares and number of employees being employed in different sectors of productive economy (measured at NACE 3-digit level).

The detailed analysis has three main parts: 1) displaying and analysing the productive sectors that provide the biggest employment in the region – compared to the national average - 2) displaying and analysing the sectors that resulted in the fastest growth – compared to the national average - between 2012-2017 and 3) highlighting the sectors that represent the biggest potentials and the highest threats for the local economy.

There is a well-established methodological background behind Part 3 that follows the approach to the analysis of the regional network of branches pioneered 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, having a complementary knowledge base, in the form of labour flow between branches (labelled as “embeddedness”). In addition, the development potential of a production branch is also based on the existence of a “critical mass” of employees in the metropolitan area being metered by the share of employees exceeding the national average (labelled as “specialisation”).

Table 2: Categories of the empirical SWOT analysis.
Development potentials according to degree of specialisation and embeddedness

	Regional embeddedness of a branch	
Regional degree of specialisation	High specialisation and well embedded (Strength S)	High specialisation but weakly embedded (Threat T)
	Low specialisation but well embedded (Opportunity O)	Not specialised and weakly embedded (Weakness W)

Source: Otto et al. (2014), ESPON MISTA (2020).

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. According to Otto et al. (2014) economic branches in a region can be classified into four different categories, by differentiating, according to the values of their localisation quotient and their embeddedness indicator (Table 2):

1. If the branch under consideration is heavily localized in the region and if this branch is also well embedded in "related" branches, the branch is large relative to the regional economy and it is likely that it will also strongly profit from localised knowledge transfers across industries in the region. As a consequence, its future development prospects should be favourable, and the branch can be considered to be a "strength" of the regional economy.

2. By contrast, a branch with a low degree of specialisation and embeddedness is unlikely to profit substantially from localized knowledge transfers but is also small in terms of the regional economy. Despite the fact that such branches may be of importance for the other reasons (e.g., the presence of natural resources or the satisfaction of local demand) such branches have therefore been regarded as a regional "weakness" in previous analysis from a technological development perspective.
3. Branches that are lowly localised but well embedded are faced by a favourable regional environment of technologically or cognitively "close" branches (and thus diverse opportunities to use a common knowledge base) but are still relatively small. Such branches could thus offer special "opportunities" to develop new strengths through structural policy initiatives in the future.
4. Finally, branches which are highly localized, but only weakly embedded in complementary in the region, tend to be seen at risk which could be reduced by strengthening complementary branches through structural policy initiatives. This is because they are relatively large but are unlikely to profit substantially from their regional knowledge base.

(A more detailed explanation on this methodology can be found in the Annex.)

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. 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 region. These results thus provide essential direct inputs for structural and cluster policy.[8]

3.2 Spatial scope of data analysis

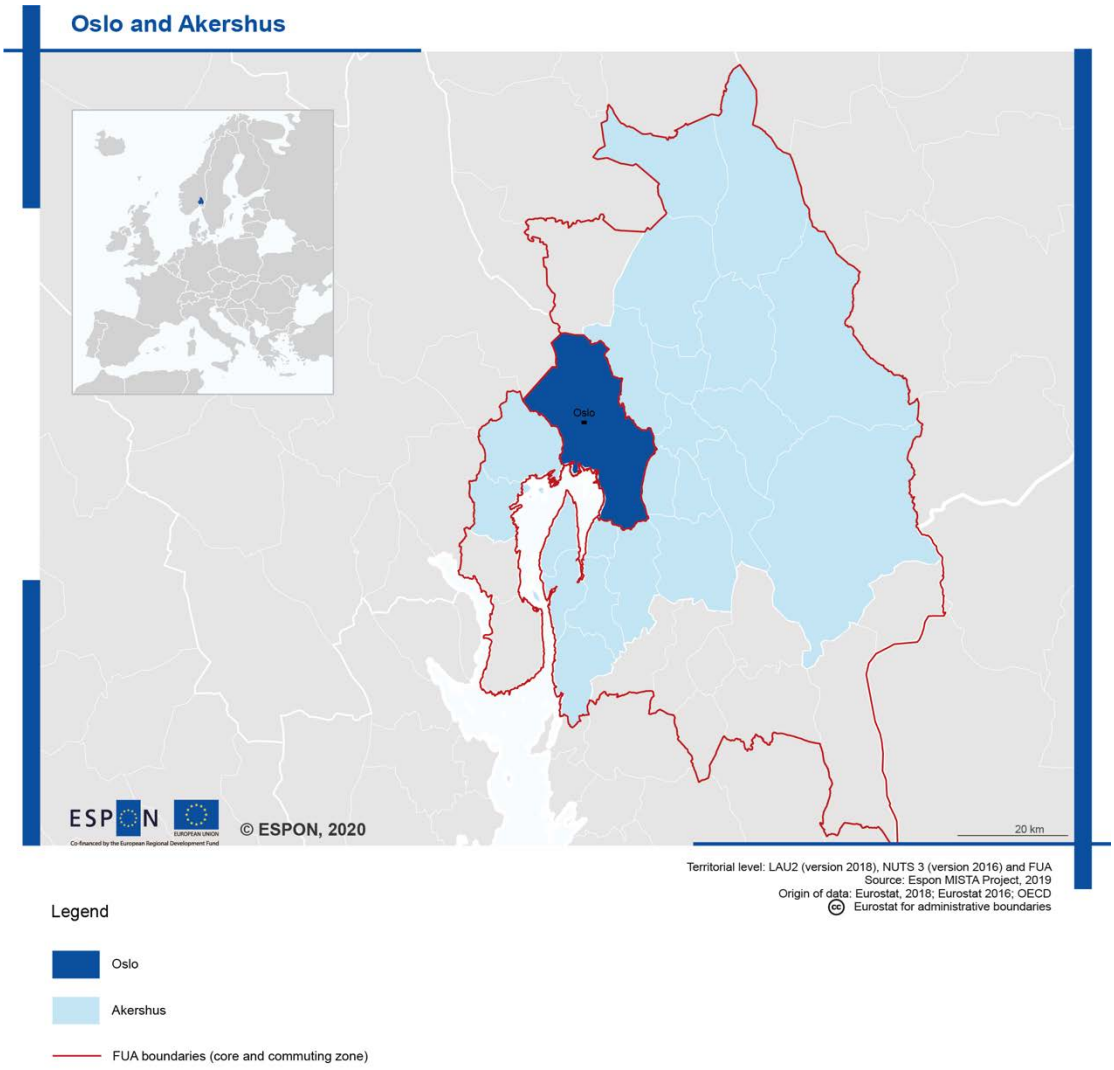
Since, as already highlighted in the background report to task 1 of the MISTA project, urban regions are open systems and may thus also profit from knowledge spillovers from nearby regions, we present results for three different regions: The city of Oslo, the environs of the city of Oslo and the Oslo metropolitan region, which is the sum of the city of Oslo and its environs. While the city of Oslo is defined from a purely administrative perspective, as the territory covered by the Oslo city administration, the Oslo environs were defined in the course of the project in co-operation with the respective city administration. In defining this region three criteria were applied:

1. The most important of these was an administrative criterium according to which the chosen definition should to some degree reflect the administrative boundaries of existing institutions (or mechanisms) for inter – regional co-operation in the city. This criterium was chosen to ensure to the best possible degree that the analytic results are useful for existing urban planning processes.

[8] 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.

2. The second criterium was based on data availability. Since the analysis conducted below requires detailed information on the development of employment at a NACE 3-digit level at a highly granular regional disaggregation level, this criterium prove to be the most constraining in the analysis.
3. Finally, the third criterium was based on analytical consideration and was derived from the fact that knowledge spillovers as the central analytical concept guiding the current analysis in all likelihood exceed the regional scope of travel to work areas, which speaks in favour of using larger regions rather than smaller ones for the current analysis.

Map 2: Definition of the metropolitan region of Oslo.



Source: ESPON MISTA (2020).

Note: As described in the ESPON SPIMA project, the metropolitan area of Oslo does not have an officially defined scale, and the delineation is still discussed. A commonly used definition is according to the formal borders of the City of Oslo and the County municipality of Akershus, with its 22 municipalities, which also is the area of the joint regional plan (1,3 mill people). The reason for the understanding of the metropolitan area being Oslo-Akershus is also strongly linked to the political reality, where the two regional bodies have binding joint agreements for transport investment, public transport, economic development and strategic planning.

In the case of Oslo, the research tea was provided with data at the community level for the years 2012 to 2019. This provides information on the number of employees for NACE 3-digit

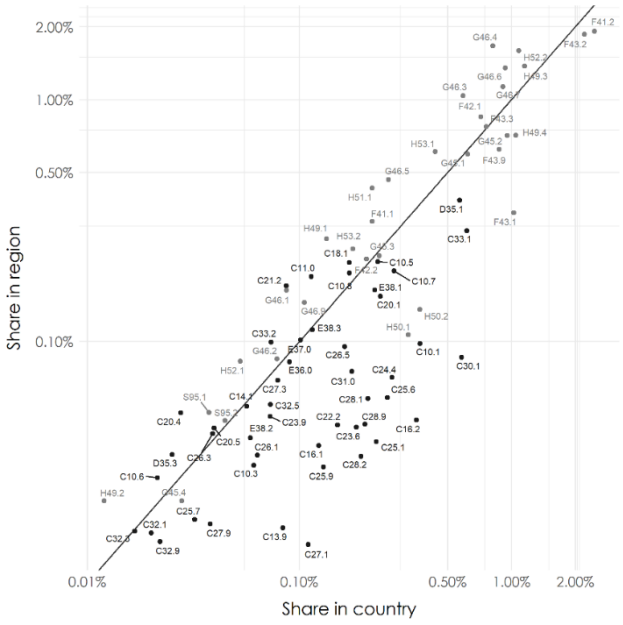
branches. Consequently, from the data perspective a definition at community level could be used for the Oslo case study and, in the lack of a formally defined metropolitan region it was therefore decided to us the county municipality of Akerhus (depicted in Map 2) as a definition for the Oslo environs. This has the advantages of using a commonly used definition, which also has a joint regional plan.

3.3 Size and growth of individual productive activities

3.3.1 Sector shares

The results of the analysis suggest that within the production activities considered in the MISTA project the importance of different NACE 3-digit industries within the Oslo metropolitan region (i.e., between the city and its' environs) is rather similar and follow many of the trends observed in European cities in general (see background report to task 1 of the MISTA project). In both regions the highest employment shares are mainly found in branches related to wholesale trade, transport and construction. Thus, the highest employment share in the city of Oslo is taken by "electrical, plumbing and other construction installation" activities (which account for 1.8% of the employed in the city). In addition, in the construction sector the "construction of residential and non-residential buildings" as well as "construction of roads and railways" and "building completion and finishing" are among the top 10 branches in terms of employment. Among the transport branches "other passenger and land transport" and "support activities for transportation" belong to the "top 10". In wholesale trade this applies to "wholesale of household goods", "wholesale of machinery", "wholesale of equipment and supplies", "wholesale of food beverages and tobacco" as well as "other specialised wholesale".

Figure 1: Sector shares of productive activities (total Oslo metropolitan area).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Table 3: Top 10 branches in terms of size (2019).

NACE	Name	Empl.	Share in %
Total metropolitan region			
F41.2	Construction of residential and non-residential buildings	14840	1,92
F43.2	Electrical, plumbing, and other construction installation activities	14443	1,87
G46.4	Wholesale of household goods	12930	1,67
H52.2	Support activities for transportation	12370	1,60
H49.3	Other passenger land transport	10668	1,38
G46.6	Wholesale of other machinery, equipment, and supplies	10483	1,35
G46.7	Other specialised wholesale	8769	1,13
G46.3	Wholesale of food, beverages, and tobacco	8057	1,04
F42.1	Construction of roads and railways	6574	0,85
F43.3	Building completion and finishing	5995	0,77

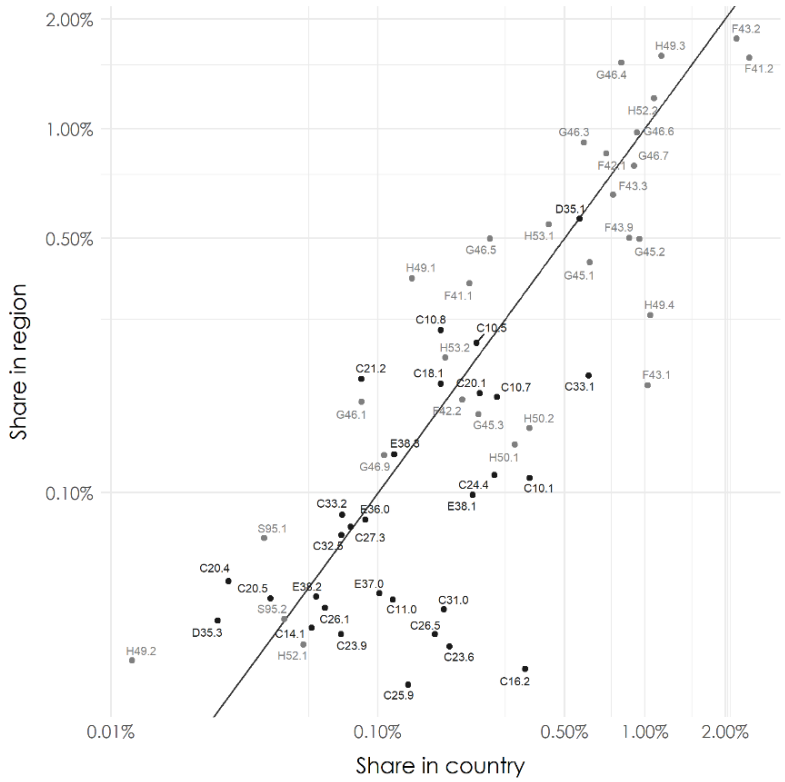
Source: Statistics Norway, ESPON MISTA (2020) calculations. Separate illustrations for the city and its environs are provided in Table A1 in the annex.

In the Oslo environs the highest share of employment among the production branches is accounted for by “construction of residential and non-residential buildings”. In addition, among construction activities “electrical, plumbing and other construction installation activities” belongs to the “top 10” in terms of employment. In wholesale trade the same applies to “wholesale of other machinery, equipment and supplies”, “wholesale of household goods”, “wholesale of food beverages and tobacco” as well as “other specialised wholesale trade”. In transportation, by contrast, the number of branches among the top 10 in terms of employment is slightly larger in the environs than in the city. It includes: “support activities for transport”, “freight transport by road and removal services” as well as “passenger air transport”.

In the overall total metro region therefore the “construction of residential and non-residential buildings” (with around 14.800 employees) holds the largest employment share. In addition, other construction branches included among the “top 10” are: “electrical, plumbing and construction installation activities”, “construction of roads and railways” and “building completion and finishing”. In wholesale trade, reflecting the important gateway function of the capital city region, this list is substantially longer and includes branches such as “wholesale of household goods”, “wholesale of other machinery, equipment and supplies”, “other specialised wholesale” and “wholesale of food, beverages and tobacco”.

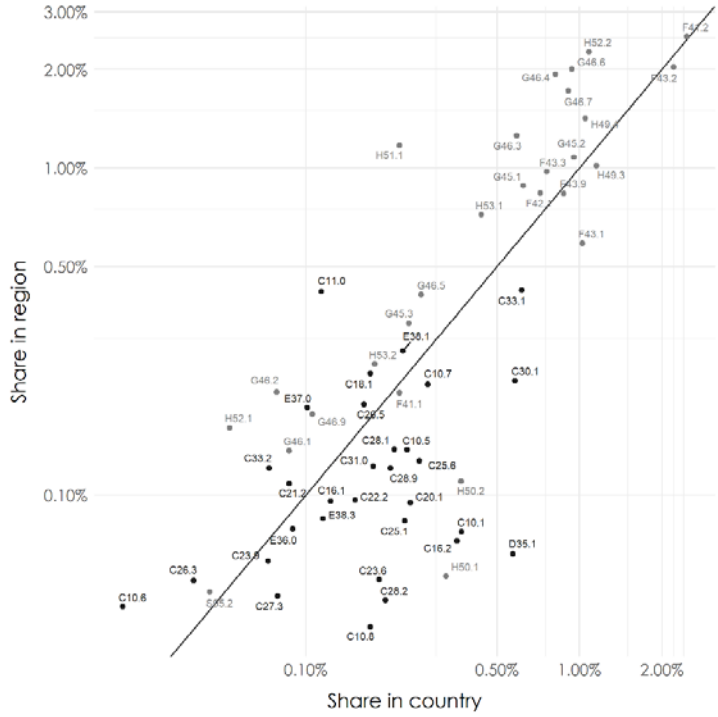
Interestingly none of the core manufacturing branches belong to the top 10 branches in terms employment shares, neither in the city of Oslo nor in its environs and thus also not in the total Oslo metro area.

Figure 2: Sector shares of productive activities (city of Oslo).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Figure 3: Sector shares of productive activities (environs).



Source: Statistics Norway, ESPON MISTA (2020) calculations; Industry (service) activities in black (grey); For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

This list of the largest branches in terms of employment shares, however, takes no account of the specialisation of the country in general and the size of sectors relative to the overall country. In this respect the location quotient is more informative. This suggests that next to the noticeable specialisation in construction, wholesale trade and transport, among the core manufacturing branches the “manufacturing of pharmaceutical preparations” and the “manufacturing of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparation” are localized in the city of Oslo. The same applies to the “manufacture of beverages” in the Oslo environs. These branches are, however, rather small in absolute terms as they account for less than 2000 employee in total in the Oslo metro area. They are therefore small in absolute employment levels, but large relative to share of employment in these branches in Norway.

Table 4: Top 10 branches in terms of specialisation (location quotient, 2019).

NACE	Name	Empl.	LQ
Total metropolitan region			
G46.4	Wholesale of household goods	12620	2,08
H51.1	Passenger air transport	3347	2,08
G46.1	Wholesale on a fee or contract basis	1525	2,03
C21.2	Manufacture of pharmaceutical preparations	1180	1,99
H49.1	Passenger rail transport, interurban	1853	1,92
G46.3	Wholesale of food, beverages, and tobacco	8105	1,83
H49.2	Freight rail transport	181	1,80
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, and toilet preparations	405	1,76
G46.5	Wholesale of information and communication equipment	3758	1,66
C33.2	Installation of industrial machinery and equipment	920	1,63

Source: Statistics Norway, ESPON MISTA (2020) calculations. Only industries with at least 100 employees are considered; Separate illustrations for the city and its environs are provided in Table A3 in the annex.

In general, this employment structure highlights the importance of the Oslo metro-area as the central trade and transportation hub in Norway by emphasizing the important role of wholesale trade, construction and transportation for its employment structure.

3.3.2 Growth

Recent employment growth trends corroborate this finding, but - in accordance with Europe wide trends (see MISTA background report to task 1) - also suggest that some smaller manufacturing branches have experienced rather rapid growth, both in the city of Oslo as well as in its environs. In the city of Oslo this applies to the “manufacture of abrasive products and non-metallic mineral products”, as well as “manufacture of other chemical products” and “manufacture of wearing apparel and food products”.

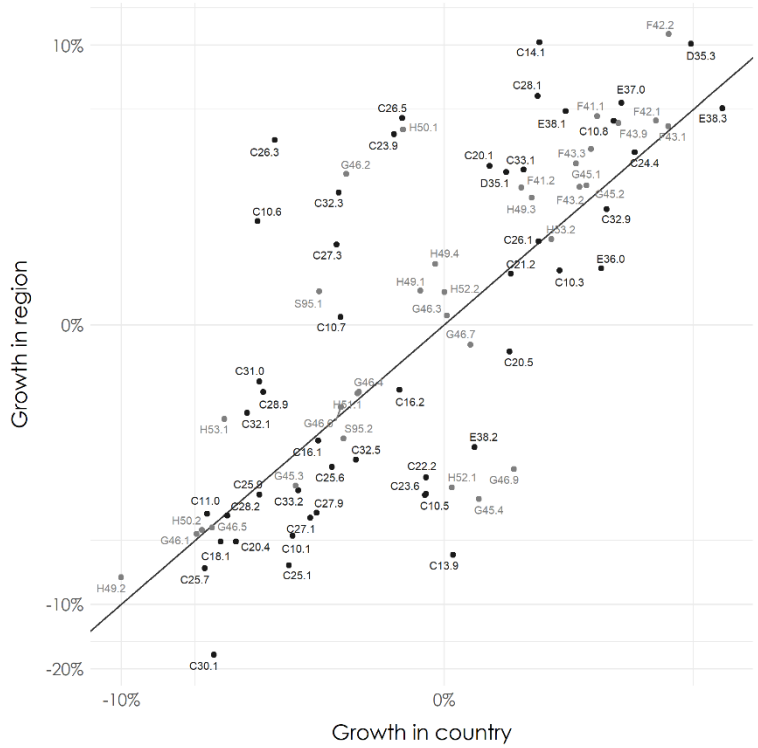
All of these branches rank among the 10 fastest growing branches in terms of employment growth of the city and are also growing more rapidly than the national average in the period considered. Among these branches in particular the production of other food products is of high relevance in terms of the absolute number of employees as it has more than 1000 employees, while the other branches employ less than 500 employees throughout.

Table 5: Top 10 branches in terms of growth (2012-2019).

NACE	Name	Empl.	Growth p.a. in %
Total metropolitan region			
F42.2	Construction of utility projects	1699	11,28
C14.1	Manufacture of wearing apparel, except fur apparel	418	10,33
D35.3	Steam and air conditioning supply	264	10,17
C28.1	Manufacture of general-purpose machinery	449	5,78
E37.0	Sewerage	784	5,36
E38.3	Materials recovery	867	5,05
E38.1	Waste collection	1265	4,90
F41.1	Development of building projects	2430	4,63
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	737	4,54
F42.1	Construction of roads and railways	6574	4,42

Source: Statistics Norway, ESPON MISTA (2020) calculations. Only industries with at least 100 employees are considered; Separate illustrations for the city and its environs are provided in Table A2 in the annex.

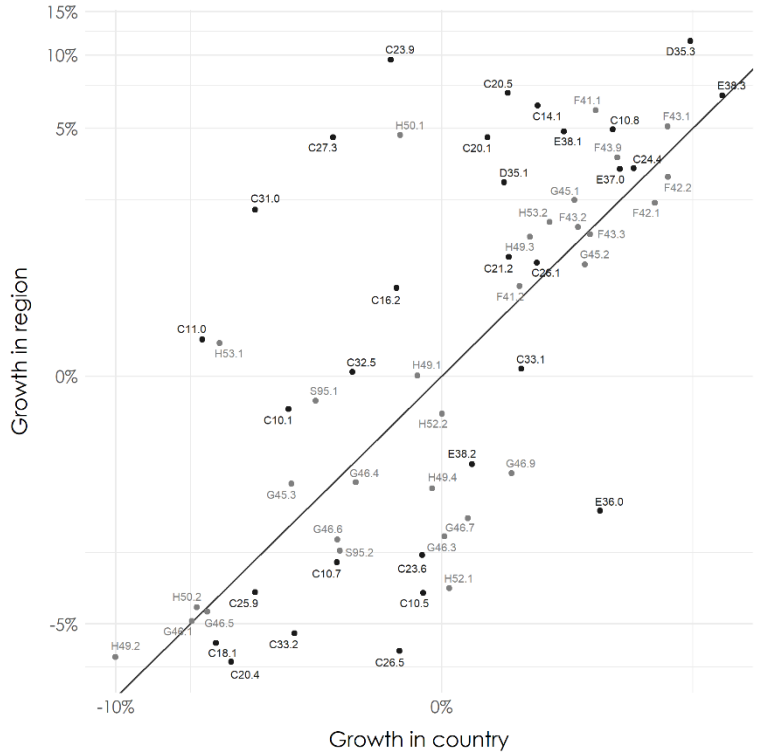
Figure 4: Growth of productive activities (total Oslo metropolitan area).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

In the environs, by contrast, among the manufacturing branches the “manufacture of instruments and appliances for measuring, testing and navigation, watches and clocks” and “bakeries and bakery products” belong to the fastest growing NACE 3-digit industries.

Figure 5: Growth of productive activities (city of Oslo).

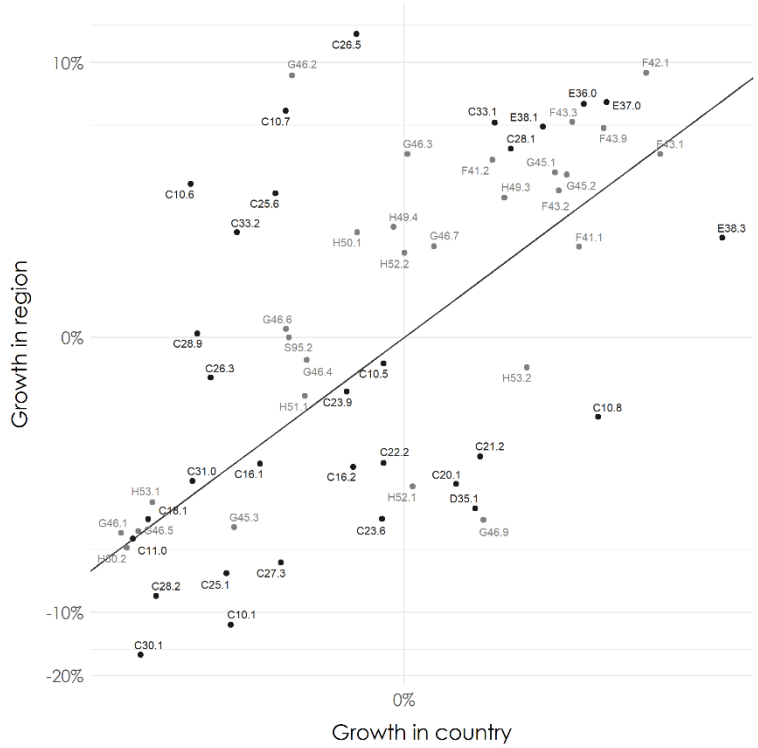


Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Next to these manufacturing branches the list of rapid growing branches in the Oslo region includes a large number of branches (such as “materials recovery, waste collection”, and “sewerage” and steam and “air conditioning supply”) that are related to the increasing environmental concerns and increased needs of for environmentally related services among the growing urban population. The high growth potential of these branches is underlined by the fact that in the city of Oslo the fastest growing NACE 3-digit branch has been “steam and air conditioning supply”. This is still rather small in terms of employment level (with around 300 employees) but has expanded employment at a rate of 11.4% annually in the period 2012 to 2019.

Within this group of utilities there also seem to be an emerging regional specialisation in the Oslo metropolitan region: In the city of Oslo growth has been particularly high in those parts of these utilities that are hard to transport (or where services have to be delivered in person) such as “materials recovery” or “waste collection”. In the outskirts more easily transportable and land intensive services (e.g., “sewerage” and water collection, treatment and supply”) are growing more rapidly. Among the branches of the transportation sector only one (“sea and coastal passenger water transport”) belongs to the 10 fastest growing branches in Oslo city, and none of these branches rank in the top 10 in the environs.

Figure 6: Growth of productive activities (environs).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Finally, also some branches of the construction sector belong to the fastest growing branches in employment in the Oslo metropolitan region. In particular “construction of utility projects” (which is closely linked to the rapid development of utilities mentioned above) has been the fastest growing branch of all in the overall metro-region. Its employment was around 1700 employees in 2019 and its employment growth amounted to 11,3% annually in the period 2012 to 2019. In addition, also the “development of building projects” and the “construction of roads and railways” rank among the 10 branches with the most rapid employment growth in the Oslo metropolitan region. With the exception of the “development of building projects” the high growth of these branches in the metropolitan region is mainly based on the high growth of these branches in the Oslo environs.

The analysis so far thus suggests a dominant role for construction, wholesale trade and transport in terms of specialisation and for utilities, construction and some manufacturing branches in terms of past employment growth.

3.4 SWOT profiles of productive activities

Interestingly, however, a consideration of the embeddedness of the different NACE 3-digit branches as proposed in the empirical SWOT analysis (see Table 7) points to a much more central role of manufacturing in the larger Oslo metropolitan area. In particular in terms of linkages here a number of smaller core manufacturing branches (such as the “manufacture of communication equipment”, “manufacture of wearing apparel and of electronic components

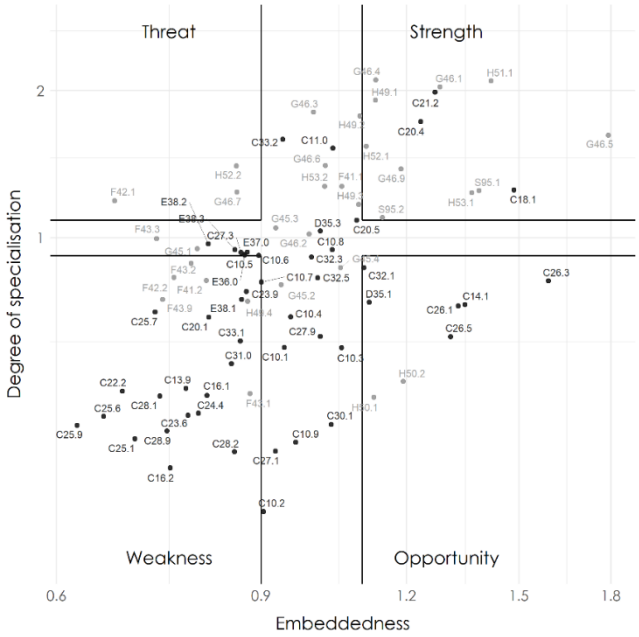
and boards" as well as "manufacture of instruments and appliances for measuring, testing and navigation, watches and clocks") profit from close linkages to some service industries located in the region. As a consequence, many of the branches that – based on their relatedness to other branches in the Oslo metro area - are considered to potentially provide growth opportunities for the future are in manufacturing.

Table 6: Top 10 branches in terms of embeddedness (2019).

NACE	Name	Empl.	Embed.
Total metropolitan region			
G46.5	Wholesale of information and communication equipment	3758	1,79
C26.3	Manufacture of communication equipment	209	1,59
C18.1	Printing and service activities related to printing	1719	1,49
H51.1	Passenger air transport	3347	1,42
S95.1	Repair of computers and communication equipment	358	1,39
H53.1	Postal activities under universal service obligation	4695	1,37
C14.1	Manufacture of wearing apparel, except fur apparel	222	1,35
C26.1	Manufacture of electronic components and boards	233	1,33
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	602	1,31
G46.1	Wholesale on a fee or contract basis	1525	1,28

Source: Statistics Norway, ESPON MISTA (2020) calculations. Only industries with at least 100 employees are considered; Separate illustrations for the city and its environs are provided in Table A4 in the annex.

Figure 7: SWOT Profile (total Oslo metropolitan area).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Table 7: SWOT Profiles for the total metropolitan region (2019).

NACE	Name	Employment
Strengths		
G46.5	Wholesale of information and communication equipment	3758
H51.1	Passenger air transport	3347
G46.1	Wholesale on a fee or contract basis	1525
C21.2	Manufacture of pharmaceutical preparations	1180
G46.4	Wholesale of household goods	12620
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	405
H49.1	Passenger rail transport, interurban	1853
C18.1	Printing and service activities related to printing	1719
S95.1	Repair of computers and communication equipment	358
H52.1	Warehousing and storage	626
Opportunities		
C26.3	Manufacture of communication equipment	209
C32.1	Manufacture of jewellery, bijouterie and related articles	141
C14.1	Manufacture of wearing apparel, except fur apparel	222
C26.1	Manufacture of electronic components and boards	233
D35.1	Electric power generation, transmission and distribution	2849
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	602
H50.2	Sea and coastal freight water transport	1061
H50.1	Sea and coastal passenger water transport	743
Threats		
H52.2	Support activities for transportation	11639
G46.7	Other specialised wholesale	8750
F42.1	Construction of roads and railways	6631

Source: Statistics Norway, ESPON MISTA (2020) calculations. Only industries with at least 100 employees are considered; Separate illustrations for the city and its environs are provided in Table A5 to A7 in the annex.

Thus the “manufacture of communication equipment”, “manufacture of jewellery, bijouterie and related articles”, “the manufacture of wearing apparel, except fur apparel”, “manufacture of electronic components and boards”, all belong to the class of strongly embedded branches in the Oslo city region, that are, however, still not strongly localised. They could therefore be expected to have a basis for more rapid growth in the future.

As with many others of these so called “opportunity” branches, this potential exits only, when the Oslo metro-region is considered as one single economic space. When considering the city of Oslo, by contrast, only the “manufacture of wearing apparel except for apparel”, and “manufacture instruments and appliances, testing and navigation, watches and clocks” are identified as highly embedded but lowly localised branches, while in the environs a longer but rather different list of such branches is identified. This stylized fact thus points to the need of industrial strategies for the Oslo region to be framed for the entire metro-region to develop these potential emerging industries.

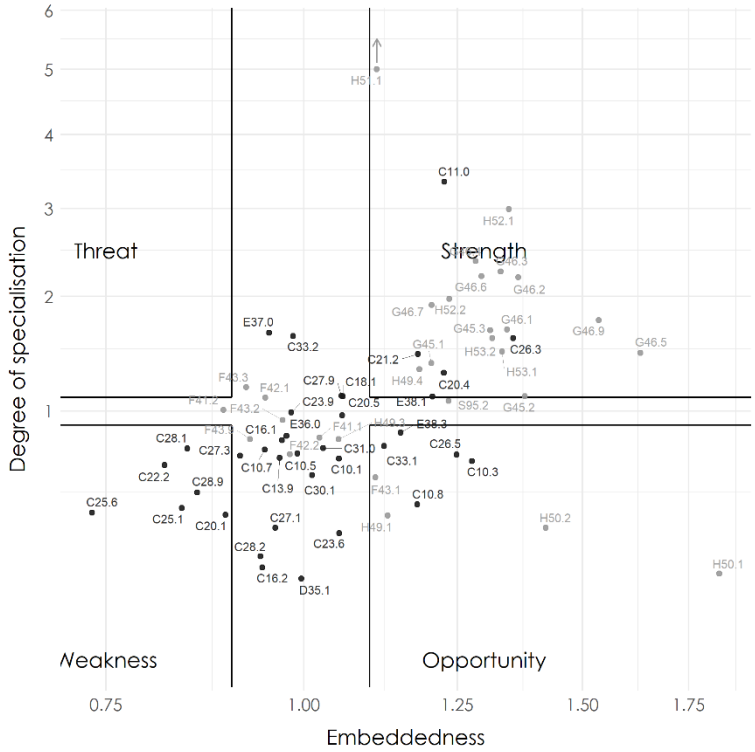
Figure 8: SWOT Profile (city of Oslo).

Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

The empirical analysis also points to a number of well embedded and heavily localized branches that may be considered to be the current strongholds of the city of Oslo and its environs. These to a large degree follow the specialisation patterns described above and thus once more point to the importance of transport and wholesale activities for the Oslo metropolitan area as a whole.

These highly embedded and heavily localized branches also show a high accordance between the Oslo environs in and the core city. Despite some differences in the list of NACEs 3-digit branches, most of these branches are once more affiliated with wholesale trade and transport. In the city of Oslo this list includes: “wholesale of information and communication equipment”, “freight rail transport”, “passenger rail transport, interurban”, “manufacture of pharmaceutical preparations”, “wholesale on a fee or contract basis”, “repair of computers and communication equipment”, “manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations”, “printing and service activities related to printing”, “postal activities under universal service obligation” and “other passenger land transport”. In the Oslo environs “passenger air transport”, “manufacture of beverages”, “warehousing and storage”, “wholesale of household goods”, “wholesale of food, beverages and tobacco”, “wholesale of agricultural raw materials and live animals”, “wholesale of other machinery, equipment and supplies”, “non-specialised wholesale trade”, “support activities for transportation” and “wholesale of information and communication equipment” are on the list of these branches.

Figure 9: SWOT Profile (environs).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

While there is thus a rather large list of highly embedded and localised branches both in Oslo city as well as its environs, the number of highly localized but poorly embedded branches, that can be expected to potentially develop less favourable in future is rather short for both regions. In particular no such branches could be identified for the Oslo environs and for Oslo city only 5 such NACE 3-digit branches that in total account for around 16.000 employees in the city could be found.

Importantly, this list reduces to only three branches ("support activities for transportation", "other specialised wholesale" and "construction of roads and railways") with a total of 26,000 employees (for the total metro region) when considering the overall metro region, which once more confirms the high relevance of the mutually positive effects of the productive activities located in the environs and in the city on each other in the development of productive activities.

3.5 Main take-aways

The employment structure of Oslo reflects its role as an important transport and infrastructure hub and its gateway function for the Norwegian economy. As a consequence, many of the most important branches in terms of employment are mainly associated with activities in wholesale trade, construction and transport, while only very few of these branches are active in the manufacturing sector. Interestingly this specialisation pattern applies to both the core Oslo city as well as to its environs.

The majority of these localized branches are also well embedded in the industrial landscape of the city region and in general show a good growth performance. Only few of these branches (in particular when including the environs in the analysis) are poorly embedded.

From a policy perspective this suggests that economic strategies based on these strongholds of the Oslo economy have a good chance to be successful. It also underlines the importance of developing such strategies jointly for the core city and the environs.

The localized manufacturing branches localized in the Oslo region are usually small in terms of absolute numbers i.e., they are large relative to the employment share of these branches in the country, but small relative to the size of the Oslo economy. This suggests that these branches are typically “niche branches” for the Oslo economy.

Next to these strengths many of the fastest growing sectors in terms of employment in Oslo are operating in public utilities that are active in waste disposal and water and energy supply. These branches mainly profit from a combination of the population growth of the city, higher demands for high quality municipal services, increasing demand for the cooling and heating and the increased ecological awareness of the population. They are likely to also be important sources of employment growth for the future and will pose additional demands in terms of land use.

In addition to there is also a number of fast-growing branches in manufacturing that are mainly either producing consumer goods and/or in high technology and knowledge intensive industries. These branches are also usually well embedded in the Oslo economy. This suggests that these two areas of core manufacturing are facing favourable growth prospects in the region.

Consequently, the empirical SWOT analysis identifies a number of branches that are well embedded in the local economy but not highly localised. These branches could thus potentially provide the basis for future development of the region. Many of these branches have shown above average growth in the period 2012 to 2019 and interestingly many of them are part of the core manufacturing sector (mostly in consumer goods and knowledge intensive industries). Strategies focusing on future growth potentials should therefore also consider addressing these branches, as they are likely to provide a source of employment growth in the future.

In particular for these weakly localised but highly embedded branches co-operation with the surrounding area may be of central importance, as their embeddedness increases substantially when considering the Oslo metropolitan area as one economic space.

4 Outcomes of the future workshop

4.1 The future workshops

Motivation

The workshops were intended as an exploratory and self-reflective process for MISTA's seven stakeholder cities to review how their planning policy, plans, regulation and technical capacity reflect their ambitions in terms of research from the MISTA project. Each workshop followed a similar structure and contained similar ambitions, including:

- Helping to expose motivations and priorities for each of the cities.
- Seeking feedback on how research could be applied to decision making processes.
- Exploring the relevance of the Inspirational Cases, based on a shortlist of 27 cases.
- Showcasing how to facilitate stakeholder co-creation based on the outcomes of the MISTA project and to create 'Metropolitan Industrial Spatial Strategies' related to 'Economic Sprawl'.

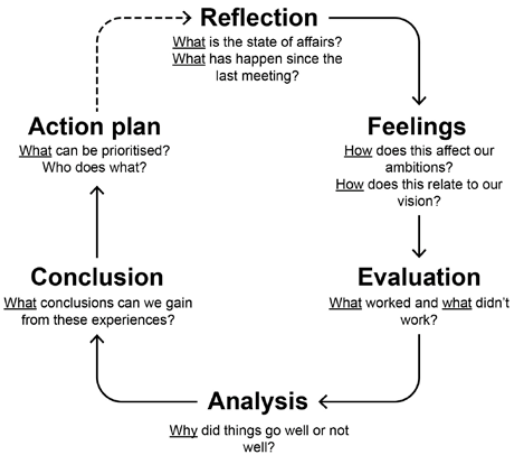
The workshops were not expected to generate exhaustive results but were designed to help create conditions for collaboration, exchange and expose what issues were most relevant to each city. The workshops also provided participants with a range of tools that could help to facilitate the use of the MISTA research for discussion and collaboration in the longer term.

Workshop program

Knowledge transfer can depend on a number of factors. This could include the technical skills of those involved, the institutional capacity to interpret and apply the knowledge to the local cultural context, the planning environment, the economic conditions and the political landscape. As noted in the main MISTA report, the public sector at a city and metropolitan level across Europe has rarely been involved in shaping urban production networks. To be more actively involved in shaping the local (production) economy would require public authorities adopting new knowledge, developing new forms of collaboration (both inter-institutional but also outside the public sector) and in some cases new skills. Organisational change management offers a useful pathway. A development process where challenges are unclear, where shared meaning is required and where the end is poorly defined, can benefit from a reflexive approach based on co-creation and learning, what has been referred to as a 'community of practice'.

The MISTA futures workshop was based on 'experiential learning' methodology developed by Graham Gibbs in 1988. The program was built around a six-step process, illustrated in the diagram below. The ambition of using this methodology was to bring together local actors within a community of practice and based on experiential learning, while showcasing a methodology that could be applied after the MISTA project was completed.

Figure 10: The six-step process.



Source: MISTA adaptation, based on Graham Gibbs 1988.

4.2 The workshop structure for Oslo

Due to the limitations imposed by COVID-19, the event was conducted online. This presented certain disadvantages but allowed the local stakeholders to embrace online collaboration platforms.

The Oslo workshop was hosted on the 12th and 27th of October with local actors for two hours per session. The event was hosted by Hans Martin Ambø, Peter Austin and Haakon McGarrigle Olsvold (City of Oslo). The event included attendees from: PBE (Department of Urban Planning), PBE (Dept of Area Development), City of Oslo, Aspelin Ramm, Grape Architects and Fragment.

Following the workshop methodology above, the first step (reflection), began with a presentation of the MISTA's analysis of the city (see the report, above). The second steps (Feelings) used a simple exercise called 'the chart of emotions' to explore participants latent feelings and motivators related to nostalgia, traumas, hopes and fears concerning production and industrial land. The third step explored a generic SWOT analysis regarding the role of production and industrial land in the city and then looked more specifically at three specific trends: environment and climate change, artificial intelligence and competitiveness. The fourth step (Analysis) involved the discussion of six problem statements, each statement was matched with inspirational cases relevant to Oslo (the fifth step (Conclusion)). The final step (Action plan) was left for general discussion.

Table 8: SWOT analysis of the place of the production sector in Oslo.

Strengths	**Weaknesses**
▪ World leading research, science and academic institutions. ▪ Wealthy economy, with a recent trend in knowledge-based innovation. ▪ Political interest (at the city level) in tackling economic activities beyond simple economic growth. ▪ Active start-up scene.	▪ Geographic configuration of the main industrial zone (Grorud Valley), with limited internal connections. ▪ Strong environmental protection. ▪ Cost of labour. ▪ Lack of 'useable land'. ▪ Absence of industrial activities within Oslo's economic policy. ▪ Integration of a good logistic system that fits within the city structure
Opportunities	**Threats**
▪ Increasing density in existing industrial areas. ▪ Links to R&D both physically and functionally. ▪ Developing the circular economy. ▪ Improving economic and planning cooperation within the functional urban area. ▪ The new types of industry do not necessarily need a lot space or generate pollution. ▪ Oslo has a range of different neighbourhoods where different industries should/can play an important role, and they can take advantage of being in a city.	▪ Growing population, with pressure on the housing market. ▪ Norwegian mindset for property ownership. ▪ Low density housing. ▪ Weak links between R&D and production. ▪ Weak capacity to link mixed use, with a specific kind of function. ▪ Poor experience with mixing activities. ▪ Challenge to retain accessible low-skilled jobs despite trends for production moving out of the city. ▪ Lack of awareness of the health of productive and manufacturing activities in Oslo. ▪ Lack of policy or priorities for industrial activities in Oslo. ▪ Weakened metropolitan links due to the reorganization of the regional structure.

Source: ESPON MISTA (2020).

4.3 Statements

In the Oslo workshop statements were used to generate discussion in the 'Analysis' step of the workshop. The following statements were tabled for discussion which give an indication of the kind of issues being prioritised in Oslo at a planning level.

1. To address long-term challenges, a clearer set of ambitions for production and industrial land are needed at the metropolitan scale to distribute activities and prioritise action.

- We need to be mission driven (M. Mazucatto).

- In order to be more effective, we need to narrow the focus area in terms of specific ambitions, and we need clear targets to create momentum.
- We need to look at the metropolitan scale.

2. Clearer definition of foundational and city-oriented activities are needed to protect critical forms of production that the city depends on.

- Foundational activities should be categorised and mapped.
- This will also involve analysing what are non-foundational activities that still need to be connected to the city.
- It will include analysing city-oriented logistics.

3. Institutional leadership to support industrial areas and production should be stronger.

- The city and other parts of the public sector need to play a stronger hand in the development and planning process for industrial land.
- New institutional competencies (or organisations) are needed to allow greater involvement of the public sector.

4. Strengthening and diversification of Innovation Districts is necessary.

- The city contains recently approved innovation districts (Oslo Science City - Life Science & Hovinbyen).
- These districts should be encouraged to have a balance of research and development, design, communications and production to ensure that they are dynamic and flexible.
- We should prioritise other sites, such as the Alnabru Rail Terminal.

5. Clearer guidelines on mixed use development are needed to allow for suitable mixed-use areas to function properly.

- We do not need to know what will be accommodated in mixed use sites.
- What we need are clear design guidelines to ensure that the mix of activities does not inherently result in tension and that spaces for production do not inherently turn into office or retail space.
- Soft solutions are required for businesses and residents to cohabit.

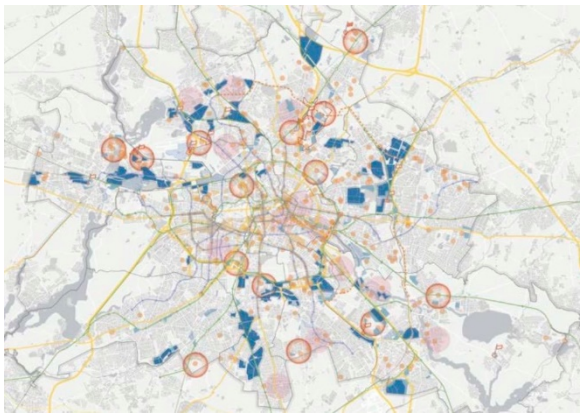
6. The Grorud Valley industrial corridor should be protected.

- Industrial activities in the Grorud Valley floor should be retained and protected.
- The corridor may be split into zones addressing certain kinds of complementary activities.
- Only sites closer to the city centre should/could be mixed.
- Housing development should be limited to the fringe of the valley.

4.4 Inspirational cases selected

Eight inspirational cases were selected for the workshop which provide an indication of the kind of interventions that were considered a priority.

Figure 11: The inspirational cases presented and discussed within the workshop.

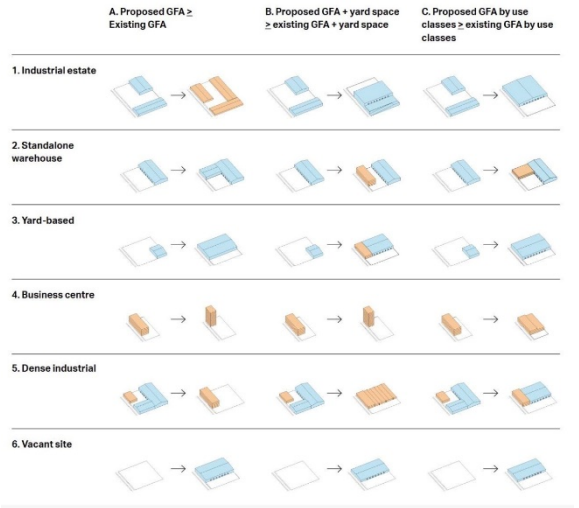


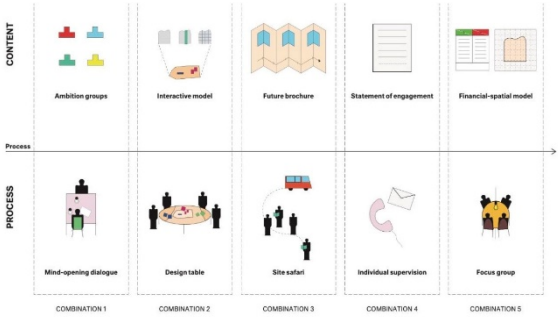
Greater Manchester Combined Authority

Oslo's metropolitan planning competencies changed recently, which has meant that official metropolitan planning has been halted. Regardless, metropolitan planning is essential as land within the city is limited and serious development pressure for housing. Oslo can thus gain much from the informal partnerships that built Greater Manchester.

Stadtentwicklungsplan Wirtschaft 2030 (Berlin)

Oslo has been criticised for being too market driven and not being clear enough about what kinds of activities should be located where. Berlin's Economic Urban Development Plan helps to flesh out how certain activities can be best distributed across the city to take advantage of logistics and links to research.



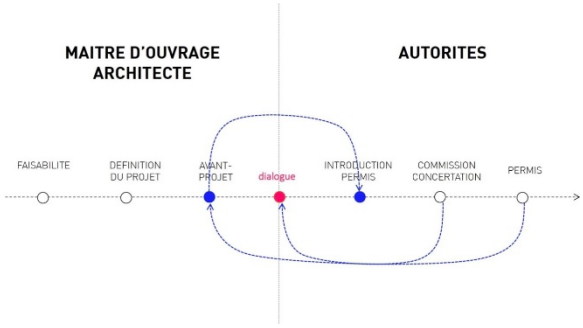


Industrial intensification and co-location study (London)

Oslo's limited available land for development and the demand for rezoning industrial land for other uses has meant that pressure is developing to use existing land more effectively. London's intensification study provides Oslo with a good example of the kinds of guidelines and development opportunities to apply locally.

Lageweg (Antwerp)

Oslo contains industrial land located within the Grorud Valley that could be developed, yet most remains in private hands. While this puts public authorities in a weak position it also provides conditions for co-creation and bottom-up planning. The Lageweg offers a successful example of process management.

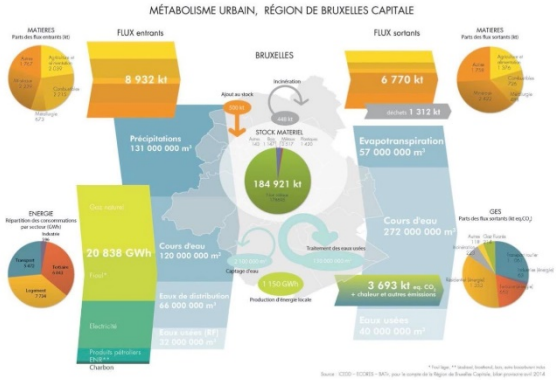


Bouwmeester Maître Architecte (Brussels)

Mixed use development has been promoted, but it has been poorly executed and remains troubling for industrial activities to use. The Bouwmeester model, as a facilitator, offers a useful model for more effective mixed use development.

RDM Campus

The RDM site links education and entrepreneurship under the same roof and encourages collaboration between people with technical and theoretical expertise. This kind of space could be an appealing investment opportunity for Oslo.



The Brussels Circular Economy Plan

Oslo has taken a market driven approach over the last two decades. A mission driven planning, like Brussels' circular economy plan, offers a pathway for building other city scale challenges to combine business, the public sector and research in dealing with challenges faced by the city.

Planned Manufacturing Districts (Chicago)

Oslo's pressure for housing could result in piecemeal rezoning of some of the city's most functional spaces. Chicago's PMD shows how rigid planning can help protect land for a range of activities that will not naturally appear on the market.

Source: ESPON MISTA (2020).

4.5 Outcomes and discussion

The discussion resulted in ambitious ideas for the local economy and a clearer role of production and industrial land uses within it. The last two decades of market-oriented development resulted in a scarcity of land for redevelopment and serious decisions need to be made before the city will run out of space for non-housing activities.

Suggestions included more clearly defining what kinds of activities to support. This particularly related to foundational activities that the city depends on (such as food, repair, basic infrastructure and construction). In fact, some participants stressed for the city to be more mission driven and present clear ambitions to help align both public and private actors. This would need to involve a greater level of facilitation, particularly from the City of Oslo.

Sites and locations were considered important. For example, the recent 'innovation clusters' were considered an important place to start, particularly if they could fit into a larger economic plan for the city. Mixed use areas remain an attractive idea but require more precision, better examples and particularly better design and design processes to conceive them. Some activities that do not depend heavily on the city, should be encouraged to move out of the city. This would require some facilitation to link businesses with other locations. Finally, for land that should remain industrial, it requires stronger protection than what is currently available.

For productive activities, Oslo needs to invest in stronger efforts to communicate the value that productive activities provide the city. Otherwise, residents will have little respect for production activities and in turn these activities will not be well integrated into the urban economy.

5 Annex: further details on the methodology of the SWOT analysis used

5.1 Detailed description of the methodology

The methodology follows the approach to the analysis of the regional network of branches pioneered 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[9], 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. Consequently, innovations are often generated by applying existing technological solutions (from one branch) to new problem areas (in another branch) by recombining knowledge from different areas (initially Jacobs, 1969).

Companies can, however, only absorb and process new knowledge if this knowledge is not too far away from their own knowledge base. Consequently, a central issue in the related varieties analysis conducted below is the measurement of the “embeddedness” of a branch. In this respect several approaches have been proposed in literature.[10] Most of them, however, are only able to identify proximity and define relatedness within the manufacturing sector or within the service sector. This makes them unsuitable for the present project as they are unable to measure the increasing linkages between services and production that characterize the economic “ecosystems” of urban agglomerations. For this reason, the current analysis relies on an approach by Neffke and Henning (2013). This approach argues that the exchange of personnel between branches (i.e., the direct movement of employees from one branch to another) is a good measure of the proximity of their knowledge base as such flows show that workers from one branch can meaningfully apply their knowledge base (gained in the source branch) in the destination branch. The approach therefore derives the measure of the proximity of the knowledge flow from flow data of employees between branches across all economic sectors.[11] This is because human capital of the workforce is highly job-specific, so that individuals (necessarily) lose part of their human capital when they move to a branch in which

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

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

[11] 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.

they cannot or can hardly make use of their previously accumulated (job- or branch-specific) knowledge (Neal, 1995; Parent, 2000). Such job changes between cognitively distant branches are rather unlikely. Rather, employees prefer to switch between branches that share a common knowledge base (i.e., are technologically or cognitively related to each other) and therefore need workers with similar skills, so that the employees can transfer a large part of their human capital when changing jobs between branches (and thus avoid losses of human capital and therefore income).[12]

Thus, the degree of cognitive or technological relatedness between two branches can be deduced from the probability of labour flows between these branches. Of course, this requires complete information on all job changes between branches at a very disaggregated sectoral level. Such data is provided by the results of a major research project conducted by the Institute for Employment Research (IAB) in Germany (Neffke et al., 2017A, 2017B), which examined labour flows between branches at a highly disaggregated level on the basis of the IAB dataset on employment history (BeH)[13] in order to define technologically or cognitively "close" branches for Germany (referred to here as "skill-relatedness"). The application of the labour-flows between branches obtained for Germany to regions of other countries seems justified. It can be feasibly assumed that branches (groups) that prove to be technologically or cognitively "close" or "skill-related" in Germany on the basis of inter-sectoral labour market flows at the level of NACE 3-digit branches, will be so in other highly developed parts of Europe as well: In fact, it can be rather ruled out that the same NACE 3-digit branches in Germany and regions in Austria, Norway or (Northern) Italy - that are subject to the present analysis - as regions with very similar levels of economic and technological development, differ substantially from each other in terms of production technology, qualification structure, input-output interdependencies etc., such that they would require systematically different knowledge bases.

We therefore use the matrix of branch-relatedness obtained from intersectoral job changes, the resulting sectoral connections for the analysis of the stakeholder city regions of the project. IAB distinguishes a total of 265 branch groups at the NACE 3-digit level in Germany. This means that a symmetrical matrix can be used to map a total of more than 70,000 target-source relationships between branches. For each of these bilateral relations a "skill-relatedness" index (*SRij*) is formed, which depicts the relative magnitude of the respective flow of labour between

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[12] An empirical confirmation of this hypothesis is provided by Neffke et al. (2017A) for Germany. They show that job changes between branches are restricted to a limited spectrum of target branches that are cognitively "related" to the respective branch of origin.

[13] In principle, the results were calculated at the 4-digit level of economic activities, but for our purposes they were aggregated to the level 3 branches. We are very grateful to Anne Otto of IAB Nuremberg for providing the data and additional processing for the purposes of our analysis. The BeH data set (for a more detailed description see Bender et al., 2000) represents a complete survey. The employee history contains comprehensive personal information on all employees and companies in Germany subject to social insurance contributions as of 30 June each year. Information on employees and companies can be linked by means of anonymous personal and company numbers, so that on this basis (also) changes of job of employees can be identified.

two branches i and j as a measure of their "skill-relatedness". The basic idea here is that comparatively "large" labour flows between two branches are an indication that workers from branch i tend to move to branch j without any problems and can reuse their knowledge or skills from the old branch i quite easily. In this case the pair of branches under consideration can be qualified as cognitively/technologically "close" (or "skill-related").

What is meant by "comparatively large": In addition to their cognitive proximity, other factors are responsible for the extent of job changes between two branches, especially their size, but also their dynamics, wage levels or similar. An observable bilateral labour flow can thus be considered "relatively large" (and only then) if the number of job changes between the two branches is greater than would have been expected taking all the factors mentioned into account. Consequently, the "Skill-Relatedness" index compares the actual number of job changes measured with those that would have occurred if job changes between the two branches (given the characteristics of the branch) had been purely random. This (in the case of random changes) "expected" labour flows thus represents the benchmark for the classification of the observed labour flows. It can be easily calculated based on probability theory (cf. Otto et al., 2014).

Specifically, the "skill-relatedness" indicator as a measure of the cognitive "proximity" between two branches i and j is thus denoted as

Equation *(3)* $SR_{ij} = \frac{F_{ij}}{\hat{F}_{ij}}, SR_{ij} = \frac{F_{ij}}{\hat{F}_{ij}}$

where $F_{ij} F_{ij}$ denotes the observed job changes between branches i and j, and $\hat{F}_{ij}$ $\hat{F}_{ij}$ denotes the expected job changes between i and j. If this "skill-relatedness" index is > 1, the actual flows between the two branches are greater than would be expected in the case of purely random job entries and exits, which means that the pair of branches can be regarded as technologically or cognitively "related" or "skill-related". With index values < 1, on the other hand, job changes between the two branches are less frequent than would be expected, and a technological or cognitive relatedness obviously is not high in this case.[14] On the basis of the matrix of these 70,225 indicator values for the 265 branch groups of the NACE classification (level 3) it is now possible to represent the entire network of cognitively or technologically "related" branches and to use it subsequently for the calculation of the embeddedness (see above) as part of the empirical SWOT analysis for the individual branches in each stakeholder region.

Against this background, the starting point of the 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, following Otto et al.

[14] In the further analysis, a normalized "skill-relatedness" index is used, which assumes values between -1 and +1. Positive values thus indicate cognitive proximity, whereas negative values do not indicate such proximity.

(2014), a branches potential in a region can be empirically assessed along two dimensions. The first is the size of the branch in the regional economy, which is measured by the location quotient (LQ_{ir}) as a measure of the relative regional of branch *i* in region *r.* If this indicator is larger than one the branch is localized in the region, otherwise it is not.

The second is the embeddedness of a specific branch *i* in the "knowledge environment" of the region. This, similarly, to its own size, can be measured by the (weighted) regional specialisation of related branches (LQ_{ir}^{rel}) in the region. If its value of is larger than 1, then branch i is well embedded in the economy of region r, as it can draw on a large pool of "related" branches with a similar knowledge base. Values smaller than 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 1: Categories of the empirical SWOT analysis
Development potentials according to degree of specialisation and embeddedness

		Regional embeddedness of branch *i*	
		high $LQ_{ir}^{rel} > 1{,}1$	low $LQ_{ir}^{rel} < 0{,}9$
Regional degree of specialisation in branch *i*	High $LQ_{ir} > 1{,}1$	High specialisation and well embedded (Strength S)	High specialisation but weakly embedded (Threat T)
	low $LQ_{ir} < 0{,}9$	Low specialisation but well embedded (Opportunity O)	Not specialised and weakly embedded (Weakness W)

Source: Otto et al. (2014), ESPON MISTA (2020).

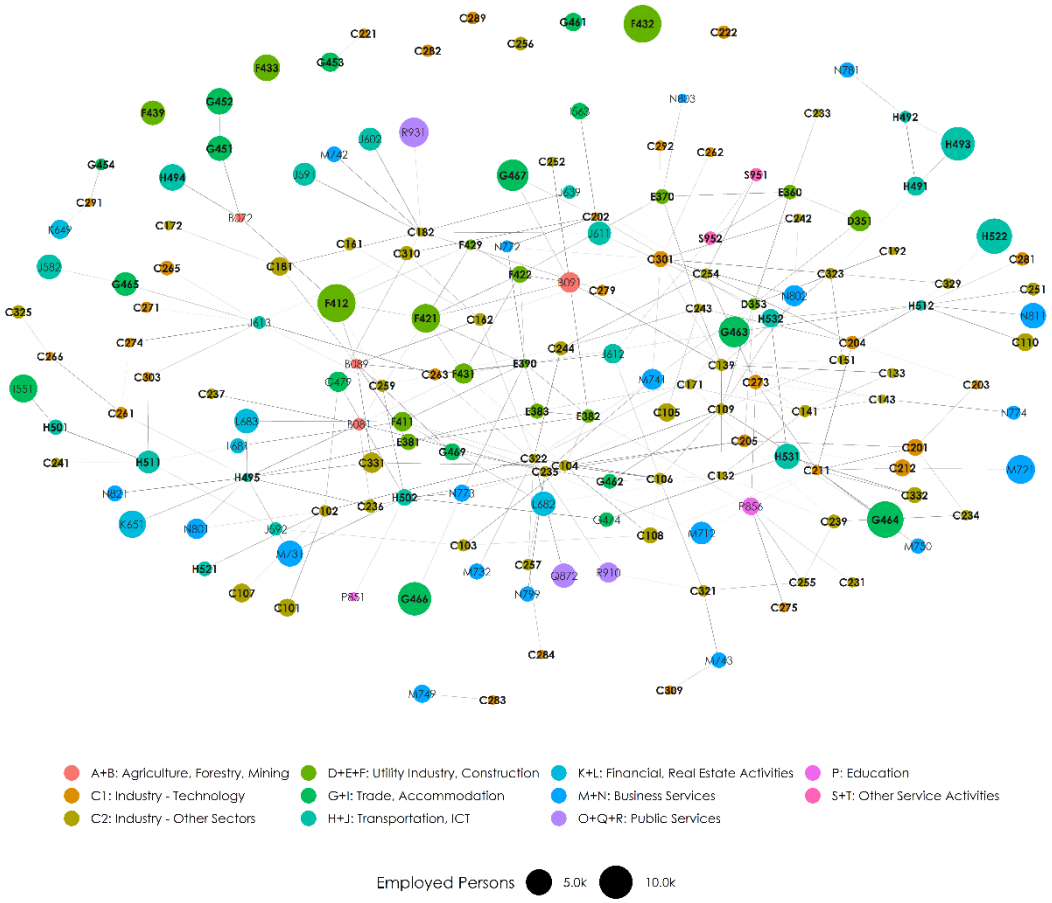
Overall, both the degree of specialisation and the embeddedness in the regional sectoral structure are decisive for an assessment of the development potential of a branch. According to Otto et al. (2014) economic branches in a region can be classified into four different categories, by differentiating, according to the values of their localisation quotient and their embeddedness indicator (Table A1):

1. If the branch under consideration is heavily localized in the region (LQ_{ir} > 1.1) and if this branch is also well embedded in "related" branches (LQ_{ir}^{rel} > 1.1), the branch is large relative to the regional economy and it is likely that it will also strongly profit from localised knowledge transfers across industries in the region. As a consequence, its future development prospects should be favourable, and the branch can be considered to be a "strength" of the regional economy.
2. By contrast, a branch with a low degree of specialisation and embeddedness (LQ_{ir} as well as LQ_{ir}^{rel} < 0.9) is unlikely to profit substantially from localized knowledge transfers but is also small in terms of the regional economy. Despite the fact that such branches may be of importance for the other reasons (e.g., the presence of natural resources or the satisfaction of local demand) such branches have therefore been regarded as a regional "weakness" in previous analysis from a technological development perspective.

3. Branches that are lowly localised (LQ_{ir} < 0.9) but well embedded (LQ_{ir}^{rel} > 1.1) are faced by a favourable regional environment of technologically or cognitively "close" branches (and thus diverse opportunities to use a common knowledge base) but are still relatively small. Such branches could thus offer special "opportunities" to develop new strengths through structural policy initiatives in the future.
4. Finally, branches which are highly localized (LQ_{ir} > 1.1), but only weakly embedded in complementary in the region (LQ_{ir}^{rel}< 0.9), tend to be seen at risk which could be reduced by strengthening complementary branches through structural policy initiatives. This is because they are relatively large but are unlikely to profit substantially from their regional knowledge base.

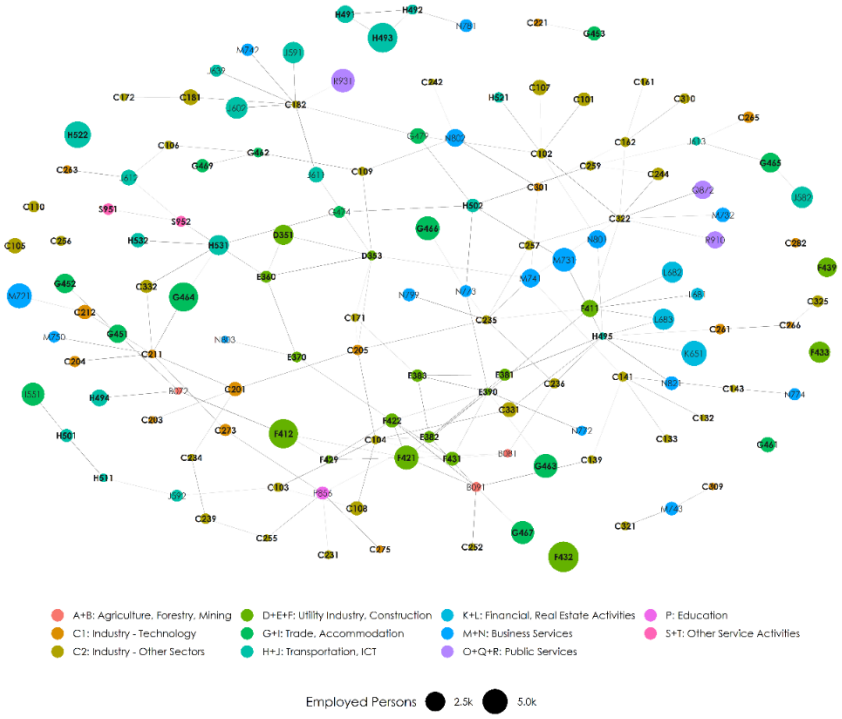
5.2 Network of branches

Figure A1: Network of branches (total Oslo metropolitan area).



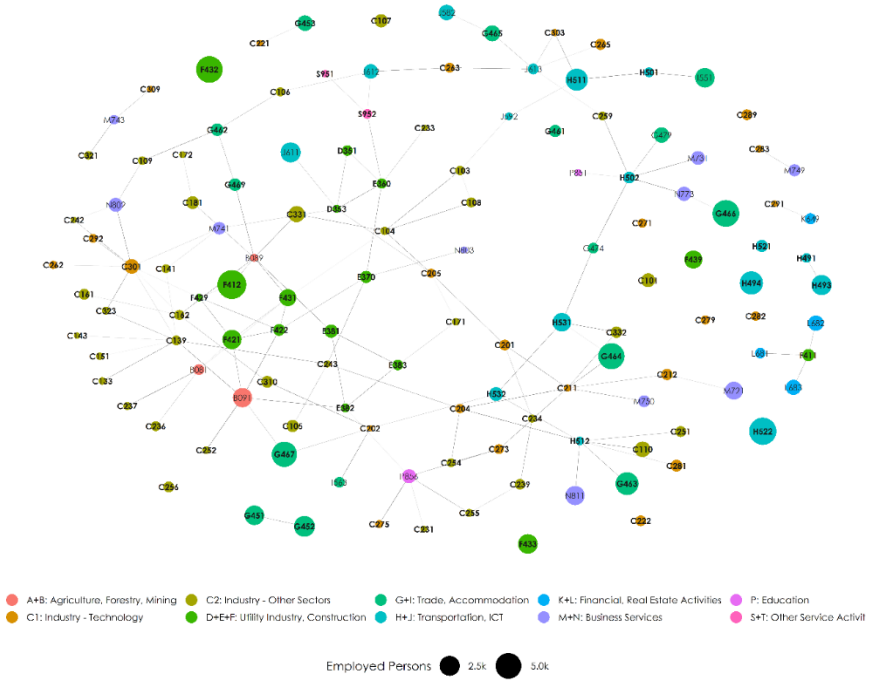
Source: Statistics Norway, network structure based on Neffke et al. (2017B), ESPON MISTA (2020) calculations. For illustrative purposes, only NACE 3-digit branch groups marking productive activities (in bold) and non-productive activities with strong links to productive activities are displayed.

Figure A2: Network of branches (city of Oslo).



*Source: Statistics Norway, network structure based on Neffke et al. (2017B), ESPON MISTA (2020) calculations. For illustrative purposes, only NACE 3-digit branch groups marking **productive activities (in bold)** and non-productive activities with strong links to productive activities are displayed.*

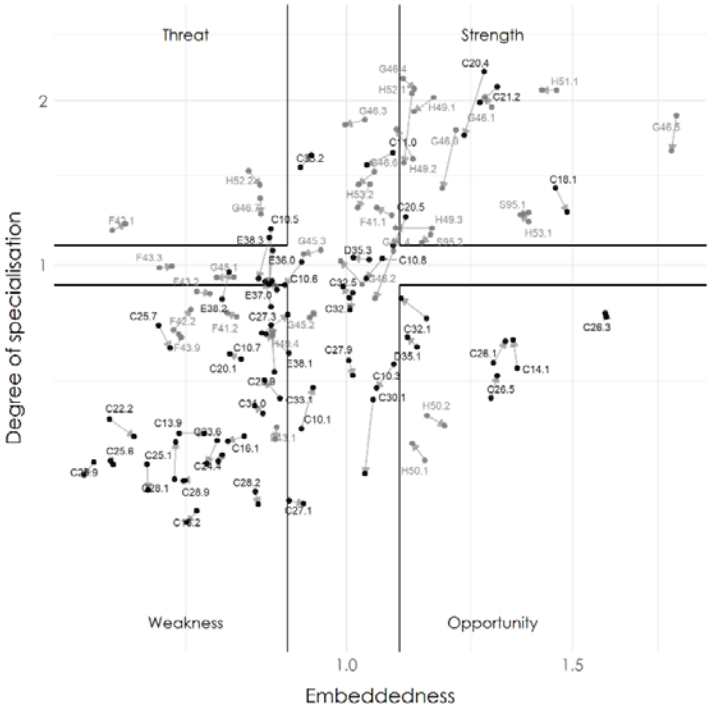
Figure A3: Network of branches (environs).



*Source: Statistics Norway, network structure based on Neffke et al. (2017B), ESPON MISTA (2020) calculations. For illustrative purposes, only NACE 3-digit branch groups marking **productive activities (in bold)** and non-productive activities with strong links to productive activities are displayed.*

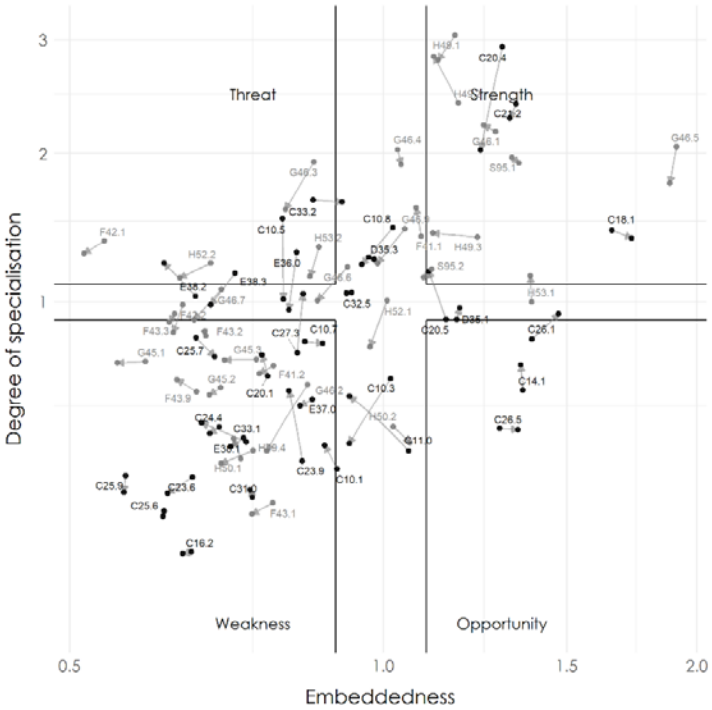
5.3 A dynamic perspective on the SWOT profiles

Figure A4: Dynamic of the SWOT Profile (total Oslo metropolitan area).



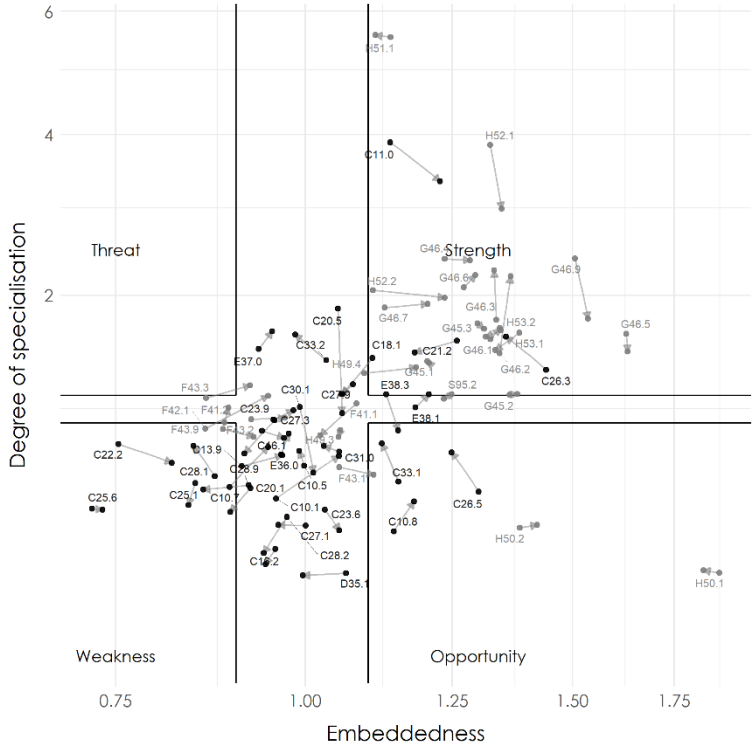
Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Figure A5: Dynamic of the SWOT Profile (city of Oslo).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Figure A6: Dynamic of the SWOT Profile (environs).



Source: Statistics Norway, ESPON MISTA (2020) calculations. Industry (service) activities in black (grey). For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

5.4 Top Tables for Subregions

Table A1: Top 10 branches in terms of size (2019).

NACE	Name	Empl.	Share in %
Total metropolitan region			
F41.2	Construction of residential and non-residential buildings	14840	1,92
F43.2	Electrical, plumbing, and other construction installation activities	14443	1,87
G46.4	Wholesale of household goods	12930	1,67
H52.2	Support activities for transportation	12370	1,60
H49.3	Other passenger land transport	10668	1,38
G46.6	Wholesale of other machinery, equipment, and supplies	10483	1,35
G46.7	Other specialised wholesale	8769	1,13
G46.3	Wholesale of food, beverages, and tobacco	8057	1,04
F42.1	Construction of roads and railways	6574	0,85
F43.3	Building completion and finishing	5995	0,77
City of Oslo			
F43.2	Electrical, plumbing, and other construction installation activities	8683	1,77
H49.3	Other passenger land transport	7796	1,59

F41.2	Construction of residential and non-residential buildings	7709	1,57
G46.4	Wholesale of household goods	7463	1,52
H52.2	Support activities for transportation	5961	1,21
G46.6	Wholesale of other machinery, equipment, and supplies	4801	0,98
G46.3	Wholesale of food, beverages, and tobacco	4503	0,92
F42.1	Construction of roads and railways	4203	0,86
G46.7	Other specialised wholesale	3891	0,79
F43.3	Building completion and finishing	3236	0,66
Environs			
F41.2	Construction of residential and non-residential buildings	7131	2,52
H52.2	Support activities for transportation	6409	2,26
F43.2	Electrical, plumbing, and other construction installation activities	5760	2,04
G46.6	Wholesale of other machinery, equipment, and supplies	5682	2,01
G46.4	Wholesale of household goods	5467	1,93
G46.7	Other specialised wholesale	4878	1,72
H49.4	Freight transport by road and removal services	4006	1,42
G46.3	Wholesale of food, beverages, and tobacco	3554	1,26
H51.1	Passenger air transport	3316	1,17
G45.2	Maintenance and repair of motor vehicles	3051	1,08

Source: Statistics Norway, ESPON MISTA (2020) calculations.

Table A2: Top 10 branches in terms of growth (2012-2019)

NACE	Name	Empl.	Growth p.a. in %
Total metropolitan region			
F42.2	Construction of utility projects	1699	11,28
C14.1	Manufacture of wearing apparel, except fur apparel	418	10,33
D35.3	Steam and air conditioning supply	264	10,17
C28.1	Manufacture of general-purpose machinery	449	5,78
E37.0	Sewerage	784	5,36
E38.3	Materials recovery	867	5,05
E38.1	Waste collection	1265	4,90
F41.1	Development of building projects	2430	4,63
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	737	4,54
F42.1	Construction of roads and railways	6574	4,42

City of Oslo			
D35.3	Steam and air conditioning supply	219	11,38
C23.9	Manufacture of abrasive products and non-metallic mineral products n.e.c.	201	9,57
C20.5	Manufacture of other chemical products	252	6,99
E38.3	Materials recovery	627	6,82
C14.1	Manufacture of wearing apparel, except fur apparel	209	6,22
F41.1	Development of building projects	1849	5,95
F43.1	Demolition and site preparation	970	5,10
C10.8	Manufacture of other food products	1375	4,96
E38.1	Waste collection	485	4,86
H50.1	Sea and coastal passenger water transport	666	4,70
Environs			
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	536	13,64
F42.1	Construction of roads and railways	2371	8,92
G46.2	Wholesale of agricultural raw materials and live animals	584	8,69
E37.0	Sewerage	524	6,46
E36.0	Water collection, treatment, and supply	223	6,34
C10.7	Manufacture of bakery and farinaceous products	616	5,88
F43.3	Building completion and finishing	2759	5,18
C33.1	Repair of fabricated metal products, machinery, and equipment	1196	5,16
E38.1	Waste collection	780	4,93
F43.9	Other specialised construction activities	2365	4,86

Source: Statistics Norway, ESPON MISTA (2020) calculations. For illustrative purposes only branches with at least 100 employees are displayed.

Table A3: Top 10 branches in terms of specialisation (location quotient, 2019).

NACE	Name	Empl.	LQ
Total metropolitan region			
G46.4	Wholesale of household goods	12620	2,08
H51.1	Passenger air transport	3347	2,08
G46.1	Wholesale on a fee or contract basis	1525	2,03
C21.2	Manufacture of pharmaceutical preparations	1180	1,99
H49.1	Passenger rail transport, interurban	1853	1,92
G46.3	Wholesale of food, beverages, and tobacco	8105	1,83
H49.2	Freight rail transport	181	1,80
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, and toilet preparations	405	1,76
G46.5	Wholesale of information and communication equipment	3758	1,66

C33.2	Installation of industrial machinery and equipment	920	1,63
City of Oslo			
H49.2	Freight rail transport	181	2,84
H49.1	Passenger rail transport, interurban	1717	2,81
C21.2	Manufacture of pharmaceutical preparations	864	2,29
G46.1	Wholesale on a fee or contract basis	1064	2,23
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, and toilet preparations	296	2,03
S95.1	Repair of computers and communication equipment	341	1,93
G46.4	Wholesale of household goods	7350	1,91
G46.5	Wholesale of information and communication equipment	2546	1,77
C33.2	Installation of industrial machinery and equipment	586	1,64
F41.1	Development of building projects	1553	1,59
Environs			
H51.1	Passenger air transport	3291	5,58
C11.0	Manufacture of beverages	1133	3,35
H52.1	Warehousing and storage	434	2,99
G46.4	Wholesale of household goods	5270	2,38
G46.3	Wholesale of food, beverages, and tobacco	3663	2,26
G46.6	Wholesale of other machinery, equipment, and supplies	5610	2,21
G46.2	Wholesale of agricultural raw materials and live animals	520	2,20
H52.2	Support activities for transportation	5827	1,98
G46.7	Other specialised wholesale	4818	1,91
G46.9	Non-specialised wholesale trade	524	1,77

Source: Statistics Norway, ESPON MISTA (2020) calculations. For illustrative purposes only branches with at least 100 employees are displayed.

Table A4: Top 10 branches in terms of embeddedness (2019).

NACE	**Name**	**Empl.**	**Embed.**
Total metropolitan region			
G46.5	Wholesale of information and communication equipment	3758	1,79
C26.3	Manufacture of communication equipment	209	1,59
C18.1	Printing and service activities related to printing	1719	1,49
H51.1	Passenger air transport	3347	1,42
S95.1	Repair of computers and communication equipment	358	1,39
H53.1	Postal activities under universal service obligation	4695	1,37
C14.1	Manufacture of wearing apparel, except fur apparel	222	1,35
C26.1	Manufacture of electronic components and boards	233	1,33
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	602	1,31
G46.1	Wholesale on a fee or contract basis	1525	1,28
City of Oslo			

G46.5	Wholesale of information and communication equipment	2546	1,88
C18.1	Printing and service activities related to printing	1176	1,73
C26.1	Manufacture of electronic components and boards	211	1,47
H53.1	Postal activities under universal service obligation	2698	1,38
C14.1	Manufacture of wearing apparel, except fur apparel	145	1,36
S95.1	Repair of computers and communication equipment	341	1,35
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	302	1,35
C21.2	Manufacture of pharmaceutical preparations	864	1,32
G46.1	Wholesale on a fee or contract basis	1064	1,25
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, and toilet preparations	296	1,24
Environs			
H50.1	Sea and coastal passenger water transport	152	1,83
G46.5	Wholesale of information and communication equipment	1212	1,63
G46.9	Non-specialised wholesale trade	524	1,54
H50.2	Sea and coastal freight water transport	365	1,42
G45.2	Maintenance and repair of motor vehicles	2811	1,38
G46.2	Wholesale of agricultural raw materials and live animals	520	1,37
C26.3	Manufacture of communication equipment	158	1,36
H52.1	Warehousing and storage	434	1,35
G46.1	Wholesale on a fee or contract basis	461	1,34
H53.1	Postal activities under universal service obligation	1997	1,33

Source: Statistics Norway, ESPON MISTA (2020) calculations. For illustrative purposes only branches with at least 100 employees are displayed.

Table A5: Top Strengths (2019).

NACE	**Name**	**Empl.**
Total metropolitan region		
G46.5	Wholesale of information and communication equipment	3758
H51.1	Passenger air transport	3347
G46.1	Wholesale on a fee or contract basis	1525
C21.2	Manufacture of pharmaceutical preparations	1180
G46.4	Wholesale of household goods	12620
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, and toilet preparations	405
H49.1	Passenger rail transport, interurban	1853
C18.1	Printing and service activities related to printing	1719

S95.1	Repair of computers and communication equipment	358
H52.1	Warehousing and storage	626
City of Oslo		
G46.5	Wholesale of information and communication equipment	2546
H49.2	Freight rail transport	181
H49.1	Passenger rail transport, interurban	1717
C21.2	Manufacture of pharmaceutical preparations	864
G46.1	Wholesale on a fee or contract basis	1064
S95.1	Repair of computers and communication equipment	341
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, and toilet preparations	296
C18.1	Printing and service activities related to printing	1176
H53.1	Postal activities under universal service obligation	2698
H49.3	Other passenger land transport	7808
Environs		
H51.1	Passenger air transport	3291
C11.0	Manufacture of beverages	1133
H52.1	Warehousing and storage	434
G46.4	Wholesale of household goods	5270
G46.3	Wholesale of food, beverages, and tobacco	3663
G46.2	Wholesale of agricultural raw materials and live animals	520
G46.6	Wholesale of other machinery, equipment, and supplies	5610
G46.9	Non-specialised wholesale trade	524
H52.2	Support activities for transportation	5827
G46.5	Wholesale of information and communication equipment	1212

Source: Statistics Norway, ESPON MISTA (2020) calculations. For illustrative purposes only branches with at least 100 employees are displayed.

Table A6: Top Opportunities (2019).

NACE	**Name**	**Empl.**
Total metropolitan region		
C26.3	Manufacture of communication equipment	209
C32.1	Manufacture of jewellery, bijouterie, and related articles	141
C14.1	Manufacture of wearing apparel, except fur apparel	222
C26.1	Manufacture of electronic components and boards	233
D35.1	Electric power generation, transmission, and distribution	2849
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	602
H50.2	Sea and coastal freight water transport	1061
H50.1	Sea and coastal passenger water transport	743
City of Oslo		
C14.1	Manufacture of wearing apparel, except fur apparel	145

C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	302
Environs		
E38.3	Materials recovery	238
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	300
C33.1	Repair of fabricated metal products, machinery, and equipment	1276
C10.3	Processing and preserving of fruit and vegetables	118
F43.1	Demolition and site preparation	1498
C10.8	Manufacture of other food products	167
H50.2	Sea and coastal freight water transport	365
H49.1	Passenger rail transport, interurban	136
H50.1	Sea and coastal passenger water transport	152

Source: Statistics Norway, ESPON MISTA (2020) calculations. For illustrative purposes only branches with at least 100 employees are displayed.

Table A7: Top Threats (2019).

NACE	**Name**	**Empl.**
Total metropolitan region		
H52.2	Support activities for transportation	11639
G46.7	Other specialised wholesale	8750
F42.1	Construction of roads and railways	6631
City of Oslo		
G46.3	Wholesale of food, beverages, and tobacco	4442
H53.2	Other postal and courier activities	919
E38.2	Waste treatment and disposal	346
H52.2	Support activities for transportation	5812
F42.1	Construction of roads and railways	4445

Source: Statistics Norway, ESPON MISTA (2020) calculations. For illustrative purposes only branches with at least 100 employees are displayed.

5.5 Summary table on size and SWOT-profiles of all productive activities

Table A.8: NACE 3-dgit branch groups and SWOT profiles.

NACE	Name	Total Empl.	City	Environs	Total Reg.
C10.1	Processing and preserving of meat and production of meat products	1467	W		
C10.2	Processing and preserving of fish, crustaceans and molluscs	145	W		
C10.3	Processing and preserving of fruit and vegetables	229		O	
C10.4	Manufacture of vegetable and animal oils and fats	104			
C10.5	Manufacture of dairy products	1595			
C10.6	Manufacture of grain mill products, starches and starch products	161			
C10.7	Manufacture of bakery and farinaceous products	1735	W		
C10.8	Manufacture of other food products	972		O	
C10.9	Manufacture of prepared animal feeds	123			
C11.0	Manufacture of beverages	1450		S	
C13.9	Manufacture of other textiles	204			W
C14.1	Manufacture of wearing apparel, except fur apparel	222	O		O
C16.1	Sawmilling and planing of wood	296			W
C16.2	Manufacture of products of wood, cork, straw and plaiting materials	335	W		W
C18.1	Printing and service activities related to printing	1719	S		S
C20.1	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms	1122	W	W	W
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	405	S	S	S
C20.5	Manufacture of other chemical products	314	S		
C21.2	Manufacture of pharmaceutical preparations	1180	S	S	S
C22.2	Manufacture of plastics products	366		W	W
C23.6	Manufacture of articles of concrete, cement and plaster	350	W		W
C23.9	Manufacture of abrasive products and non-metallic mineral products n.e.c.	435	W		W
C24.4	Manufacture of basic precious and other non-ferrous metals	519	W		W
C25.1	Manufacture of structural metal products	327		W	W
C25.6	Treatment and coating of metals; machining	432	W	W	W
C25.7	Manufacture of cutlery, tools and general hardware	153	W		W
C25.9	Manufacture of other fabricated metal products	214	W		W
C26.1	Manufacture of electronic components and boards	233			O
C26.3	Manufacture of communication equipment	209		S	O
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	602	O	O	O

C27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	135			
C27.3	Manufacture of wiring and wiring devices	580			
C27.9	Manufacture of other electrical equipment	136			
C28.1	Manufacture of general-purpose machinery	446		W	W
C28.2	Manufacture of other general-purpose machinery	233	W		W
C28.9	Manufacture of other special-purpose machinery	304		W	W
C30.1	Building of ships and boats	951			
C31.0	Manufacture of furniture	579	W		W
C32.1	Manufacture of jewellery, bijouterie and related articles	141			O
C32.3	Manufacture of sports goods	112			
C32.5	Manufacture of medical and dental instruments and supplies	429			
C33.1	Repair of fabricated metal products, machinery and equipment	2296	W	O	W
C33.2	Installation of industrial machinery and equipment	920			
D35.1	Electric power generation, transmission and distribution	2849			O
D35.3	Steam and air conditioning supply	171			
E36.0	Water collection, treatment and supply	600			
E37.0	Sewerage	674	W		
E38.1	Waste collection	1038	W	S	W
E38.2	Waste treatment and disposal	429	T		
E38.3	Materials recovery	716		O	
F41.1	Development of building projects	2011			
F41.2	Construction of residential and non-residential buildings	14126	W		W
F42.1	Construction of roads and railways	6631	T		T
F42.2	Construction of utility projects	1172	W		W
F43.1	Demolition and site preparation	2237	W	O	W
F43.2	Electrical, plumbing and other construction installation activities	13774	W		W
F43.3	Building completion and finishing	5449	W		
F43.9	Other specialised construction activities	4188	W		W
G45.1	Sale of motor vehicles	4319	W	S	
G45.2	Maintenance and repair of motor vehicles	5208	W	S	
G45.3	Sale of motor vehicle parts and accessories	1939	W	S	
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	178			
G46.1	Wholesale on a fee or contract basis	1525	S	S	S
G46.2	Wholesale of agricultural raw materials and live animals	659	W	S	
G46.3	Wholesale of food, beverages and tobacco	8105	T	S	
G46.4	Wholesale of household goods	12620		S	S
G46.5	Wholesale of information and communication equipment	3758	S	S	S
G46.6	Wholesale of other machinery, equipment and supplies	10029		S	

G46.7	Other specialised wholesale	8750		S	T
G46.9	Non-specialised wholesale trade	1154		S	S
H49.1	Passenger rail transport, interurban	1853	S	O	S
H49.2	Freight rail transport	181	S		
H49.3	Other passenger land transport	10363	S		
H49.4	Freight transport by road and removal services	5302	W	S	W
H50.1	Sea and coastal passenger water transport	743	W	O	O
H50.2	Sea and coastal freight water transport	1061		O	O
H51.1	Passenger air transport	3347		S	S
H52.1	Warehousing and storage	626		S	S
H52.2	Support activities for transportation	11639	T	S	T
H53.1	Postal activities under universal service obligation	4695	S	S	S
H53.2	Other postal and courier activities	1657	T	S	
S95.1	Repair of computers and communication equipment	358	S		S
S95.2	Repair of personal and household goods	389			S

Source: ESPON MISTA (2020) calculations; S… Strength, W… Weakness, O… Opportunity, T… Threat; Empty cell indicates no specific SWOT profile in the region.

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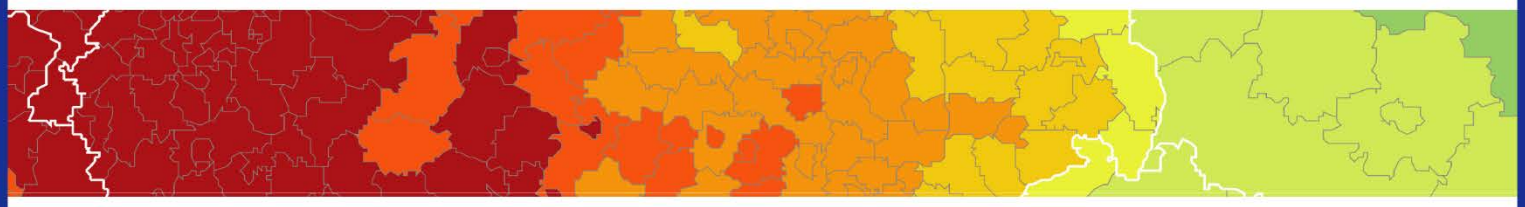

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