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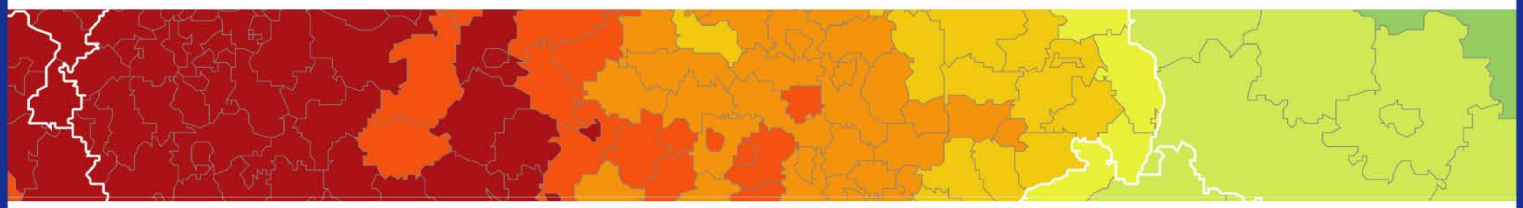

MISTA
Metropolitan Industrial Spatial Strategies & Economic Sprawl

Targeted Analysis

Annex 3.5
Case study report: Turin (IT)

Annex 3.5 – Case study report: Turin (IT)

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

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Annex 3.5 – Case study report: Turin (IT)

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Executive summary

As a middle-sized city, Turin has long held a prominent position in Italy's industrial production system. Located at the western end of Po Valley, a region famed for centuries of technical innovation, Turin specialised in vehicle production and more recently in aerospace. The years succeeding World War Two resulted in Italian industry driving the economy and a strong recovery, referred to by some as the "Italian Miracle". Thanks to the growth in Fordist-style production, which radically increased demand for labour and drew internal immigration from the south of Italy, Turin grew rapidly and sub-urbanised.

However, the demand for labour has since curbed rapidly through globalisation and automation. Under the changing industrial environment, the former province of Turin, has been challenged by the reorganisation of its economic base (see Cotella, 2011; Vanolo, 2015). The earlier Fordism crisis, and massive structural changes in the car industry since then, have had a decisive impact on industrial development and localisation (Vanolo, 2015). Industry has moved from the city centre to the outskirts and surrounding municipalities of the first two belts (taking advantage of the accessibility of the ring road).

In 2015, with the implementation of a new state led policy to create metropolitan governance areas, the province of Turin (Provincia di Torino) was converted into the Turin Metropolitan City (Città metropolitana di Torino). A mere transposition that failed to respond to the complexity and heterogeneity - both demographic and socio-economic - of the larger metropolitan territory. The dimensional structure as well as the allocation of financial resources are only part of the causes that triggered disruption in metropolitan governance. The political architecture of the metropolitan city, as a second-level institution, resulted in weaking leadership and complicating the interaction between the city of Turin and the municipalities of the first and second belts, impacting competition and economic specialisation. Divisions are further aggravated by the declining birth rate and an influx of migrants which is sewing nationalism.

The complex geographical structure and institutional-political framework characterising the metropolitan city has also weakened its capacity to direct the economic development in a homogeneous way. This affects the capacity to develop a shared vision for economic development that accommodates the complexity and diversification of the whole metropolitan territory. Moreover, cooperation across different institutional levels is still rather problematic because the metropolitan government does not have the institutional capacity to steer the coordination and promotion of the socio-economic development of the area.

Next to this, the Turin Metropolitan City is stagnating economically and as such, there is no demand for new industrial spaces. The same applies to the residential development. Consequently, there is little conflict between manufacturing and other uses. Over the years the deindustrialisation process alongside the decentralisation of productive activities towards more peripheral areas have resulted in a series of disused sites. This has been driven by recent crisis where many companies shut down and industries decentralised (under the increasing fiscal pressure along with strict environmental regulations). These trends exacerbated the economic

dynamic whereby the number of abandoned areas grew exponentially. Stakeholders lament the lack of a structured vision. Arguably, a series of public measures/actions directed at facilitating the regeneration of brownfield areas, needs to be put in place. This is particularly evident when considering that the real estate market has never been able to generate consistent demand for either residential, or industrial uses. Therefore, the Turin Metropolitan City has limited influence on technical innovation that builds on its industrial heritage, generates business, leads to the redevelopment of brownfield land and avoids the outflow of highly educated students.

Antidotes for unemployment are being explored, with the situation proven by public authorities looking to attract low value-added economic activities like logistics. Welcoming new business to provide jobs could address the pending employment crisis but does not take advantage of the region's historic strengths. The region's heritage in technology, vehicle manufacturing and the aerospace sector remains a stable foundation for the economy. Turin's location at one end of the Po Valley allows access to skilled labour, technical knowledge, and a trans-regional network of complementary clusters from Milan to Modena. Furthermore, Turin's location near France and Switzerland could provide a niche compared to other cities in the Po Valley. Politecnico di Torino is a well-established university, a solid foundation for knowledge, research and development which is home to the world renown I3P incubator. With various vacant sites across the metropolitan region, new business opportunities could help rehabilitate or redevelop these sites. This will require that the benefits and costs be balanced at a metropolitan scale, with dedicated tools and incentives.

Leadership is one of the evident challenges and opportunities for the metropolitan city of Turin that can be leveraged to take build on its assets and reduce division across the metropolitan area. There are various kinds of leadership which could be addressed. The need of a stronger alliance between Turin and the surrounding municipalities is evident; these peripheral municipalities are suffering from economic decline, high(er) employment and vacant industrial land, while Turin is competing against other Italian and European cities to attract talent, investment, and business. Regardless of their position in the metropolitan area, both the core and metro region have much to gain from cohesive development that clusters businesses and retains both skilled labour and knowledge in or around the city. Leadership is also required to avoid abandoned industrial land from resulting in blight or polluting natural ecosystems. Improved metropolitan cooperation could help channel investment, when available, in rehabilitating or redeveloping existing sites, the question is how such cooperation could occur.

Leadership could also help shift production towards sectors with potential future growth. The recent COVID-19 experience and the shift of global attitudes towards climate change could expose two of Turin's large industrial activities: the automotive and aerospace sector. This will require a comprehensive transition which can build on existing skills, technology, logistics and education infrastructure. Business transitions may need supporting established organisations change management patterns while also attracting and retaining new businesses.

Table 1: Results of SWOT analysis.

Strengths	**Weaknesses**
▪ A strong industrial heritage, presenting also different specialization, beside the strong tradition in the automotive sector. ▪ Well connected to industrial activity along the Po Valley, connected by a high-speed train line. ▪ Strong high-level services-oriented functions located within the city. ▪ Territorial capital/established territorial assets (business clusters, university poles and research centres of excellence) capable of offering development opportunities.	▪ Limited powers for the metropolitan city which results in fragmented policy and limited capacity to balance the strength of Turin city with the weaker hinterland. ▪ A diffused and wide urban area with small(er) municipalities surrounding Turin. ▪ Brain drain: the loss of highly educated, university educated workers. This could be due to poor conditions for entrepreneurs, lack of employment conditions or lack of possible clients (due to the configuration of larger businesses). ▪ Lack of coordination of spatial planning and sectoral conflicts - presence of administrative precincts with little dialogue between them. ▪ Bureaucratic slowness weighing on the location choices of companies and on the ability of the private operator to activate a series of investments in some areas rather than others.
Opportunities	**Threats**
▪ Building tighter links between research and production. This could involve using vacant or underused space for prototyping and research. ▪ Provide greater support for start-ups and new businesses. This can include structural support, financial support, seed funding and so forth. ▪ Encourage networks and agglomeration to encourage Turin to be more resilient and adaptable. ▪ A strong inflow of patents, indicating that research is being developed. ▪ High unemployment levels. This is an opportunity for manual labor if suitable jobs can be sourced. ▪ Proximity to other larger centres and markets in France (Lyon) or Switzerland (Geneva). ▪ Build on the strengths of projects such as the I3P incubator, applying it to policy or at a metropolitan scale.	▪ Weak leadership at a metropolitan scale. ▪ New development is not attracted to the older brownfield sites. ▪ Lack of growth, meaning investors are not taking risks. ▪ High levels of bureaucracy. ▪ Low real estate values for both residences and offices and warehouses are a critical element for the attraction of investments and the recovery of some brownfield sites (e.g., real estate certifications and resources). ▪ Difficulties in coordination between supra-municipal authorities for the realisation of infrastructural works (e.g., metro line 2), which would offer significant development opportunities.

Source: ESPON MISTA (2020).

Finally, the data analysis confirms that manufacturing in the Turin Metropolitan City, particularly the fastest growing branches over recent years are highly embedded in the regional economy. This strongly applies to the automobile industry, which plays a major role in the region. Parts of the ICT and higher technology branches are also identified as further strongholds in the Turin economy. Therefore, developing appropriate viable industrial strategies for both automotive

and the ICT sector is crucial to support the local economy. On the positive side, outside the automotive there are only few threats to the industrial structure of the city. On the negative side, however, if and when the automotive production stagnates, only few other sectors will be able to support Turin economy. The strong industrialisation of the Turin Metropolitan City is mainly associated to the industrialisation of the environs, where promising industrial specialisation are emerging. In the city of Turin, despite the city clearly being an industrial city, fewer manufacturing branches are present, some could be crucial for the future of the city and the wider metropolitan territory.

The results of the interviews and statistical analysis were presented back to stakeholders in a *'Futures Workshop'* held in November 2020, in order to gauge their feedback of the portrait that emerged through the MISTA project research and to also contribute feedback on development opportunities. The workshop helped raise collective resentment and frustration with the state of leadership and economic development across the metropolitan area. The result of the discussion raised two key points. Firstly, there is a lack of collective leadership which symbolically is creating confusion and a lack of cohesive investment. Secondly, there is a need for support in economic development that could involve a neutral actor that is not restricted by political boundaries and can help stimulate projects and partnerships. Finally, the experiences from COVID-19 have left a noticeable mark on Turin, but this should be used as an opportunity to reach back to the region's economy based on productive activities, with already strong ties with other economic sectors.

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

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 Turin 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, 2-day long mission in February 2020, where MISTA researchers visited Turin and conducted a series of on-site discussions with the local stakeholders. As a result, the first draft of the Turin 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 Turin in the course of May-June 2020. However, COVID-19 made this impossible, thus the workshop had to be postponed to November and even then, could only be organised online. Despite this difficulty, the 1-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 Turin Metropolitan City 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, taking into account the particular local conditions of the Turin Metropolitan City.

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 Turin Metropolitan City 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

2.1 Main demographic/social and spatial development trends

Turin Metropolitan City (Città Metropolitana di Torino, CMTo) outlines the spatial and institutional frame of reference, responsible - among other functions - for the socio-economic development of an area lived by about 2.3 million inhabitants and 6830 Km2 wide. Instituted by the Delrio law [1] (or Law 56/14) introducing all over Italy the so called "Metropolitan Cities", it is the fourth largest in Italy by population and the first for geographical extension, as well as one of the most problematic in terms of coherence between the institutional boundaries and its main socio-economic features. The metropolitan city is characterized by a marked morphological heterogeneity (divided between mountain territory and the plain/hill) and comprises 312 municipalities, 139 of which mountain municipalities. Thus, in order to ensure an adequate representation of the various territorial needs, in 2015 the metropolitan territory was organised into 11 homogeneous zones (Z.O.). Turin, which is a homogeneous zone itself, is at the forefront of the economic development of the metropolitan city. [2] Despite this effort, the current metropolitan institution is responsible for highly diversified socio-spatial and economic conditions, from the central urban areas of Turin and the surrounding municipalities to the peripheral mountain areas, basically neglected or out of the most relevant dynamics and also developmental policies. This unusual geographical structure has been inherited by the former boundaries of the provincial level, which the law instituting the metropolitan government has adopted all over Italy in order to speed up the process of constituting such institutional entities. From the spatial point of view, high level of urbanisation and built-up density are found all over the plain while the mountain areas are much less dense and urbanised, despite the presence of important touristic settlements - built in particular during the eighties - which have undergone processes of decline for some years now.

The Turin Metropolitan City can be considered on the one hand, as part of a larger urban region moving from Milan to Venice and reaching out to the port city of Genoa, partially reinforced by the high-speed railway line. On the other hand, it works as a large functional area and it is subdivided into six local labour systems (SLLs). Building on the home-work commutes, SLLs are defined by ISTAT (Italian National Institute of Statistics), 'as territorial areas (consisting of two or more neighbouring municipalities) that record constant commuting flows, and within which nearly all of the socio-economic relations are entertained' (Istat, 2011 p.1). In the metropolitan city there are six SLLs (the largest of which is Turin with 112 municipalities).

[1] In 2014, the Delrio law foresaw the establishment of Metropolitan Cities at the national level. These were originally conceived as "engines of the socio-economic development" capable of promoting national growth. Among the fundamental functions attributed by the Law 56/14 to the Metropolitan Cities is the adoption of the "Strategic Metropolitan Plan" (PSM) and "General Metropolitan Territorial Plan" (PGTM).

[2] Source: I dossier delle Città Metropolitane, 2017. Città metropolitana di Torino. Dipartimento per gli Affari Regionali e le Autonomie Presidenza del Consiglio dei Ministri.

Although there is a strong concentration of economic activities and jobs around Turin and the surrounding municipalities, the other SSLs have specific and important economic specialisations as well. [3]

Map 1: Spatial delineation of the 11 Homogeneous Zones and the SLLs.

Source: IRES, 2018; Vetritto et al., 2017.

Well known in the literature as the "one company town", the city of Turin has flourished consistently during the fifties and sixties with the automotive sector, being by large organised on the presence of the most important Italian car manufacturing, FIAT. In this period, work-related immigration mainly from the south of Italy and the rest of the region has been an engine for growth so much so that the city of Turin and metropolitan area have experienced for several

[3] As reported by Vetritto et al. (2017, p.45) "half of the Turin's Local Labour Systems (Chieri, Rivarolo Canavese and Torino) are classified as 'Local Transport Systems', those of Ivrea and Susa are classified respectively as 'High Specialization Local System' and 'Local Tourism System' while the Pinerolo SLL is part of the 'Made in Italy System' specialized in the manufacture of machinery, and finally the extra provincial SLLs of Santhià and Savigliano are specialized respectively in petrochemical/pharmaceutical and metal production and processing."

decades a consistent trend of demographic growth. However, the reorganisation of the automotive sector and the economic crisis of the early seventies brought in a quite disruptive process of change, and the whole area was heavily affected both in economic and socio-demographic trends. In particular, the end of Fordism has been characterised by a progressive relocation of population from the city of Turin and the first belt municipalities, to the second and third belts, with a general movement of high classes to the hills and mountains, while working classes moved or remained stuck in the suburbs. In the background, the mountain arc kept shrinking demographically and in its already weak economic role. All in all, the city of Turin lost one quarter of its population, while the surrounding municipalities kept growing of one third, generating a strong residential pressure. Within this framework the city started shrinking from both residential and industrial function, which has resulted in empty factories and abandoned manufacturing buildings mostly located in the central urban area. The decentralization of productive activities towards more peripheral areas have resulted in a large series of disused sites, particularly concentrated in the city of Turin (around 3,5 million squares meters), with an exacerbated dynamic in the last years, where the real estate has never been able to generate consistent demand for either residential or other economic uses. As such, the number of industrial abandoned areas grew exponentially particularly in the city, but also in the metropolitan area. Despite this, interviewees emphasize that recently, speculative dynamics have tried to generate new land value offering new industrial sites, which still result empty. In terms of size, brownfields are located in both urban and suburban areas, inside and outside Turin. Today, the exclusive function that manages to occupy brownfield areas is logistics (or trade activities but in a smaller percentage).

Over the last two decades, after a short demographic recovery in the ‘90s - because of the progressive phenomenon of suburbanization, the increasing ageing population and the low birth rate - the city of Turin kept losing population (even if at a steady low increasing trend -2%), while the surrounding municipalities kept growing at a higher trend (Rapporto Giorgio Rota-Centro Einaudi, 2019, p.16). Next to this, massive waves of immigration, mainly from North-African and Eastern Europe countries, have changed the social composition of the resident population. Recent studies have shown that in Turin, “the incidence of the foreign population on the total population has increased in the last twenty years, from 3% in 1998 to 13% in 2008, to 15% in 2018” (Ibidem, p. 26). Currently, data reveal that “inflow and outflow are balanced suggesting that the phase of expansion of the migration dynamic is coming to an end and the phenomenon is settling” (Città di Torino, Prefettura di Torino, 2017, p.16 cited Rapporto Giorgio Rota-Centro Einaudi, 2019 p.26).

2.2 Main trends in the development of the economy and manufacturing

The industrial production in the Turin Metropolitan City has had a cyclical trend between 1998 and 2018, with a collapse in 2009, when the effects of the global economic crisis produced the most incisive consequences (the industrial production decreased by 26% compared to 2008). Instead, the maximum positive peak was reported in the second quarter of 2010, with a +12%

compared to the same period of the previous year. Looking at economic trend of the main industrial sectors, for almost all of them the collapse in 2008-09 was followed by a recovery in 2010-11, hence the production has substantially stabilized in the following years. Exceptions are the automotive sector (which had a significant positive peak in 2014 and another minor one in 2016) and the food industry, which remained stable over the last twenty years. [4]

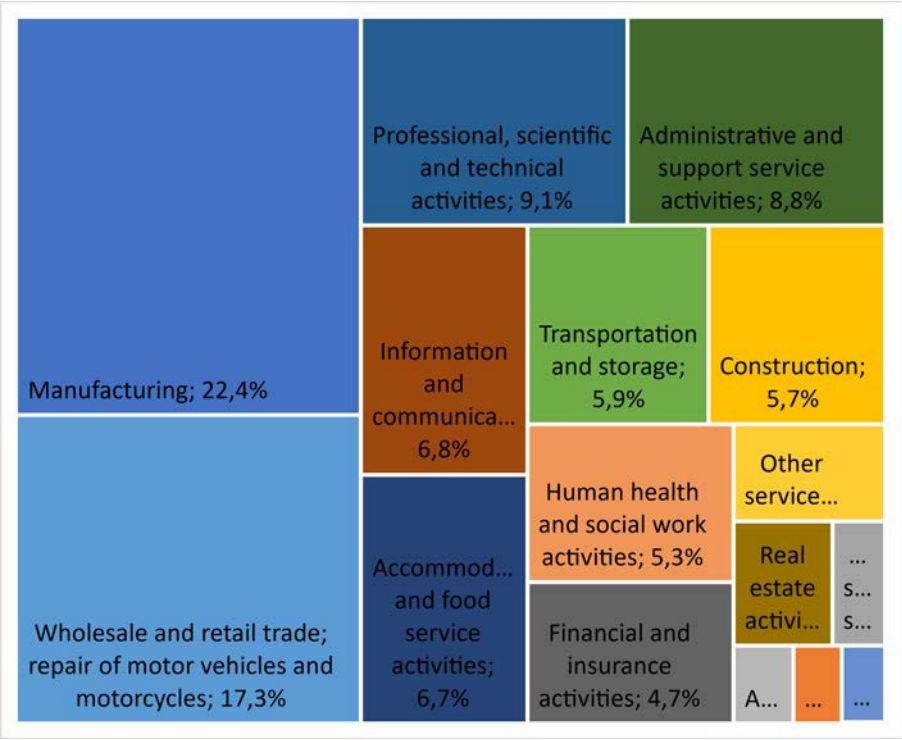
Looking at the current economic conjuncture (referred to 2019), the best performances were achieved by the food sector (average annual variation +5.5%), by the mechanical sector (+0.9%) and by the other manufacturing sectors (+0.6%). The most negative annual average changes were made by the transport means sector (-3.7%) and the manufacturing of fabricated metal products (-1.8%). At the end of 2019, the firms registered in the metropolitan city of Turin were 219513 (-1389 units compared to 2018), with a variation of -0.6% compared to 2018. In 2019 the gradual downturn of the more "traditional" sectors was confirmed: the construction sector reported a decrease of 2.1%, followed by the manufacturing industry (-2.2%), by agriculture (-1.8%) and trade (-1.7%). The tertiarization process keeps on going, with an increase of +3% in the activities of people-oriented services and a growth of +0.8% in the activities of business-oriented services. [5]

During the last ten years (2009-2018) the number of manufacturing firms in the Turin Metropolitan City has decreased by 4.84%, and the employment has decreased by 6.74% (considering the period 2012-2018). However, as depicted in Figure 1, the manufacturing activities still play a crucial role in the economy of the Turin SLL (accounting for the 22.4%), although employees mainly work in service sectors: 17.3% in wholesale and retail trade, 9.1% in professional, scientific and technical activities, 8.8% in administrative and support services activities, 6.8% in information and communication activities, etc.

[4] For a review see Rapporto Giorgio Rota-Centro Einaudi, 2019. Ventesimo Rapporto «Giorgio Rota» su Torino. [online] pp.17-70; 221-228. Available at: https://www.rapporto-rota.it/images/rapporti/docs/2019/XX_Rapporto_Rota.pdf (accessed 9 May 2020).

[5] See Torino Congiuntura Nr.78/2020.

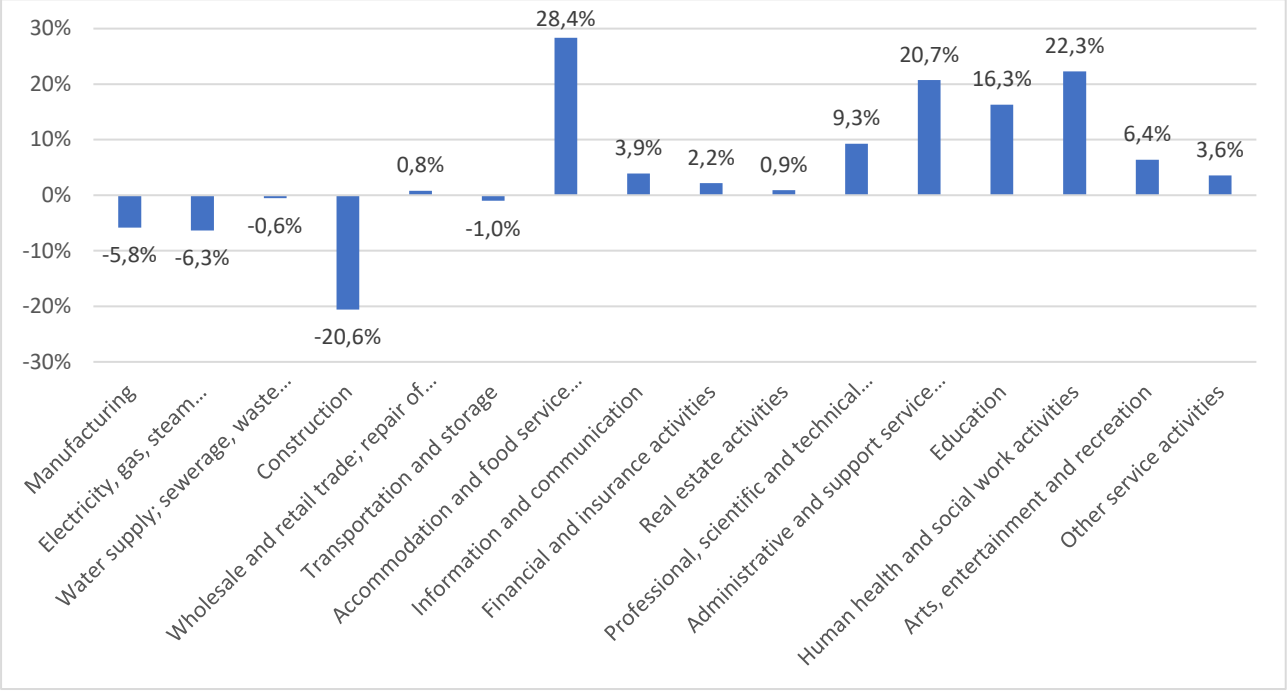
Figure 1: Employment shares by sector in Turin SLL, 2017 (% of the overall economy).



Source: Istat 2017, ESPON MISTA (2020) team calculations.

As shown in Figure 2, in the Turin SLL most of the service sectors employment grew between 2012 and 2017, especially accommodation and food services activities (+28.4%), human health and social work activities (+22.3%) and administrative and support services activities (+20.7).

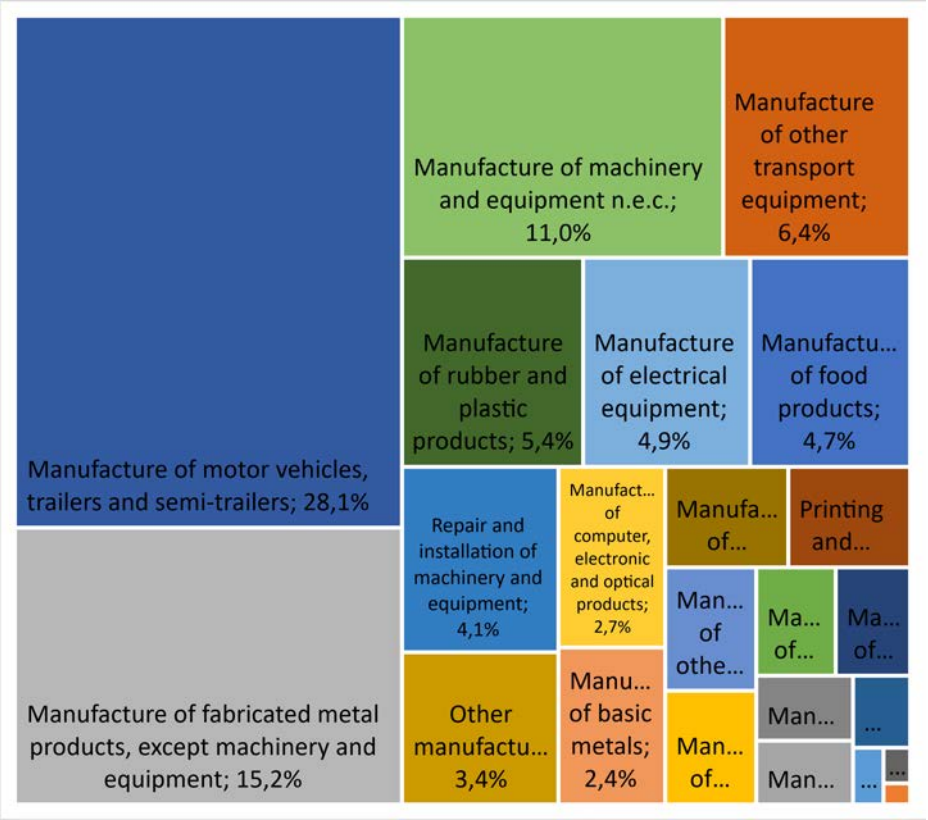
Figure 2: Employment variation (2012-2017) by sector in Turin SLL (%).



Source: Istat database, ESPON MISTA (2020) team calculations.

The manufacturing base of Turin Metropolitan City is characterized by a high number of specializations organized around the core of the advanced mechanics sector, with a production structure generating numerous opportunities for innovation, through connections and relationships between similar productions.[6] As depicted in Figure 3, the automotive sector accounts for about 65%[7] of the overall manufacturing activities in the Turin SLL.

Figure 3: Employment shares by manufacturing sector in Turin SLL, 2017 (% of total manufacturing).



Source: Istat 2017, ESPON MISTA (2020) team calculations.

Most of the manufacturing firms are concentrated within the city of Turin, and in the nearest areas (in particular in the Western and Norther part of the metropolitan area), and they are specialised in the fields of manufacturing of basic metals and of motor vehicles, trailers and semi-trailers.

In particular, the Canavese area is specialised in the manufacturing of fabricated metal products (NACE code 25), while the Western part of the metropolitan area is characterised by a relevant presence of manufacturing of machinery and equipment (NACE code 28), manufacturing of fabricated metal products (NACE code 25), and manufacturing of rubber and plastic products

[6] Ibidem, for a review see Vetritto et al. (2017).

[7] This percentage is an approximation, calculated considering the following sectors, which probably belongs to the automotive supply chain: manufacture of chemicals and chemical products, manufacture of rubber and plastic products, manufacture of fabricated metal products, except machinery and equipment, manufacture of machinery and equipment n.e.c., manufacture of motor vehicles, trailers and semi-trailers, manufacture of other transport equipment.

(NACE code 22). The Northern part of the metropolitan area shows a concentration of firms in the fields of manufacturing of machinery and equipment (NACE code 28), and manufacturing of rubber and plastic products (NACE code 22). Finally, the South-West part of Turin is specialised in the manufacturing of motor vehicles, trailers, and semi-trailers.[8] In terms of size, the manufacturing firms located within CMTo are mainly micro firms (64%) and small firms (20%); while only 1% are large firms, in line with the national entrepreneurial structure.

All in all, the strengths of the metropolitan area remain its strong export-oriented economy (being the second metropolitan area contributing to 4% of the national export share[9]) and the presence of an economic base with a strong specialization in the manufacturing sector (the manufacturing share is around 8/9% with 35% added value[10]). The main exported products by firms located in the CMTo are related to transport means.

Economic diversification and the knowledge economy turn

Today, Turin seems evolved from its car dominated/centered past towards a greater economic diversification (see Cotella, 2011; Vanolo, 2008; 2015a/b). A paramount event in the process of restructuring Turin's economic base was the host of the Winter Olympic Games in 2006. As recalled by many stakeholders, on the wave of the mega-event, the idea that the areas' industrial vocation was coming to an end in the short run, became firmly established in both the public opinion and at the institutional level. In order to recover from the reorganisation of the automotive sector and from the process of "relative deindustrialization" - that has hit the whole urban area, moving in particular from the central city- policymakers exploited this momentum to reorient the development of Turin from the traditional automotive-centred specialization towards new service sectors (see Cotella, 2011; Vanolo, 2008, 2015a, 2015b; and Spaziante, 2001). The mega-event undoubtedly constituted a catalyst of change triggering processes of urban transformation that facilitate the promotion of a renewed vibrant identity for the area grounded in a knowledge-based economy (Cotella, 2011; Vanolo, 2008).

This generated a new concentration of job offer in the central city, partly contrasting the effects of deindustrialisation, and of new economic activities in the Susa Valley and around Turin. The haste to quickly abandon the industrial vocation of the area in favour of a "wannabe global city" (Rossi and Vanolo, 2012 cited Vanolo, 2015b p. 1), however, has proved to be an "hyper-optimistic aspiration" when the area was struck by the global financial crisis in 2007 (Vanolo, 2015b p. 1). The economic crisis of 2007 strongly hit the area, generating additional stress to its already fragilized manufacturing structure that has lived on the total dependence of the FIAT,

[8] See Città Metropolitana di Torino, 2020, Piano territoriale generale metropolitano (PTGM). Aggiornamento del sistema economico-produttivo metropolitano. O.3 – Analisi degli insediamenti produttivi.

[9] For a review see Rapporto Rota-Centro Einaudi (2019) and CAMERA DI COMMERCIO INDUSTRIA ARTIGIANATO E AGRICOLTURA DI TORINO (2019b), TORINO CONGIUNTURA.

[10] Data source: Istat 2016 cited Rapporto Rota-Centro Einaudi (2019, p.41).

and consequently has not been able to completely discard from its unique industrial vocation and heritage.

Against this background, local actors agree that the increasing competitive pressure and the diversification of economic vocations have been a further incentive for innovation. Indeed, the promotion of a knowledge-based economy has resulted in a significant innovative-oriented and diversified ecosystem which comprises “2 Universities, 3 Business Incubators, 4 Innovation Hubs, 2 Science and Technology Parks, 2 Technology Districts, and 1 Bio Park” (Città Metropolitana di Torino, 2019). As shown by several studies, over the years many specialisations have developed around the automotive industry (e.g. advanced mechanics and mechatronics, electronics) with a strong concentration in technologically advanced sectors like aerospace (which ranks third in Italy in terms of employment – with over 15.000 employees – and turnover - about 3.6 billion euro -),[11] ICT, and biotech. Innovation is further fostered by the cooperation and the proximity relations with advanced research centres and academic institutions. Next to this - on the wave of the “touristification” process started back in 2006 - data shows that also the tourism sector is continuing to grow. Also, the sector of social innovation (third sector, social welfare, corporate policies) is rising new opportunities. The coexistence of traditional manufacturing activities with some new production dynamics has led to the development of new business services, closely linked to the needs of modern companies. In 2018, business services firms represented 25% of the total number of registered firms, followed by commerce (25%) and construction sector (15%), highlighting that the outsourcing process which involved the metropolitan factories keeps on going. However, despite the progressive decline in the number of companies, the manufacturing sector continues to have a strategic importance in terms of employment.[12] Against this background, many local stakeholders witness the lack of a metropolitan policy framework to support the further development of the industrial ecosystem.

Spatial dynamics: first and second round of manufacturing relocation

Today, the hinterland of Turin and neighbouring municipalities are characterized by a marked spatial concentration of industries. In particular, sectoral studies[13] estimate that the request for space for industrial use is mainly concentrated in the municipalities of the first two belts like Moncalieri, Rivalta, Grugliasco, Collegno, and Settimo Torinese. From the third belt, the lower concentration of industrial sites is observable mainly because of the high levels of environmental quality and the agricultural vocation of the area. Thus, the territorial dimension and extension of the manufacturing activities result highly concentrated compared to the

[11] See Vetritto et al., 2017.

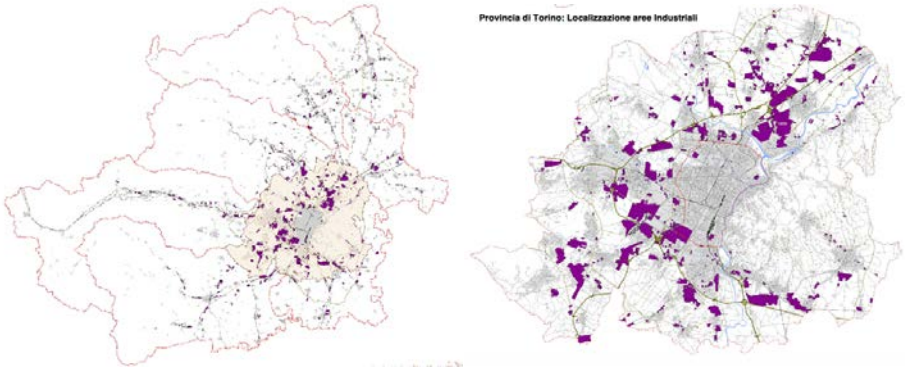
[12] See Città metropolitana di Torino, 2020, Documento Unico di Programmazione (DUP) 2020.

[13] Scenari Immobiliari, 2017. Rapporto 2017 sul mercato immobiliare del Piemonte e Valle d’Aosta. (online) Available at: http://www.piemonte.ance.it/docs/docDownload.aspx?id=41118; JLL and Ceipiemonte, 2019. Torino Urban Profile 2019. Overview del mercato immobiliare torinese. (online) Available at: https://www.centroestero.org/images/pdf/TUP2019_ITA.pdf; Ufficio Studi Gruppo Tecnocasa, 2018.

administrative boundaries of the metropolitan area. Among the various reasons that have led to such a spatial configuration is the lacking space for expansion, increasing land values and rent prices, but above all the environmental incompatibility and accessibility needs. These latter are the strongest factors guiding the relocation of many industries. Next to this, the agglomeration economies have had and continue to have a remarkable impact affecting the location choices of the companies and contributing to the spatial concentration of industrial activities around the capital city as illustrated in Figure 5. Some of the interviewees have pointed out that, compared to the past, large-scale industries began to reduce their size. Indeed, as reported by stakeholders, since the past 10/15 years there has been a decreasing demand for large-scale buildings and areas (if not for logistics), whilst it has been recorded an increasing demand for the decomposition of large, covered areas into smaller industrial sheds of 200 or 300sqm (maximum 500 sqm). [14]

On the one hand, the main result of the interviews is the fact that the area is economically stagnating, and consequently there is no demand for new industrial spaces. The same applies to the residential development. [15] Consequently, there is little conflict between manufacturing and other uses.

Map 2: Spatial distribution of industrial activities at the metropolitan scale and in the Turin Metropolitan area (AMT).



Source: Città Metropolitana di Torino, 2011.

On the other hand, there is a general consensus over the industrial relocation process as an embedded dynamic which encompasses the evolutionary urban development pathways of cities: it looks impossible to conceive the presence of large-scale manufacturing within urban central areas because of the unsustainable environmental and social costs. Nevertheless, different interviewees put forward the need to relocate industry in the city. [16] Indeed, in their

[14] For more info see footnote 25 and the following: https://www.rapporto-rota.it/trasformazioni-urbane/mercato-immobiliare.html and https://www.scenari-immobiliari.it/tag/industriale/

[15] A recent study called “Torino atlas”, conducted on the city of Turin area and the municipalities of the first two belts shows that since 2007 due to the ongoing economic crisis the number of new buildings for residential use has significantly decreased. Next to this, “average house prices are also declining and are strongly polarised between the central area where prices are four times higher than in the more peripheral areas” (Rapporto Giorgio Rota-Centro Einaudi, Urban Center Metropolitano and IED, 2018, p. 47).

[16] Currently, the Full (Future Urban Legacy Lab) research centre in Turin, is carrying out a line of research called "City and Innovation" that aims to understand how likely it is that manufacturing can

view - after a season that has accelerated the expulsion of greater economic activities from inner-city locations to the edge, on the wave of the Olympic games and the knowledge economy turn - there is the need to rethink the voids left by industries in terms of productive spaces. Given the undergoing process of digitization of the industrial base towards more sustainable models of production, interviews expect inner urban spaces to become able to accommodate innovative-oriented activities (i.e., labs, centres of product development, product design, or prototyping, etc.) as these latter benefit from geographical clustering and spatial density. More precisely, the potential relocation of activities is argued drawing on a scale of micro-production and technologically advanced production chains based on customization.

Next to this, according to the opinion of some stakeholders, processes of relocation at a global scale seem to be difficult to contrast due to the access to greater benefits/incentives large companies tend to relocate production and 'capital' abroad. Conversely, some interviewees argue for an opposite phenomenon whereas is found, especially for high-level productions (e.g., Vadò in Moncalieri), the tendency to move back to Italy. High-level productions indeed are considered to be activities that can no longer follow exclusively cost-based logic, but rather appear to follow precise positioning advantages such as access to qualified markets. Therefore, the emerging phenomenon seems to be the return of some (high-level) productions in Italy, and a second round of delocalization (from East-European countries to China). Finally, on a more general level, analysts pointed out that most relevant spatial allocation decisions mainly concern the localization of research and development centres, which are crucial as they facilitate technology transfer.

Main challenges and conflicts of future development in manufacturing

- **Lack of vision and weak metropolitan leadership**. According to many stakeholders the Delrio Law, establishing the metropolitan city, has led to a deterioration in the governance dynamics. The political architecture of the Turin Metropolitan City as a second-level institution makes the construction of leadership more difficult and in part complicates the interaction between municipalities with respect to processes of competition and economic specialisation. In particular, is found the lack of an overall vision able to deal with the complexity and diversification of the metropolitan territory. Actually, few of the metropolitan city's strategic objectives include keeping industry, and the attraction of new economic activities by the creation of a competitive environment. Nevertheless, interviewees lament a situation of inertia of the public administration and the need of a more effective leadership for supporting the existing productive activities, and the establishment of new ones. In addition, civil servants stress the need for an improved metropolitan cooperation that could help channel investment - when it is available - in rehabilitating or redeveloping existing sites. Next to this, from the interviews emerges the difficulty for municipalities to manage economic development policies, suggesting the need to create a territorial agency for the coordination of the industrial development at the metropolitan scale. This will also help the management of the abandoned industrial areas. All in all, leadership is one of the

return/move back to the city. Indeed, the role of the industry in the city and the extent to which a potential relocation process is possible and the form in which this should occur seems to be highly debated.

evident challenges and opportunities for the metropolitan city of Turin to take advantage of its assets and reduce division across the metropolitan area.

- **Insufficient incentives for the regeneration of brownfield areas** – Local political agendas seem quite sensible to the relevance and consequences of the 'brownfield phenomenon' (in terms of both economic/environmental sustainability and safety management). Nevertheless, stakeholders lament the lack of a structured vision which reflects the absence of adequate tools. The high - and often difficult to estimate - costs of the environmental remediation produce a first consistent obstacle to new investments. Companies remain mostly oriented towards greenfield development, whereas greenfield sites are increasingly less because of the sustainable development approach adopted by the metropolitan authority. Hence, stakeholders ask for reconciliation between different policy objectives: sustainability and economic development. The existing public measures directed at facilitating the regeneration of brownfield areas are considered to be insufficient. With various vacant sites across the metropolitan territory, new business opportunities could help rehabilitate or redevelop these sites. This will require dedicated measures and incentives (e.g., the reduction of urbanization costs, zero costs for decontamination, incentives for the completion of the characterization plans, "Piani di Caratterizzazione", etc.).
- **Business organizational approach and the hyper-fragmentation of the industrial base.** Besides the institutional and spatial issues above-mentioned, interviewees highlight two main challenges affecting the future of industry. One major challenge limiting the development of manufacturing is the rather traditional entrepreneurial culture of most SMEs. Not only, companies have not been sufficiently reactive to renew their structure in time to create the right conditions for accommodating the ongoing changes in the market, but the difference in entrepreneurial culture and business organizational approach, still plays a significant role in firms' survival capacity. In fact, as noted by the trade unions, management-directed companies are more likely to cope with crises situations compared to owner-controlled companies which builds on a more informal and sometimes ineffective approach. Next to this, recent research and studies (e.g., Banca d'Italia, Eurosistema, 2019) have identified in the hyper fragmentation of the industrial base a further limiting factor. The prevalence of micro-industries, which are less robust compared to medium-large and large enterprises, continues to be a challenge increasing the divide between small and medium-large/large companies. In particular, size affects the ability to invest in innovation and research (e.g., companies' capacity to innovate has not been homogeneous in these years), the possibility to secure financial resources, as well as to access and compete in international markets. Such dynamics are not well-supported when it comes to micro-enterprises.

2.3 Main factors affecting locational choices of manufacturing

Among the factors affecting firms' choices of location – which according to analysts mainly concern issues related to the economic/organisation spheres rather than specific spatial problems – the most relevant are:

- **Infrastructural deficit.** The infrastructural deficit of the metropolitan territory (e.g., telematics infrastructure such as broadband, and limited connection networks like airport and railway) contributes significantly to the loss of economic competitiveness of the productive system. This implies not only marginalization but also higher costs (economic, environmental, and social).
- **Lack of high-skilled workforce**. As an effect of the digitization of the economic base, also the employment structure in the manufacturing sector has substantially shifted to an

increasing demand of high-skilled jobs. However, it is observable the shortage of qualified labour force especially in certain fields. Next to this, there is an outflow of highly educated students. In particular, the Polytechnic of Turin, despite its great capacity to attract students, still has a very little capacity to retain human capital. To this regard, it is interesting to note that with the regional Law 23/2015 some specific competences, like professional training (which is usually of regional competence) have been delegated to the CMTo. This is one of the very few cases in Italy where the region has delegated such a paramount function in the context of industrial policies to the metropolitan authority.

- **Institutional and legislative uncertainty** (i.e., legal certainty, the certainty of the employment relationships, etc.) is identified as a further limiting factor. More precisely, the difficult interaction with the Italian labour market from a legislative point of view constitutes a strong barrier to the attraction of foreign investments. Similarly, the lack of homogenization of the administrative/bureaucratic procedures for the establishment and operation of new firms, further undermines the attractiveness of the area. Some initiatives to streamline this process were implemented. For instance, the SUAP, "Sportello Unico Attività Produttive" (One-Stop Shop for Productive Activities), was constituted by a national law with the aim of simplifying and coordinating the procedures for the setting-up of new businesses at the municipal level. Despite some positive results, interviewees lament the heterogeneity of application among municipalities, and a general lack of coordination at supralocal level.
- **Time-constraints and planning procedures.** The rather lengthy planning procedures, which very often exceed companies' expectations, makes it difficult to accommodate the needs of firms that seek for immediate answers. As such, the mismatch between the administrative/bureaucratic response time and firms' expectations, affects the internal decision-making policies of companies and their final location choice accordingly.

2.4 Development preferences of the city (region) leadership

The metropolitan strategic plan defines amongst its major objectives the attraction of new companies and the creation of new employment. Indeed, one of the five platforms (namely, PP3) around which the metropolitan strategic plan builds upon is the formation of "an innovative and attractive metropolitan city for businesses and talent" (Città Metropolitana di Torino, 2018 pp.13-17). Within this framework the metropolitan city has recently launched a budget line for innovation (INNOMETRO) directed at supporting micro-enterprises[17]. The PP3 line of development is pursued in conformity with the sustainable development approach to urbanization adopted by the metropolitan city, which intends to minimize the environmental impact of production activities.

The combination of these two priorities, that is the need to create further economic development and environmental protection, has resulted in a series of actions aimed at the regeneration of former industrial sites. The preservation of high-quality agricultural land and the rationalization of existing spaces are the underlying drivers of a massive phenomenon of requalification. As such, greenfield areas for industrial use are increasingly less due to soil protection reasons.

[17] The political direction at the metropolitan level is to focus on micro-enterprises because very often funding at the national and regional level concerns large companies. Therefore, the transition to an innovative-driven economic base will mainly affect the world of SMEs.

To this regard, it should be recalled the “Trentametro” project, which has been launched as a pilot project in 2018 (and included in the Metropolitan Strategic Plan). Drawing on the existing brownfields, the project identifies 30 privately-owned abandoned areas (measuring more than 5000sqm), which are believed to be particularly ‘suitable for foreign investors in an attempt to revitalize the local economy by guaranteeing zero soil consumption’ (Città Metropolitana di Torino, 2019). [18]

Next to this, local administrations at the municipal level are sometimes taking the lead to meet the needs and demands of industries willing to settle in the area both at the procedural level (i.e., experimentation of simplified processes for administrative procedures within the institution of SUAP) and as regards the urban planning instruments (i.e., territorial equalisation, territorial agreements, planning conventions, settlement agreement “Contratti di insediamento”).

Finally, the demand for new development seems limited and mostly concentrated in the logistics sector. In fact, Turin’s strategic location - as part of a larger urban region moving from Milan to Venice and reaching out the port city of Genoa, partially reinforced by the infrastructure network (e.g., high-speed railway line) - makes it suitable for the settlement of logistic activities. However, the attraction of low value-added economic activities like logistics - although in line with the strategic vision of the regional government which entails making Piedmont a “logistic platform” - does not take advantage of the region’s historic strengths. Despite reducing buildability, logistics consumes land and does not come with a high number of jobs (not to mention the environmental impact of such activities and the pressure generated on the capacity of transport infrastructure networks). In addition to the large logistics hubs, local stakeholders highlight as an emerging requirement, the accommodation of the intermediate level logistics platforms to serve both end-consumers and medium-sized commercial structures.

2.5 Tools through which the municipality can control the development processes

The regulations and policies that have the greatest influence on the localisation of production activities are of national, or eventually regional, competence. In fact, the levers of competition that most affect firms (such as job regulation, energy costs, etc.) are mainly determined by national strategies. In the early 2000s, the main incentives to foster territorial economic development have been promoted by the national government through the so-called “Patti territoriali” (territorial pacts, PT) - a nationally founded programme grounded in the local labour systems), to be implemented by the provincial level. In the Turin case, the province (today Metropolitan City), has been the promoter of a large and fruitful season of spatial concertation

[18] As described in the “Trentametro” project dossier, the variables guiding the selection process were as follows: location, accessibility, broadband connection, remediation costs, and the availability of services in the area (Città Metropolitana di Torino, 2019, p.4)

and of alternative forms of governance by experimenting bottom-up partnerships. This experience is still considered a best practice.

Given the current limited financial resources, the tools through which the metropolitan authority can influence the development process are the “Strategic metropolitan plan” and the “General territorial metropolitan plan”. The first sets the framework for territorial development: it is updated annually and renewed every three years. The second identifies optimal territorial areas for the localization of productive activities. It defines the set of criteria and spatial conditions under which suitable areas are identified.

The municipalities instead retain the power to design the urban master plans (Piano Regolatore Generale), through which regulate the land use and the construction activity within the administrative borders of the municipality by also applying standards. The local urban masterplans should be consistent with the higher-level plans. However, despite the adoption of the “General Territorial Metropolitan Plan” (PGTM) replacing the “Territorial Coordination Plan” (PTCP) of the former province, stakeholders note how the “national and regional regulations do not provide substantial elements to understand the difference between the PGTM and the PTCP, neither in content nor in value compared to the local masterplans PRGCs”. This has further limited the co-planning relationship among different territorial levels and has complicated the confrontation of the local master plans (PRGCs) with the higher-level plan. As a consequence, interviewees witness a certain “urban planning autonomy” at the local level as the higher-level planning fails in providing a uniform approach and direction to the planning practice, and thus, ending up having a more indicative nature. In addition, the critical fragmentation of the urban planning instruments further limits the capacity to effectively respond to varying urban planning processes resulting in a lack of homogeneity in vision and in a condition of irrelevant strategic coordination and direction that mainly apply at the metropolitan level. Thereby, it is the lower-level decision making which plays the role of author as well as the direction for territorial development.

Municipalities are also responsible for the set-up of new industrial activities (e.g., defining implementation rules). To do so, a production settlement plan (PIP - Piani di Insediamento Produttivo) is set up for each new transformation. This urban planning tool is an executive instrument of private initiative; thus, it is the responsibility of the economic operator to draft the plan - detailing the project’s aspects for the overall development site - and submit it to the evaluation of the municipality. The municipal council then approves it once the compliance of the plan is verified. The executive plan is based on an agreement that sets out the public-private relationship with regard to the infrastructure of the area, the standards that the intervention has to comply with (i.e., the ratio between productive spaces and public areas), the possible transfer of the areas, and the economic value of the transfers/rents. Hence, the executive plan being an implementation tool, it is approved only upon the definition of a series of elements, namely: the buildable private area having deducted the surface for public facilities (e.g., roads, parking areas and services under public competence), alongside the urban planning standards and the

construction costs. Planning fees (“oneri di urbanizzazione”) are paid to the municipality along with the construction contribution (“contributo di costruzione”) that the local municipalities get drawing on the surface of the area to be built by the private (€/mq). The tax level (both for the construction contribution and the planning fees) is defined by the municipality. The lowest charges are those for industrial/productive activities compared to other functions such as residential or tertiary/commercial.

Next to this, the municipalities may introduce a discount when the economic operator favours the regeneration of brownfield areas rather than greenfield development, and therefore there is clean-up cost for the site. Usually, each municipality adjusts the tax level according to the characteristics of the site. The planning fees for the urbanization works can be allocated to the municipality in two different ways: through the intervention of the private economic operator for the realization of the public facilities, which are then transferred to municipality deducting fees, or via the monetization of the value of these areas. In this last case, planning fees are directly collected by the municipal administration, which commits to using the fees to build the planned works. Finally, it is worth noting that the ownership regime of land (greenfield as well as brownfields) is private except for a very small percentage.

2.6 Potentials for metropolitan area cooperation

As already mentioned, in 2015 with the implementation of a new state led policy to create metropolitan governance areas, the province of Turin (Provincia di Torino) was converted into the Turin Metropolitan City (Città metropolitana di Torino, CMTo). This passage not only resulted in the contraction of the technical staff, but the political architecture of the metropolitan city as a second-level institution weakened leadership and the institutional capacity of the metropolitan authority. The shift, from province to Metropolitan City, has also complicated the cooperation between municipalities while political interlocution across different governance levels (in particular regional and national) is still rather problematic. Also, the lack of financial resources limits effective forms of cooperation, and the overall ability to “make system, as evoked in recent years but which has had a little operational follow-up” (Rapporto Giorgio Rota-Centro Einaudi, 2019 p. 227).

Next to this, the metropolitan city dimensional structure further undermines its governance capacity as it disperses both economic and human resources for the coordination of activities. Despite the organization of the metropolitan city into 11 homogeneous zones, in order to properly disentangle the needs of the highly heterogeneous metropolitan context and to facilitate institutional cooperation (CMTo, 2015; 2018) [19], it seems that this failed to generate meaningful spaces of dialogue among the many territorial identities. [20] All in all, from interviews

[19] As reported in the Statutes of the CMTo - Title IV - Chapter I - Article 27 "all homogeneous areas identify a spokesperson and participate in the shared formation of the Strategic Plan and the Metropolitan Territorial Plan".

[20] Although the claimed objective, local stakeholders share the belief that the establishment of these 11 sub-areas has formalized a subdivision that has fostered a harsh competition at the local level, not to attract investments but rather to share them.

emerges a shared nostalgia for the significant role played by the former province, as an intermediate subject on the vast scale, having real institutional power to steer the coordination and promotion of the socio-economic development of the area.

Indeed, there is general consensus that various forms of cooperation and stakeholder networks (more or less formalized) have always characterized the Turin area. These governance initiatives appear to be a typical feature of this context starting from the significant experience of territorial pacts ("Patti Territoriali") - through which it was possible to experiment forms of bottom-up partnerships involving a multitude of public and private actors, third-sector associations and trade unions - continuing with more sectoral projects focused on the development of industrial districts and innovation clusters. Emblematic in this sense is the experience of the aerospace district that, from being a committee, has strengthened over time its governance structure (through an institutionalized cooperation), until evolving into a well-established district. A more recent experience, instead, linked to forms of cooperation among municipalities is the "Bando Periferie" project; mainly destined to urban regeneration processes which has also provided for certain mechanisms of facilitation for enterprises.

Finally, interviewees express the existence of a significant difference between previous experiences of cooperation and current ones. *De facto*, the forms of cooperation activated under the former province of Turin, were initiatives capable of consolidating their structure over time, becoming more or less institutionalized (see Caruso, Cotella and Pede, 2015). Vice-versa, the current forms of cooperation are perceived as *ad-interim* experiences whose durability is highly influenced by the availability of funding (in particular public funds), as the premises for the generation of substantial cooperation opportunities (ibidem). As noted by interviewees "if there is available the financial resources, actors will cooperate". As a result, forms of cooperation are activated when they entail the possibility of working on projects that - either directly with cooperation funds or in another form - can be financed. However, if the industrial policy is carried out by means of tax credits, it is likely that cooperation will eventually take place at the national level, as today most of the benefits to industry are financed by tax credit mechanisms.

Turin-centric approach and conflictual political divide

Local stakeholders describe the perception of a Turin-centric approach, whereby the city is seen as an actor that takes decision with little or no interaction with the metropolitan authority and behaves as the protagonist of major changes. Also, at the regional level actors lament a stronger focus on the city, rather than the wide metropolitan context. The risk is that policies fail to represent the industrial dynamics of relevant sectors - such as the automotive and aerospace - that extend beyond the municipal boundaries of the capital city (which is only a part of the metropolitan territory).

Finally, a further aspect complicating the institutional confrontation between different governance levels is the political opposition between the centre-right regional administration and the CMTo which is centre-left oriented. In fact, the unexpected turn out of last regional

elections, after years of centre-left regional governments, have moved the 'decisional centre of gravity' out of Turin, thus ending up representing more the rest of the Piedmont region than the Turin area.

2.7 Potential inspirational cases from the stakeholder city-region

- I3P incubator (PoliTo): I3P is the public incubator of Politecnico di Torino university and is the result of a regional public policy. Established in 1999, the incubator aims at supporting innovative and technologically advanced startups. The services offered by I3P consist in incubation and pre-incubation programs – which are provided for free - designed to strengthen startups innovation capacity, minimize uncertainty, and maximize companies' growth. Recognized as a relevant center for innovation and business development, the incubator is specialized in hi-tech and deep-tech projects encompassing innovative industrial supply chains according to a B2B model.

- Pirelli industrial zone in Settimo Torinese municipality. At a time when the factories were relocating and moving the production abroad, the activity of Pirelli has been concentrated in the Settimo Torinese municipality, specializing its activity around the manufacturing of technologically advanced tyres. The reasons why the case is interesting are as follows:

    - the public-private partnership.
    - the role of the public institutions in directing the overall process guaranteeing to Pirelli the conditions to stay.
    - the quality of the settlement under many respects (the project has been designed by Renzo Piano).

- LAVAZZA Headquarters. The Lavazza Headquarters project is located in Borgo Aurora, a former industrial area of the City of Turin previously connoted as a working-class district. After the deindustrialization, the area has undergone a process of decline for years. The site is characterised by large empty factories. Over time many commercial activities shut down, while socio-demographic dynamics such as ageing population and social tensions between residents and migrants were exacerbated. The project - which is located in the former Enel power plant - consists of a massive intervention on the existing block, which allowed to make the area accessible by opening the former industrial premises to the surrounding context. The project designed by Cino Zucchi Architetti draws upon a strong urban scheme encompassing architectural elements to create openness, break down barriers, and link the public and private realms. As such, the project develops a mixed urban area that integrates the main buildings with several public amenities (e.g., green spaces, parking spaces, public square, pedestrian zones and various facilities). Today the research centre employs 600 people. The Lavazza project is an emblematic case of manufacturing servitization. The case, in fact, offers insights not just on the cooperation between the private and

public sectors, which allowed for such redevelopment, but also on how production can be integrated into an increasingly service-oriented economy.

3 A data-driven SWOT analysis for Turin Metropolitan City

3.1 Introduction and methodology

The following chapters provide an analysis of the employment structure of Turin Metropolitan City (CMTo). They are 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 specialization 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 localisation and well embedded (Strength S)	High localisation but weakly embedded (Threat T)
	low $LQ_{ir} < 0{,}9$	Low localisation but weakly embedded (Opportunity O)	Not localized 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. [21]

3.2 Spatial scope of data analysis

Since, as already highlighted in the background report in 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 Turin, the environs of the city and the Turin metropolitan region, which is the sum of the city and its environs. While the city of Turin is defined from a purely administrative perspective, as the territory covered by the city administration, the Turin 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.
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-

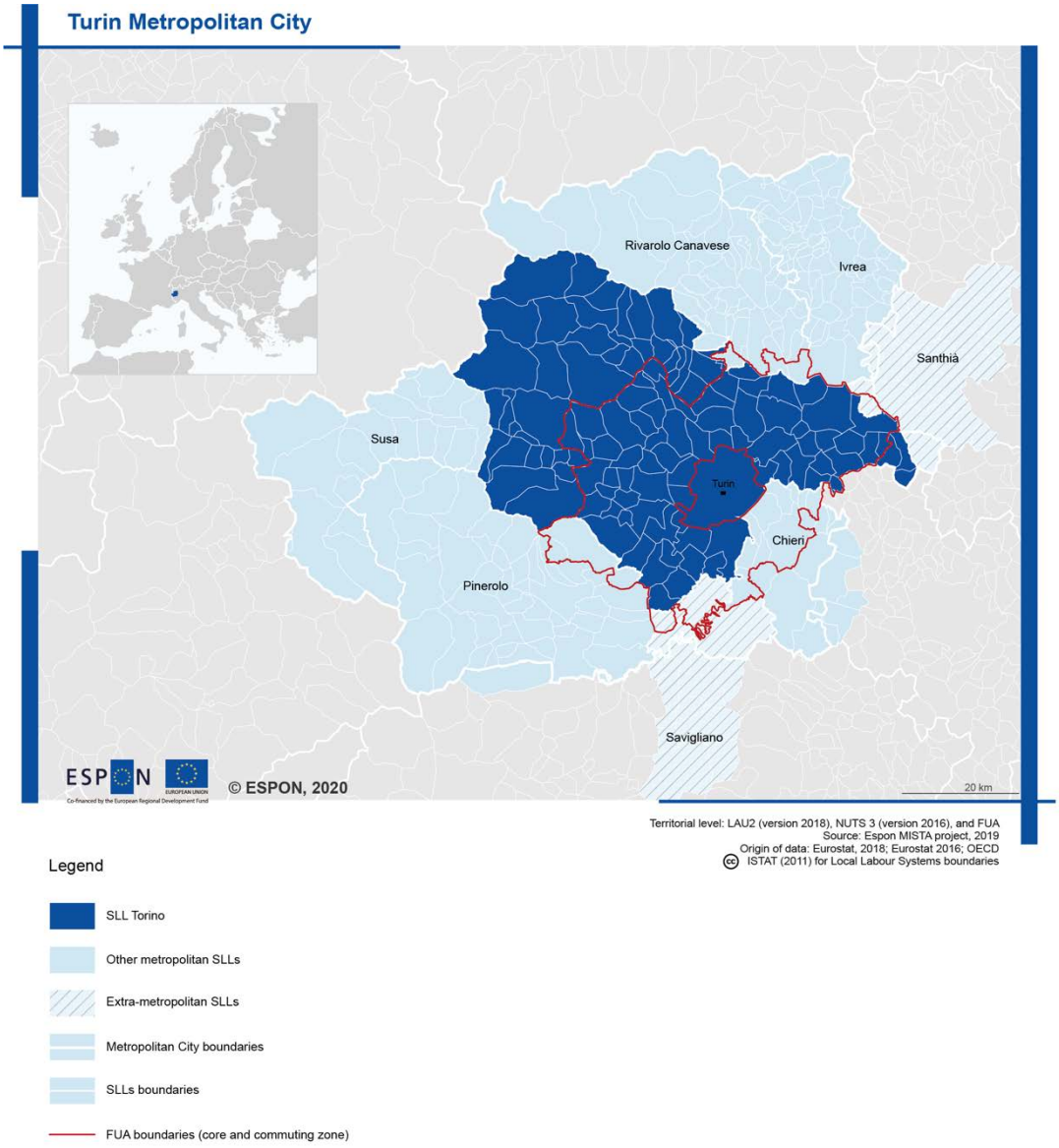
[21] Note that strengths, weaknesses, etc. are identified according to their degree of specialisation and embeddedness in the regional economy and not based on their degree of technology, R&D intensity and other factors evaluating the complexity and sophistication of a branch. Rather, being labelled 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.

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.

In the case of Turin, the research team was provided with data at the community level for the years 2012 to 2017. 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 Turin case study and aggregated to the level of the Turin Local Labour System (SLL), which includes the Turin city and 111 neighbouring municipalities (as depicted in Map 1). Given the aim of the current analysis, the SLL is chosen since it is the sub-regional geographical area where the bulk of the labour force lives and works, and where establishments can find the largest amount of the labour force necessary to occupy the offered jobs.

Map 3: Definition of the metropolitan region of Turin.



Source: ESPON MISTA (2020).

Note: the map shows the six Local Labour Systems (SLLs) of the Metropolitan City of Turin. Local Labour Systems as defined by the Italian National Institute of Statistics (ISTAT, 2011 p.1) are 'aggregations of neighbouring municipalities entertaining socio-economic relations and daily commuting flows, more precisely, the systems are identified drawing on the home-work commutes'. Next to this, the Turin Functional Urban Area (FUA) perimeter is displayed on the map. FUAs are defined by OECD (2020, p.26) as "economic units characterised by a city (or core) and a commuting zone that is functionally interconnected to the city". For illustrative purposes, only the Turin SLL is highlighted as the analysis has been conducted on this area.

3.3 Size and growth of individual productive activities

3.3.1 Sector shares

Table 2 denotes the ten largest production industries in terms of employment for the metropolitan region of Turin. Figures 4 to 6 compare the employment shares of production branches in the metropolitan region and its sub-regions to the respective shares in the country. Altogether the results reported in these tables and figures characterize Turin as an industrial

city in which automobile production plays a central role. The “manufacture of motor vehicles” (C29.1) is the largest production branch in the city of Turin (see Table A1 in the annex). It alone accounts for 5.1% of the employment in the city. This is augmented by “maintenance and repair of motor vehicles” as the eighth largest sector. In total these branches closely related to the automobile sector therefore account for over 20.000 employed (6.2% of the total) in the city. The other 8 top 10 branches in terms of employment include a number of transport [22], construction [23] and wholesale [24] branches and thus follow a more usual specialisation for metropolitan regions. They account only for a further 10.4% of total employment.

Table 3: Top 10 branches in terms of size (2017).

NACE	Name	Empl.	Share in %
Total metropolitan region			
C29.1	Manufacture of motor vehicles	21924	3,63
C29.3	Manufacture of parts and accessories for motor vehicles	15168	2,51
F43.2	Electrical, plumbing, and other construction installation activities	14556	2,41
F43.3	Building completion and finishing	11106	1,84
H49.4	Freight transport by road and removal services	10361	1,72
G46.1	Wholesale on a fee or contract basis	8658	1,43
H52.2	Support activities for transportation	8247	1,37
G45.2	Maintenance and repair of motor vehicles	7418	1,23
H49.3	Other passenger land transport	7062	1,17
C25.6	Treatment and coating of metals; machining	6867	1,14

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

In the environs manufacture of parts and accessories for motor vehicles (C29.3) is the largest employer, with around 13,600 employees (5.3% of the total) and the “manufacture of motor vehicles” the 9th and “maintenance and repair of motor vehicles” the 10th largest. In addition, the “manufacture of air and spacecraft and related machinery” is likely to have close technological links to the automobile industry. Together these branches account for 11.3% of total employment in the region. In addition, one can also expect that the “treatment and coating of metals; machining” and the “manufacture of special purpose machinery” (as the 5th and 6th largest branches in the region) are closely linked to the demand of the automobile industry in the Turin area. By contrast, branches with high employment in this region outside manufacturing are specialised construction industries, such as electrical, plumbing and other construction installation activities (F43.2) and building completion and finishing (F43.3), as well as branches in vehicle trade and repair (G45), wholesale trade (G46), and land transport (H49).

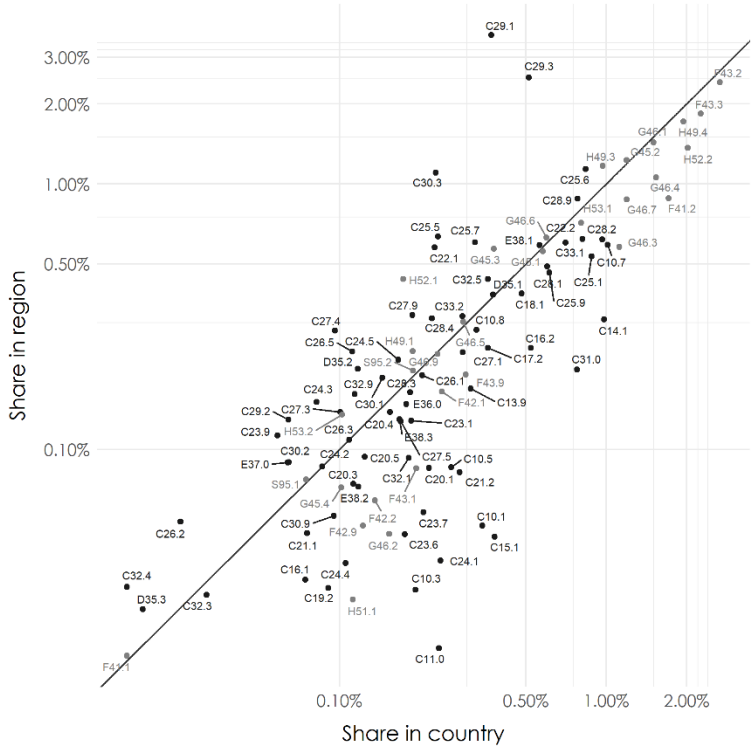
[22] These are „other passenger land transport“, „support activities for transportation“, freight transport by road and removal services“ and „postal activities under universal obligation“.

[23] These include „electrical plumbing and other construction installation services“, „Building completion and finishing“.

[24] “wholesale on fee or contract basis“, „wholesale of household goods“

In total, therefore in the Turin metropolitan region, “manufacturing of motor vehicles” and “manufacture of parts and accessories for motor vehicles” are the largest employers in the region, which account for over 6% of its total employment. For the whole metropolitan region outside manufacturing, however, also “electrical, plumbing and other construction installation activities”, “building completion and finishing”, freight transport by road and removal services”, “wholesale on a fee or contract basis”, “support activities for transportation” and “other passenger land transport” belong to the list of the 10 largest branches in terms employment. These account for a combined 11.1% of total employment.

Figure 4: Sector shares of productive activities (total Turin metropolitan area).



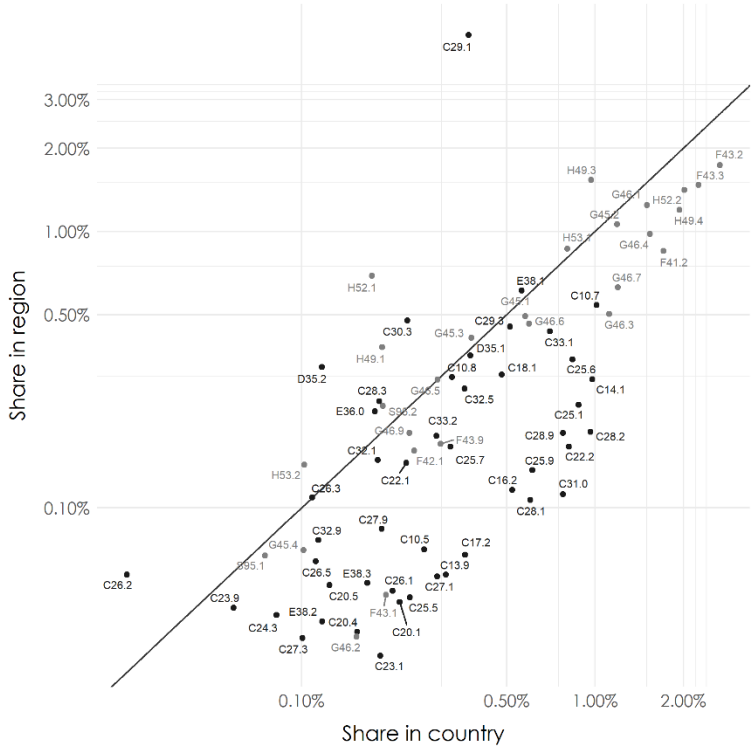
Source: Istat, ESPON MISTA 2020 calculations; Industry (service) activities in black (grey); For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

This picture of the dominance of automobile production and related production in the region is reinforced when considering the localisation of branches in the Turin Metropolitan region. As depicted in Table 5, nine out of the ten production branches with the highest degree of specialisation in the metropolitan region of Turin are activities in manufacturing. Not surprisingly, all NACE 3-digit branches assigned to “manufacture of motor vehicles, trailers and semi-trailers” (C29) are among them. The location quotient of “manufacture of motor vehicles” is particularly high. It takes a value of 9.8, implying that the share of employment in this branch to total employment is almost ten times larger in the metropolitan region than in the country.

Also, other high-technology branches show substantial location quotients in the metropolitan region, such as “manufacture of computers and peripheral equipment”, “manufacture of instruments and appliances for measuring testing and navigation; watches and clocks” and

"especially manufacture of air and spacecraft and related machinery". Further, many of these branches (e.g., "manufacture of air and spacecraft related machinery", "manufacture of electric lighting equipment", "manufacture of rubber products") can be expected to be closely linked to the demand of the automobile industry. The only production activity outside manufacturing with a high degree of specialisation in the metropolitan region is "warehousing and storage".

Figure 5: Sector shares of productive activities (city of Turin).

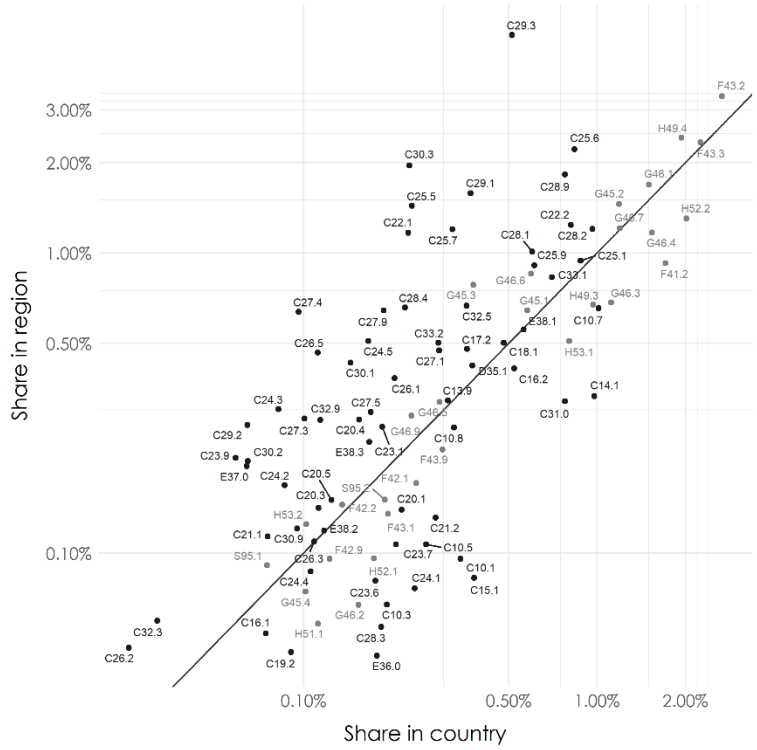


Source: Istat, ESPON MISTA 2020 calculations; Industry (service) activities in black (grey); For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

This high localisation of industry is particularly pronounced in the Turin environs. In this all of the 10 most localized branches are production branches and also the extent of this localisation is high. Most of these branches again are possibly important suppliers of the car industry. This includes "forging, pressing, stamping and roll-forming of metal" and "manufacture of electric lighting equipment" and "manufacture of rubber products". Additionally, "manufacture of air and spacecraft and related machinery" also shows a substantial localisation in the Turin environs.

In the city of Turin, by contrast, fewer manufacturing branches are localised. Apart from the "manufacture of motor vehicles", there are thus also relevant specialisations on "warehousing and storage" and "manufacture of gas" and "passenger rail transport, interurban". In addition, utilities such as "manufacture and distribution on gas(eous) fuels" and "steam and air conditioning supply" are among the most important employers in the city of Turin.

Figure 6: Sector shares of productive activities (environs).



Source: Istat, 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.

3.3.2 Growth

While a consideration of employment levels therefore clearly marks Turin as a car manufacturing city, an analysis of recent growth trends highlights the deep structural change that Turin has been undergoing in the recent past. In general, the branches that have grown most strongly over the recent years (2012-2017) are very different to the group of branches that currently show the largest employment shares in the metropolitan area of Turin. In the metropolitan region as a whole this structural change has been associated with a strong shift within manufacturing. As depicted in Table 4, the only non-manufacturing branch in the top 10 growth production branches are “sewerage” and “warehousing and storage”. The later has, however, had, by far, the highest average annual growth rate (of 26,7% per year) in the region which is mostly due to its strong growth in the city of Turin (see Table A2 in the annex). Specifically, “warehousing and storage” belongs to the logistics industry, which includes large multinational firms like CEVA logistics, which is a supplier of FIAT, and smaller firms also involved in the growing e-commerce b2C.

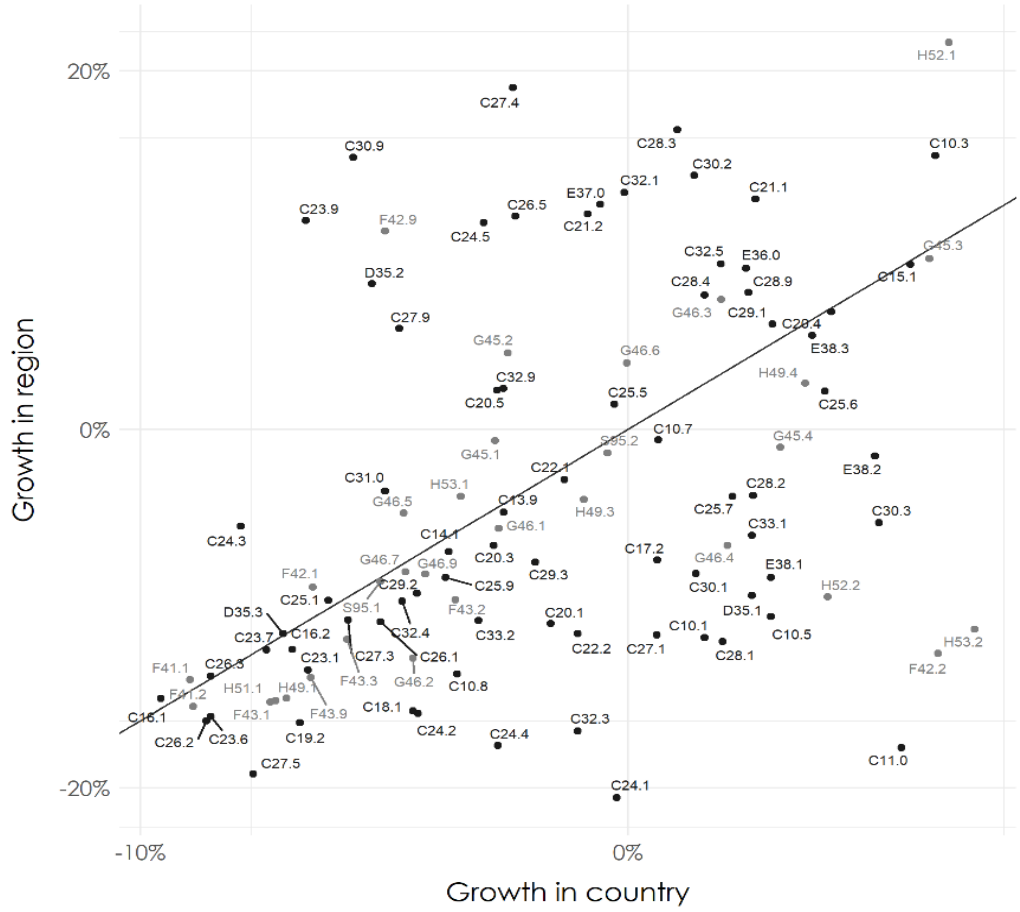
Table 4: Top 10 branches in terms of growth (2012-2017).

NACE	Name	Empl.	Growth p.a. in %
Total metropolitan region			
H52.1	Warehousing and storage	2650	26,74
C27.4	Manufacture of electric lighting equipment	1693	16,80

C28.3	Manufacture of agricultural and forestry machinery	991	10,90
C10.3	Processing and preserving of fruit and vegetables	179	8,33
C30.9	Manufacture of transport equipment n.e.c.	340	8,18
C30.2	Manufacture of railway locomotives and rolling stock	542	6,79
C32.1	Manufacture of jewellery, bijouterie, and related articles	561	5,67
C21.1	Manufacture of basic pharmaceutical products	292	5,30
E37.0	Sewerage	540	5,02
C21.2	Manufacture of pharmaceutical preparations	496	4,54

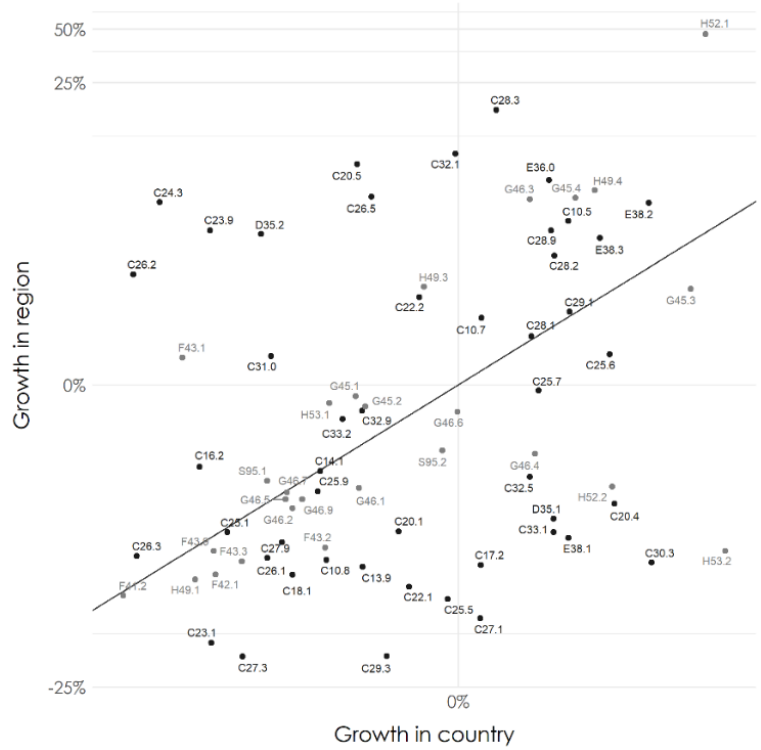
Source: Istat, ESPON MISTA 2020 calculations. Only industries with at least 100 employees in 2017 are considered; Separate illustrations for the city and its environs are provided in Table A2 in the annex.

Figure 7: Growth of productive activities (total Turin metropolitan area).



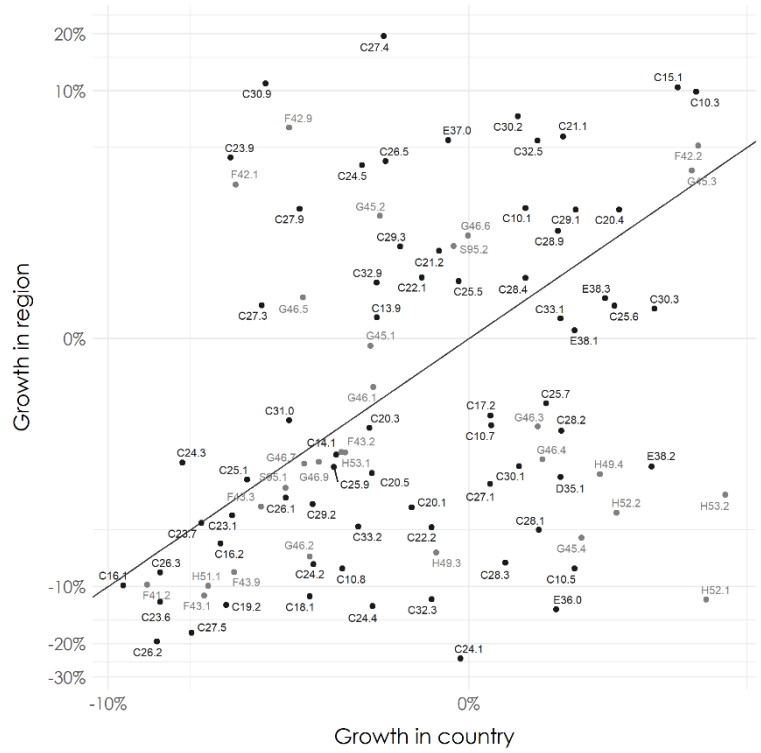
Source: Istat, ESPON MISTA 2020 calculations; Industry (service) activities in black (grey); For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Figure 8: Growth of productive activities (city of Turin).



Source: Istat, 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 9: Growth of productive activities (environs).



Source: Istat, 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.

Apart from that, all other fast growing production branches in the metropolitan region are within manufacturing. They range from “manufacture of basic pharmaceutical products and pharmaceutical preparation” (C21) over “manufacturing of electric lightening equipment” (C24.7), manufacturing of agricultural and forestry machinery (C28.3), processing and preserving of fruit and vegetables (C10.3) to some branches in manufacture of transport equipment. These branches also grew substantially stronger in the metropolitan area of Turin than in Italy.

This pattern is somewhat different in the city of Turin, where also some services exhibited high employment growth rates. These were “freight transport by road and removal services”, followed by “sale, maintenance and repair of motorcycles and related parts of accessories” and “wholesale of food beverages and tobacco”). Consequently, the rapid growth of some manufacturing branches in the Turin metropolitan region is strongly focused on the Turin environs. There the branches that have been growing strongly outside manufacturing were in “civil engineering, in particular construction of utility projects” and “other civil engineering projects”. These might be related to the recent construction of the underground and of the railway station of Porta Susa. In sum therefore structural change has been more strongly associated with de-industrialisation in the city of Turin, than in the Turin environs.

3.4 SWOT profiles of productive activities

Given this strong focus on manufacturing and in particular on automobile production it is not surprising that many of the highly localised manufacturing branches in the region are also very highly embedded in the regional economy. In general, the network analysis suggests that Turin represents a case of a very closely knit industrial network. On the one hand this increases the danger of a cognitive "lock-in" into predefined technological paths, that in the face of path dependence is rather hard to overcome from an industrial policy perspective. On the other hand, this, however, also implies that many of the leading industries in the region share a common knowledge base, which they can use as a basis for future development.

Table 5: Top 10 branches in terms of specialisation (location quotient, 2017).

NACE	Name	Empl.	LQ
Total metropolitan region			
C29.1	Manufacture of motor vehicles	21924	9,80
C29.3	Manufacture of parts and accessories for motor vehicles	15168	4,90
C30.3	Manufacture of air and spacecraft and related machinery	6654	4,80
C27.4	Manufacture of electric lighting equipment	1693	2,92
C25.5	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	3828	2,71
C22.1	Manufacture of rubber products	3483	2,54
H52.1	Warehousing and storage	2650	2,53
C26.2	Manufacture of computers and peripheral equipment	323	2,11
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1412	2,10
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	781	2,01

Source: Istat, 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.

Hence apart from “manufacturing of motor vehicles” and of the “manufacture of parts and accessories for motor vehicles”, also the “sale, maintenance and repair of motor vehicles” (G45.2 and G45.4) belong to the ten most strongly embedded branches in the Turin metropolitan region (see Table 5). Most of the remaining top ten embedded branches are, however, associated with ICT equipment related productions and services, such as its production (C26.3), its wholesale (G46.4), and with ICT related industries such as manufacture of electronic components and boards (C26.1) and manufacture of computers and peripheral equipment (C26.2).

This thus suggests that next to the automobile production, from a perspective of related varieties ICT production and services are another central part of the production system in the Turin metropolitan region. This is mainly attributable to the city of Turin. Here next to the above-mentioned branches also the “repair of ICT equipment” belongs to the top ten embedded production activities. By contrast in the environs, all of the top ten embedded production branches are in manufacturing. Apart from the car industry, this group mainly comprises branches in the “manufacture of electrical equipment” and “manufacture of machinery”, where the high degree of embeddedness mainly results from close linkages to the car industry.

Table 6: Top 10 branches in terms of embeddedness (2017).

NACE	Name	Empl.	Embed.
Total metropolitan region			
C29.1	Manufacture of motor vehicles	21924	1,72
G45.2	Maintenance and repair of motor vehicles	7418	1,62
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	435	1,53
C30.3	Manufacture of air and spacecraft and related machinery	6654	1,48
C29.3	Manufacture of parts and accessories for motor vehicles	15168	1,45
C28.1	Manufacture of general-purpose machinery	2953	1,43
C26.1	Manufacture of electronic components and boards	1150	1,40
C26.3	Manufacture of communication equipment	658	1,40
C26.2	Manufacture of computers and peripheral equipment	323	1,40
G46.5	Wholesale of information and communication equipment	1824	1,31

Source: Istat, 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.

Due to the high localisation of automobile production and its strong embeddedness in the regional economy this industry is also unambiguously the strongest and most pronounced stronghold of Turin. Thus for of the in total 10 highly localized and strongly embedded NACE 3 digit branches (“manufacture of motor vehicles”, “manufacture of parts and accessories for motor vehicles”, “manufacture of bodies (coachwork) for motor vehicles”; “manufacture of trailers and semi-trailer”) are directly associated with the automobile industry in the metropolitan region and for a further two (“manufacture of air and spacecraft and related machinery”,

"forging, pressing, stamping and roll-forming of metal; powder metallurgy") a very close link to car manufacturing through supplier networks can be assumed.

In addition to this, and probably more surprisingly, the empirical SWOT-analysis identifies the "manufacture of cutlery, tools and general hardware", "manufacture of other electrical equipment", "manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks" and "manufacture of computers and peripheral equipment" as further branches with high localisation and strong embeddedness. This thus corroborates our finding of ICT and higher technology industries as a second stronghold in the metropolitan region.

This group of branches – despite being localized - is, however, substantially smaller than the automotive sector in terms of absolute employment, as these branches account only for an employment of less than 8.000 workers. It may therefore be considered an additional niche stronghold in production.

Table 7: SWOT Profiles for the total metropolitan region (2017).

NACE	Name	Empl.
Strengths		
C29.1	Manufacture of motor vehicles	21924
C29.3	Manufacture of parts and accessories for motor vehicles	15168
C30.3	Manufacture of air and spacecraft and related machinery	6653
C25.5	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	3828
C26.2	Manufacture of computers and peripheral equipment	322
H52.1	Warehousing and storage	2649
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1411
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	781
C27.9	Manufacture of other electrical equipment	1937
C25.7	Manufacture of cutlery, tools, and general hardware	3644
Opportunities		
C28.1	Manufacture of general-purpose machinery	2953
C27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	1405
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	435
C19.2	Manufacture of refined petroleum products	182
Threats		
C32.9	Manufacturing n.e.c.	976
E37.0	Sewerage	540
H53.2	Other postal and courier activities	816
C32.5	Manufacture of medical and dental instruments and supplies	2643

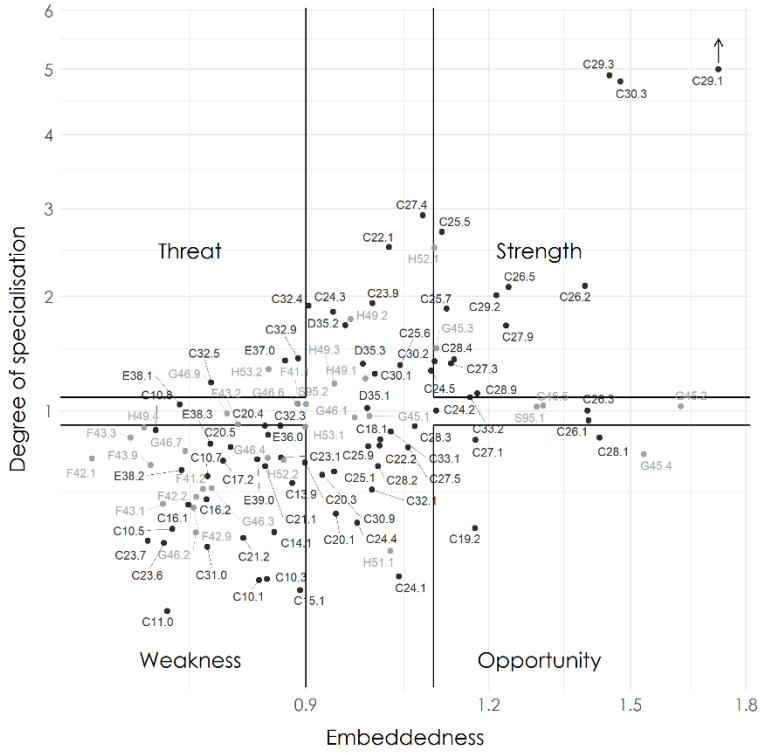
Source: Istat, ESPON MISTA 2020 calculations. Only industries with at least 100 employees are considered; Separate illustrations for the city and its environs are provided in Table A5 to A7 in the annex.

Furthermore, from a regional perspective most of these findings are due to the industrial structure of the environs of Turin, while the number of localised and well embedded branches

in the city of Turin is rather low. In the core city only four production branches [25] are identified as localised and well embedded. By contrast, in the environs the same applies to a much stronger larger number of branches. The branch that stands out particularly in the city and does not belong to the environs' strengths is "warehousing and storage" (H52.1). In the Turin environs by contrast the highly localised and embedded branches are essentially the same as the ones for the total metropolitan region, the only additions to this list are "manufacture of electric lightening equipment" and "manufacture of rubber products" (Table A5).

Outside the manufacturing sector only "warehousing and storage" has a high localisation and embeddedness in the Turin metropolitan region. This is mainly due to the embeddedness and localisation of this branch in Turin. In consequence the region as a whole as well as both the city of Turin and its environs seem to lack strongly embedded and localised service branches.

Figure 10: SWOT Profile (total Turin metropolitan area)



Source: Istat, 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.

Due to the pronounced specialisation of Turin on the well embedded automobile industry, the number of well embedded but not localized branches outside the automobile sector is rather limited both in the overall metro regions as well as in the city of Turin. Outside manufacturing only, the ICT sector may provide a basis for future industrial development in the city. Thus, in the city of Turin, among the five branches identified to belong under this category three

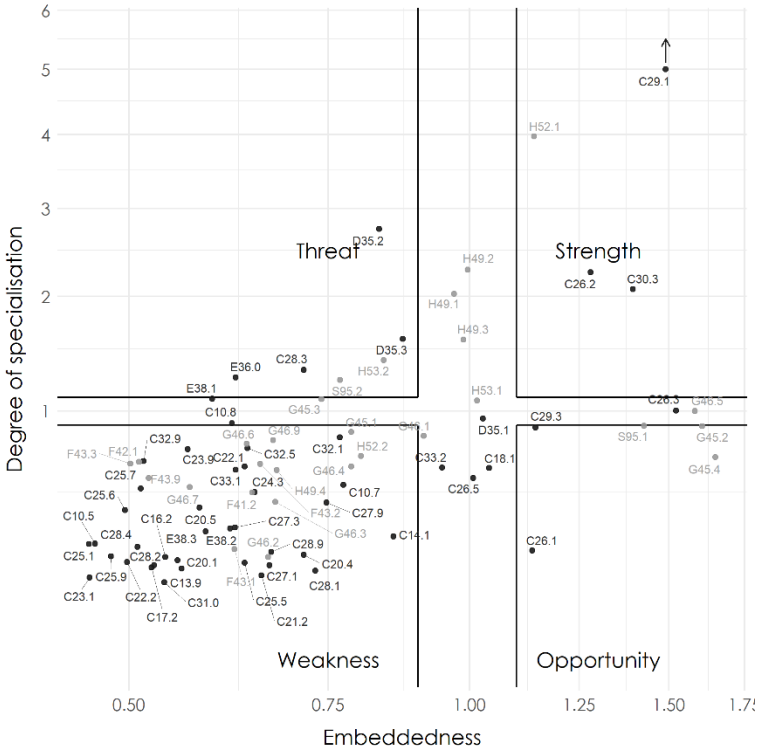
[25] These are: "manufacture of general-purpose machinery", "manufacture of electric motors, generators, transformers and electricity distribution and control apparatus", "sale, maintenance and repair of motorcycles and related parts and accessories" and "manufacture of refined petroleum products".

("maintenance and repair of motor vehicles", "sale, maintenance and repair of motorcycles and related parts and accessories" and "manufacture of parts and accessories for motor vehicles") are connected to the car industry and two ("repair of computer and communication equipment" and "manufacture of computers and communication equipment as well as manufacture of electronic components") to the ICT sector.

In the environs, by contrast, the nine branches classified as strongly embedded but not localized represent a more diverse mix of mostly manufacturing branches and include the "manufacture of general-purpose machinery", "manufacture of metal forming machinery and machine tools", "manufacture of cutlery, tools and general hardware" , "manufacture of other electrical equipment", "manufacture of other special-purpose machinery". "manufacture of wiring and wiring devices" and "treatment and coating of metals; machining".

For the overall Turin metropolitan region, however, the structure of the city of Turin dominates the picture. As a consequence, only four non-localised but well embedded branches could be identified in the current analysis. These are: "manufacture of general-purpose machinery", "manufacture of electric motors, generators, transformers and electricity distribution and control apparatus", "sale, maintenance and repair of motorcycles and related parts and accessories" and manufacture of refined petroleum products.

Figure 11: SWOT Profile (city of Turin).

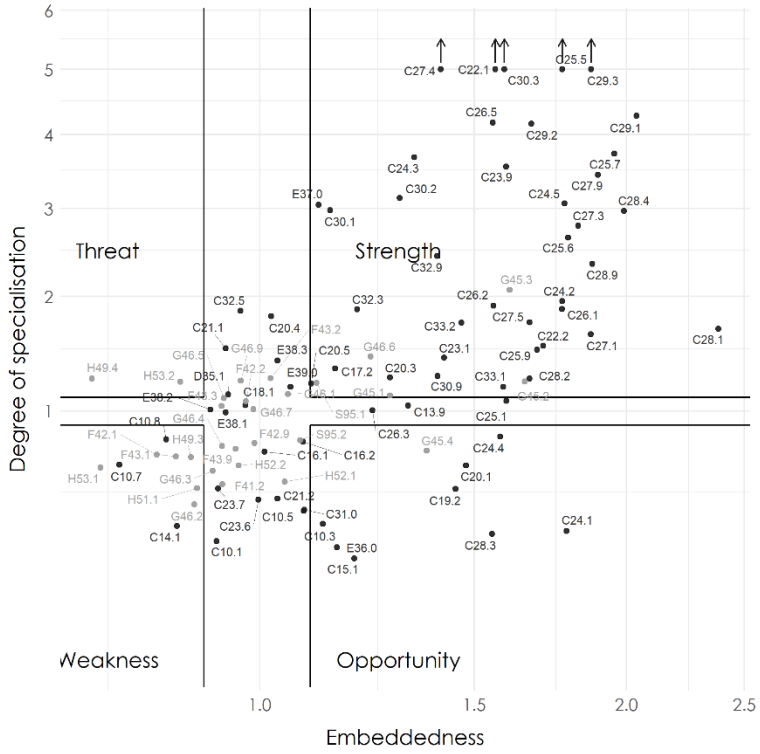


Source: Istat, ESPON MISTA 2020 calculations; Industry (service) activities in black (grey); For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

Similarly, the dominance of the automobile industry and its close inter-industrial connection in Turin also leads to a low number of branches with a high localisation that are only weakly

embedded in the local economy. In the city of Turin this applies to only 6 branches [26] that employ less than 5000 workers, while for the overall metropolitan region 4 such branches [27] with an overall employment of less than 5000 workers are identified. The only sub-region of the Turin metro area where large, localised branches, with high localisation and low embeddedness, exist are the Turin environs, where in particular "Freight transport by road and removal services", with over 6.000 employees belongs to this group.

Figure 12: SWOT Profile (environs).



Source: Istat, 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.

3.5 Main take-aways

- **In contrast to most other cities analysed in the MISTA Project manufacturing and in particular the automobile industry plays a major role in the metropolitan region of Turin.** 40% of the employed in the ten largest production branches work in manufacturing, and the manufacturing branches have also belonged to the fastest growing branches over recent years. Moreover, the results of the SWOT analysis show that these manufacturing branches are also highly embedded in the regional economy. This applies even more strongly to the automobile industry, which is marked both by a very strong localisation as

[26] These are "manufacture of gas; distribution of gaseous fuels through mains", "steam and air conditioning supply", "other postal and courier activities", "repair of personal and household goods", "manufacture of agricultural and forestry machinery", "water collection, treatment and supply"

[27] These are "manufacture of medical and dental instruments and supplies", "manufacturing n.e.c.", "other postal and courier activities", "sewerage".

well as a high embeddedness in the region. Developing appropriate viable industrial strategies for the automobile sector in the region is therefore of high importance.

- **Next to the automobile industry the analysis, however, also identifies parts of the ICT and higher technology branches as a further stronghold in the Turin economy**. Although the branches of this sector are smaller (relative to the automotive industry) this sector is therefore a second (niche) specialisation of Turin. This sector may therefore be an additional focus of the industrial policy of the region.
- **Due to the strong dominance of manufacturing, the number of workers in branches that are characterized by a low localisation and weak embeddedness and a high localisation, but weak embeddedness is low.** On the positive side this implies that outside the automotive industry there are only few threats to the industrial structure of the city. On the negative side, however, if and when the automotive industry production stagnates, only few other sectors will be able to support the economy of the area.
- **Branches in construction, logistics and utilities that have been identified as a major contributor to employment growth in other cities, do not attain a similar importance in Turin**. They are also rarely found among the well embedded branches in the metropolitan region. These branches do play an important role in the core city of Turin and, specifically, “warehousing and storage” (logistics) has also been growing very rapidly in the last years.
- **The strong industrialisation of the Turin metropolitan area is mainly associated to the industrialisation of the environs.** In the city of Turin, despite the city clearly being an industrial city, fewer manufacturing branches are localised and apart from the “manufacture of motor vehicles”, there are also relevant specialisations on “warehousing and storage” and “manufacture of gas” and “passenger rail transport, interurban”. In addition, utilities such as “manufacture and distribution on gas(eous) fuels” and “steam and air conditioning supply” are among the most important employers.

4 Outcomes of the future workshop

4.1 Workshop structure

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 26 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'.

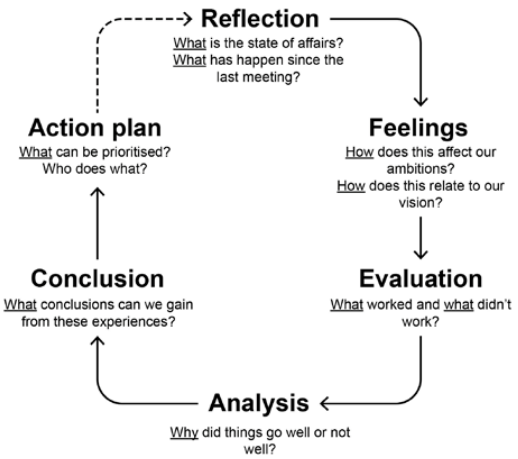
The workshops were not expected to generate exhaustive results but were designed to help create conditions for collaboration, exchange and expose what issues were most relevant to each city. The workshops also provided participants with a range of tools that could help to facilitate the use of the MISTA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

Workshop program

Knowledge transfer can depend on several 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. Organizational 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 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 13: The two axes that define the policy scenarios.



Source: MISTA adaptation, based on Graham Gibbs 1988

4.1.1 Workshop structure for Turin

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 Turin workshop was hosted on the 10th of November with local actors for five hours. The event was hosted by Valeria Fedeli (Politecnico di Milano) upon request from Irene Morati and Claudia Fassero from the Città Metropolitana di Torino. The event included ten attendees from: Città Metropolitana di Torino, the City of Turin, the municipalities of Moncalieri and Settimo, the Region of Piemonte, Politecnico di Torino, Links Foundation, the LAVAZZA Group, CGIL Torino and Confservizi Piemonte Valle D'Aosta.

The workshop methodology followed the six steps noted 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. The fourth step (Analysis) involved the discussion of four problem statements, each statement was matched with inspirational cases relevant to Turin (the fifth step (Conclusion)). The final step (Action plan) was left for general discussion.

4.1.2 Statements

In the Turin 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 prioritized in Turin at a planning level.

"**Torino" needs the support of a renewed plural leadership to address the issue of the "industrial crisis" explicitly and collectively.**

- Turin has made a great effort to address the processes of deindustrialization and rethink itself since the late 1990s, but it has not yet managed to openly address the issue of transforming its manufacturing base
- Manufacturing may still need the city as a place that links product and experience; in these conditions, manufacturing can find new life in the city and help the city emerge from the crisis
- The Turin area has suffered from a difficulty on the part of local politicians and actors in tackling the deindustrialisation process and the transformation of the city's economic base. This has slowed down the ability to innovate
- The Region, the City of Turin and the Metropolitan City must align their strategies and converge to build a new alliance for development: fragmentation and conflicts must be overcome
- A series of new players qualify as the fulcrum of new alliances: the role played to date by the universities, the Politecnico di Torino, is crucial in the face of the weakness/fragmentation of the local players' system
- A territorial alliance is needed between the city of Turin with its innovative projections, the metropolitan area with its history and skills in manufacturing and the region with its strategic position for logistics. This alliance can generate solutions for a stable exit from the crisis; the territorial pacts have been an important opportunity for building territorial alliances.

The future of some of the key sectors of historical manufacturing, from automotive to aerospace, is particularly exposed to the global scale and there is a need for a multi-scalar strategy to anchor these sectors to the territory.

- There is a need for a strong strategy at national level to support the development of highly internationalised sectors (automotive, aerospace) whose dynamics escape the capacity of the local context to foster their roots.
- There is a need for a strong local alliance between research and business to develop innovative ideas and build strategic alliances.
- We need to strategically position ourselves in terms of both supply and demand for innovative products to become innovation territories once again.
- The plain/mountain dualism, in socio-economic terms, is a problem, but also a resource, also in terms of foundational economy
- Part of the territory is still attractive and competitive for manufacturing, but requires a change of pace, capable also of dealing with the organisational and spatial burden of the legacy of the past.
- The demand-supply of logistics is a significant opportunity for some areas abandoned by manufacturing, but to generate value, starting with some recent infrastructure investments, it must be based on system strategies.

It is necessary to build a favourable and open environment for innovative manufacturing.

- It is important to simplify and reduce decision-making fragmentation and the slowness in the management of administrative-bureaucratic and urban planning procedures.
- It is necessary to create an environment that facilitates innovation by overcoming sectoral barriers and opening to experimentation that challenges mainstream policies.
- It is important to build a business environment that generates demand for innovation.

It is necessary to tackle the unresolved but also future problems of the relationship between the city, the territory and manufacturing.

- The Turin context has resolved several important environmental conflicts, but the cost of restoring and reclaiming land abandoned by manufacturing is still very high
- There is a strong legacy of unresolved environmental problems, and the imperative to reduce land consumption is sometimes not compatible with the need to rehabilitate areas that are no longer suitable for the needs of today's industry and require high reclamation costs.
- The new choices in manufacturing can find an important turning point in the new green deal (battery hub/sustainable mobility).
- Manufacturing needs the city as a place that links product and experience; under these conditions, manufacturing can find new life in the city.
- The Turin area has promoted several important and innovative projects to renew the relationship between the city and industry, often promoted by large-scale industry and supported by the public sector with substantial investment, with mixed results.
- Alongside large industry there is a dense network of small and medium-sized enterprises, whose size and organisational forms can now find interesting opportunities for dialogue in the city, but the heavy legacy of disused industrial heritage requires complex operations in which public action can be more effective and innovative.
- The redevelopment of large brownfield sites outside the city requires strategies aimed at tackling the challenge of refunctionalisation in an integrated manner: the availability of land is not enough; integrated policies need to be constructed.

4.1.3 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.

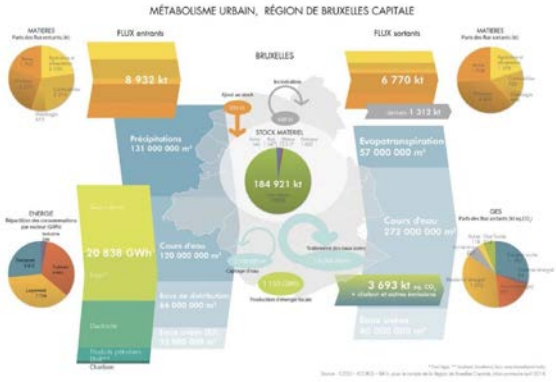
Figure 14: The inspirational cases presented and discussed within the workshop.

Greater Manchester Combined Authority

Turin has a well-established metropolitan government and governance system; however, the scale of the area and its limited competencies are challenging to convert into action. Greater Manchester provides a good example of a metropolitan area with a narrow focus (particularly services and economic development) that could be inspiring to improve cooperation and governance.

Strategic dialog on the Automotive Industry (SDA in BW)

Turin's economy remains heavily focused on vehicle production, yet one of the challenges is to foster a stronger relationship between production and production related services (such as research and development, design and so on). Stuttgart is an economy focused also on vehicle production that has grown notably over the last decade and can offer a useful model.

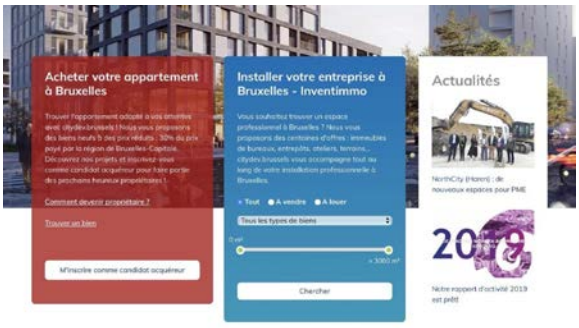


The Brussels Circular Economy Plan

Turin's industrial economic base is spread out over a vast area and covers many public and private actors which are challenging to align. 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 metropolitan area.

Berlin Regional Development Plan 2030

The metropolitan area of Turin contains several clusters of production, with numerous sites becoming inactive. Currently the priority is simply to re-activate these sites, but this can also lead to incoherent development. 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.

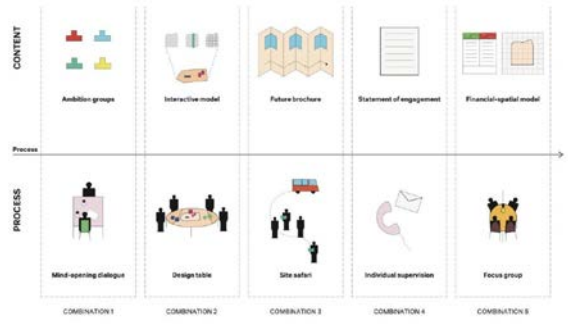


Citydev.brussels

Metropolitan development can be showcased by a public developer that can create space that the market may not be 43rioritizing. This is particularly relevant for the brownfield sites. Citydev provides a useful model of a publicly owned private developer.

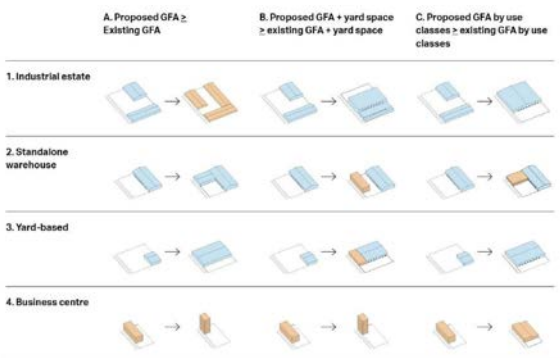
Strijp-S (Eindhoven)

Inner-city brownfield sites can be developed in a profitable way that results in an evolution of the industrial heritage and benefits the local economy. Through public partnership in the development process, community space can be integrated into the heart of the project.



Lageweg (Antwerp)

The Metropolitan Area of Turin contains a relatively large amount of industrial, yet most remains in



Industrial intensification and co-location study (London)

private hands. While this puts public authorities in a weak position it also provides conditions for co-creation and bottom-up planning. The Lageweg case offers a successful example of process management.	In some cases, centrally located sites could be more intensively developed to improve efficiency and take advantage of clustering. London's intensification study provides Stuttgart with a good example of the kinds of guidelines and development opportunities to apply locally.

Source: ESPON MISTA (2020).

4.1.4 Outcomes and discussion

The workshop exposed common concerns about metropolitan cohesion, portraying a sense of loss and abandonment of a previous era and a lack of capacity to adapt both land and production processes to the 21st century. This comes in part due to a perceived lack of leadership and fragmentation politically and within economic networks built on the region's production-based heritage. Participants lamented poor integration of research and innovation, despite efforts being made. Furthermore, there appeared to be a lack of new ideas that were built on old production processes, that would help avoid the blight and abandon of brownfield industrial land. In the past numerous projects have been developed as well as interventions, which nevertheless appear to have had limited results; this is building reluctance for trying again or committing efforts to a larger, more ambitious, long-term, metropolitan scale project. There are two particular dimensions that the discussion can be boiled down to.

Firstly, the issue of cohesion. In order to build momentum, leadership is needed at both the local and metropolitan scale. Such leadership is not just political, but also institutional - participants reflected on a time when the Strategic plan had much stronger impact on cohesion and policies were effective. More transversal development policies are needed which do not just focus on single issues (such as transport, brownfield redevelopment or economic development). For example, tourism is being promoted but this should be embedded into the region's industrial heritage. The current area of action needs to be revisited and not be limited by the division (such as the differences between the plain and the mountain areas).

The second challenge is in facilitating practical development projects. Development could include the development of land, businesses, networks, or projects. Comments suggested the need, but also the complexity of promoting an agency that sits between public and private actors, that can attract financial investment and businesses to the metropolitan area, which can help negotiate and facilitate bureaucracy and can help stimulate the local economy and provide leadership.

Participants reflected on the COVID-19 experience, which had left a considerable mark on the region but could also be treated as an opportunity to launch new mission driven projects. For example, rethinking the location and distribution of certain activities across the larger metropolitan area: from mixed use to zones of production. It could also be an opportunity to rethink manufacturing in terms of urban metabolism and how this could help drive a new form of 21st century production.

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 [28], 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. [29] 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. [30] 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 they cannot or can hardly make use of their previously accumulated (job- or branch-specific)

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

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

[30] 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.

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). [31]

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) [32] 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 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

31 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.

32 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.

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

where F_{ij} denotes the observed job changes between branches i and j, and $\hat{F}_{ij}$ 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.[33] 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. (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

[33] 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.

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.

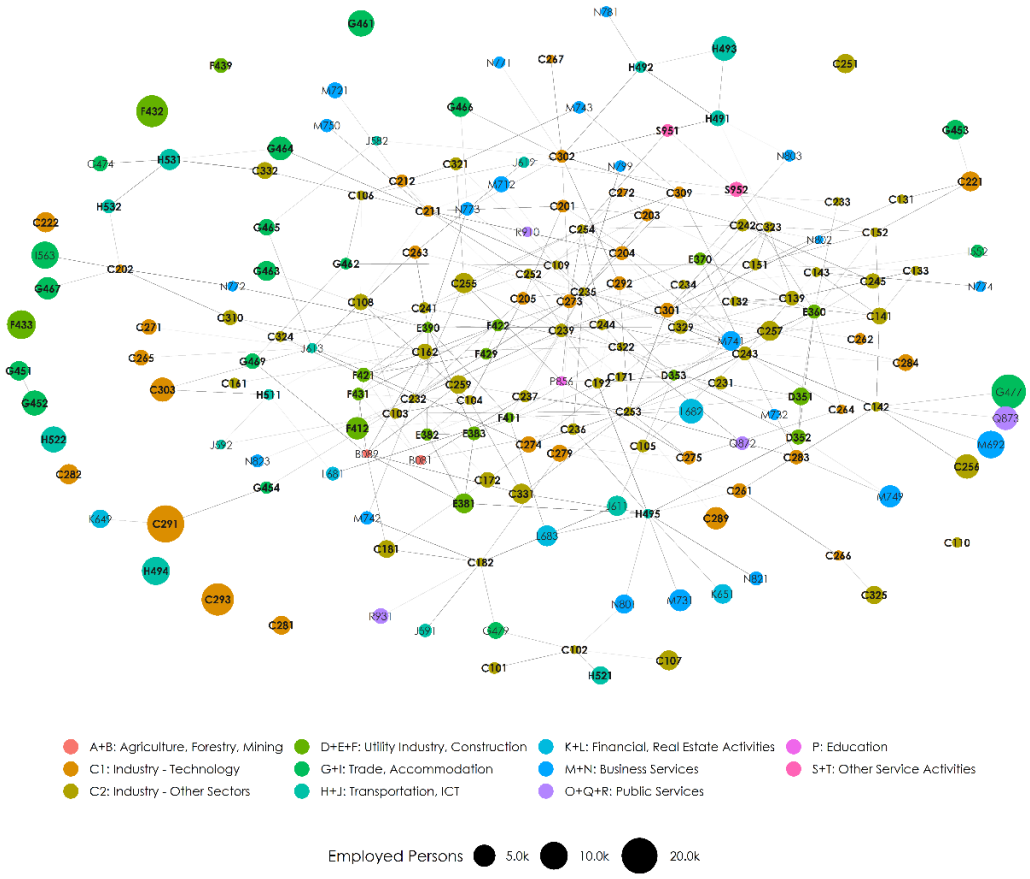
Overall, both the degree of specialisation and the embeddedness in the regional sectoral structure are decisive for an assessment of the development potential of a branch. According to Otto et al. (2014) economic branches in a region can be classified into four different categories, by differentiating,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

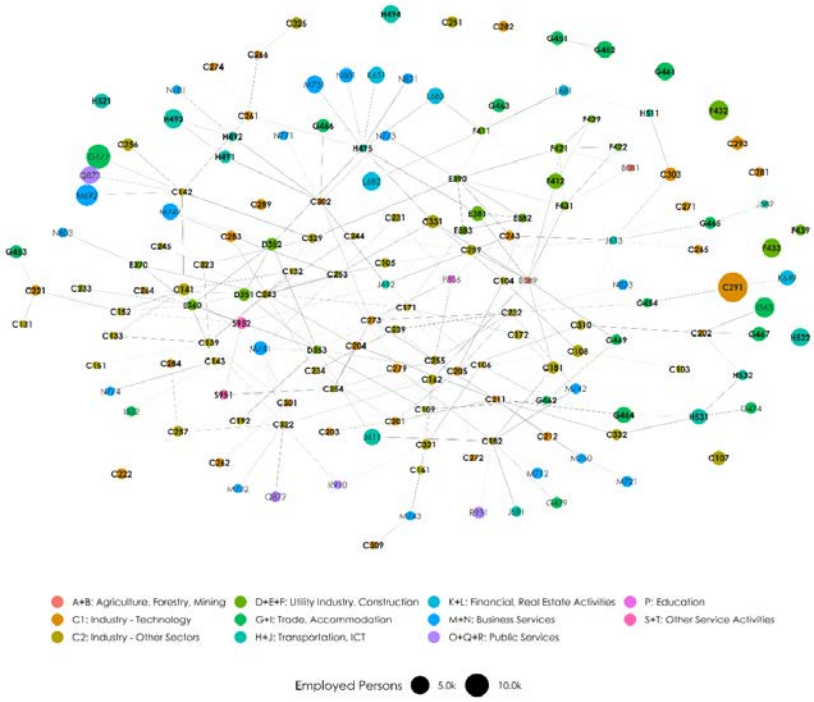
5.2 Network of branches

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



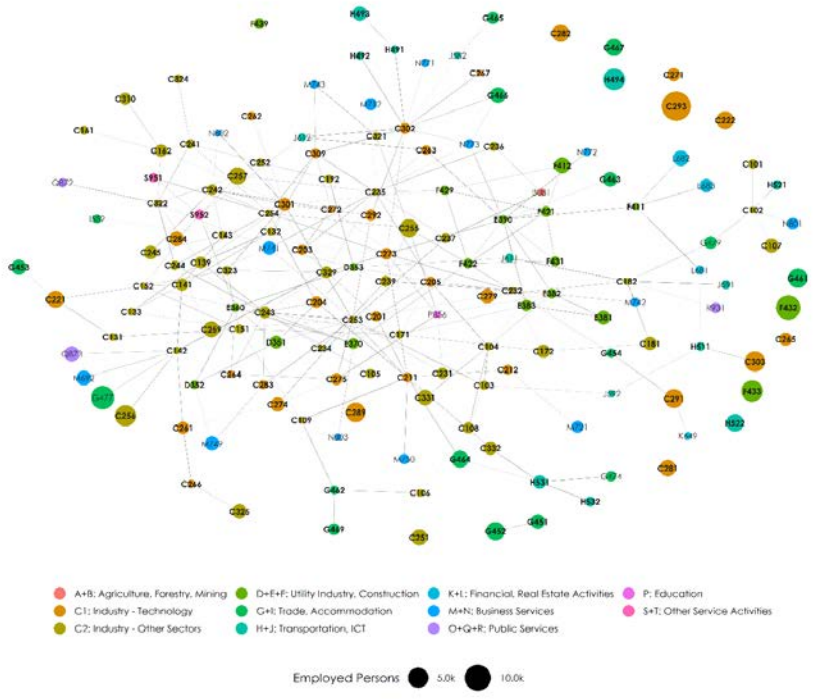
*Source: Istat, network structure based on Neffke et al. (2017B), ESPON MISTA 2020 calculations; For illustrative purposes, only NACE 3-digit branch groups marking **productive activities (in bold)** and non-productive activities with strong links to productive activities are displayed.*

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



*Source: Istat, 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.*

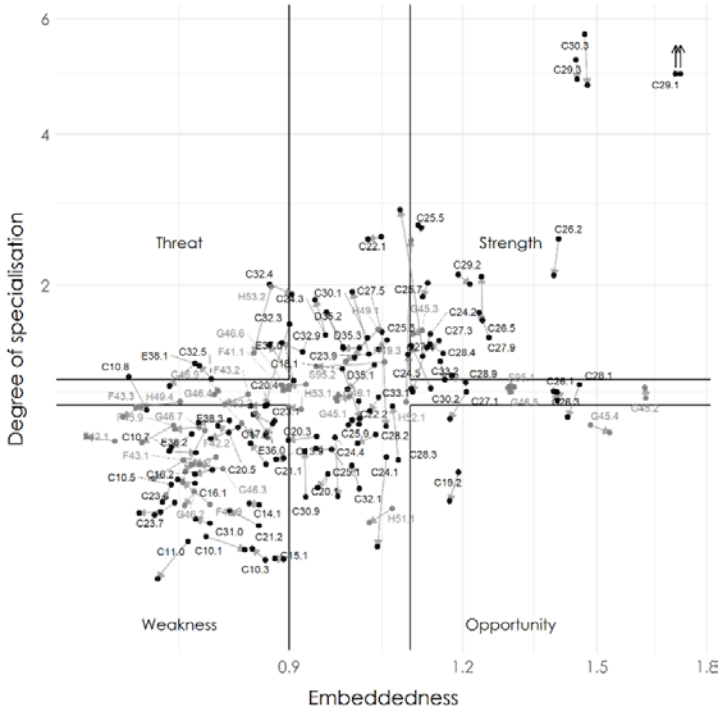
Figure A3: Network of branches (environs).



*Source: Istat, 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.*

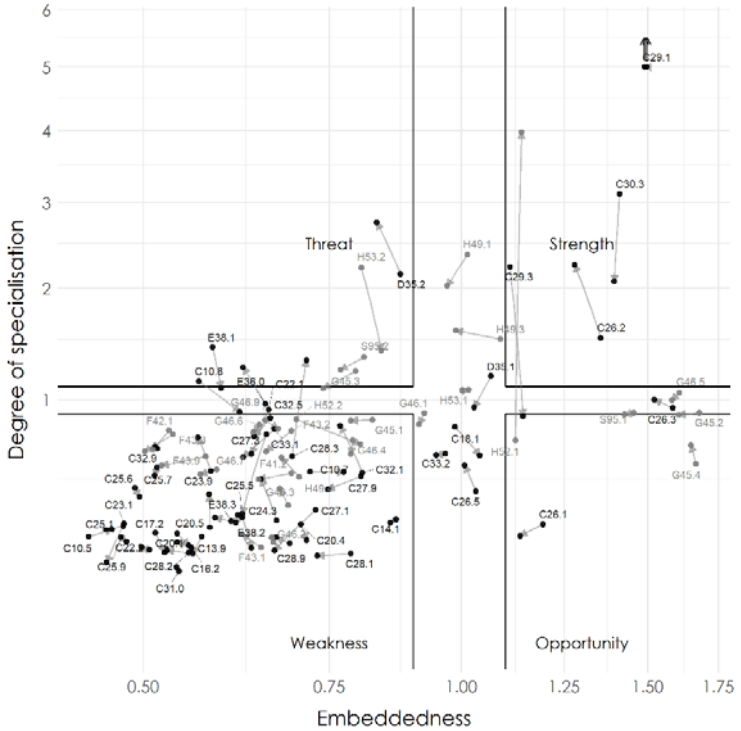
5.3 A dynamic perspective on the SWOT profiles

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



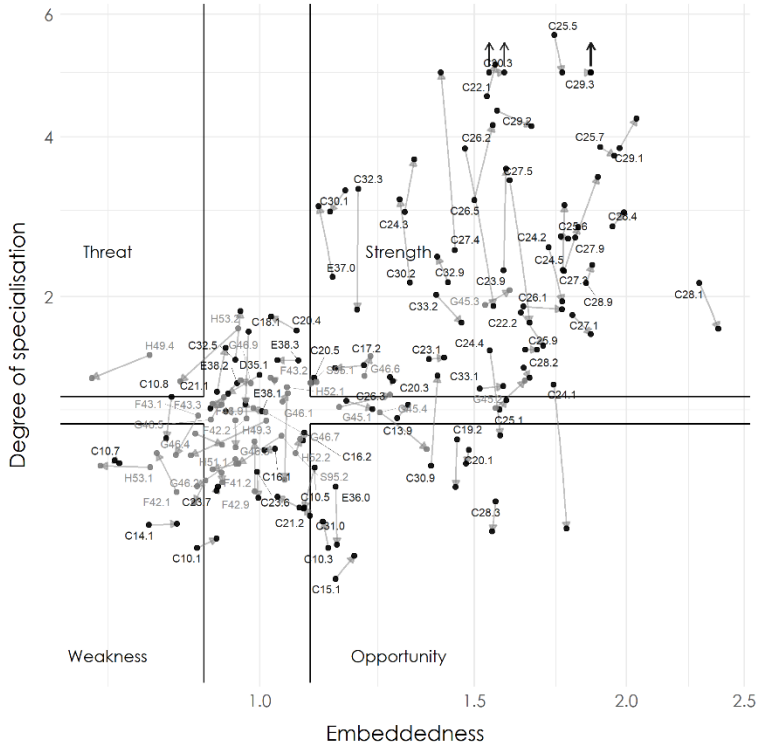
Source: Istat, ESPON MISTA 2020 calculations; Industry (service) activities in black (grey); For illustrative purposes only branches with at least 100 employees are displayed. For NACE codes and branches see Table A8 in the annex.

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



Source: Istat, 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: Istat, 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 10 Tables for Subregions

Table A1: Top 10 branches in terms of size (2017).

NACE	Name	Empl.	Share in %
Total metropolitan region			
C29.1	Manufacture of motor vehicles	21924	3,63
C29.3	Manufacture of parts and accessories for motor vehicles	15168	2,51
F43.2	Electrical, plumbing, and other construction installation activities	14556	2,41
F43.3	Building completion and finishing	11106	1,84
H49.4	Freight transport by road and removal services	10361	1,72
G46.1	Wholesale on a fee or contract basis	8658	1,43
H52.2	Support activities for transportation	8247	1,37
G45.2	Maintenance and repair of motor vehicles	7418	1,23
H49.3	Other passenger land transport	7062	1,17
C25.6	Treatment and coating of metals; machining	6867	1,14
City of Turin			
C29.1	Manufacture of motor vehicles	17881	5,13
F43.2	Electrical, plumbing, and other construction installation activities	6055	1,74
H49.3	Other passenger land transport	5344	1,53
F43.3	Building completion and finishing	5135	1,47
H52.2	Support activities for transportation	4920	1,41
G46.1	Wholesale on a fee or contract basis	4337	1,25
H49.4	Freight transport by road and removal services	4174	1,20
G45.2	Maintenance and repair of motor vehicles	3700	1,06
G46.4	Wholesale of household goods	3411	0,98
H53.1	Postal activities under universal service obligation	3017	0,87
Environs			
C29.3	Manufacture of parts and accessories for motor vehicles	13591	5,32
F43.2	Electrical, plumbing, and other construction installation activities	8501	3,33
H49.4	Freight transport by road and removal services	6186	2,42
F43.3	Building completion and finishing	5971	2,34
C25.6	Treatment and coating of metals; machining	5667	2,22
C30.3	Manufacture of air and spacecraft and related machinery	4996	1,96
C28.9	Manufacture of other special-purpose machinery	4662	1,83
G46.1	Wholesale on a fee or contract basis	4321	1,69
C29.1	Manufacture of motor vehicles	4043	1,58
G45.2	Maintenance and repair of motor vehicles	3718	1,46

Source: Istat, ESPON MISTA 2020 calculations.

Table A2: Top 10 branches in terms of growth (2012-2017).

NACE	Name	Empl.	Growth p.a. in %
Total metropolitan region			
H52.1	Warehousing and storage	2650	26,74
C27.4	Manufacture of electric lighting equipment	1693	16,80
C28.3	Manufacture of agricultural and forestry machinery	991	10,90
C10.3	Processing and preserving of fruit and vegetables	179	8,33
C30.9	Manufacture of transport equipment n.e.c.	340	8,18
C30.2	Manufacture of railway locomotives and rolling stock	542	6,79
C32.1	Manufacture of jewellery, bijouterie, and related articles	561	5,67
C21.1	Manufacture of basic pharmaceutical products	292	5,30
E37.0	Sewerage	540	5,02
C21.2	Manufacture of pharmaceutical preparations	496	4,54
City of Turin			
H52.1	Warehousing and storage	2405	46,79
C28.3	Manufacture of agricultural and forestry machinery	846	17,54
C32.1	Manufacture of jewellery, bijouterie, and related articles	518	9,94
C20.5	Manufacture of other chemical products	183	8,68
E36.0	Water collection, treatment, and supply	778	7,05
H49.4	Freight transport by road and removal services	4174	6,16
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	223	5,67
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	245	5,58
G46.3	Wholesale of food, beverages, and tobacco	1750	5,47
C24.3	Manufacture of other products of first processing of steel	143	5,27
Environs			
C27.4	Manufacture of electric lighting equipment	1625	19,37
C30.9	Manufacture of transport equipment n.e.c.	308	10,91
C15.1	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, and harness; dressing and dyeing of fur	211	10,40
C10.3	Processing and preserving of fruit and vegetables	172	9,88
C30.2	Manufacture of railway locomotives and rolling stock	517	7,32
F42.9	Construction of other civil engineering projects	244	6,38
C21.1	Manufacture of basic pharmaceutical products	290	5,72
E37.0	Sewerage	498	5,47
C32.5	Manufacture of medical and dental instruments and supplies	1703	5,45
F42.2	Construction of utility projects	370	5,12

Source: Istat, ESPON MISTA 2020 calculations. For illustrative purposes only branches with at least 100 employees in 2017 are displayed.

Table A3: Top 10 branches in terms of specialisation (location quotient, 2017).

NACE	Name	Empl.	LQ
Total metropolitan region			
C29.1	Manufacture of motor vehicles	21924	9,80
C29.3	Manufacture of parts and accessories for motor vehicles	15168	4,90
C30.3	Manufacture of air and spacecraft and related machinery	6654	4,80
C27.4	Manufacture of electric lighting equipment	1693	2,92
C25.5	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	3828	2,71
C22.1	Manufacture of rubber products	3483	2,54
H52.1	Warehousing and storage	2650	2,53
C26.2	Manufacture of computers and peripheral equipment	323	2,11
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1412	2,10
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	781	2,01
City of Turin			
C29.1	Manufacture of motor vehicles	17881	13,85
H52.1	Warehousing and storage	2405	3,98
D35.2	Manufacture of gas; distribution of gaseous fuels through mains	1124	2,75
H49.2	Freight rail transport	221	2,28
C26.2	Manufacture of computers and peripheral equipment	199	2,26
C30.3	Manufacture of air and spacecraft and related machinery	1658	2,07
H49.1	Passenger rail transport, interurban	1327	2,03
D35.3	Steam and air conditioning supply	101	1,59
H49.3	Other passenger land transport	5344	1,58
H53.2	Other postal and courier activities	498	1,40
Environs			
C29.3	Manufacture of parts and accessories for motor vehicles	13591	10,38
C30.3	Manufacture of air and spacecraft and related machinery	4996	8,53
C27.4	Manufacture of electric lighting equipment	1625	6,62
C25.5	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	3663	6,14
C22.1	Manufacture of rubber products	2978	5,13
C29.1	Manufacture of motor vehicles	4043	4,27
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1189	4,17
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	683	4,16
C25.7	Manufacture of cutlery, tools, and general hardware	3065	3,73
C24.3	Manufacture of other products of first processing of steel	770	3,68

Source: Istat, 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 (2017).

NACE	Name	Empl.	Embed.
Total metropolitan region			
C29.1	Manufacture of motor vehicles	21924	1,72
G45.2	Maintenance and repair of motor vehicles	7418	1,62
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	435	1,53
C30.3	Manufacture of air and spacecraft and related machinery	6654	1,48
C29.3	Manufacture of parts and accessories for motor vehicles	15168	1,45
C28.1	Manufacture of general-purpose machinery	2953	1,43
C26.1	Manufacture of electronic components and boards	1150	1,40
C26.3	Manufacture of communication equipment	658	1,40
C26.2	Manufacture of computers and peripheral equipment	323	1,40
G46.5	Wholesale of information and communication equipment	1824	1,31
City of Turin			
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	245	1,65
G45.2	Maintenance and repair of motor vehicles	3700	1,60
G46.5	Wholesale of information and communication equipment	1011	1,58
C26.3	Manufacture of communication equipment	379	1,52
C29.1	Manufacture of motor vehicles	17881	1,49
S95.1	Repair of computers and communication equipment	234	1,43
C30.3	Manufacture of air and spacecraft and related machinery	1658	1,39
C26.2	Manufacture of computers and peripheral equipment	199	1,28
C29.3	Manufacture of parts and accessories for motor vehicles	1577	1,14
H52.1	Warehousing and storage	2405	1,14
Environs			
C28.1	Manufacture of general-purpose machinery	2582	2,38
C29.1	Manufacture of motor vehicles	4043	2,04
C28.4	Manufacture of metal forming machinery and machine tools	1682	1,99
C25.7	Manufacture of cutlery, tools, and general hardware	3065	1,96
C27.9	Manufacture of other electrical equipment	1646	1,90
C28.9	Manufacture of other special-purpose machinery	4662	1,88
C29.3	Manufacture of parts and accessories for motor vehicles	13591	1,87
C27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	1208	1,87
C27.3	Manufacture of wiring and wiring devices	718	1,83
C25.6	Treatment and coating of metals; machining	5667	1,79

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

Table A5: Top Strengths (2017).

NACE	Name	Empl.
Total metropolitan region		
C29.1	Manufacture of motor vehicles	21924
C29.3	Manufacture of parts and accessories for motor vehicles	15168
C30.3	Manufacture of air and spacecraft and related machinery	6654
C25.5	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	3828
C26.2	Manufacture of computers and peripheral equipment	323
H52.1	Warehousing and storage	2650
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1412
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	781
C27.9	Manufacture of other electrical equipment	1938
C25.7	Manufacture of cutlery, tools, and general hardware	3644
City of Turin		
C29.1	Manufacture of motor vehicles	17881
H52.1	Warehousing and storage	2405
C30.3	Manufacture of air and spacecraft and related machinery	1658
C26.2	Manufacture of computers and peripheral equipment	199
Environs		
C29.3	Manufacture of parts and accessories for motor vehicles	13591
C30.3	Manufacture of air and spacecraft and related machinery	4996
C25.5	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	3663
C27.4	Manufacture of electric lighting equipment	1625
C29.1	Manufacture of motor vehicles	4043
C22.1	Manufacture of rubber products	2978
C25.7	Manufacture of cutlery, tools, and general hardware	3065
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	683
C27.9	Manufacture of other electrical equipment	1646
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1189

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

Table A6: Top Opportunities (2017).

NACE	Name	Empl.
Total metropolitan region		
C28.1	Manufacture of general-purpose machinery	2953
C27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	1405
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	435
C19.2	Manufacture of refined petroleum products	182
City of Turin		
G45.2	Maintenance and repair of motor vehicles	3700
S95.1	Repair of computers and communication equipment	234
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	245
C29.3	Manufacture of parts and accessories for motor vehicles	1577
C26.1	Manufacture of electronic components and boards	174
Environs		
C24.4	Manufacture of basic precious and other non-ferrous metals	222
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	190
C20.1	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics, and synthetic rubber in primary forms	355
C19.2	Manufacture of refined petroleum products	119
C24.1	Manufacture of basic iron and steel and of ferro-alloys	195
C28.3	Manufacture of agricultural and forestry machinery	145
C10.3	Processing and preserving of fruit and vegetables	172
E36.0	Water collection, treatment, and supply	116
C15.1	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, and harness; dressing and dyeing of fur	211

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

Table A7: Top Threats (2017).

NACE	Name	Empl.
Total metropolitan region		
C32.9	Manufacturing n.e.c.	976
E37.0	Sewerage	540
H53.2	Other postal and courier activities	816
C32.5	Manufacture of medical and dental instruments and supplies	2643
City of Turin		
D35.2	Manufacture of gas; distribution of gaseous fuels through mains	1124
D35.3	Steam and air conditioning supply	101
H53.2	Other postal and courier activities	498
S95.2	Repair of personal and household goods	813
C28.3	Manufacture of agricultural and forestry machinery	846
E36.0	Water collection, treatment, and supply	778
Environs		
H53.2	Other postal and courier activities	318
H49.4	Freight transport by road and removal services	6186

Source: Istat, 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	Envi-rons	Total Reg.
C10.1	Processing and preserving of meat and production of meat products	312			W
C10.3	Processing and preserving of fruit and vegetables	179		O	W
C10.5	Manufacture of dairy products	519	W		W
C10.7	Manufacture of bakery and farinaceous products	3558	W	W	W
C10.8	Manufacture of other food products	1702		W	W
C11.0	Manufacture of beverages	108			W
C13.9	Manufacture of other textiles	1022	W		W
C14.1	Manufacture of wearing apparel, except fur apparel	1866	W	W	W
C15.1	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, and harness; dressing and dyeing of fur	283		O	W
C16.1	Sawmilling and planing of wood	196			W
C16.2	Manufacture of products of wood, cork, straw, and plaiting materials	1456	W		W
C17.2	Manufacture of articles of paper and paperboard	1457	W	S	W
C18.1	Printing and service activities related to printing	2334			
C19.2	Manufacture of refined petroleum products	182		O	O
C20.1	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics, and synthetic rubber in primary forms	514	W	O	
C20.3	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	449		S	W
C20.4	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, and toilet preparations	834	W		W
C20.5	Manufacture of other chemical products	566	W	S	W
C21.1	Manufacture of basic pharmaceutical products	292			W
C21.2	Manufacture of pharmaceutical preparations	496	W		W
C22.1	Manufacture of rubber products	3483	W	S	
C22.2	Manufacture of plastics products	3749	W	S	
C23.1	Manufacture of glass and glass products	775	W	S	W
C23.6	Manufacture of articles of concrete, cement, and plaster	289			W
C23.7	Cutting, shaping, and finishing of stone	350			W
C23.9	Manufacture of abrasive products and non-metallic mineral products n.e.c.	682	W	S	
C24.1	Manufacture of basic iron and steel and of ferro-alloys	231		O	
C24.2	Manufacture of tubes, pipes, hollow profiles, and related fittings, of steel	521		S	
C24.3	Manufacture of other products of first processing of steel	913	W	S	
C24.4	Manufacture of basic precious and other non-ferrous metals	226		O	
C24.5	Casting of metals	1315		S	

C25.1	Manufacture of structural metal products	3226	W		
C25.5	Forging, pressing, stamping, and roll-forming of metal; powder metallurgy	3828	W	S	S
C25.6	Treatment and coating of metals; machining	6867	W	S	
C25.7	Manufacture of cutlery, tools, and general hardware	3644	W	S	S
C25.9	Manufacture of other fabricated metal products	2802	W	S	
C26.1	Manufacture of electronic components and boards	1150	O	S	
C26.2	Manufacture of computers and peripheral equipment	323	S	S	S
C26.3	Manufacture of communication equipment	658			
C26.5	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	1412		S	S
C27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	1405	W	S	O
C27.3	Manufacture of wiring and wiring devices	835	W	S	S
C27.4	Manufacture of electric lighting equipment	1693		S	
C27.5	Manufacture of domestic appliances	770		S	
C27.9	Manufacture of other electrical equipment	1938	W	S	S
C28.1	Manufacture of general-purpose machinery	2953	W	S	O
C28.2	Manufacture of other general-purpose machinery	3728	W	S	
C28.3	Manufacture of agricultural and forestry machinery	991	T	O	
C28.4	Manufacture of metal forming machinery and machine tools	1881	W	S	S
C28.9	Manufacture of other special-purpose machinery	5312	W	S	S
C29.1	Manufacture of motor vehicles	21924	S	S	S
C29.2	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	781		S	S
C29.3	Manufacture of parts and accessories for motor vehicles	15168	O	S	S
C30.1	Building of ships and boats	1123		S	
C30.2	Manufacture of railway locomotives and rolling stock	542		S	S
C30.3	Manufacture of air and spacecraft and related machinery	6654	S	S	S
C30.9	Manufacture of transport equipment n.e.c.	340		S	
C31.0	Manufacture of furniture	1207	W		W
C32.1	Manufacture of jewellery, bijouterie, and related articles	561	W		
C32.3	Manufacture of sports goods	172		S	W
C32.4	Manufacture of games and toys	184			
C32.5	Manufacture of medical and dental instruments and supplies	2643	W		T
C32.9	Manufacturing n.e.c.	976	W	S	T
C33.1	Repair of fabricated metal products, machinery, and equipment	3633	W	S	
C33.2	Installation of industrial machinery and equipment	1917		S	
D35.1	Electric power generation, transmission, and distribution	2317			
D35.2	Manufacture of gas; distribution of gaseous fuels through mains	1215	T		

D35.3	Steam and air conditioning supply	151	T		
E36.0	Water collection, treatment, and supply	895	T	O	W
E37.0	Sewerage	540		S	T
E38.1	Waste collection	3547			
E38.2	Waste treatment and disposal	438	W		W
E38.3	Materials recovery	784	W		W
E39.0	Remediation activities and other waste management services	210			W
F41.1	Development of building projects	101			
F41.2	Construction of residential and non-residential buildings	5325	W		W
F42.1	Construction of roads and railways	998	W	W	W
F42.2	Construction of utility projects	389			W
F42.9	Construction of other civil engineering projects	312			W
F43.1	Demolition and site preparation	514	W	W	W
F43.2	Electrical, plumbing, and other construction installation activities	14556	W		
F43.3	Building completion and finishing	11106	W		W
F43.9	Other specialised construction activities	1158	W		W
G45.1	Sale of motor vehicles	3363	W	S	
G45.2	Maintenance and repair of motor vehicles	7418	O	S	
G45.3	Sale of motor vehicle parts and accessories	3438		S	S
G45.4	Sale, maintenance and repair of motorcycles and related parts and accessories	435	O	O	O
G46.1	Wholesale on a fee or contract basis	8658			
G46.2	Wholesale of agricultural raw materials and live animals	291	W	W	W
G46.3	Wholesale of food, beverages, and tobacco	3496	W		W
G46.4	Wholesale of household goods	6398	W		W
G46.5	Wholesale of information and communication equipment	1824			
G46.6	Wholesale of other machinery, equipment, and supplies	3793	W	S	
G46.7	Other specialised wholesale	5276	W		W
G46.9	Non-specialised wholesale trade	1382	W		
H49.1	Passenger rail transport, interurban	1416			
H49.2	Freight rail transport	298			
H49.3	Other passenger land transport	7062		W	
H49.4	Freight transport by road and removal services	10361	W	T	W
H51.1	Passenger air transport	164		W	
H52.1	Warehousing and storage	2650	S		S
H52.2	Support activities for transportation	8247	W		W
H53.1	Postal activities under universal service obligation	4315		W	W
H53.2	Other postal and courier activities	816	T	T	T
S95.1	Repair of computers and communication equipment	466	O	S	
S95.2	Repair of personal and household goods	1198	T		

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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