



MASTER THESIS

TRANSIT-ORIENTED DEVELOPMENT *in* *European Spatial Governance* *and* *Planning Systems*

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ABSTRACT

Today, the need for innovative sustainable development models is becoming more and more central in the international debate. The integration between land-use and transport in policy-making and planning is crucial for achieving sustainability, and Transit-Oriented Development (TOD) is reported to be one of the possible models to follow in order to promote this integration.

This thesis wants to describe the current trends in applying Transit-Oriented Development strategies, in eight European nations, and it also aims to understand how the Spatial Governance and Planning System (SGPS) features could affect, positively and negatively, future implementations of the model.

Starting with an overview of today's sustainability issues and their links with urbanisation and transport, the attention shifts to the TOD's background, definition, examples, and recognition as a sustainable development model by the international scene. After that, Sweden, Denmark, UK, France, Germany, Netherlands, Italy and Belgium are analysed, according to their land-use and transport planning systems and TOD experiences reported by literature for each nation.

The outcome is an analysis, that highlights how and if Transit-Oriented Development is used as a model in the selected countries and how it is performed. Additionally, the degree of land-use transport planning integration and the presence of key elements for successful TODs are explored in SGPSs, in order to understand future potentials of this model in the European countries, considered by the research.

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ABBREVIATIONS

BART	Bay Area Rapid Transit
CC	Climate Change
CF	Cohesion Fund
CFCs	Chlorofluorocarbons
CH4	Methane
CNU	Congress of New Urbanism
CO	Carbon Monoxide
CO2	Carbon Dioxide
DOT	Development-Oriented Transit
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
ECMT	European Conference of Ministers of Transport
ECOSOC	Economic and Social Council of the United Nations
EEA	European Environmental Agency
EIA	Energy Information Administration (USA)
ERDF	European Regional Development Fund
ERTMS	European Railway Traffic Management System
ESDP	European Spatial Development Perspective
ESF	European Social Fund
ESPON	European Spatial Planning Observation Network
EU	European Union
EU-15	European Union with 15 members (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom), before 2004.
EU-28	European Union with 28 members (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom)
GA	General Assembly of the United Nations
GHGs	Greenhouse Gases
ICIs	International Cooperative Initiatives
ICJ	International Court of Justice of the United Nations
IEA	International Environmental Agency
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LPT	Local Public Transport
MDGs	Millennium Development Goals
MoS	Motorways of the Sea
NASA	National Aeronautics and Space Administration (USA)
NOAA	National Oceanic Atmospheric Administration of USA
NOx	Nitrogen Oxides
NSA	Non-State Actors
NUA	New Urban Agenda
O ₂	Oxygen
O ₃	Ozone
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries

PM	Particulate Matter
SD	Sustainable Development
SDGs	Sustainable Development Goals
SLR	Sea Level Rise
SGPS	Spatial Governance and Planning System
TAD	Transit Adjacent Development
TEN-T	Trans-European Transport Network
TND	Traditional Neighbourhood Development
TOD	Transit Oriented Development
UHI	Urban Heat Island
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN-HABITAT	United Nations Human Settlements Programme
WHO	World Health Organization
WMO	World Meteorological Organization
WWII	World War II

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I

INTRODUCTION: THEORIES and FRAMEWORKS for TOD

In this first part of the thesis the focus is the theoretical framework behind Transit-Oriented Development and its relevance in international policies.

Recently, TOD has been recognised in the United Nations “New Urban Agenda” as a development model that could help achieving sustainable urban development.

The conceptualisation by Calthorpe in 1993 has been a milestone in the evolution of the theory, but previous experiences in Europe are the background for TOD model.

01

SUSTAINABILITY: THE ROLE of TRANSPORT and LAND-USE PLANNING

1.1 SUSTAINABILITY

In order to rely to the main topic of this chapter, the integration of land-use and transport planning, it is necessary to understand why it is needed in the present framework of spatial planning, not only for what concerns Europe, but the whole World.

Born in the second half of the XX Century, the sustainability principle has a leading role in many policies, especially in the spatial planning ones, where every predicted scenario could affect all the three pillars of sustainability, the economic, the social and the environmental one, in both a positive or negative way.

Unsustainable development in spatial policies led to the urban sprawl phenomenon which generated habitat destruction, constant increase in use of private transport modes, creation of single-function neighbourhoods (residential), increasing cost in housing and infrastructures cost, etc.

The integration of land-use and transport planning, through comprehensive regional and local policies, could help facing for all these issues leading to more dense and mixed development areas and to prevent further habitat and farmland degradation and promoting healthier, safer and more sustainable transport modes (Calthorpe, 2011).

In this chapter the sustainability topic is will be analysed from its historical

background to the present challenges, linked to the Climate Change phenomenon, also focusing on the role of urbanisation and transportation in causing troubles, but even in being potential drivers for change.

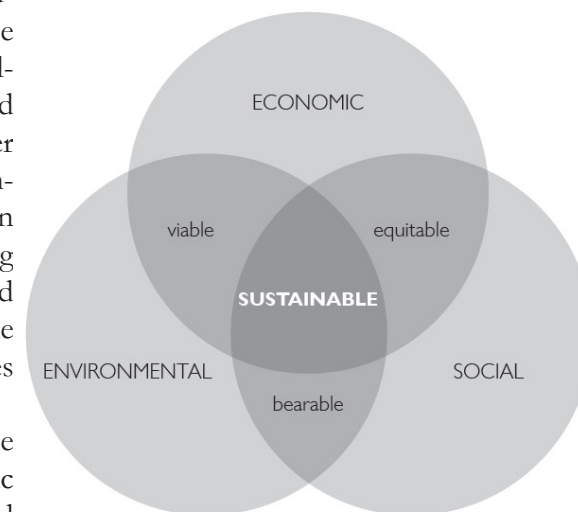


Figure 1.1. Scheme of the three sustainability pillars. Author's own elaboration based on the sustainability definition of "Our Common Future", 1987.

1.1.1 Genesis of the principle

The “sustainability” concept is relatively recent, it emerged in the late 20th Century as the response to worldwide economic (and energetic) crisis. However, the need for a sustainable development was expressed, referring to specific cases, since few centuries ago: for example, the German scientist George Agricola underlined the impacts of the woodcutting, because wood was the main fuel and construction material. Even in ancient civilization, many sustainability problems occurred due to the extensive use of soil for agricultural uses (Du Pisani, 2006).

Anyway, the breaking point was reached in the ‘70s: the need for a change in the development patterns became relevant with the OPEC (Organization of the Petroleum Exporting Countries) oil embargo of 1973, as a rebound to the decision of United States to support Israel against Egypt in the Yom Kippur War (Kimberly, 2019). The embargo and the response policies of US caused the 1973-75 recession, which had effects on the energy cost and consequently on all the sectors that were dependent by oil consumption, as transport, industry and many more (Macalister, 2011). The second relevant event that definitively brought to the awareness of rethinking the way of leading development was the oil shock of 1979, caused by the collapse of the regime of the Sha by the Iranian Revolution (Britannica, 2019). The oil output from Iran was declining and oil-price doubled in one year: this worldwide crisis showed up (Federal Reserve History, 2013) and the topic of sustainable development started being discussed, with the mindfulness that the production and consumption models were not suitable with the environment and were exploiting too natural resources.

There have been different milestones in the sustainable development definition and recognition, mostly connected to the United Nations international activity in rising awareness (Mensah, 2019). Firstly, the Declaration of United Nations was the result of the Conference on the Human Environment held in Stockholm in 1972. It is the first document that recognises the man existence is linked to the environment, both for the “physical sustenance” and for the opportunity for intellectual growth and the rising population should not represent a treat for environment. The declaration highlights the need for finding measures to ensure the human well-being

and the preservation of the environment and sets up 26 principles to achieve the goal (United Nations, 1972).

A second stage and the most important, was the UN report “Our Common Future” of 1987, also known as “Brundtland Report”; starting from an analysis of the current situation of the humanity that was more and more exposed to treats of environmental, social and economic nature, the main shared definition of sustainable development was given in the report:

“Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth.” (United Nations, 1987, p. 16).

Afterwards, in 1992 another UN Conference on Environment and Development (UNCED) was held in Rio de Janeiro and in that occasion the first commonly shared agenda was adopted by more than 178 Governments, called “Agenda 21”. The agenda was thought to give an effective continuity to the UNCED with the involvement in the actions of all governments to accelerate the achievement of the sustainable development (United Nations, 1991) (United Nations, 2019).

With the beginning of the new millennium, in 2000 the United Nations developed the eight Millennium Development Goals (MDGs):

- “Eradicate extreme poverty and hunger;
- Achieve universal primary education;
- Promote gender equality and empower women;
- Reduce child mortality;
- Improve maternal health;
- Combat HIV/AIDS, malaria and other diseases;
- Ensure environmental sustainability;
- Global partnership for development” (United Nations, 2000).

The MDGs are not more in charge since 2015 and the UN worked, from 2013, to a new framework for sustainable development whose

results are the “Agenda 2030” and the seventeen Sustainable Development Goals (SDGs) (United Nations, 2019).

Even in these recent documents, the main inter-connected topics are water, energy, climate, oceans, urbanization, transport, science and technology; it is important to underline the need of dealing with all these topics in an integrated and trans-scalar approach, especially in effective planning practices.

In general terms, cities and their capacity to move to sustainable development are representing one of the most prominent challenges of urban researchers, even because not only environmental issues, but also social and economic issues are pressing on these systems (While & Whitehead, 2013).

1.1.2 Urban and transport sustainability

The general term “sustainability” could be referred to problems at different scale, from global to local, but surely cities represent the most impacting human-made habitats on Earth (Diappi, Bolchi, & Franzini, 1998).

In order to deal with the environmental challenges, it is necessary a process that have to keep the focus on cities: the impacts that cities have on the environment goes far beyond their legal boundaries and the effects of the constant urbanisation rates (in 2017 urban areas covered the 1% of the Earth’s surface, but they contained 54% of the global population) are effecting the whole World (IUCN, 2019). Therefore, cities are also the right place to implement innovation and to adapt and mitigate to the climate change, in terms of dimension, number of inhabitants and pro-capita consumption, so every action performed in a city is necessarily more effective (Diappi, Bolchi, & Franzini, 1998) (Hamman, 2017).

As for the “sustainability” principle definition, even for urban sustainability it is important to mention the UN Human Settlements Programme (UN-Habitat) that works since 1978 on different issues concerning urban areas, promoting socially and environmentally sustainable towns and cities (United Nations, 2019).

Following the Habitat II Conference held in Istanbul in 1996, the “Istanbul Declaration” was approved and the definition of a sustainable urban settlement was set up:

“Developing societies that will make efficient use of resources

within the carrying capacity of ecosystems and take into account the precautionary principle approach, and by providing all people, in particular those belonging to vulnerable and disadvantaged groups, with equal opportunities for a healthy, safe and productive life in harmony with nature and their cultural heritage and spiritual and cultural values, and which ensures economic and social development and environmental protection, thereby contributing to the achievement of national sustainable development.”
(United Nations, 1996, p. 24).

Accordingly to the UN-Habitat “Global campaign on Urban Governance”, the sustainability must be included in all dimension of the urban development to achieve the goal of a good urban governance (United Nations, 2002). Even transportation, like urbanisation, is not sustainable in the way we are performing it, for many reasons:

- Petroleum resources are limited;
- High number of accidents occurs because of transportation by motor vehicles;
- Private transportation enhances urban sprawl;
- Oil emissions have bad impacts on air quality;
- Transport creates congestion (Mosaberpanah & Khales, 2013).

All these reasons are in contrast with the principle of sustainable development because negatively affect energy and environmental resources that will not be sufficient for future generations, but also they do not fit any of the three dimensions of Sustainable Development (environmental, social and economic).

1.2 THE CLIMATE CHANGE PHENOMENON

Regarding to sustainability, it is impossible not to relate the principle to the environmental challenge of our times: climate change. Nowadays, climate change is turning into a key-topic in the scientific debate at national and international levels and its effects are becoming evident and are showing off earlier than thought and public awareness is growing thanks to a higher access to information (Moser, 2010).

Moving from focusing on general impacts, the debate is moving to the need of new city-development models and strategies and even mitigation and adaptation measures are going to be more and more relevant due to the stated phenomenon of the climate change. It is

1 Intergovernmental Panel on Climate Change is an organisation of governments (currently it has 195 members), belonging to the United Nations or WMO (World Meteorological Organisation). The organisation is supported by volunteer scientist for the assessment reports and the objective is to “provide government at all the different levels with scientific information to develop climate policies” (IPCC, 2019).

2 Greenhouse Gases (GHGs) are gases that trap heat in the atmosphere, such as carbon dioxide, methane, nitrous oxide and fluorinated gases (EPA, 2017).

3 Weather “is the current atmospheric condition in a given place. This includes variables such as temperature, rainfall, wind or humidity. Anyone looking outside can see if it is raining, windy, sunny or cloudy and can find out how hot it is by checking a thermometer or just feeling it.” (FAO, 2002).

defined from the IPCC¹ as “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer” (IPCC, 2018).

In the following paragraphs, the causes and impacts of climate change will be analysed, but the human activity has deeply influenced the climate, since the Industrial Revolution, with rising emission of GHGs² related to the current global warming phenomenon. Global Warming differs from climate change and it could be defined as a long-term heating of the Earth climate due to human activities that increased gases in the atmosphere with heat-trapping results. While climate change analysis takes into account the average weather³ pattern (temperature, precipitation, humidity, atmospheric pressure, wind, atmospheric particle count, etc.), global warming refers only to temperature data (NASA, 2019). Global warming could be considered the major driver in the man-made climate change (Asian Development Bank, 2013). Obviously, not every variation in the climate patterns is related to the “climate own variability” that is linked to variations from the mean state of climate parameters in a given period of time.

IPCC published a special report in 2018 that specifies the need to stop the increase of global warming at a temperature of 1.5°C more than pre-industrial levels. If the threshold of 1.5°C is going to be respected thanks to the improving of worldwide actions, there will be more time to develop solutions and less irreversible impacts. The report focuses on the climate change causes and emission pathways both from the past and the future with two different scenarios of the climate change: the first one in which the warming is stopped at 1.5°C above pre-industrial levels and the second one where the warming is supposed to reach 2°C (IPCC, 2018).

Many of the effects of this phenomenon have already been experimented in many regions and ecosystems are more and more vulnerable to climate change; especially less developed and poorer countries are more likely to be affected by the negative impacts, but they are also less prepared to face the wide range of problems of social, environmental and economic nature produced by the worst scenario (IPCC, 2018). The report clearly sets the requirement of having a transition, defined as “unprecedented in term of scale and speed”

in the way we manage the following systems:

- Energy system;
- Land, urban and infrastructure system;
- Industrial system.

Meeting these needs implies a balance between the energy production and the energy consumption with a lowering request. Energy production should be pleased on with a solar energy, wind energy and electricity storage, taking into account that not every country as the same competences and the transition could be faster or lower (IPCC, 2018).

Deepening into the urban and infrastructure system the report underlines the need for new planning practices that will lead to a great reduction of energy consumption from buildings, but also from the transport sector. Land use in rural area have to be deeply changed with a consistent reduction of the usage for pasture and non-pasture agricultural land and an increase of energy crops. Ecosystems have to be restored, diets have to change, and the way urban area are developed have to be more energy efficient (IPCC, 2018).

Industrial plants have a great impact on the energy consumption and also in this case a renewal of the way of project the production and delivering activities is needed, even more for large industrial plants. All the changes, needed for limiting the global warming at 1.5°C, are supposed to be implemented not only by the policymakers, but also by all the citizens. Moreover, the spreading of knowledge, information, data and education on the climate change phenomenon is necessary to make everyone aware of what has to be done.

1.2.1 Causes

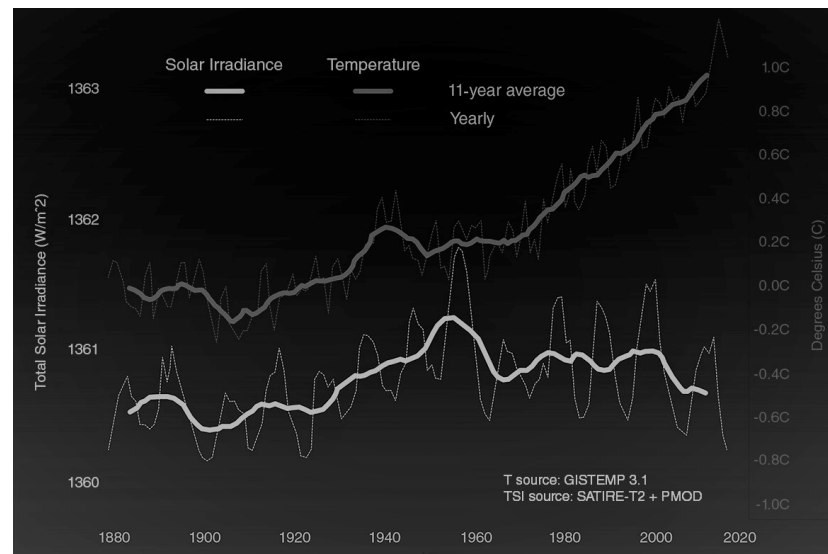
Climate change is a phenomenon that could occur for different causes, both natural and anthropogenic, but, from the Industrial Revolution, it has been mainly affected by the human activity. As previously said, climate has a variability that could occur due to different factors; when variability trends are performed for long-term (usually centuries) periods it is possible to talk about climate change. Firstly, in order to talk about the causes of climate change, Earth is surrounded by a set of layers, known as “atmosphere”, composed by different gases, at 21% of Oxygen (O₂) and 78% of Nitrogen. It acts as a filter from solar rays, has a thermoregulating effect, keeps

the oceans in liquid status and protects Earth from space debris. All the natural or human made phenomena that affect the composition of the atmosphere could potentially cause climate change.

The natural internal processes that lead to climatic impacts are earthquakes and volcanic eruptions (Cheng, 2009), these phenomena release big amount of heating gases in the atmosphere and could provoke in extreme cases impacts on the weather and climate at different scales. Instead, a natural external process could be the Sun activity that in certain periods could be more intense, generating climate variations, or an extreme event like a colliding meteorite.

Anyway, as showed in *Figure 1.2*, there is not a relation between the solar activity and the increase of temperature from 1880 and 2018.

Figure 1.2. Solar activity and temperature.
Source: NASA (https://climate.nasa.gov/internal_resources/1896/)



Surely, the main cause for climate change is the increasing emission of GHGs in the atmosphere led by human activities (NASA, 2019b), in the last century industrial production, the advent of private mobility (by airplanes, cars) and of logistic (by mainly trucks and big ships), land-use changes and the reduction of forests for food production have produced an increasing need of energy and usage of fuels. The GHGs are responsible of the global warming because they are blocking the solar heating rays to go out of Earth's atmosphere.

Additionally, a part of these gases is also concerned in the shrinking of the ozone layer and the consequent a higher amount of UV rays is reaching the surface, but they can not be properly reflected.

The *Greenhouse Gases* (GHGs) or *Radiatively Important Trace Species* (RITS) are the 0.1% of the atmospheric composition, but have a great influence on climate (Hardy, 2003):

- Carbon dioxide (CO₂) is the most known GHG and it is produced by a set of natural processes such as photosynthesis, human respiration, volcanic eruptions, but also by deforestation, changes in land-use and fossil fuel burning. It is responsible for the 64% of the human-made global warming (European Commission, 2019);
- Methane (CH₄) is a gas produced “*through natural sources and human activities, including the decomposition of wastes in landfills, agriculture, and especially rice cultivation, as well as ruminant digestion and manure management associated with domestic livestock*” (NASA, 2019b);
- Carbon monoxide (CO);
- Nitrogen oxides (NO_x);
- Chlorofluorocarbons (CFCs) are industrial-produced compounds that are responsible for the ozone layer depletion;
- Ozone (O₃) is the gas which composes the layer of the stratosphere protecting Earth from UV rays. This layer has been interested by the “ozone depletion” phenomenon;
- Water vapor increases when the atmosphere is warmer. It is a great feedback for the current status of the climate and it also allow precipitations (NASA, 2019b).
- The stratosphere layer has been deeply affected by the increasing of GHGs emissions, even if it only contains the 1% of the atmospheric mass. In conclusion, man is the main responsible for the bulk of global warming phenomenon.

1.2.2 Impacts

Climate change impacts on natural and human systems have been analysed in recent years by the IPCC in the 2014 report, which is focused on impacts, adaptation and vulnerability linked to the phenomenon. Impacts are generally defined as “*effects on natural and human systems.[...] Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the*

interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. Impacts are also referred to as consequences and outcomes. The impacts of climate change on geophysical systems, including floods, droughts, and sea level rise, are a subset of impacts called physical impacts” (IPCC, 2014, p. 5). The climate changes in a slow way with alterations and disaster, but it is clear that even an alteration in a remote place is going to affect human settlements, and especially cities with a higher risk due to the concentration of population in relatively small area. The phenomena are not changing the pattern since in 2019 CO₂ has reached new highs, according to the World Meteorological Organisation (McGrath, 2019).

It is possible to easily divide the impacts in base to the climate component they affect:

- Precipitations:
 - Drought is defined as a “period without rain, especially in planting season” that injures crops, but drought phenomenon affects each region in different ways, due to their different weathers that need different thresholds. For example in UK it could be defined as “fifteen days, none receiving 0.25mm of rain” or in Libya “annual rainfall less than 180mm (Hudson & Hazen, 1964)” (Wilhite & Glantz, 1985);
 - Flood be defined as “a temporary overflow of a normally dry area due to overflow of a body of water, unusual build-up, runoff of surface waters, or abnormal erosion or undermining of shoreline. Floods can also be overflow of mud flow caused by build-up of water underground” (BD DIctionary, n.d.). It is the phenomenon that is mostly climate-related (Hirabayashi, et al., 2013), because it will increase with warmer climate and extreme events will be easier to occur in countries that are not prepare to high-concentrated and high-frequent rainfalls;
- Gases:
 - Ozone Hole or “ozone depletion”⁴ is going to let more UV rays to reach the Earth’s surface enhancing the global warming effect;
 - Global Warming;
- Temperature:

⁴ Ozone depletion is defined as “gradual thinning of Earth’s ozone layer in the upper atmosphere caused by the release of chemical compounds containing gaseous chlorine or bromine from industry and other human activities. The thinning is most pronounced in the polar regions, especially over Antarctica.” (Encyclopedia Britannica, 2019).

- Sea Level Rise (SLR) is a consequence of Ice melting and globally sea level is increasing, but the phenomenon has regional effects, provoking decreasing of the level in some regions and increasing or flattening in others. Actually, is globally estimated by NASA that the sea level is increasing of 3.3 mm/yrs. This effect is going to deeply affect in the future coastal areas and cities and islands;
- Ice melting is the phenomenon that is leading the ice-mass of Artica (-12.85% mass decrease per decade from 1981 and 2010), Antartica (-127 Gt/yrs) and Greenland (-286 Gt/yrs) to a constant decrease (NASA, 2018) (NASA, 2017);
- Urban Heat Island (UHI) is the phenomenon performing a consistent alteration of the flux of heat in an urban area, it could be considered detrimental or positive according to the location and the weather (Taha, 1997). It is a common problem in large cities, due to the little natural surface, the height of buildings and it leads cities to be warmer than the surrounding areas. The problem is faced since the ‘80s in countries like Japan, but it is going to become more and more difficult to face it with effective solutions, with the current urbanisation rates (Yamamoto, 2006);
- Wind:
 - Hurricanes is defined by NOAA⁵ as “a tropical cyclone is a rotating low-pressure weather system that has organized thunderstorms but no fronts”. Sea level rise, the warming of oceans’ surfaces and the consequent evaporation are making these events more and more intense and wider regions will be interested by them (Michener, Blood, Bildstein, Brinson, & Gardner, 1997);
 - Wildfires are a phenomenon due to a hot and dry weather condition, soil moisture and the presence of trees or other flammables material. It is very dangerous for inhabited areas because these events could destroy houses and entire ecosystems; additionally they could be worsened by winds (Center for Climate and Energy Solutions, 2019);
 - Sand or dust storms are related to dry soils and weather (it usually occurs in arid and semi-arid regions) and happens

⁵ National Oceanic and Atmospheric Administration of USA.

when strong winds rise large amount of sand and storms (WMO, 2019).

All these extreme weather phenomena are going to affect the global population and be responsible for consequent changes:

- Extinction of some species;
- Loss of Ecosystems;
- Acidification of oceans;
- Massive migrations.

Figure 1.3. Satellite sea level observations (1993-present). Source: NASA (<https://climate.nasa.gov/vital-signs/sea-level/>)

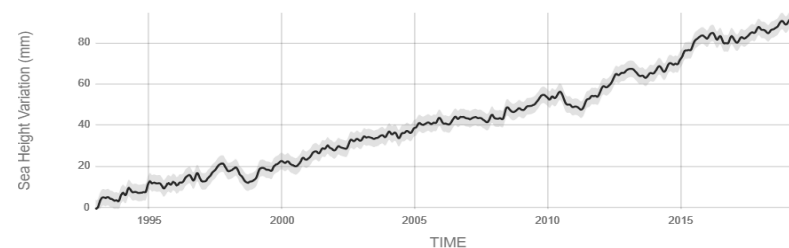


Figure 1.4. Antarctica mass variation since 2002. Source: NASA (<https://climate.nasa.gov/vital-signs/ice-sheets/>)

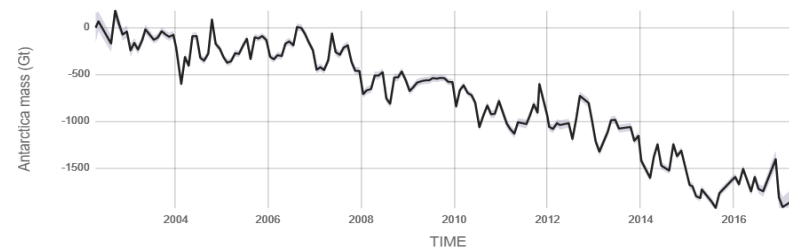


Figure 1.5. Greenland mass variation since 2002. Source: NASA (<https://climate.nasa.gov/vital-signs/ice-sheets/>)

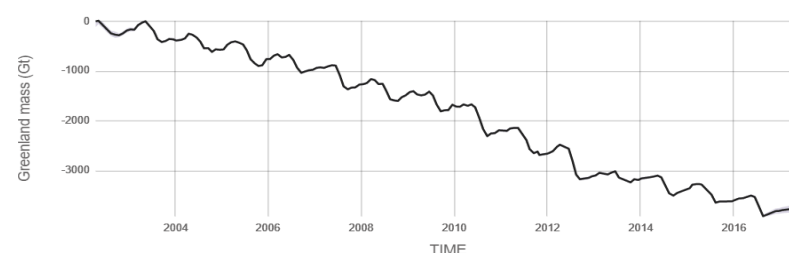
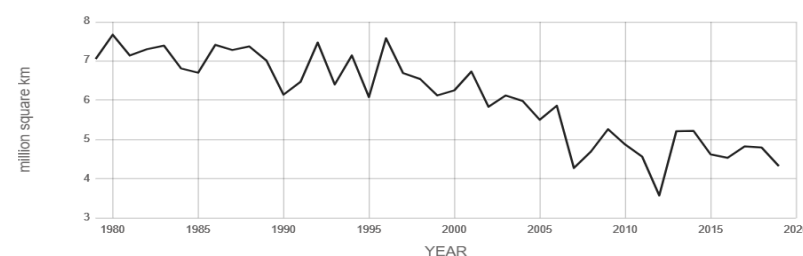


Figure 1.6. Arctic Sea Ice average area since 1979. Source: NSIDC/NASA (<https://climate.nasa.gov/vital-signs/arctic-sea-ice/>)



1.3 CITIES, URBANISATION AND CLIMATE CHANGE

Firstly, a definition of “urbanisation” must be given, even if it is not simple to refer to it in a shared way, because the process always presents changes in different dimensions, but they do not always occur together. According to McGranahan and Satterthwaite, it could be defined as:

“broad-based rural-to-urban transition involving population, land use, economic activity and culture, or indeed any one of these” (McGranahan & Satterthwaite, 2014, p. 6).

United Nations in 2018 refers to it as a “*complex socio-economic process [...] alters the demographic and social structure of both urban and rural areas*” (United Nations, 2018, p. 3). Not only the urbanisation has to be defined, but also the idea of urban area: in many cases urban-related data are referring to the administrative boundaries of a city, but they could not include the suburban areas around it that have a strong connection in social and economic dimension with the inner city. Thus, it is important to refer to “metropolitan area”⁶, in order to include all the agglomerations around the city.

As previously said, sustainability issues and climate change-related impacts have a strong relation with cities, towns and urban development, due to the fact that the biggest part of the World’s population lives in urban areas and, consequently, these areas are the major responsible, but also the main victims of the phenomenon.

The transition from unsustainable to sustainable ways of living, development patterns, production methods, energy consumption and production and transport modes have to take place in urban areas to be effective and to avoid the scenario described in IPCC 2018 Special Report.

The following analysis of the urbanisation rates and the emissions for which cities are responsible will help to understand why it is necessary to integrate land-use planning and transport planning.

1.3.1 Increasing urbanisation rates

At a worldwide level, the United Nations estimated in 2010 that cities are producing the 75% of the GHGs emissions (United Nations, 2010) and consuming the 67-76% of the global energy, even according to the density of the areas. More dense areas have more sustainable patterns of energy consumption. The problems related

⁶ Defined by United Nations as: “A type of urban settlement defined by both the contiguous territory inhabited at urban levels of residential density and additional surrounding areas of lower settlement density that are also under the direct influence of the city (e.g., through frequent transport, road linkages, commuting facilities etc.)” (UN Population Division, 2019).

to cities are more evident when unplanned urban expansions occur and consequently are responsible for:

- urban sprawl;
- land consumption;
- environmental degradation;
- other problems (United Nations, 2018).

Looking at international data on urbanisation it is possible to see that the rates of urbanisation are increasingly growing, and they will be more and more consistent in future, also due to climate-related migration phenomena. The urban population is slightly increasing since 1960, with a constant trend from a value of 1 billion to 4 billion in 2017, so it has quadrupled. Instead, the rural population after a growing pattern from 1960 to 2000 is now keeping a constant. The urbanisation phenomenon is something is not giving signs of stopping since the end of WWII. Other analysis could be done looking at the following data.

Figure 1.7. Population data (billions) from 1950 to 2050, per development regions. Author's own elaboration based on UN data.

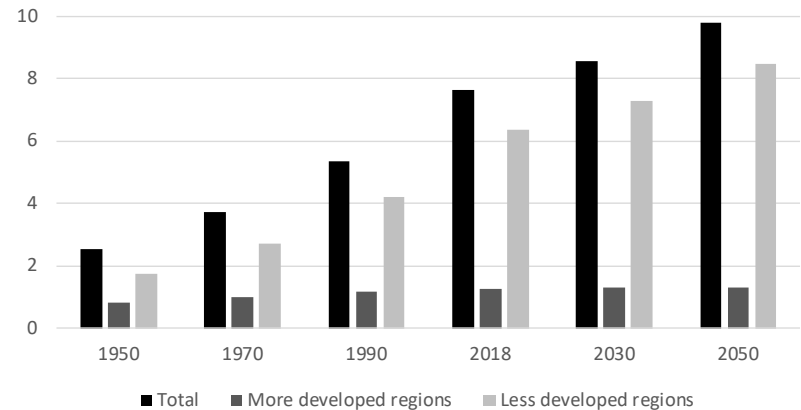


Figure 1.8. Population living in urban areas (billions) from 1950 to 2050, per development regions. Author's own elaboration based on UN data.

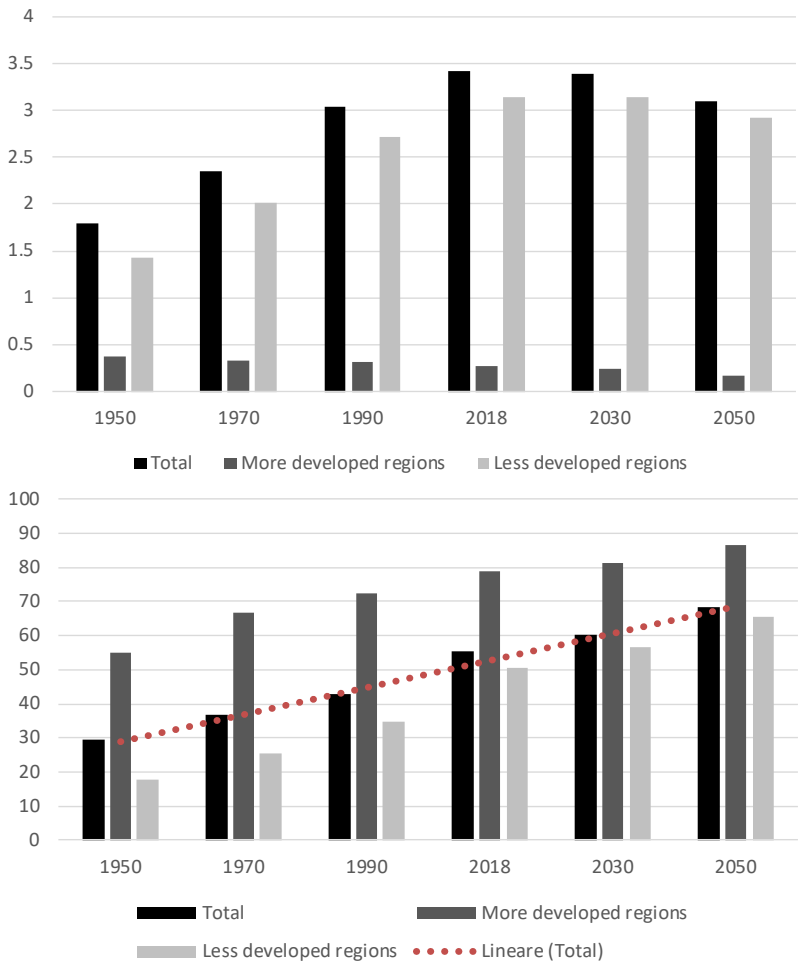
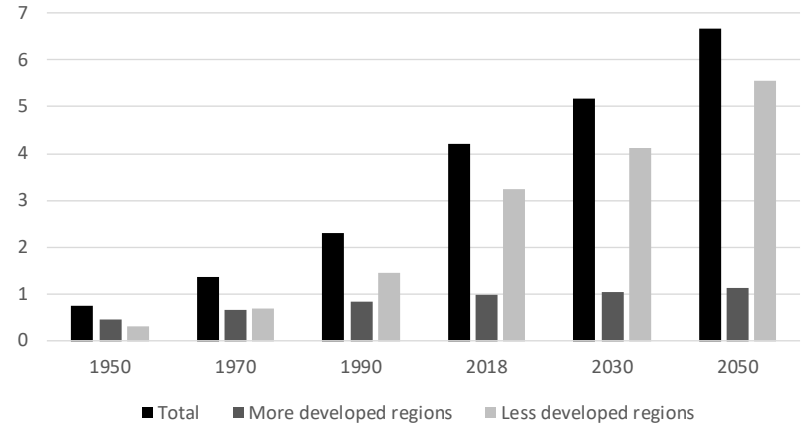


Figure 1.9. Population living in rural areas (billions) from 1950 to 2050, per development regions. Author's own elaboration based on UN data.

Figure 1.10. Percentage of urban population from 1950 to 2050, per development regions. Author's own elaboration based on UN data.

Firstly, the worldwide data provided by the United Nations in the “World Urbanization Prospect” of 2018 could give an overview of the population distribution through urban and rural areas since 1950 and, also, a projection of the future patterns. In general, the overall population on Earth is going to increase effectively, from 7.63 billion of 2018 to 8.55 billion in 2030 and 9.77 billion in 2050. The augmentation is mostly concerning less developed regions of the world where the population is supposed to quadruple in 2050, compared to the 1950 data.

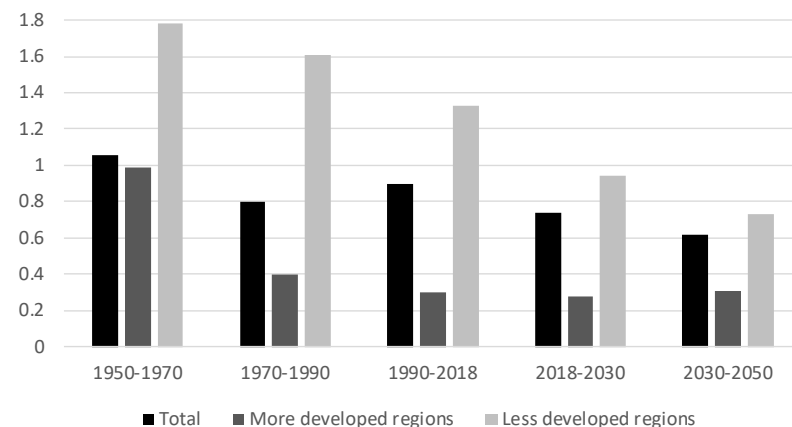
Even population living in urban areas is constantly growing, according to the data provided and by 2050 the 69% of the overall

population is going to live in cities and in more developed regions the percentage is supposed to almost reach the 90%. In less developed countries, data show a lower percentage of people living in urban areas, but dealing with the fact that the 80% of the current worldwide population lives here, it is not difficult to understand that urban areas in these regions are reaching quite ungovernable dimensions, also due to the lack of policies really effective in governing migrations of large numbers of people from rural areas. In 2000, there were 39 cities with more than 5 million inhabitants, now they are 54 and 2/3 of them are located in developing countries (Vojonovic, 2014). These megacities have different characteristics, in the developed countries they have lower growth rates and they are expected to decline, but in less developed regions they are constantly and consistently growing (Views of the World, 2011).

Looking at urbanisation rate⁷ data (Figure 1.11), the high contrast between the data, coming from developed and less developed countries, is evident. Even though, the rates are decreasing in both the regions, but in less developed countries there are still higher values.

⁷ Defined and calculated by the United Nations as: “Average exponential rate of change of the percentage urban over a given period (UN Population Division, 2019).

Figure 1.11. Rate of urbanisation, per development regions. Author's own elaboration based on UN data.

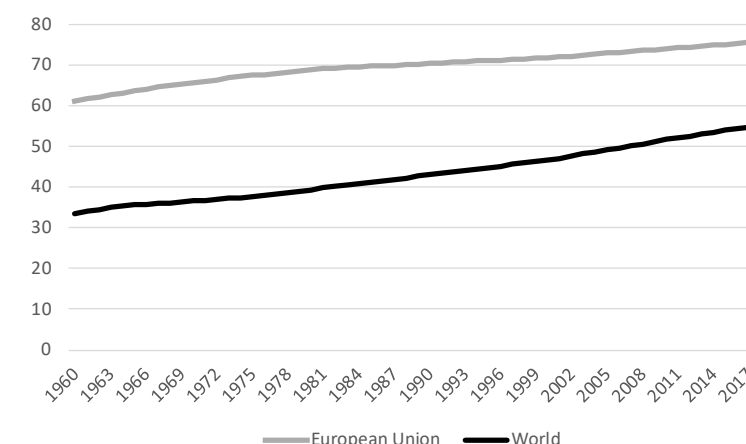


1.3.2 Emissions in urban areas

Cities are important in GHGs emissions phenomena because they are large economies and they impacts proportionally to “the level of output and the combination of energy sources”. There is a strong link between urbanisation phenomenon, economic growth and GHGs emission, all of them happen in cities and, consequently, big cities in developed countries consume and emit a lot more than cities

of the same size in developing countries, but they have lower per capita consumes, because they are well-planned and efficient (World Bank, 2010).

If previously we were just talking about the increasing urbanisation phenomenon around the World, it is now necessary to connect it with the problem related to the emissions in urban area. As already said, the major part of the population lives in urban areas, this trend is even more relevant in the European Union, where in 2017 about the 75% was already living in urban areas, 20% more than in other part of the world (where the average is about 55%); the prominence of the phenomenon in the European Union is due to many factors, mainly the presence and evolution of big cities since the XIX century with the Industrial Revolution. Observing data from the World Bank it is also easy to understand that the energy consumption and GHGs emissions per capita are mainly located in urban areas. For both the information, the graphs show a steady increasing in the emission and energy consumption, both at the global and European level. The trend is opposite for what concerning the CO2 emissions that had a decrease in the European Union since 1978, arriving in 2014 at about 6 kT per capita, almost the same level reached in 1960. This is an important information concerning the effectiveness of the EU in promoting policies that led to substantial reduction of certain gases. Even in the “Emission Gap Report” of 2018 the UN underlines that most of the climate-related initiatives are taking place in Europe, with the 83% of NSA⁸ cities participants in carbon initiatives, 60 (shared between Western and Eastern Europe) out of 220 mitigation focused ICIs⁹ (UNEP, 2018).



⁸ Non-State (or subnational) Actors.

⁹ International Cooperative Initiatives.

Figure 1.12. Percentage of urban population, comparison between the European Union and the World. Data collected from 1960 and 2017. Author's own elaboration based on World Bank data (<https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=EU>).

Figure 1.13. Total GHGs emissions (kilo Tons of CO₂ equivalent), comparison between the European Union and the World. Data collected from 1969 and 2011. Author's own elaboration based on World Bank data (<https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE>).

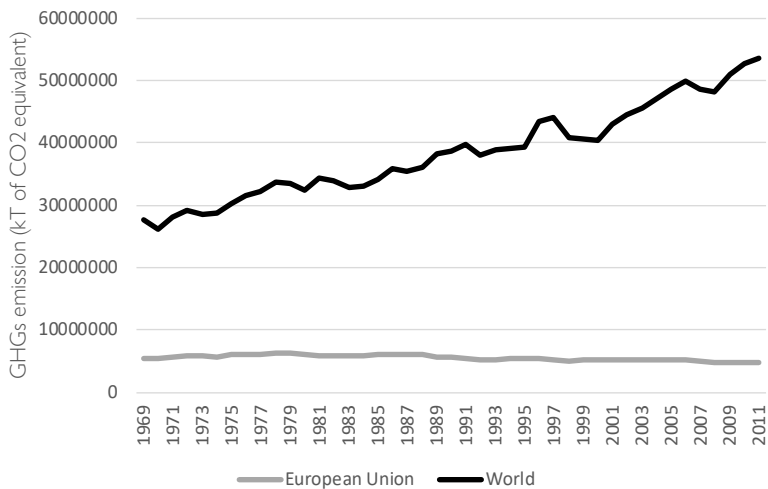


Figure 1.14. Total CO₂ emissions (kilo Tons of per capita), comparison between the European Union and the World. Data collected from 1960 and 2014. Author's own elaboration based on World Bank data (<https://data.worldbank.org/indicator/EN.ATM.CO2E.PC>).

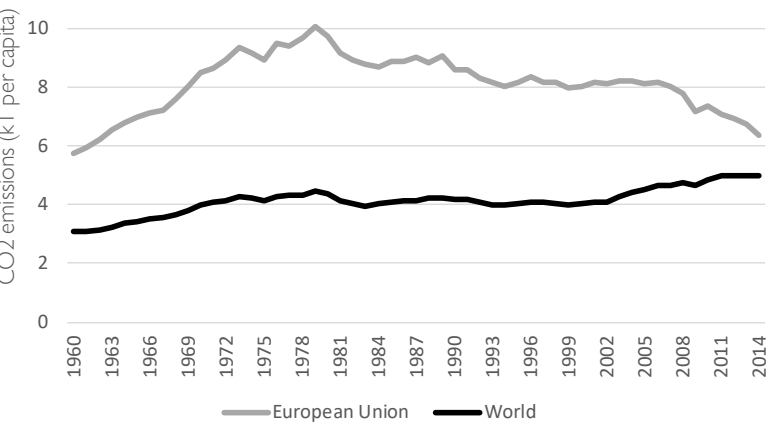
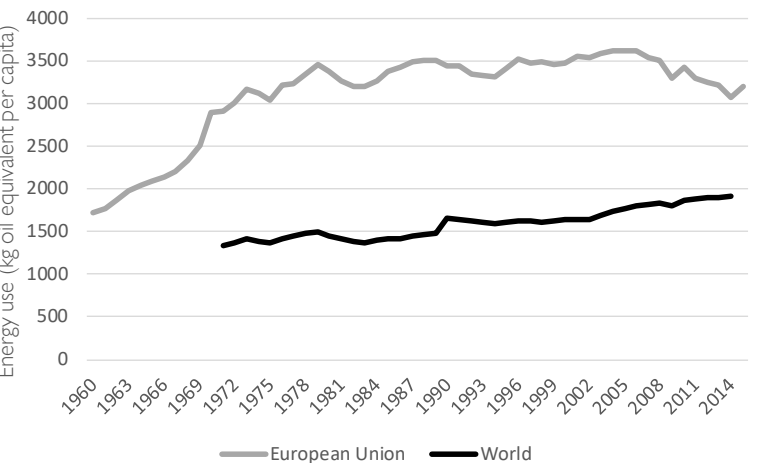


Figure 1.15. Total energy use (kg oil equivalent per capita), comparison between the European Union and the World. Data collected from 1960 and 2014. Author's own elaboration based on World Bank data (<https://data.worldbank.org/indicator/EG.USE.PCAP.KG.OE>).



In cities, lots of the emissions are coming from buildings (6.8 GtCO₂) and transport (2.8 GtCO₂) on a total of 10 GtCO₂ and building emissions are expected to rapidly arise, around 12.6 Gt CO₂ in order to face the climate with a constant usage of cooling and heating systems (Creutzig, et al.).

Information and data are not common to all the cities and not all the zones of a city, but may influencing factors have to be taken into account, such as:

- Urban form, which is relevant because denser urban forms leads to lower emissions in many cities, for example in European towns the centres have always lower consumption, especially in transport;
- Land-use patterns;
- Land cover;
- Socio-demographic information that sometimes highlight the connection between the economic wellness and social condition of inhabitants and the easing of behaviour that have greater impacts (Creutzig, et al.) (Miller, 2018).

All these factors are usually managed in urban policies and this evidence highlights again the need for new spatial policies that really want to effectively account these problems and try to create cities with forms and uses that could help achieving the goal of sustainable development. Not only big cities, bit also small-sized and medium-sized cities have to play an important role in achieving mitigation and adaptation actions, also cooperating with other cities and higher-level institutions. In fact, cities with less than 1 million inhabitants own more than 50% of the population living in urban areas. Small towns also often represent an unsustainable way of development mostly characterized by suburbs and single-house dwelling, especially in the more developed countries.

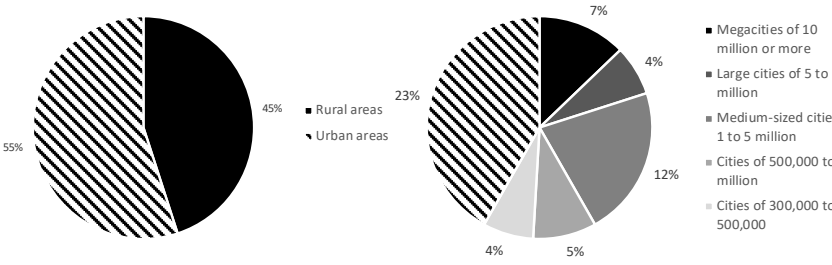


Figure 1.16 (on the left). Percentage of population by area of residence. Author's own elaboration based on UN data.

Figure 1.17 (on the right). Percentage of population by size of urban settlement. Author's own elaboration based on UN data.

1.4 TRANSPORT AND CLIMATE CHANGE

In the previous paragraph, the relations between cities, urbanisation, emissions and climate change have been analysed, now it is necessary to have a specification of the impact not of a typology of area (like urban areas), but by sector of usage. There are commonly 5 energy-use sectors used in the GHGs emissions analysis:

- Industrial sector;
- Transport sector;
- Residential sector (or building);
- Energy power and heat production sector;
- Other sector that could be different according to the institution or agency that is analysing data; it is easy to find sectors like waste management, agriculture or commercial one (EIA, 2019).

Transport is a sector that is rapidly enhancing its impact on climate emissions, especially it could be defined as an “end-use” sector that is affecting the most the GHGs emissions, mainly produced by cars, and freight transport. Even though the environmental-related issues are a focus when talking about transport, as the long-lived and short-lived CO₂ emission (WHO, 2019b), it is important to remember all the impacts transport has on:

- Air pollution that lead to 3.7 million deaths mainly related to particulate matter (PM) (WHO, 2019a);
- Traffic injuries that lead each year to 1.5 million deaths and is one of the ten most prominent death cause (WHO, 2019d);
- Physical activity that has a decline with urban development and motorisation and led to 2 million deaths at the global level each year and to a lot of health issues (WHO, 2019c);
- Noise.

Transport has impacts on many different components, concerning human health, but it also has a great role in the global warming phenomenon: the dependence of transportation on oil as fossil fuels and the great dominance of road transport between different transport modes make this sector one of the main affecting climate (Chapman, 2007).

Clearly, some strategies could increase the sustainability of the transport system, for example:

- Promoting Public Transportation;
- Demand Management;

- Improving road management;
- Pricing Policies;
- Vehicle technology improvement;
- Using clean fuels;
- Cultural enhancement;
- Transportation planning (Mosaberpanah & Khales, 2013).

Transport mitigation measures are actions policymakers could put in place, but they are more likely to affect low income groups, more than others, because rich people are likely to change vehicles or pay taxes; moreover, people causing GHGs emission and consequently climate change are not always the one mainly concerned by the negative impacts.

The car dependent population is mainly spread by the expanding suburbs, with people willing to leave the city chaos, but also willing to easily commute in the workplace in the urban centre. Policymakers with proper spatial strategies and urban design have the commitment to guide the exchange to better lifestyles, reducing the use of private cars and enhancing walking and bicycling activities, but also ensuring a good public transport network of buses and railways (Chapman, 2007).

1.4.1 Transport sector emissions

Analysing the GHGs emissions by sector at the global and European level helps us having a complete overview of the phenomenon. It is clear that both in the EU-28 and internationally the transport contributes for about the 25% to the total GHGs emissions, with a value of 26.64% in EU and 24% in the world in 2017. Especially in EU-28 there is the evidence of a consistent increase of relevance of the transport sector over the total emissions, because in 1990 it was covering the 15.08% and in 27 years there has been a growth of the 11%.

Thus, it is also true that GHGs emission in European Union have a different pattern from the worldwide ones: GHGs are remaining constant, with a soft decrease, instead at a global level there is a steady increase. The other sector that had a small increase from 1990 to 2017 is agriculture, according to IEA data, all the three other sectors (industrial processes, waste management and fuel combustion) have a lower impact in 2017 than in 1990.

Figure 1.18. Global percentage of GHGs emissions by sector in 2017.
Author's own elaboration bases on IEA data (<https://www.iea.org/statistics/co2emissions/>)

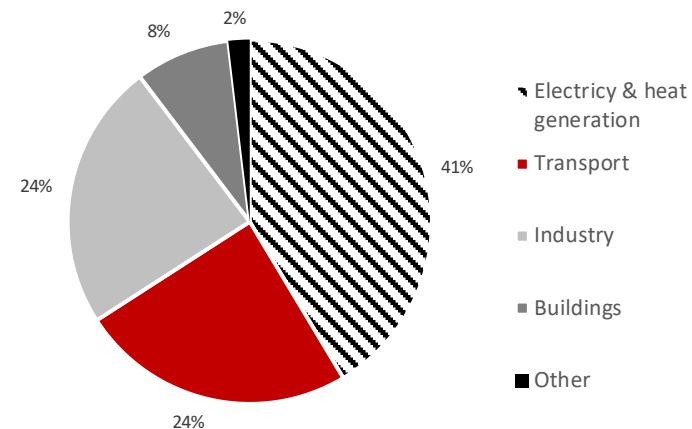


Figure 1.19. EU percentage of GHGs emissions by sector in 1990.
Author's own elaboration bases on EEA data.

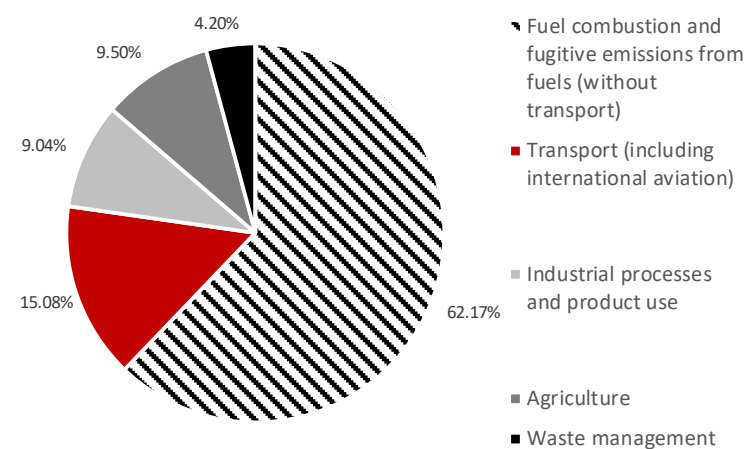
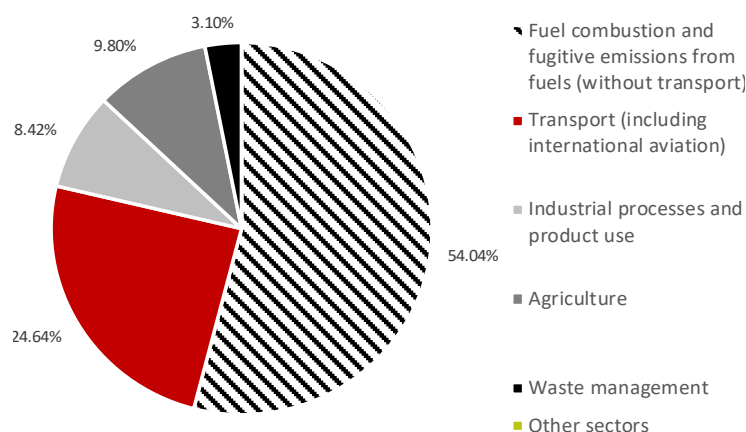


Figure 1.20. EU percentage of GHGs emissions by sector in 2017.
Author's own elaboration bases on EEA data.



1.5 THE INTEGRATION BETWEEN TRANSPORT AND LAND USE

As analysed in the previous paragraphs, transport and urban development are central topics in order to achieve sustainable development, because of their huge negative impacts in the case in which a proper planning activity is missing.

Urban areas are interested by constraints due to the increasing migration of people in cities and the constant depopulation of rural areas, this evidence is critical especially in situations where the spatial planning activity only focuses on fitting demand and offer of housing, changing land-uses and without integrating it in effective ways to transport planning. Urban sprawl phenomenon has led to a high diffusion of private low-density, high-flexibility and high-speed transport modes (Curtis, Renne, & Bertolini, 2009) that are unsustainable from many points of view. The importance of and integrated and trans-scalar spatial planning activity has been recognized by many official documents, from UN or EU, but it is important the open reference to this need by the ECMT¹⁰ of 2001:

"Sustainability requires that policy-making for urban travel be viewed in a holistic sense: that planning for transport, land-use and the environment no longer be undertaken in isolation one from the other" (ECMT, 2002, p. 33).

However, integration has been used as synonyms for different concept which have to be clearly diversified from it:

- *Policy co-operation* only implies the dialogue and information;
- *Policy co-ordination* is based on policy coherence and consistency, additionally to transparency in order to avoid conflicts;
- *Policy integration* is based on dialogue, information, transparency, but also joint working to create synergies between policies and use the same goals (Stead & Geerlings, 2005).

The integration should be trans-scalar (within institutions of different levels), inter-sectoral (between different sectors), inter-territorial (between neighbouring authorities) and intra-sectoral (within different sections of the same sector) (Geerlings & Stead, 2003).

This expected integration is needed in a view of sustainable development, but is even emphasised by the advent of the climate change phenomenon that is highlighting the lack in the current way spatial planning policies are projected and implemented. Actually,

¹⁰ European Conference of Ministers of Transport.

¹¹ The UN definition for mitigation is the ensemble of “efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behaviour” (UNEP, 2019).

¹² The adaptation to CC is a response to adapt to the effects of climate change, it is necessary because mitigation is not enough anymore.

urban areas are the ones more likely to be affected by the occurrence of extreme climatic events and by the global warming phenomenon; spatial policies have to face it through mitigation¹¹ and adaptation¹² measures.

Changing the way urban area are projected could help in avoiding extreme events like floods or UHI, but changing the spatial pattern on which they are organised could be effective in limiting emissions and mitigating the global warming phenomenon.

1.5.1 History of studies on interaction between land-uses and transport

The relation between the land-use and traffic has started being analysed since the ‘50s with the studies provided by Mitchell and Rapkin; they were the first assuming that traffic is a function of land-use, distribution and characteristics of human settlements and they also underlined that planners should consider both the two aspects in their work (Mitchell & Rapkin, 1954). Among the American literature of the ‘50s and the ‘60s the recognition of the fact that trip and location decisions both co-determine each other brought to the theorisation of the so called “land-use transport feedback cycle”, also thanks to the New Urbanism that had its focus on anti-sprawl objectives. The cycle was made by a set of relationships, but it was represented for the first time in the ‘90s by the professor Michael Wegener (see Figure 1.21):

- “The distribution of land-uses over the area determines the locations of human activities;
- The distribution of human activities requires spatial interactions, trips, in the transport system to overcome the distance between locations and activities;
- The distribution of infrastructure in the transport system creates opportunities for spatial interactions and can be measured as accessibility;
- The distribution of accessibility co-determines location decision and changes the land-use system” (Wegener & Furst, 2004, p. 5).

The cycle could also follow different phases:

- The construction of urban settlements and distribution of land-uses;
- The locations decisions of private, in relation to the distribution of land-uses;

- The trips from and to settlements in order to perform different activities;
- The choices about the mode, destination, route and trip are made in relation to the car ownership;
- The links between loads determines accessibility;
- The accessibility determines the location decisions of investors (Vitale Brovarone, 2010)

Another relevant study in the field of interaction between transport and land use was made by John Brotchie in 1984: he developed the “Brotchie Triangle” (see Figure 1.22) that represents possible interactions and spatial structures, associating the dispersion of location (horizontal axe) and the spatial interaction (vertical axe). The scheme highlights three spatial configurations:

- the monocentric city (A) with a radial network, where all the workplaces are in the middle;
- the polycentric city interconnected (B), where people are deciding where to live independently from their workplace;
- the polycentric city not interconnected (C), where people are living where they work and all the trips could be done by feet or bike (Vitale Brovarone, 2010).

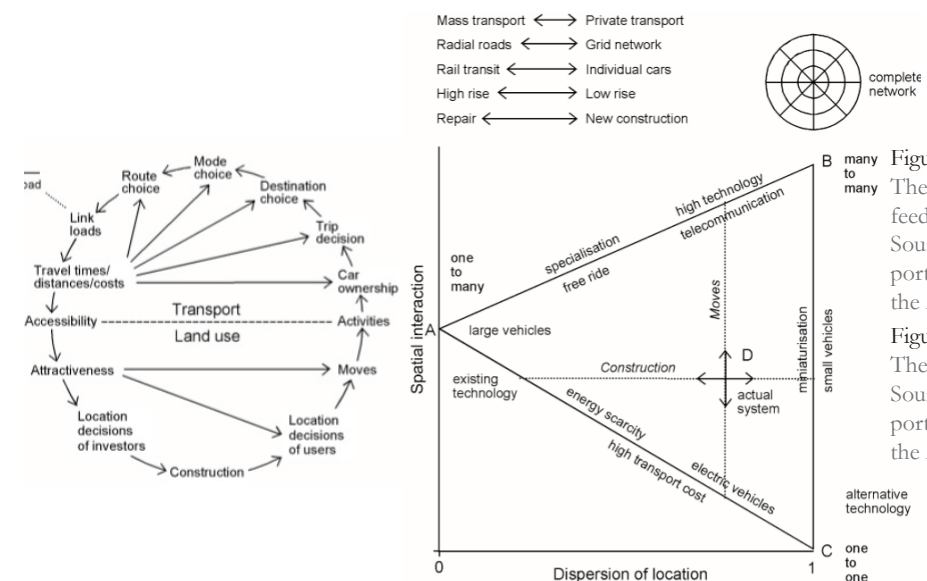


Figure 1.21 (on the left). The “land-use transport feedback cycle”. Source: “Land-use transport interaction: State of the Art”, 2004, p.6.

Figure 1.22 (on the right). The “Brotchie Triangle”. Source: “Land-use transport interaction: State of the Art”, 2004, p.10.

Other important theoretical contributes have been given by the “Dutch school” (Kees Maat, Henk Meurs, Dominic Stead, Bert van Wee), which started treating the topic focusing on the individual and his travel behaviours, postulating that travel is a derived demand from the need to reach location where the activities are performed. This approach is also called activity-based, because it assumes that *“people do not separate decisions considering only trips, but they try to schedule activities in a daily pattern”* (Maat, van Wee, & Stead, 2005, p. 38), instead in utility-based theories on travel demand *“individuals are assumed to make choices in which they maximise the utility they obtain by participating in an activity”* (Maat, van Wee, & Stead, 2005, p. 37).

For Mokhtarian, Salomon and Redmond the travel is not a derived demand, but a utility generator, where utility is composed by:

- The utility of the activity conducted at the destination;
- The utility of the activities that could be made during the travel;
- The activating of traveling itself (pleasure of travel) (Mokhtarian & Salomon, 2001).

Also, they differentiate the utilitarian travel from the undirected travel. Finally, the studies of Peter Naess are unifying the individual choices with the role of the urban structure on determining travel:

“By creating proximity as well as distance between activities, and by facilitating various modes of travelling, the urban structure makes up a set of incentives facilitating some kinds of travel behaviour and discouraging other types of travel behaviour. However, it is people who travel, not buildings or geographical distributions of urban functions” (Naess & Jensen, 2002, p. 299).

Relations between the urban space generation and transport have been discussed a lot in the past, but now the attention is focusing on which are the key element to have a real integration between sectoral policies and plans.

1.5.2 The need for an integrated strategy: Transit-Oriented Development

The interaction between land-uses and transport is clear and it is also clear that many congestion problems are linked to a not correct interpretation of the relation between mobility and the location of activities among the city (Riganti, 2008). Strategies that implement

and integrated planning between land-use and transportation are deeply required and one of the most relevant ones is Transit Oriented Development (TOD).

TOD is a strategy that could effectively integrate new spatial planning patterns that should reduce the private transport modes, and consequently emissions with and enhancement of walking, cycling and public transport, but also promoting dense and diverse urban areas, in contrast with the urban sprawl phenomenon.

It should be regulated by strong strategic policies at different levels of government, from regional to local, in order to have a general view on the activity location among the region and how public transport system should make them accessible.

TOD could provide also a sustainable urban development pattern and reduce many issues related to private transportation mode emissions.

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02

TRANSIT-ORIENTED DEVELOPMENT

2.1 THEORETICAL BACKGROUND OF THE TOD STRATEGY

In the previous chapter, the need for a more integrated land-use and transport planning has been analysed, looking the sustainability principle and the advent of worldwide challenges like the Climate Change and global warming. Thus, there has to be a significant change in the way spatial planning is led, because it could worsen, but also solve many problems; as underlined by Peter Calthorpe in one of his books, the responsibilities of bad urban planning practice in the current critical unsustainable situations of urban areas, but also emphasizes the need to act through the instruments of spatial planning to solve the issues (Calthorpe, 2011).

Transit-Oriented Development, or TOD, is the name that defines a spatial planning strategy that is focused on the integration between the land-use and transport planning and has the willingness to concentrate urban development areas around stations in order to create *dense, diverse and well-designed* areas that could allow the use of public transportation systems and encourage cycling and walking activities. Nowadays TOD strategies focuses on the possibility to enhance accessibility, sustainability and create a sense of “urbanity” that is not possible to be found in sprawled residential areas (Curtis, Renne, & Bertolini, 2009). The TOD has been firstly comprehensively theorized by Peter Calthorpe in 1993 in his book “The Next American metropolis: Ecology, community and the American dream”, but it mainly reviewed an hold concept that was already existing in the European tradition of planning since the XIX Century (Carlton, 2007); in his book, Calthorpe defines TOD as:

“moderate and high-density housing, along with complementary public uses, jobs, retail, and services [...] concentrated in mixed-use developments at strategic points along the regional transit system” (Calthorpe, 1993, p. 41).

In the following paragraphs, the theoretical and practical evolution of TOD policies is going to be analysed in relations to new urban theories and to the need of changing the actual development patterns. In particular, the spreading of residential suburbs, whose accessibility is strongly dependent on private car use, has highlighted that it is not possible to keep on designing part of cities with mono-functional vocation (e.g. residential) and mono-modal transportation (e.g. private car).

¹ Ebenezer Howard (1850-1928) was an English urban planner, founder of the “Garden Cities” movement.

2.1.1 The Howard’s “Garden Cities” and the first TOD experiences in Europe

The first theory that clearly stands behind the development of the TOD, as a strategy, is the Ebenezer Howard’s¹ “garden cities” one, that was firstly presented in his masterpiece “*To-Morrow: A peaceful path to Real Reform*” in 1868 and then revised in the late “*Garden Cities of To-Morrow*” in 1902. At the time in England, many changes occurred in society after the Industrial Revolution, as people living in residential suburbs in unhealthy and depriving conditions and the increasing number of people coming to cities in search of jobs was leading the situation to get worse. Howard understood that the relation between the Town and the Country was becoming more and more conflictual, because people were preferring living near the workplace, achieving higher social possibilities, even without the benefits of living in greener, healthier places, leaving the countryside that seemed to offer less opportunities. He divided in “*three magnets*” the potential attractors for people, the Town, the Country and the Town-Country and identified the elements that attracted people to each one of them:

- the Town attracts people because it represents the opportunity of high wages and work, social interactions and amusement, but has the lack of open and green areas, of natural beauty and so on;
- the Country, instead, represents the natural environment and beauty, the fresh air, but it has long distances from the city, low-wages, less social opportunities and no amusement occasions;
- the Town-Country magnet represents a mix of the two realities. In the Town-Country magnet, there was the utopian idea for a new typology of urban development, called “Garden Cities”, situated outside the borders of the dense city, in the countryside. Although, they had to be quickly reachable from the city centre through an efficient transport system for people who had to commute to workplaces, but also must provide new jobs for people integrating the productive function in the area. There had to be services for the inhabitants and low-density residential area, that were totally different from the residential dwellings in the big city.

The surrounding rural environment should provide benefits to the

inhabitants that would have the advantages of a city in the context of the countryside. The main characteristics of the garden cities were (Planning Tank, 2019):

- Limited town size, with a maximum of 30.000 inhabitants and a density of 12 families per acre;
- The presence of a large park having public building;
- Presence of services and industries;
- Amenities, like small private gardens or public areas with specific purposes (Howard, 1869, 1902).

It is also relevant to underline that the importance of the green areas in urban context and the link between the community and the ecological dimension were also analysed, at the beginning of the XX Century by Patrick Geddes², that expressed this interest in the conceptualisation of the “green belts” and their importance as boundaries for the urban expansion (Buxton & Goodman, 2004). The principles were experimented with the creation of Letchworth city, by Raymond Unwin and Barry Parker in 1903. The garden city is situated 50 kilometres away from London, and it was the first practical example of the Howard’s principles in reality and was though as a solution for the congestion problem of the capital city, with a decentralisation of industries and population (Clapson, 2016).

² Patrick Geddes (1854-1932) was a Scottish sociologist, biologist and town-planner, mainly known for its contribute to the usage of the “survey” technique in urban studies and for the conceptualisation of the “green belts”, now a key principle for planning in the UK and Ireland (Geddes, 1915). Figure 2.1. The “Three Magnets” according to Ebenezer Howard. Source: Howard, 1902, p. 17.

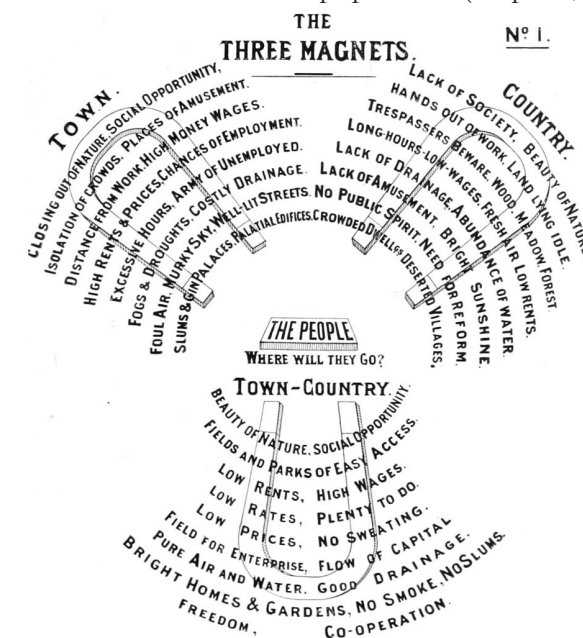
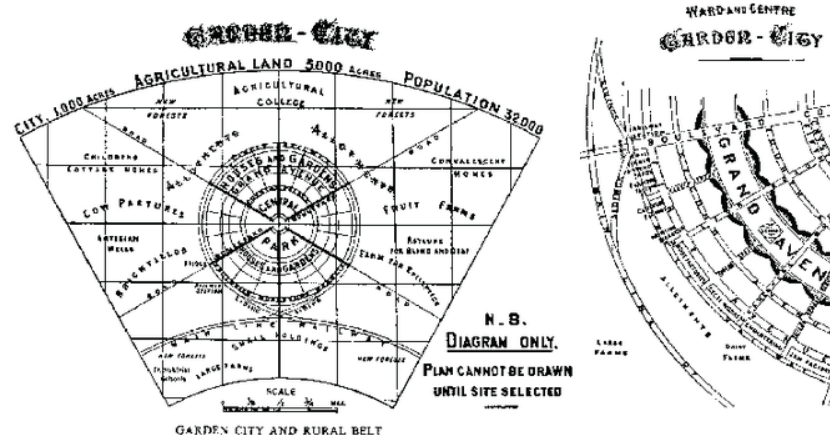


Figure 2.2. The Garden City Principle in a representative diagram.
Source: Choay, 1969, p. 77.



Another example of garden city was Welwyn, situated in the Hertfordshire county in England, which construction was started by Howard in 1920, a city connected by a railway line and bus lined to the surroundings (Choay, 1969) (WGC Heritage Trust, 2008).

After the WWII, the principles of Howardian “garden cities” were integrated in the “new town” concept, firstly used in the United Kingdom, and then in many other nations, to reduce the congestion due to expansion of cities in even bigger suburbs, thanks to the spreading of private cars as main transport mode. There are two main plans, developed for the Danish and the UK Capitals, that at the middle of the ‘900 have really implemented the new towns principles but also represent great examples of the European advance in creating *ante-litteram* TOD policies: the Greater London Plan of 1947, designed by Patrick Abercrombie³, and the Copenhagen “Finger Plan” of 1947, designed by Peter Bredsdorff⁴. Both the plans have a regional strategic vision, based on the need of creating a decentralization from the capital, keeping the new development areas highly connected with the city centre. Especially the so called “Finger Plan” is a TOD based on the suburban railway lines systems, being the backbone for new development (Knowles, 2012). The European attention to the integration between transport and land-use planning is historically established, but also the awareness of the need to put a limit in city expansion, as in the case of Vienna where the “green belt area”, known as the “ring”, that was created since the late XIX Century (Breiling & Ruland, 2016).

³ Patrick Abercrombie (1879-1957) was an English architect and town planner.

⁴ Peter Bredsdorff (1913-1981) was a Danish architect and town planner.

There are almost two main characteristics of Garden Cities that are still present in modern TOD:

- Connection with the main city through railway lines;
- Creation of neighbourhoods with services, housing and job opportunities.

2.1.2 Paradigms of urban planning and evolution of TOD

Even though, the late conceptualisation of TOD came from the US, so it is important to understand when the change in the American way of see planning occurred. Mainly from the end of the XX Century, the evidence of the unsustainability of the current development models started to be evident. In the United States, the high availability of empty spaces and the diffusion of the private cars led to an even more extreme case of suburban sprawl with a very dense street network than the European one, that was mentioned in the *New York Times* in 1948 (Chang, 2006). Only few metropolitan areas (e.g. New York and San Francisco) have been capable of keep low vehicle travel and emission, thanks to their street network that were set up before the advent of the private car (Barrington-Leigh & Millard-Ball, 2015). Jane Jacobs⁵ in her “*The Death and Life of Great American Cities*” of 1961 underlined problems arisen from the quite Modernist⁶ simplification of the way city were planned in US, with mono-functional zones with specific vocation, leading to the “inert city” type, in opposition to the “vital city”. She also criticized the way of thinking and analysing the city in planning theories of her times, that were only focused on two factors: quantity of housing and number of jobs. That way of planning, based on uses separation, promoted segregation, formation of degraded residential slums and other urban issues (Jacobs, 1961). She mainly did a critique of the low-density and car-dependent development that American Cities were showing, instead Jacobs promoted an idea of city with high-density, mixed uses, social diversity that should make the city vibrant (Knox & Pinch, 2010).

From the theoretical reflections of Jacobs, we could find three elements that are incorporated in TOD principles:

- Mixed uses;
- High density;
- Short blocks (providing walkable area).

⁵ Jane Jacobs (1916-2006) was an American-born Canadian writer and urbanologist (Britannica, n.d.).

⁶ Modernism in architecture was a movement founded by Mies van der Rohe and Le Corbusier, based on essential functional concerns. In urban planning, the movement influenced the practices with the use separation in the city (Britannica, 2019).

In US, the problems that will lead to the TOD theory began in the ‘70s, when there started being a sharing of the urban problems underlined by Jacobs and other authors, but also thanks to the crisis linked to high oil dependence and the rise of environmental movement.

There was a theoretical shift from the “Development-Oriented Transit” of the early ‘900, when transport was only an “enabler” for urban development and spontaneous small commercial activities arose near the stops, to the “Transit-Related Development” of the ‘70s when the transit agencies in US found out the possibility to lease their land to generate revenue (Carlton, 2007) (Braswell, 2013). Actually, there are a main distinction to do in urban development concerning transit:

- Transit-Adjacent Development (TAD), when railway stations are placed near suburban area, with low-density and the dominance of the parking surface for cars, without pedestrian/cyclable access and separated land-uses;
- Transit-Oriented Development (TOD) with high densities, mixed uses, high accessibility for pedestrians and cyclists (Renne, 2009).

Many of the current experiences of TOD, could easily end up with a TAD project, without achieving the real characteristics objectives.

Table 2.1. Different characteristics between TOD and TAD.
Author’s own elaboration based on Renne, 2009.

Characteristics	
TOD	TAD
Grid street pattern	Suburban street pattern
High density	Low density
High accessibility for pedestrians/cyclists	Limited accessibility for pedestrians/cyclists
Mixed land-uses	Segregated land-uses
Structured parkings	Surface parkings

2.1.3 TOD and New Urbanism

Since the ‘60s, many problems related to spatial planning arose and planners started theorizing new principles for face those issues. These new theoretical movements proposed a strong antithesis to the unsustainable previous models which guided a spatial development that resulted in urban sprawl, social separation and environmental deterioration, defines as “anti-urban practices” (Congress for the New Urbanism, n.d.). Specifically, urban sprawl is the main

concern in the literature of new urbanists, because of its strong presence in the US development patterns; it is considered the main cause of many social and environmental issues and it is characterized by five elements:

- Housing subdivision and villages with single-house dwelling only affordable by rich people;
- Shopping centres, or retailing areas exclusively used for shopping;
- Office parks and business parks;
- Civic institutions centres;
- Roadways (Duany, Plater-Zyberk, & Speck, 2000).

The main movement is the New Urbanism, born in 1993 with the first “Congress for the New Urbanism” (CNU) held in Alexandria (VA) and also Peter Calthorpe, the theorist of TOD is part of the group of architects and planners proposing this new paradigm. The CNU movement followed the example of the previous international congress, the *Congr s Internationaux d’Architecture Moderne*⁷, also known as CIAM, but eradicating the single architect influence on the association work and promoting a multi-disciplinary specialists’ interaction (Dutton, 2000).

New urbanists try to give multi-dimensional expression of planning, sensitive to the scale at which they operate, from regional to local, reversing the effects of disorganized capitalism that brought urban areas to be stocks of production, consumption and residences (Talen, 2005).

The result of the congress was the “*Charter of the New Urbanism*” that defines the different scales of spatial planning and their principles:

- the regional scale of planning has to take under consideration the definitions of metropolis, city and town. The new development areas must be continuous with the already existing urban areas, respecting the historical boundaries and patterns, conserving the environmental resources. The regional organisation has to be supported by a transportation system that should maximize accessibility. Revenues and resources have to be shared by municipalities without competition;
- the neighbourhood should be planned with mixed-use and high accessibility even for people not driving, high densities in build-

7 *Congr s Internationaux d’Architecture Moderne* or CIAM was an association created in 1928 by Le Corbusier, that reunited a group of architects appertaining to the ideas of Modernism. The main result of the association work was the “*Athens Charter*”, which defined the modernist approach to urban issues (Ben).

ings, services for inhabitants and parks distributed through the neighbourhood;

- the block, the street and the building scale have to be planned according to safety and security principles for pedestrians and cyclists, but also accommodating automobiles. The urban design also has to provide a sense of identity to inhabitants and preserve historical buildings. Even the energy supply should be managed to be resource-efficient (Congress for the New Urbanism, 1996).

Making a resume, the CNU view on spatial planning is based on:

- Walk Ability;
- Connectivity;
- Mixed Use & Diversity;
- Mixed Housing;
- Quality of architecture and urban design;
- Traditional neighbourhood structure;
- Trans-sectoral planning;
- Increasing density;
- Smart transportation;
- Sustainability;
- Quality of life (Rahanama, Roshani, Hassani, & Hossienpour, 2012) (CNU & HUD, 2000).

Obviously, even if it is born in the US, the New Urbanism Movement promotes a spatial development that could fit the situation of many geographical areas around the World, because many places have experimented a not-organised growth since the Industrial Revolution and the WWII.

It is evident that has inside many principles common to TOD strategies, due to the fact that there was a common shared vision of what was the proper way to rethink urban planning, but TOD has its core in the presence of a public transportation transport, usually a railway station, not always present in the model proposed by the CNU.

One of the milestones in the movement is the Traditional Neighbourhood Development, that has many common characteristics with the TOD area, in terms of urban design, density and functions; TND is clearly inspired to the neighbourhood organisation common in historical towns in Europe, but also the American units

of the '20s with a street grid that allows pedestrian accessibility and high-density dwellings (Duany, Plater-Zyberk, & CO., 2014).

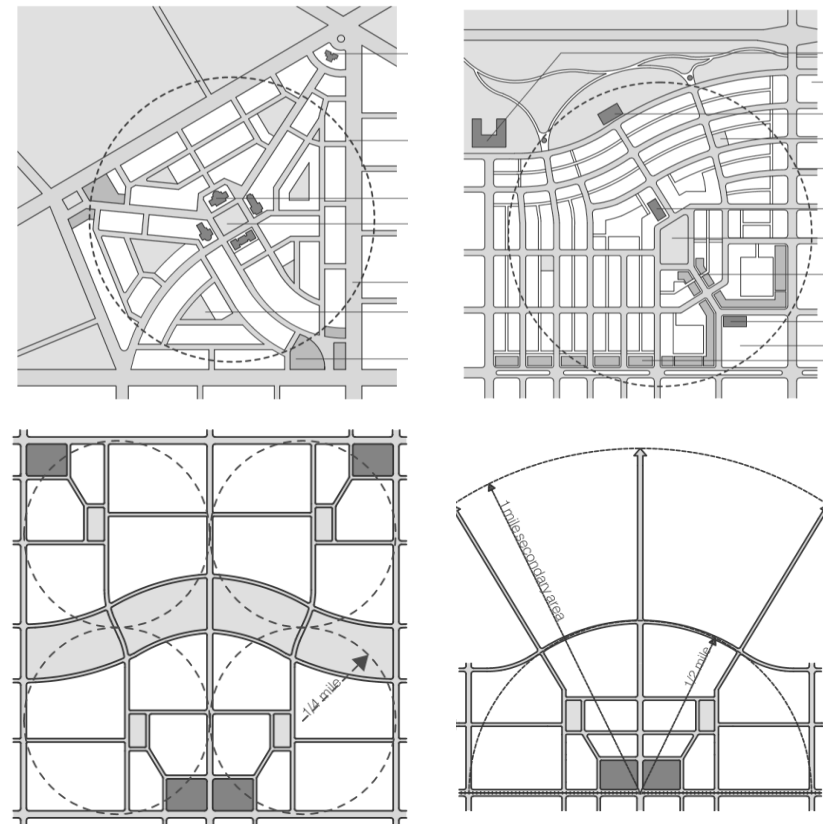


Figure 2.3. Comparison between a neighbourhood unit in 1927 and a TND in 1997. Source: "The Lexicon of New Urbanism", 2014, p.17.

Figure 2.4 (on the left). TND pattern. Source: "The Lexicon of New Urbanism", 2014, p.18.

Figure 2.5 (on the right). TOD pattern. Source: "The Lexicon of New Urbanism", 2014, p.18.

One of the last updating in the field of the Transit-Oriented Development strategies is their possible "marriage" with the Green Urbanism principles (Cervero & Sullivan, 2011), that want to minimize the use of energy, water and materials at every stage of the city/district's life-cycle (Lehmann, 2010).

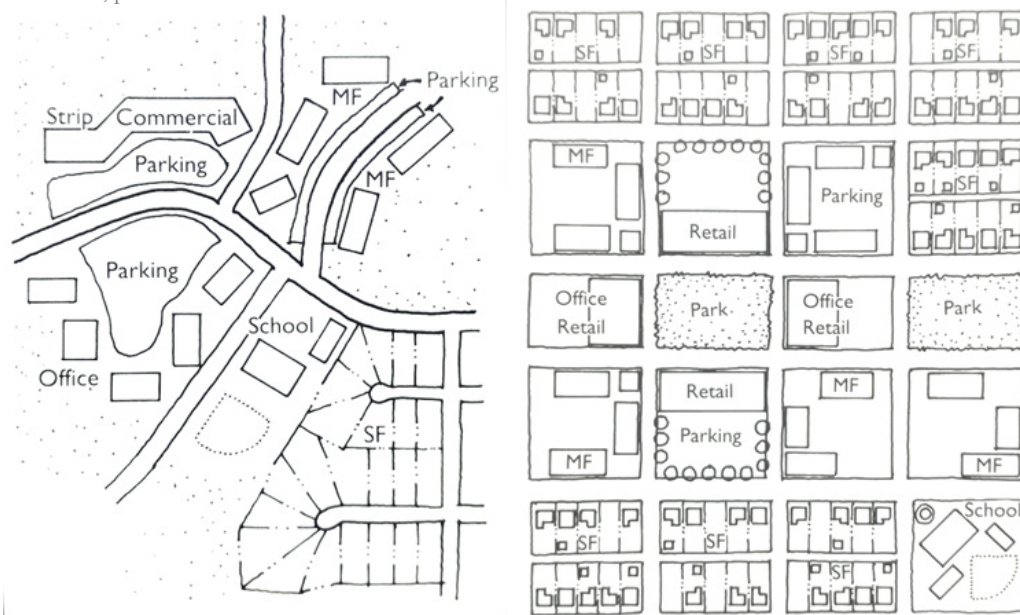
It is important to underline that the TOD Model proposed by the CNU is strongly related to the local dimension and to the design of the urban area surrounding the public transport core station, but all the specific projects are usually contextualised in the framework of a regional strategic vision and not only in a single-station development.

2.2 MAIN PRINCIPLES OF TOD

Transit-Oriented Development, as a possible response to the present issues in sustainable urban development, should be effective in relating to the seven key issues of transport and to the three land-use and development factors:

- Congestion;
- Increasing air pollution;
- Traffic noise;
- Road safety;
- Degradation of urban landscape;
- Use of space by traffic;
- Global warming;
- Decentralisation of cities from the city centre to the surrounding areas with development pattern that are too dispersed to be served by an efficient public transport system;
- Development pressure, for the real estate interests in building social exclusive, expensive residential areas, not affordable and accessible by everyone;
- Globalization and relocation of industries (Banister, 2000).

Figure 2.6. The conventional suburban development (left) and the TOD development (right).
Source: "The Next American metropolis: Ecology, community and the American dream", 1993, p. 49.



Transit-Oriented Development could be a response to all these issues, integrating land-use and transport, in order to create accessible, livable, walkable, cyclable, with mixed-uses urban areas and with a great mix of people appertaining to different social background, promoting a sustainable urban development in social, economic and environmental way.

The creation of the TOD concept was developed by Peter Calthorpe in 1993 with "*The Next American metropolis: Ecology, community and the American dream*", but he already started elaborating his idea of new form of development in the previous book "*The Pedestrian Pocket Book*" in which he firstly introduced the pedestrian dimension in the planning of an area, according to the fact that $\frac{1}{4}$ miles is an optimal walking distance and all the neighbourhood should develop in this radius (Calthorpe, Kelbaugh, & al., 1989). The principles of Transit-Oriented Development are the core of the strategy and allow to promote alternative way of transport, but also a formula for affordable communities and they could be resumed in seven key points:

- A regional level organised strategy that have to ensure a compact and transit-supportive development;
- A local street network that has to be cyclists and pedestrian friendly;
- Mixed-uses in the area, as commercial, residential, civic, leisure (e.g. parks), and jobs;
- High densities that also have to be variable according to the distance from the station;
- High quality open space, that could preserve the habitat;
- Public spaces as the centre of the neighbourhood activities;
- Redevelopment and filling of low-density areas along the transit corridor (Calthorpe, 1993).

The need of an integration between transport and land-use planning could not only occur at the local scale on which many of the New Urbanism theories and consequently TOD are mainly focused on, but it important that there is a political will to create regional policies with long-term visions in order to achieve an effective integration between planning sectors and avoiding inter-municipal competition (Calthorpe, 1993) (Hikichi, 2003) (Wheeler, 2013).

The necessity for upper-local planning policies is additionally linked

to the need of creating an effective network between the transit and circulation networks.

Figure 2.7. TOD scheme.
Source: Calthorpe, 1993,
p. 56.

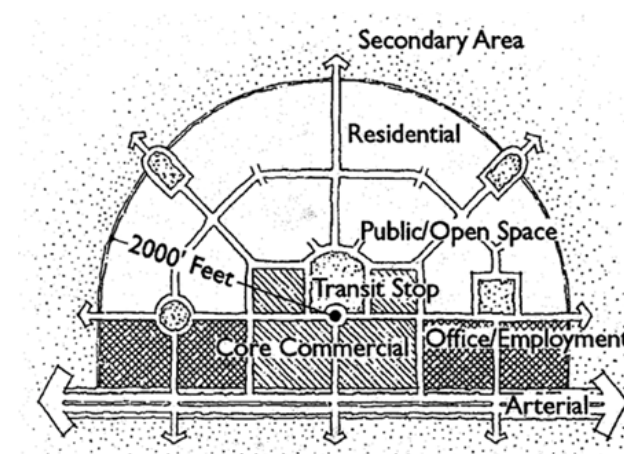
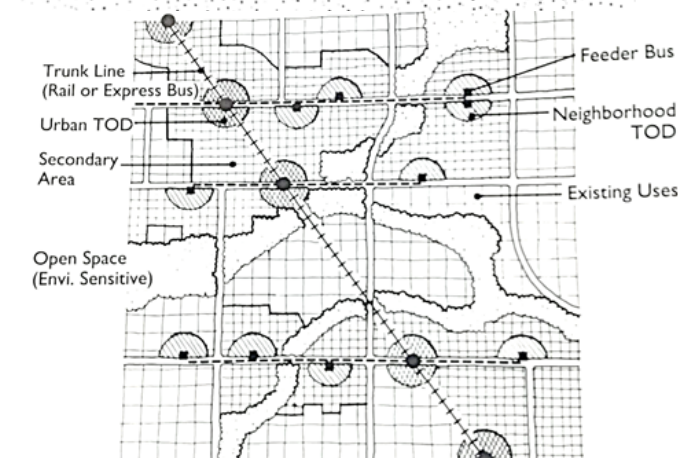


Figure 2.8. Transit and circulation.
Source: Calthorpe, 1993,
p. 62.



In recent years, an important model related to TOD has been developed by Bertolini and Spit, it is known as “*node-place*” model. It was created as a method to examine the relation of multi-modal transportation hubs and land-uses; basically, it resumes the fact that a station in a TOD strategy has to become a “*node*” of transport and non-transport networks, but also a “*place*” inhabited temporarily and permanently with dense and diverse uses (Curtis, Renne, & Bertolini, 2009). This method of analysis could lead to understand if the node-values and place-values are balanced and, if not, it is important to govern the phenomena in order to provide stability (Hynnen, 2005).

2.2.1 The “D” variables approach and its evolution

The original principles of TOD theorised by Calthorpe have been further elaborated and systematized by other theorists; in this paragraph the approach of the “3Ds”, Design, Diversity and Design, firstly used by Robert Cervero and Kara Kockelman is going to be analysed. The authors introduced the 3Ds approach as a way to relating the travel demand to specific dimensions of the built environment and to be effective a TOD strategy should have:

- Quality Design to increase accessibility and sustainable mobility;
- High Diversity to decrease automobile users;
- High Density to increase transit users (Li & Lai, 2009).

Firstly, the *Design* variable is the one generally related to the physical, morphological composition of the streets in the analysed area (usually defined as the maximum area reachable by walking 10 minutes from the main railway/bus station):

- Characteristics of the streets that are linked to the accessibility of the area for pedestrians and cyclists that should have the chance of changing their itinerary more frequently than car-users, as the incidence of four-way intersection;
- Pedestrian and cycling paths provision, that could be analysed by the proportion of blocks in the area with sidewalks, planting strips, overhead lights, flat terrain and quadrilateral shape;
- Site design that is characterised by blocks face length, sidewalks width, distance between lights and proportion of parking available for commercial areas.

The *Diversity* variable is mainly linked to the level of mixed-use provided in the area, basically to understand if commercial, service and recreational activities are directly accessible for residents or are creating separated uses. Entropy measures of diversity could be used with high values pointing out a good mix and low values a single-use area, but also the following elements should be analysed to evaluate it:

- Percentage of retailing activities per acre;
- Percentage of activity centres per acre;
- Percentage of parks and recreational sites;
- Proportion of the commercial-retail parcels;
- Proportion of residential acres within the convenience distance

from the retail store.

The *Density* variable is the one mostly related to the resident population and workers that utilize the area and how it is accessible for them. It is always measured in the number of given value per given unit, analysing:

- Population density per developed acre;
- Employment density per developed acre;
- Accessibility through an index that defines the possibility to reach all the working places (by car) and all the sales and services activities (by feet or bike) (Cervero & Kockelman, 1997).

This approach had an evolution in the studies of Robert Cervero and Reid Ewing adding 3 more Ds to the existing ones, even if some aspects are overlapping:

- *Destination accessibility* measures the possibility to easily access to the trip attraction;
- *Distance to transit* measures the shortest routes to the nearest railway station or bus stop from residences or workplaces;
- *Demand management* related to the parking supply and cost in TOD areas (Ewing & Cervero, 2010)

Definitively, the creation of a built environment ensuring the maximum possible values for the the six variables previously described is fundamental in achieving goals in reduction of GHGs and in general to provide an effective TOD.

2.2.2 Tools

Transit-Oriented Development requires an integration between the tools providing land-use planning and the ones related to transport planning in order to coordinate the transit centres and building centres development.

Traditional planning tools like land-use plans or sectoral transport plans could not provide a comprehensive framework, if produced and implemented by themselves; instead, strategic integrated planning tools are necessary. In general, Strategic Planning could be defined as:

“A socio-spatial process through which a range of people in diverse institutional relations and positions come together to design plan-making processes and develop contents and strategies for the management of spatial change; an opportunity for constructing

new ideas and processes that can carry them forward; collective effort to re-imagine the city, urban region or region and to translate the outcome into priorities for an area investment, conservation measures, strategic infrastructure investments and principles of land-use regulation.” (Albrechts, 2017, p. 5).

According to Newman, an effective strategic planning procedure and process for TOD should be developed through four policy tools:

- A strategic policy framework that assets where centres need to occur and at what kind of density and mix;
- A strategic policy framework that link centres with a rapid transit base, almost invariably electric rail;
- A statutory planning base that requires development to occur at the necessary density and design in each centre, preferably facilitated by a specialized development agency;
- A public-private funding mechanism that enables the transit and the TOD to be built or refurbished through linkage between the transit and the centres will service (Newman, 2009, p. 13).

The strategic nature of the tools is appropriate because TODs policies are supposed to enhance the general wealth, reduce car dependence, save time and space, generate investments and create new city spaces suitable for different purposes.

		Planning tools		
Scale		Strategic policy framework	Statutory Planning	Funding mechanism
	Regional	x		x
	Local		x	x

Table 2.2. Planning tools and scale.
Author's own elaboration.

The planning tools are also expected to be developed at different scales: it is obvious that municipalities alone are not able to develop a TOD system for the following reasons:

- Competition between municipalities without a strategic regional framework could generate policies that use resources and revenues for the single benefit;
- Lack of resources (economical and human) at the local level for implementing such an inter-sectoral strategy;
- Municipalities have not always a public transportation network where it is always possible to implement TODs;

- The demand for transport generally it is not generated and satisfied at the local level.

Concluding, TOD implementation needs the generation of policy ideas, tools, relationships between actor and good practices to be effective; actors must keep cooperative and collaborative relationships in order to produce plans with long-term visions and multi-disciplinary teams. The site-specific tools and instruments are required to enable financial gains between different actors (public or private), but also a strong attention to the small-scale design has to be provided, in order to produce the expected cycling and walking friendly area (Thomas, et al., 2018).

2.2.3 Benefits and challenges of TOD

TODs strategies implementation has many benefits and challenges that have to be considered when defining the general strategy, but also the specific design. As anticipated in the previous paragraphs, the main benefit of transit-oriented development is that it could be an effective response to the current sustainability issues and it promotes urban sustainable development, avoiding or at least reducing urban sprawl, car-dependency, traffic-related problems and habitat degradation.

Not only the general issue on sustainability, but also Climate Change and GHGs emission trends could have in TODs a potential solution.

Looking only to the general principles of TOD, one of the main challenges concerns the international transferability of the principles, policies and tools, recently analysed in a paper by Thomas et al. in 2018: transit-oriented development is a strategy that could not be implemented in every region and, then, in every municipality in the same way. It is fundamental to deeply know the socio-economical, environmental issues of the place in which TOD is going to be implemented in order to define a suitable set of policies and local projects (Thomas, et al., 2018). For example, the high-density is considered one of the main characteristics for this kind of development, but certain densities are not acceptable in all the markets, in order to arise interest in private actors and potential inhabitants (Duany, Plater-Zyberk, & CO., 2014).

	BENEFITS	CHALLENGES
ENVIRONMENTAL	Lower GHGs emissions, because of the walkability and cyclability of the area make more convenient not using private transportation modes;	High densities requirements could lead to too impervious soils condition
	Reduction of urban sprawl and soil sealing	
	Habitat preservation	
	Creation of high-quality open spaces	
	Promoting use of renewable energy sources	
ECONOMIC	Creation of new jobs opportunity in the commercial activities	Local activities could be disadvantaged, and big commercial companies could have major opportunities in the area
	Creation of real estate values in underdeveloped areas	
	Creation of partnerships between public and private actors in order to implement the policy	
	Enhancing the use of public transportation systems, facilitating investments to get it better	
SOCIAL	Creation of a mixed-use area, that will make more livable the neighbourhood for people	Lower quality of life due to very compact urban development
	Improving quality of life (safer and healthier environment)	
	Creation of a "vital" neighbourhood with services and commercial activities for the population	
	Providing transportation possibilities for people having not the possibility to afford private vehicles	

Table 2.3. Benefits and challenges of TOD related to sustainability principles.
Author's own elaboration.

Another key issue is represented by the creation of a shared political and academic consensus around the effectiveness of TODs that is still considered a risky policy in many cases, especially when it concern the creation of totally new neighbourhoods in underdeveloped area (Renne, 2005). Institutions have strong barriers in implementing this strategy because in spatial planning the sectoral fragmentation is still very tricky to eradicate and cooperation and coordination between different levels or sectors is not easy achievable (Staricco & Vitale Brovarone, 2018).

Gentrification and displacement are other issues which TODs promoters have to face and avoid; even if TOD is considered a strategy that should provide many benefits to inhabitants, workers and commercial in the area, in many cases the new development opportunity arises many interests, especially when the TOD is supposed to oc-

cur in a developed urban area. The kind of design and the accessibility to a station usually provide an increase of property values, that can be economically unsustainable for the population that lives in the area, but also for local commercials. This should provoke a displacement of original inhabitants, the creation of a rich community and the advantage for big retail companies, instead of small local ones (Rayle, 2015).

Pojani and Stead also highlighted in 2018, how in many cases modern TODs focus more on urban aesthetics, leaving a little bit “behind” the other characteristics as accessibility, density, design and diversity (Pojani & Stead, 2018).

Even though the benefits of well-planned TODs are evident, it also relevant to understand that all the described challenges could be addresses if the TOD strategy has a good cooperation, coordination between actors and participation processes.

2.3 DIFFERENT APPROACHES TO TOD STRATEGY

Transit-oriented development has general principles and characteristics that should be followed if planners and policymakers want to implement this typology of strategy, but due the cultural differences of every context it had different shapes and approaches, according to the specific area. In particular, two main approaches to TODs have showed strong differences: the one generated in Europe since the half of the XX Century and the one that has been developed since the '80s in the US. Other differences in TODs could concern the density of the area or the planned system in which it is located.

2.3.1 TOD classification

Providing a general classification and characterisation of different ways in which TOD could be developed is an important element for a comprehensive framework of analysis. According to Pojani and Stead' studies, one way of differentiating TODs is accordingly to the context (urban or suburban), the dimension of the network (more railway/bus stations or a single) and the type of transit network (heavy rail transit or light rail transit/bus rapid transit):

- Single-node TOD is characterised by the presence of a single development project around a heavy railway station, usually developed in a circular pattern around the station in order to

better achieve accessibility (the radius ranges from 0.5 to 0.7 kilometres from the station). The location can be urban or suburban;

- Multi-nodes TOD is based on a regional network of nodes around railway stations, developed in circular or semi-circular pattern around the core, with specialization of each node in a specific activity in order to create complementary nodes and not competing ones;
- Corridor TOD is based on Light Rail Transit or Bus Rapid Transit in a urban location, with linear development patten along the transit line and it could be planned in already exiting area or for planned urban extensions (Pojani & Stead, 2018).

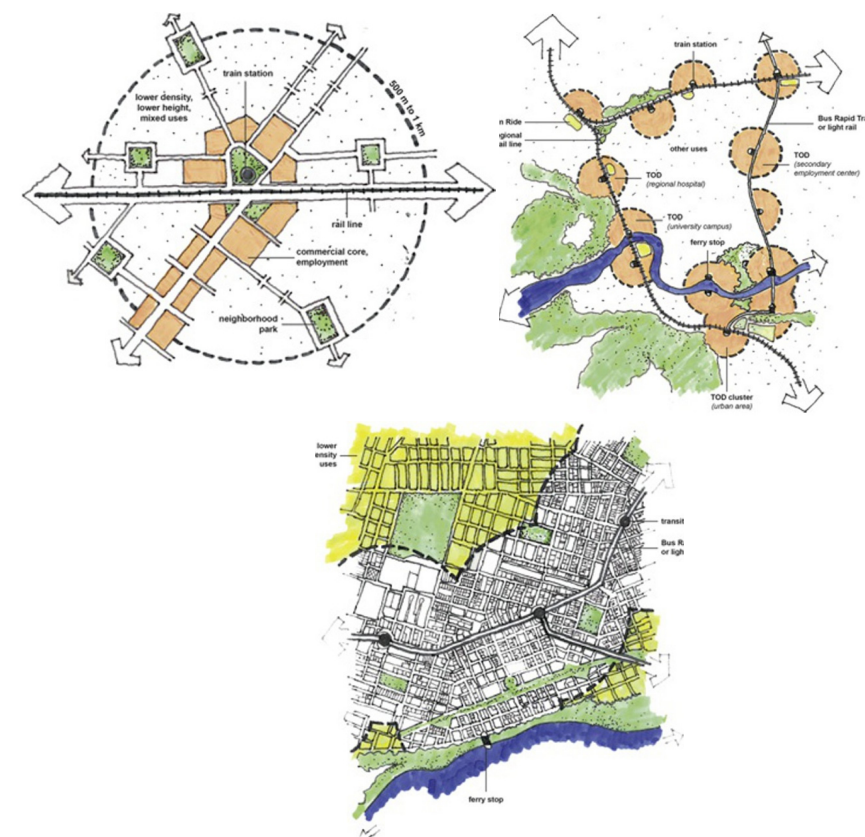


Figure 2.9. Single-node TOD (on top left), Multi-node TOD (on top right) and Corridor TOD (on bottom). Source: Pojani and Stead, 2018, p.95.

Another classification could be done basically looking to the purpose of the TOD policies or projects according to the typology of the are designated to it:

- Infilling TOD projects are thought to create higher densities around a transport node which already has a sort of development around, but it not fully exploited;
- Re-developing TOD projects are the ones which could be located in dismissed areas that have a potential because are located along transit lines;
- New TOD projects are developed in unused area, sometimes near suburban zones.

In the following paragraphs two anticipatory experiences are going to be analysed as models for the upcoming definition of TOD principles. The big differences between the European and American approach are not only related to the way the policy are implemented, but also in the institutions which propose it.

2.3.2 The Copenhagen “Finger Plan”: the “European” approach

In Europe a transit-oriented approach to urban development was adopted in different areas after the WWII, in order to face problems linked to uncontrolled urban developments, that were occurring in many cases after the Industrial Revolution.

One of the most relevant examples of this European tradition of planning is the Copenhagen “Finger Plan”, designed by Peter Bredsdorff in 1947. It was a regional plan for all the Copenhagen metropolitan area, not only for the town, even if the 1939 “Town Planning Act” did not speak about the creation of regional plan. The *Copenhagen Regional Planning Committee* was established in 1928 and started working in the Capital Region, that comprehended at that time thirty municipalities with quite various dimensions (Bredsdorff, 1948) and it was the first regional planning experience in Denmark.

When planners were assigned the task to create a development plan for the city, they understood that the pattern was already resembling like a hand, with the city’s core represented by the “palm”, with the medieval development of the city shifted from a small core to a 130.000 inhabitants in the XIX Century, and the five fingers represented by the existing railway lines (Organisation of World Heritage Cities, 2018) (Green Belt, 2019).

The plan had 10 key challenges to face: industrialisation, migration, mobility, health, energy, nature preservation, food, waste, drinking

water and global war and the objectives of the plan were:

- To control urban sprawl;
- To provide a sustainable growth;
- To preserve the natural spaces between the “fingers”;
- To enhance the potentials of the public transportation system (initially thought to be free) (Maternoski, 2013).

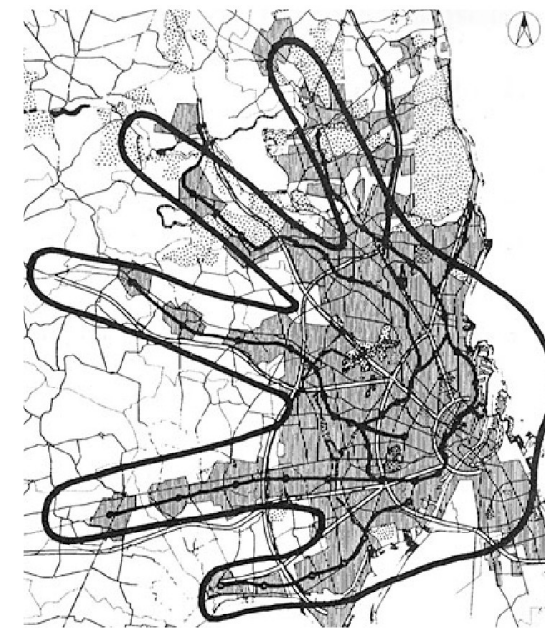


Figure 2.10. The general scheme of the “Copenhagen Finger Plan”. Source: Chiara La Ferlita (<https://www.chiaralaferlita.com/fullscreen-page/comp-ja-5j6xnh/>).

In general, the plan had a Transit-Oriented Development strategy because all the urban developments were supposed to happen along the railway lines and particular around the stations; also, a set of measures were developed in order to increase the quality of the public transportation system. The Plan was very effective and guided the urban development in the Capital Region for almost 60 years, avoiding an uncontrolled development of the city and creating a very recognizable image of the city, including:

- *“the presence of visible and overlapped historical layers;*
- *the relationship between land and water, characterized by the jagged coast line;*
- *the scale of the urban spaces and the green structure of the parks;*
- *the city’s skyline, where a mainly uniform building height establish a peculiar relation with the spires, domes and turrets interrupting it at some points.*

- *the high degree of land-use diversity and integration of living and working spaces in the citycentre*” (Organisation of World Heritage Cities, 2018, p. 4).

It represented the first Regional Plan in Denmark, but also one of the first experiences in Europe that proposed a transit-based model of development. It generated an example for all the following plans and set out the characteristics for the European approach to TOD:

- Regional Plan, with strong strategic vision is the main instrument to develop TOD;
- Multi-node TOD systems;
- Enhancing of the existing railway lines and station potentials;
- Local level of planning implementing the Regional Plan
- Urban design leading to inter-modal transport exchange.

2.3.3 The BART of San Francisco: the “American” approach

The “American” approach to transit-oriented development has some peculiar characteristics that are almost constant in the US experiences, since the first one, the Bay Area Rapid Transit of San Francisco.

Nowadays, BART and every form of transportation in San Francisco area are managed by the SFMTA (San Francisco Municipal Transportation Agency) and MUNI (Municipal Railway System); the railway metro system comprehends 48 station (19 surfaced, 14 elevated and 15 subway) and it covers a 121 miles distance (CNN, 2018).

The project was started in 1956 with the “Regional Rapid Transit” document, after the end of the WWII and had the aim of shaping the region growth along radial corridors and creating a multi-centred metropolitan form; a special Commission was created in 1951 to develop the project and it was composed by 26 members with representatives from each of the 9 counties of the area, that still compose the “Saint-Jose-San Francisco-Oakland” Combined Statistical Area (CSA) (San Francisco-Oakland-Hayward, Santa Rosa-Petaluma, San Jose-Sunnyvale-Santa Clara, Napa, Vallejo-Fairfield, Stockton-Lodi, Modesto, Merced, Santa Cruz-Watsonville) (BART, 2019a). At the time, the BART was not already developed, and it needed a great financial funding effort (the project total cost was almost \$1 billion) and was the first transit service planned at

the regional level in the US, but the high density of the city of San Francisco and the geography of the region created a favourable condition for the project (United States Congress, 1976). At the start of the activity of the BART in 1972, the system was mainly served by street car parkings near the stations in order to allow the inter-modal exchange between private automobiles and the railway. Thus, the BART authority decided to start implementing a new development strategy, TOD, near the stations through a leasing system of the area to private investors for determined periods of time. The decision was due to the low economical revenues from tickets that were covering only 1/3 of the investment needed for the metro, but it was also following the anti-sprawl movements that were arising in the US at the time.

BART was originally expected by planners to have a great influence on the development patterns of the Bay Area and also to impact the land uses, but it happened only where supportive conditions were present, as incentive zoning. By 1990, only 1557 hectares of vacant land were developed in new land-uses (41% residential, 21% commercial, 16% to public, 15% to industrial and 7% roads and parkings) and, even if TOD around BART stations seems to have contributed in creating a multi-centred region, it is mainly attracting residential investment, because commercial activities are more oriented locating in downtown or along freeways (Cervero R., 1997). This low level of influence on the growth of the metropolitan area is linked to the fact that local planning policies have to exist in order to encourage and guide investments in the BART stations areas; on the contrary, the municipalities were not always leading effective policies in this sense.

In any case, BART’s Transit-Oriented Development Programme evolved in the three decades of experience and actually BART’s TOD goals that have been re-branded in recent years (BART, 2017): from 2016 to 2019 a work of creating a comprehensive policy for BART that should lead to six goals:

- Complete Communities that want to ensure BART contributing to neighbourhood/district vitality;
- Sustainable communities strategy that should lead to the delivery of regional land use and transportation vision to achieve quality of life, economic and GHGs reduction goals;

- Increased ridership in the area that have a capacity to grow;
- Value creation and capture;
- Transportation choice;
- Affordability of housing for all income levels (BART, 2016).

The hope for the programme is to give more information about the TOD, provide transparency, increase predictability, encourage investors, provide guidelines, provide a check-list and to create a BART's Strategic Plan Framework (BART, 2017).

Concurrently, even the Association of Bay Area Governments and the San Francisco County Transportation Authority have started the development of a new "Plan Bay Area" policy, that is focused on land-use and transportation goals in 2050 target. The integration between the two dimensions of spatial planning is considered fundamental to achieve a reduction of GHGs emission, an increase of non-auto mode share, a reduction of vehicles operating, a reduction of aged infrastructures and the decrease housing and transportation costs for lower-income residents (San Francisco County Transportation Authority, 2019). Thus, also a sectoral "San Francisco County Transportation Plan" is going to be developed with the horizon 2050. The transportation sectoral plan is developed to inform the regional one, through a process of collaboration between different authorities (San Francisco County Transportation Authority, 2019). Currently, the TOD projects in the BART metro system are twelve, distributed among 11 stations for a total of 1975 housing units and 194000 square feet of commercial space; the state of projects could be different, both at planning or construction phase (BART, 2019b):

- Castro Valley;
- Richmond;
- Fruitvale;
- Pleasant hill/Contra Costa centre;
- Ashby;
- West Dublin/Pleasanton;
- Hayward;
- East Dublin;
- MacArthur;
- South Hayward;
- San Leandro (BART, 2019c).

In conclusion, the BART is a coherent example with the gener-

al characteristics of the "American approach" to TOD has always been characterised by several factors that have caused the low diffusion of this kind of development strategy:

- A single-project vision, that has caused the scares results of the BART's TOD programme in the first three decades of work;
- Improprity of high densities in some suburban contexts;
- Lack of local policies that should enhance the possibility of investing in station areas;
- Missing of a strategic regional vision integrating land-use and transportation.

Regional authorities are trying to act in order to reverse the trend and to make the integration between transportation and land-use real, creating a new framework for BART's TOD that was previously a pure leasing activity for have revenues and return the investments.

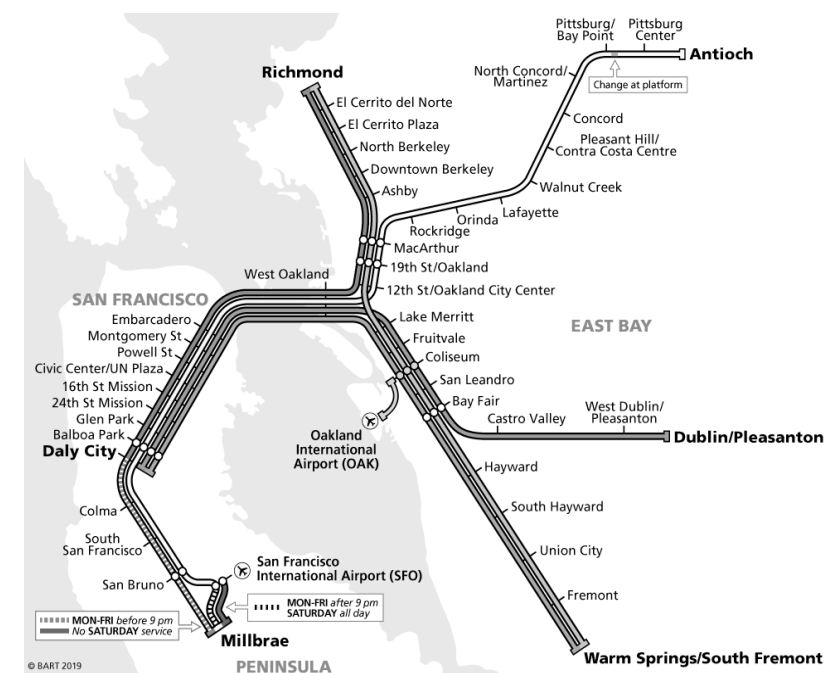


Figure 2.11. BART system map.
Source: BART (<https://www.bart.gov/system-map>).

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03

TRANSPORT and URBAN POLICIES in INTERNATIONAL and EUROPEAN FRAMEWORKS

3.1 THE UNITED NATIONS POLICIES: NEW URBAN AGENDA AND THE SDGs

In the previous chapters the need of an integration between land-use and transport planning has been highlighted, relating it with the sustainability issues of our time and with the historical evolution of urban theories. Obviously, the integration could not happen only through theoretical frameworks and ideas, but it needs to be supported through legal frameworks. Actually, the most important upper-national bodies that influence the objects of study are the United Nations and the European Union. In this Chapter, the international and European frameworks for transport and urban policies are going to be analysed in order to understand, if there are some elements that could lead to an integration of different sectoral policies.

The United Nations are an international organisation, currently composed by 193 Member States, that was founded in 1945, after the end of WWII.

United Nations, through the work of its organs are one of the main promoters of Sustainable Development principles that have had a key-role in the UN agenda. In particular, the General Assembly has many subsidiary organs and programmes that should be considered as “High-Level Political Forum on Sustainable Development”, among them is important to remember:

- UNDP (United Nations Development Programme);
- UNEP (United Nations Environment Programme);
- UN-HABITAT (United Nations Human Settlement Programme) (United Nations, 2019).

All the United Nations Organs and specialised agencies work in specific sector and they are all involved in the achieving of sustainability goals through the Member States.

3.1.1 From Millennium Development Goals to Sustainable Development Goals

The Millennium Development Goals (MDGs) were a set of eight goals adopted by the UN Member States in 2000 in order to fight poverty around the world with the deadline date in 2015. They were elaborated during the “Millennium Summit” held in New York in 2000, after the adoption of the “Millennium Declaration”. The

background for the declaration and the goals was the “Agenda 21” or “Rio Declaration on Environment and Development”, adopted in 1992 by 178 states (UNCED, 1992).

In the declaration the shared values for the new millennium were expressed: freedom, equality, solidarity, tolerance, respect for nature and shared responsibility (United Nations, 2000).

The Goals and their targets were the ways in which the Member States were trying to provide a better future for humanity in the first fifteen years of XXI Century:

- *Eradicate extreme poverty and hunger* was the goal set in order to help the drop of number of people living in deprived condition;
- *Achieve universal primary education* was focused on promoting higher literacy rates among young people and decreasing the out-of-school children of primary school;
- *Promote gender equality and empower women* in order to reduce the gender gap between men and women, enhance the political representation of women in parliament;
- *Reduce child mortality*;
- *Improve maternal health*;
- *Combat HIV/AIDS, malaria and other diseases* that were still a problem in 2000;
- *Ensure Environmental Sustainability*;
- *Develop a global partnership for development*.

The MDGs were effective in many ways, but after the reach of the 2015 expiration date, there were still some problems that were persisting: the gender inequality, the gap between rich and poor people, the climate and environmental degradation and conflicts. It was clear that the MDGs were an initial framework for the creation of more effective and furthermore comprehensive and integrated approaches to sustainability. In fact, the MDGs were treating many themes, but not in a substantial view of sustainable development, but were mostly alone-standing goals (United Nations, 2015a). Another limit of the MDGs was their low possibility to be effectively measured by indicators, and in the poorest countries is even more difficult to register reliable data (Attaran, 2005).

In 2009, the “United Nation Conference on Sustainable Development” (Rio+20) was held in Rio de Janeiro and the Member States adopted the outcome document “The Future We Want” (adopted

in 2012), in which they reaffirm the need to achieve the MDGs and the Rio principles, but also decided to process to develop new goals, built up on the previous ones (United Nations, 2012) (Sustainable Development Goals, 2019a). The General Assembly after the adoption of the document in 2012, elected a 30-members workgroup to develop the SDGs. In 2015, after the end of the MDGs validity, the process for the development of a “post 2015 agenda” ended, all the Member States of the United Nations adopted the “2030 Agenda for Sustainable Development”, containing the 17 SDGs and 169 targets (United Nations, 2015b).

Integration between the SDGs and the overall topics they are referred to is important and UN acts through the Division for Sustainable Development Goals, the secretariat for SDGs. The Division recognizes the relation between the Goal 3, Goal 9 and Goal 11 (Sustainable Development Goals, 2019b) and this is one of the basis for an international framework that realizes how transport and urbanisation are linked and how they affect sustainable development.



Figure 3.1. Sustainable Development Goals. Source: <https://sustainabledevelopment.un.org/?menu=1300>

3.1.2 The New Urban Agenda (NUA)

Mainly concerning urban development, the New Urban Agenda (NUA) is the fundamental document provided by UN in order to guide urban policies around the World and integrate the SDGs inside them in the correct way; it was adopted at the United Nation Conference on Housing and Sustainable Urban Development (Habitat III) held in Quito (Ecuador) in 2016. The goal is supposed to be achieved thanks to two documents, the *Quito Declaration on Sus-*

tainable Cities and Human Settlements for all and the *Quito implementation plan for the New Urban Agenda*, both part of the NUA.

In the first document, the shared vision is defined and it moves towards cities which should be equal, inclusive, safe, healthy, accessible, affordable resilient and sustainable for the current and the future human generations (United Nations, 2016).

The NUA recognizes that the vision for better cities should be implemented effectively through the work at national, regional and local level in each country that is sharing and adopting the agenda and also that a strong combination between different sectors and scales of governance and planning should be guaranteed:

88. We will ensure coherence between goals and measures of sectoral policies, inter alia, rural development, land use, food security and nutrition, management of natural resources, provision of public services, water and sanitation, health, environment, energy, housing and mobility policies, at different levels and scales of political administration, across administrative borders and considering the appropriate functional areas [...] (United Nations, 2016, p. 23).

95. We will support the implementation of integrated, polycentric and balanced territorial development policies and plans, encouraging cooperation and mutual support among different scales of cities and human settlements [...] (United Nations, 2016, p. 24).

Moreover, the need for integration between land-use planning and transport planning is not left behind in the NUA and it is strongly emphasized in the part related to the “Effective Implementation” of the agenda, also referring to the need of reducing urban sprawl and unsustainable development models, similarly to the New Urbanism ideas:

98. We will promote integrated urban and territorial planning, including planned urban extensions based on the principles of equitable, efficient and sustainable use of land and natural resources, compactness, polycentrism, appropriate density and connectivity, and multiple use of space, as well as mixed social and economic uses in built-up areas, in order to prevent urban sprawl, reduce mobility challenges and needs and service delivery costs per capita and harness density and economies of scale and agglomer-

ation, as appropriate (United Nations, 2016, p. 25).

99. We will support the implementation of urban planning strategies, as appropriate, that facilitate a social mix through the provision of affordable housing options with access to quality basic services and public spaces for all [...] (United Nations, 2016, p. 25).

111. We will promote the development of adequate and enforceable regulations in the housing sector, including, as applicable, resilient building codes, standards, development permits, land use by-laws and ordinances, and planning regulations, combating and preventing speculation, displacement, homelessness and arbitrary forced evictions and ensuring sustainability, quality, affordability, health, safety, accessibility, energy and resource efficiency, and resilience [...] (United Nations, 2016, p. 28).

In the agenda, not only that promotion of integrated urban and territorial planning, but also the specific case of “Transit-Oriented Development” strategies is mentioned as one of the possible policies that could overcome inequality issues in the city and provide a framework for social mix, affordability, accessibility and appropriate density in redevelopment or new-development areas:

114. We will promote access for all to safe, age- and gender-responsive, affordable, accessible and sustainable urban mobility and land and sea transport systems, enabling meaningful participation in social and economic activities in cities and human settlements, by integrating transport and mobility plans into overall urban and territorial plans and promoting a wide range of transport and mobility options, in particular by supporting:

(a) A significant increase in accessible, safe, efficient, affordable and sustainable infrastructure for public transport, as well as non-motorized options such as walking and cycling, prioritizing them over private motorized transportation;

(b) Equitable “transit-oriented development” that minimizes the displacement, in particular, of the poor, and features affordable, mixed-income housing and a mix of jobs and services;

(c) Better and coordinated transport and land-use planning, which would lead to a reduction of travel and transport needs, enhancing connectivity between urban, peri-urban and rural areas, including waterways, and transport and mobility planning,

particularly for small island developing States and coastal cities; (d) Urban freight planning and logistics concepts that enable efficient access to products and services, minimizing their impact on the environment and on the liveability of the city and maximizing their contribution to sustained, inclusive and sustainable economic growth (United Nations, 2016, p. 29).

115. We will take measures to develop mechanisms and common frameworks at the national, sub-national and local levels to evaluate the wider benefits of urban and metropolitan transport schemes, including impacts on the environment, the economy, social cohesion, quality of life, accessibility, road safety, public health and action on climate change, among other things (United Nations, 2016, p. 29).

116. We will support the development of these mechanisms and frameworks, based on sustainable national urban transport and mobility policies, for sustainable, open and transparent procurement and regulation of transport and mobility services in urban and metropolitan areas [...] (United Nations, 2016, p. 29).

The recognition of TOD as a key strategy for achieve the vision of the NUA can help to promote an international rethinking of this model and to bring it from a theoretical dimension, based on academic studies, to an effective implementation in different contexts.

3.2 EUROPEAN UNION POLICIES

It has been analysed how the main international organisation, the United Nations, tries to give a framework for achieving sustainability, defining a set of 17 goals (SDGs) and calling for spatial development models, especially in urban areas, thanks to the vision and goals of the New Urban Agenda which try to define guidelines for policymakers. Even if there are many challenges that have to be overcome in the NUA, as the problem of having proper measurement of data and the kind of “generalisation” that could occur in a document that refers to very various areas, it is a milestone for the international efforts on sustainability (Caprotti, et al., 2017).

In the paragraph, the attention will be focused on the European Union policies both on urban development and transport, but also on the limits that EU has on spatial planning. It is the broader framework for the analysis of what is happening in different countries in

Europe about the integration of land-use and transport planning.

3.2.1 The issue of influence on spatial policies

The European Union is a supra-national organisation of Countries, nowadays there are 28 Member States which cover almost the whole continent geographical territory. The idea for the creation of the EU has its background in the economic cooperation began after the WWII, resulting in the European Economic Community (EEC) established in 1958 with six countries: Belgium, Germany, France, Italy, Luxembourg and the Netherlands. From a merely economic union, the organisation started being involved in many other issues and the result was the creation of the European Union in 1993 with the Treaty of Maastricht; after that, in 2009 another treaty, known as the Treaty of Lisbon, increased the powers of the European Parliament (European Union, 2019b).

The EU has eight main goals:

- *“promote peace, its values and the well-being of its citizens;*
- *offer freedom, security and justice without internal borders;*
- *sustainable development based on balanced economic growth and price stability, a highly competitive market economy with full employment and social progress, and environmental protection;*
- *combat social exclusion and discrimination;*
- *promote scientific and technological progress;*
- *enhance economic, social and territorial cohesion and solidarity among EU countries;*
- *respect its rich cultural and linguistic diversity;*
- *establish an economic and monetary union whose currency is the Euro”* (European Union, 2007).

The supra-national nature of the organisation differentiates it from the international organisation like the UN, because EU has the power of adopt regulations that are immediately effective in the Member States, without the need of being ratified. Specifically, the European Union works respecting the subsidiarity and proportionality principles, establishing which matters are competence of the organisation, which of the single state and with have a shared competence (Crosetti & Giuffrida, 2012). Communitarian policies are concerning 35 main areas, both exclusive and shared competence with the Member States:

- economy and finance;
- climate action;
- migration and asylum;
- borders and security;
- business and industry;
- single market;
- digital economy and society;
- employment and social affairs;
- education and training;
- research and innovation;
- regional policy;
- transport;
- agriculture and rural development;
- maritime affairs and fisheries;
- environment;
- energy;
- foreign affairs and security policy;
- EU enlargement;
- European neighbourhood policy;
- trade;
- international cooperation and development;
- humanitarian aid and civil protection;
- justice and fundamental rights;
- public health;
- food safety;
- consumers;
- banking and financial services;
- competition;
- taxation;
- customs;
- culture and media;
- youth;
- sport;
- budget;
- fraud prevention (European Commission, 2019e).

Transport is one of the shared competences between the EU and the Member States, but the organisation has not a specific competence in territorial and urban government, even if the some of the policy topics are deeply related with spatial planning (Gonales Medina & Fedeli, 2015). However, even without a specific responsibility in the field, through the years a sort of “European spatial planning” has been practiced without any kind of specific competence (Janin Rivolin, 2016).

In the following paragraph, we are going to see which are the European policies on transport planning and the one influencing urban development and if they have any kind of reference to the integration between transport and land-use planning.

3.3 EUROPEAN POLICIES ON TRANSPORT

The integration process started by the European Union has a deep interaction with transport since the beginning: a single market area should be interconnected and this sector always occupied a key role in the economic growth, but also in allowing a good mobility of freight and people around Europe. Moreover, transport is in many cases the core of other policies which can not be performed and implemented without an integrated transport system:

- the *industrial policy* is based on the capacity of the EU of make freight move around by railways and roads in the easiest way possible;
- the *competition policy* from the ‘80s, with the creation of the single market, a denationalisation process has started in many sectors, and also in transportation has led to a major competition in the service provision sector;
- the *energy policy* is now focused on the reduction of consumes and, clearly, for the issue of the transport sector consumes and emissions is fundamental to have a transport network which is continuously evolving in term of technology and efficiency;
- the *environmental policy* has been a key element of the EU action since the Maastricht Treaty adoption and the role of transport in the approach to sustainable development model is recognized by the organisation;
- the *new technologies policy* has been focused on researches about new way of transportation that are supposed to be more sustainable in many cases
- the *foreign policy* is also deeply linked with transport policy which in many cases have provided new commercial routes with extra-EU countries, and between Member States, reinforcing the relationships between different nations (Ross, 1998).

The aim of the European transport policy is to “provide efficient, safe and environmentally friendly mobility solutions for Europeans and to create the condition for a competitive industry generating growth and jobs” and the policy is managed by four sub-policies:

- *transport emissions policy* which wants to reduce the GHGs emissions for transport through a set of actions;
- *mode of transport policies* that focus on all the types of transportation (air, road, rail, maritime and waterways);

- *transport infrastructure policy* which focuses to create an integrated network overcoming the gaps between national transport systems;
- *transport-related themes policies* that integrate various issues like passenger right, security and safety, sustainability, research, etc (European Commission, 2019d).

3.3.1 From the 2001 “White Paper on transport” to the 2011 one

The EU transport policy has its fundamental paper in the “White paper¹ on transport”, published in first edition in 2001, which had set out the goals of the transport policy with a vision ending in 2010; underlining the transport as a key factor in modern economies, the document focuses on the need for a change from poor quality transport services to economically, socially and environmentally sustainable ones. The document highlights three major issues to face:

- Congestion on the main roads and rail routes, in towns and airports;
- The unequal growth in different transport modes, with the predominance of road transport;
- Harmful effects on public health and environment.

The paper recognised the impact on transport sector achieving a sustainable development and also asserted that there was a need for a comprehensive strategy going beyond the European transport policy, wishing the creation of a programme that could integrate different sectoral EU policies. In this framework the need for the integration between the transport policy and the urban and land-use planning policies is highlighted because it should be avoided an “unbalanced planning of the distances between home and work place” (Commission of the European Communities, 2001).

The mid-term evaluation of the 2001 White Paper has been produced in 2006 with the title “*Keep Europe Moving - Sustainable mobility for our continent*” and focused on the always changing framework of action in the transport sector due to the enlargement of the EU, the changes in transport industry, in the European governance and in the innovation technology. Even if many new challenges arose from 2001 to 2006, a good number of projects started being imple-

mented, especially for what concerns the TEN networks (Commission of the European Communities, 2006b).

In 2009, the vision of the 2001 White Paper was coming to end and the European Commission started a reflection on the goals achieved and not achieved in the previous ten years and the result was the document “*A sustainable future for transport*”. Here, trends and challenges are reported, because they have to be faced in a future transport policy, as the ageing of population, the migration issue, the environmental challenges and, also, urbanisation. The EC recognised that the urban sprawl resulting from the last decades of urban development has generated the more and more increasing need for individual modes of transport, generating also congestion and environmental problems. The challenge would be the creation of infrastructures capable to serve a public in a suburban dimension (European Commission, 2009).

Finally, in 2011 the new White Paper has been adopted and it sets up the transport policy of the EU for a ten years period, ending in 2020. The main goals of the strategy are:

- “*Improving the energy efficiency performance of vehicles across all modes. Developing and deploying sustainable fuels and propulsion systems;*
- *Optimising the performance of multi-modal logistic chains, including by making greater use of inherently more resource-efficient modes, where other technological innovations may be insufficient (e.g. long-distance freight);*
- *Using transport and infrastructure more efficiently through use of improved traffic management and information systems (e.g. ITS, SESAR, ERTMS, SafeSeaNet, RIS), advanced logistic and market measures such as full development of an integrated European railway market, removal of restrictions on cabotage, abolition of barriers to short sea shipping, undistorted pricing, etc*” (European Commission, 2011c, p. 6).

The urban dimension in the paper is mainly linked to the creation of a new instrument the Urban Mobility Plans that at that time were seen as mandatory for cities of a certain size and should support the creation of a city efficient transport systems (European Commission, 2011c).

In 2011, also a draft of the EC about the ambitions on transport for 2050 has been created; the “*Transport 2050: Commission outlines ambitious plan to increase mobility and reduce emissions*” document differentiates the goals for the typology of journey:

¹ The White Papers of the European Commissions are defined as “are documents containing proposals for European Union (EU) action in a specific area. In some cases, they follow on from a Green Paper published to launch a consultation process at EU level. The purpose of a White Paper is to launch a debate with the public, stakeholders, the European Parliament and the Council in order to arrive at a political consensus. The Commission’s 1985 White Paper on the completion of the internal market is an example of a blueprint that was adopted by the Council and resulted in the adoption of wide-ranging legislation in this field” (European Union, 2019c).

- For intercity travel 50% of all the medium-distances passengers and freight should be shifted from road to rail;
- For long-distance travel and intercontinental freight, the dominant modes will continue being air travels and ships, but they will become more efficient and reduce their emission thanks to new engines, fuels and traffic management;
- For urban transport, there should be a big shift to cleaner cars and fuels (European Commission, 2011a).

These three goals are related to the ones expressed in the 2011 White Paper, where the switching to a cleaner and more sustainable transport is supposed to be easier due to the high population density and lower requirements for vehicle range. The European Commission proposed some actions to achieve “clean urban transport and commuting”:

- To reach a higher share of travel by collective transport, through an increasing density and frequency of the service. Land-use and demand management are also supposed to reduce traffic volumes;
- To use “*smaller, lighter and more specialised*” road passenger vehicles;
- To introduce new propulsion technologies which could help in reducing air emissions and also noise, allowing to perform freight transport even during the night in urban areas (European Commission, 2011c, p. 8).

3.3.2 The TEN-T Network Regulation

Far from the theoretical framework provided by white papers and other document, the Trans-European Transport Network (TEN-T) is part of the transport infrastructure policy and it is composed by two layers one called the Core Network, that includes the most important connections to be completed by 2030, and the Comprehensive Network, that covers all the European regions and should be completed in 2050 (European Commission, 2019c).

The creation of a comprehensive network of roads, railways and waterways to unify the territory of the EU has been planned since the creation of the organisation in the ‘90s, but its regulation and implementation has started more recently.

In addition to the completion of the two layers, other two horizon-

tal goals are part of the TEN-T policy: the creation of the European Rail Traffic Management Systems² (ERTMS) and the Motorways of the Sea³ (MoS).

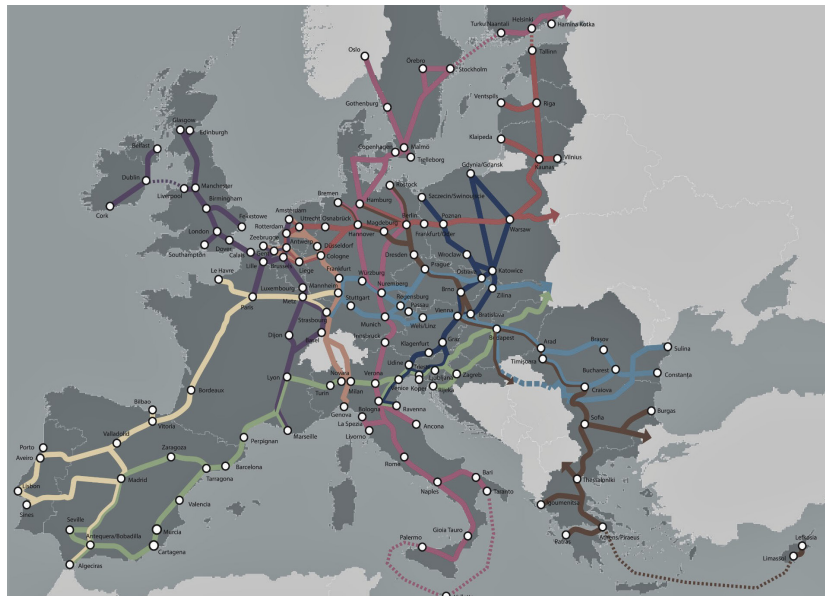
The network has to contribute to the major European Union objectives and has four main goals:

- Cohesion, which should be achieved through: accessibility and connectivity of all regions of the Union, reduction of infrastructure quality gaps between Member States, for both passenger and freight traffic, a transport infrastructure that reflects the specific situations in different parts of the Union and provides for a balanced coverage of all European regions;
- Efficiency, which should be achieved through: the removal of bottlenecks and the bridging of missing links, the interconnection and interoperability of national transport networks, optimal integration and interconnection of all transport modes, the promotion of economically efficient, high-quality transport contributing to further economic growth and competitiveness, efficient use of new and existing infrastructure, cost-efficient application of innovative technological and operational concepts;
- Sustainability, which should be achieved through: development of all transport modes in a manner consistent with ensuring transport that is sustainable and economically efficient in the long term, contribution to the objectives of low greenhouse gas emissions, low-carbon and clean transport, fuel security, reduction of external costs and environmental protection, promotion of low-carbon transport;
- Increasing the benefits for its users through: meeting the mobility and transport needs, ensuring safe, secure and high-quality standards, supporting mobility even in the event of natural or man-made disasters, and ensuring accessibility to emergency and rescue services, the establishment of infrastructure requirements, accessibility for elderly people, persons of reduced mobility and disabled passengers (European Union, 2013).

² “The European Railway Traffic Management System (ERTMS) is a single interoperable system to replace the more than 20 different national train control and command systems currently in operation throughout Europe. Implementation of the system will deliver enhanced cross-border interoperability, creating a seamless, Europe-wide railway system” (European Commission, 2019a).

³ “Motorways of the Sea (MoS) is the maritime pillar of the TEN-T. It consists of short-sea routes, ports, associated maritime infrastructures, equipment, facilities and relevant administrative formalities. MoS contributes towards the achievement of a European Maritime Transport Space without barriers, connecting Core Network Corridors by integrating maritime links with hinterland” (European Commission, 2019b).

Figure 3.2. The TEN-T Network map.
Source: European Commission (https://ec.europa.eu/transport/themes/infrastructure/ten-t_en)



3.3.3 The “European Strategy for Low-Emission Mobility”

The “European Strategy for low emission Mobility” is part of the transport emissions policy and has been adopted by the European Commission in 2016, following the increasing need for a shift to low-emission mobility, also taking into account the international agreements on climate change, like the *Paris Agreement* and the *2030 Agenda on Sustainable Development*.

The issue related to transport sector emissions is at the core of the actual discussion on Climate Change, Global Warming and Sustainability and even if it is integrated in many policies of the EU, the EC understood that a document completely dedicated to that was fundamental.

The key points of this policy are:

- the need for a regulatory framework for low-emission mobility at the European level, which should provide certainty for the stakeholders in investing;
- the creation of a new framework enabling the transition to low-emission mobility, through research, innovation, new skills, investments.

Moreover, it is recognised that even in this change has to be implemented by cities because they represent the main responsible for the 23% of the EU GHGs emissions and the strategy should be

delivered by local authorities and cities to be effective, through the implementation of incentives to generate the shift.

The comprehensive approach proposed by the EU, has to take place through:

- sustainable urban mobility planning;
- integrating spatial planning and looking into mobility;
- encouraging the modal shift to active travel (cycling and walking), public transport or shared mobility to reduce the congestion and pollution in cities.

In conclusion, in transport-related policies of the European Union the integration between land-use and transport planning is often cited as part of the needed measures to overcome the present problems (European Commission, 2016).

3.4 EUROPEAN POLICIES FOR URBAN AREAS

The European Union has not specific competences in spatial planning, as specified in the previous paragraphs, but it is clear that all the policies implemented from the creation of the single-market to now had spatial impacts.

The recognition of the spatial effects of social and economic policies were assessed in 1999 with the “European Spatial Development Perspective” (ESDP), whose elaboration started ten years before thanks to the reunion of the European Ministers responsible for Spatial Planning (Servillo, Atkinson, & Russo, 2011); the objective of the ESDP was to underline the regional disparities between European regions and to provide a framework for the achievement of a sustainable and balanced development for all the areas (Council of Ministers responsible for Spatial Planning, 1999).

The European spatial governance has been characterized by an “implicit nature” (Gonzales Medina & Fedeli, 2015), but it has treated the topic of urban development in many documents with different legal nature:

- in 1990, the “Green Paper⁴ on Urban environment”;
- in 1994, the Aalborg Charter, approved after the European Conference on Sustainable Cities and Towns, following the example of the Rio Summit of UN;
- in 1997, the communication “Towards and urban agenda in the European Union”;

³ “Green Papers are defined by the EU as “documents published by the European Commission to stimulate discussion on given topics at European level. They invite the relevant parties (bodies or individuals) to participate in a consultation process and debate on the basis of the proposals they put forward. Green Papers may give rise to legislative developments that are then outlined in White Papers” (European Union, 2019a).

- in 1998, the communication “New framework plan for sustainable urban development”;
- in 2004, the communication “Towards a thematic strategy on the urban environment”;
- in 2006, the communication “Cohesion Policy and cities: the urban contribution to growth and jobs in the regions”;
- in 2014, with the communication “The urban dimension of EU policies – Key features of an EU urban agenda” (Janin Rivolin, 2016);
- in 2016, the Pact of Amsterdam established the Urban Agenda for the EU.

Additionally, the EU has not only stimulated the debate on cities’ challenges and on the need for an agenda, but also have in some way “influenced” the practices of spatial planning thanks to the funds for the cohesion policy⁵, in particular:

- European Regional Development Fund;
- European Social Fund;
- Cohesion Fund.

The European Union has always stressed out another key issue since the beginning of its existence: the “urban problem”. Since 1990 urban oriented initiatives have been implemented to experiment practice interventions considered relevant for the community. Between 1990 and 1993, has been financed by the EU a first phase of Urban Pilot Projects (UPP) aimed to “*support innovation in urban regeneration and planning within the framework of the broader Community policy for promoting economic and social cohesion*” (European Commission, 2011b); the result were 33 UPPs implemented in 11 Member States. After the great response to this initiative, a second phase of the UPP was initiated in 1996 and ended in 1999, with 26 projects in 14 nations (Janin Rivolin, 2013).

Other relevant initiatives were Urban and Urban II, started 1992 and ended in 2006, both having the objective of developing improvements in the quality of life in cities and to tackle the social, environmental and economic issues present in urban agglomerations. The relevance of Urban experiences is also related to the integrated approach it provided with the rehabilitations of transport infrastructures, and economic and labour markets. The program was developed in historical centres, but also peripheral areas with

different population characteristics and ended with 118 funded projects (European Commission, 1999).

URBACT is one of the more recent programmes, funded with ERDF, which started in 2003 and planned to end in 2020 in the framework of the “Europe 2020 strategy”. URBACT has the objective to help cities to share knowledge and good practices to promote integrated sustainable development; the lack between local policies and mainstream programmes is an issue that the program tries to face, working on the creation of strategies for cities, which are results of horizontal and vertical integration and the identification of common challenges in different urban areas (European Union, 2015).

The last initiative is the Urban Agenda for the EU, boosting the European action in urban areas, started in 2016 and oriented to provide better regulation, better funding and better knowledge on urban issues. It does not create new funds or regulations, but tries to set a coordinate approach to different initiatives of EU for what concerns urban areas. The agenda wants to give an operational framework which could help stakeholders in implementing projects in cities thanks to EU funding, overtaking issues related to sectoral EU legislations and policies (European Union, 2016).

3.4.1 Integration between land-use and transport planning in EU urban policies

Integration between different sectoral policies have been stated as a fundamental principle in the Article 6 of the Amsterdam Treaty:

“Environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities referred to in Article 3, in particular with a view to promoting sustainable development” (Art. 6) (European Union, 1997).

Urban-related documents and policies in the EU are surely impacting on how different States are facing common issues which are manifesting in cities; the approach to integration has become more defined thanks to detailed publications. The rising awareness on the big economic and social forces, which root urban problems, has produced several European experimentations in urban policies and planning (Atkinson, 2001).

⁵ “Economic and social cohesion – as defined in the 1986 Single European Act – is about ‘reducing disparities between the various regions and the backwardness of the least-favoured regions’. The EU’s most recent treaty, the Lisbon Treaty, adds another facet to cohesion, referring to ‘economic, social and territorial cohesion’” (European Union, 2007).

Before 1997, various phases of the European trends on policy making are observed. From the Treaty of Rome the main theme was the economic growth and the approach was mostly sectoral; then, from the half of the '80s *harmonisation* of various policies became more important, with the increasing evidence of the inadequacy of policies in creating a good framework for achieving the recently born concept of sustainable development. From the '90s even *harmonisation* was not enough and the EU passed to the concept of *co-ordination* of policies and now the approach is leading to *sectoral integration* (Geerlings & Stead, 2002).

The need for an integrated approach to reach a sustainable development, especially in urban areas, have been also anticipated in 1990 in the Green Paper on the urban environment and in the 1997 communication for the creation of a European urban agenda (Geerlings & Stead, 2003). In the last one the "urban issue" is analysed as a common situation for all the European cities, where the de-industrialisation has created social and economic difficulties and only metropolitan areas located in strategic places were able to reconvert their economy from industry to service-oriented one. The relevance of transport policies for achieving a good urban development was evident and the integration between spatial planning priorities and transport infrastructure planning was recognised as key factor for providing a balance between different areas in Europe. The setting of a common urban agenda in the EU is important for achieving the improvement of the citizens' quality of life and an equal development (Commission of the European Communities, 1997).

An important document is also the Aalborg Charter of 1994, signed by local, national and upper-local administrations, wanted to promote a sustainable development in urban areas through the approach of "*globally thinking and locally acting*". The objective of the charter is the setting of common principles and behaviours which have to be followed in order to drive cities to a sustainable profile. The document recognised that "*present urban lifestyle, in particular our patterns of division of labour and functions, land-use, transport, industrial production, agriculture, consumption, and leisure activities, and hence our standard of living, make us essentially responsible for many environmental problems humankind is facing*" (Participants at the European Conference on Sustainable Cities & Towns, 1994, p. 1). The commitments of the

charter include also the land-use and urban mobility as key drivers to sustainable city development; the objectives are:

- Driving the urban economy to a sustainable pattern, reducing the anthropogenic pressure on environment;
- Promoting social equity and justice;
- Adopting sustainable land-use patterns ensuring a mix in urban tissues;
- Facing the Climate Change issue, reducing urban energy consumption and GHGs emissions;
- Creating participatory process in which community is involved as a central actor;
- Promoting sustainable urban mobility;
- Achievement of the local self-governance;
- Prevention of Ecosystems toxification;
- Integrating planning tools with new environmental and ecosystem approach (Filpa & Talia, 2009).

In the 2004, communication "*Towards a thematic strategy on the urban environment*" of the EC, the development of an European strategy for urban environment has been treated and the transition to a more integrated approach is not only expressed, but also characterized in the levels and sectors, defining that horizontal integration should happen between community policies, as transport, cohesion, health, research and technological development, but also at the local level of planning integrating in a single plan various issues environmentally relevant. Vertical integration is expected for different administration levels (Commission of the European Communities, 2004). In 2006 the role of cities in the cohesion policies has been analysed by the European Commission: cities are places where disparities in different dimensions happen in many cases, for example are places with high work possibilities, but also with high unemployment rates, and improving the attractiveness of urban areas is fundamental to achieve the cohesion objective through the EU (Commission of the European Communities, 2006a).

The work for the creation of a common urban agenda for the EU has been characterised by different phases and in 2014 a document the agenda could be more or less limited in term of issues to face, but the more ambitious one should provide a framework to bring coherence to different initiatives and policies, not only recognising

shared challenges (European Commission, 2014).

The Pact of Amsterdam of 2016 has established the Urban Agenda for the EU and the first report from the EC to the European Council was delivered in 2017, giving details on the agenda implementation. Also, in this document integration between different policies is highlighted as fundamental to ensure the success of the city initiatives (European Commission, 2017).

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II

EUROPEAN SPATIAL GOVERNANCE and PLANNING SYSTEMS and TOD

This part of the thesis is focused on the method used for the following analysis, on the selection of the case studies and on the characteristics of each SGPS in relation to TOD implementation.

The eight nation selected, are going to be analysed in terms of land-use and transport planning system structure and tools. Then, a review of the TOD experiences is going to be done for each country.

04

SPATIAL PLANNING and TOD in EUROPEAN UNION

4.1 SPATIAL PLANNING TRADITIONS IN EUROPE

In the previous chapter, European policies on transport and urban issues have been analysed and the interest of the EU on spatial government inside its member States is clear. The creation of the single-market area and the integration process have been major reasons for the implementation of common policies with the aim of creating a shared and interconnected network of infrastructures and decreasing regional disparities. Although, spatial planning is not an EU competence, but different sectoral policies (e.g. environmental and transport ones) and funding tools have been the precondition for the “indirect” influence of the European Union on national spatial planning policies and practice (Salamin, 2010).

The interest in national planning “systems” arose in recent years, almost since the beginning of the ‘90s: many comparative studies have been developed on the spatial planning systems in different European countries trying to characterize and classify them. The first official one was a study commissioned to Davies, Edwards, Hooper, and Punter by the United Kingdom government, focusing its attention on five states of western Europe: Denmark, France, West Germany, the Netherlands, and the UK. This first attempt classified the nations according to their juridical asset and two “legal families” were identified:

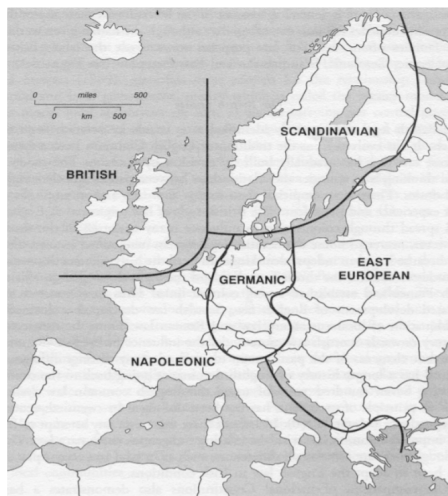
- the “continental” family, or *civil law*, having its juridical basis in the Roman Law and the “Napoleonic Code”. This category is based on codes, laws and other normative acts and, consequently, also the spatial planning is performed through plans which are legally-binding, containing regulations and detailed zoning;
- the “English” family, or *common law*, instead, has its foundations on custom and court decisions generating the legislative basis for future judicial cases. In the UK the common law has influenced the spatial planning practice, producing the tendency to generate not legally-binding plans and characterized public discretion on transformation decisions (Davies, Edwards, Hooper, & Punter, 1989).

The approach proposed by Davies et al. based on legal and administrative systems has been adopted by Newman and Thornley in the analysis of 15 European Member States (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland Luxembourg,

Netherlands, Portugal, Spain, Sweden, Switzerland, UK) in 1996. The study has produced a classification in five “families”:

- the “British” family (comprehending UK and Ireland) is characterised by *“a system of case law which is built up decision by decision”*. The administrative government is based on two levels and the local one is responsible for carrying out the national policies;
- the “Napoleonic” family (comprehending France, Italy, Belgium, the Netherlands, Portugal, Spain and Greece) is characterised by the legal tendency to use abstract norms that have to prepare the system of rules in advance. A multi-level administrative system is performed in a more or less decentralised way, according to the economic prosperity of the country;
- the “Germanic” family (comprehending Germany, Austria and Switzerland) is a “branch” of the Napoleonic one. It has been developed through a systematisation happened later than in other countries, because Germany had not a strong central government imposing a unified legal system. During the Enlightenment period the German jurists systematised a common legislation. The main characteristic of this family is the great importance given to the Constitution and a well-defined distribution of powers and responsibilities among different levels of government;
- the “Scandinavian” family (comprehending Denmark, Sweden and Finland) has its origins in the old Germanic law, systematised between XVII and XVIII Centuries. The main characteristics of this family is its clear and accessible written style. From the administrative point of view, it is a hybrid between the Napoleonic family, with its strong relationship between central and local governments, and the Germanic one;

Figure 4.1. European legal and administrative families.
Source: Newman and Thornley, 1996, p. 29.



- the “East European” family (comprehending all the countries of the former Eastern block) that was in an early stage of development in 1996 and was difficult for authors to characterize (Newman & Thornley, 1996).

These early comparative studies have great value in terms of research, but they have not been highly effective to understand the practices in different planning contexts (Janin Rivolin, 2016). The research about legal and administrative structures obviously helps explaining differences between countries, but over-emphasizes the formal system of planning and tends to forget the reality of the practices (Nadin & Stead, 2008).

4.1.1 The “EU Compendium of Spatial Planning System and Policies” classification

In order to overcome the limits of precedent attempts in the classification of spatial planning systems and governance, the European Commission started at the half of ‘90s the elaboration of *“The Eu Compendium of spatial planning systems and policies”*, published in 1997. The Compendium had its background in the rising awareness *“of the role of spatial planning in the process of European Cohesion”* and more detailed reasons for this comparative study are listed as:

- *“the recognition of the effects that spatial planning within Member States or region could have on its neighbours or the rest of the European Union;*
- *the need to maximize the economic potential of the Single European Market by ensuring that infrastructure gaps and inconsistencies in spatial development patterns are minimised;*
- *the need for co-ordinate public investment, including the Structural Funds, to maximise its contribution to Community policies, to increase competitiveness and redress regional disparities;*
- *to make most opportunities for Member States to work jointly on cross-border or transnational planning problems;*
- *recognition of the role that spatial planning can play in promoting sustainable development of the Community’s territory and ensuring that economic growth is balanced against the need to protect the environment and heritage;*
- *to address the spatial development implications of the integration of the central and Eastern countries and the southern and Eastern Mediterranean countries with the European Union”* (European Commission, 1997, p. 21).

The document was based on national reports of the 15 Member States (former EU15) that produced a comparative review of spatial planning systems and policies according to seven interrelated factors: the scope of the system, the extent and type of planning at national and regional levels, the locus of power, the relative roles of public and private actors, the nature of the system of law, constitutional provisions and administrative traditions, the maturity and completeness of the system, the distance between expressed objectives and outcomes (European Commission, 1997). The outcome is the identification of four spatial planning “traditions” or “ideal types”: the land-use management, the regional economic planning approach, the comprehensive-integrated approach and the urbanism tradition (see Figure 4.3). In 2007, after ten years from the publication of the EU Compendium a research project (ESPON project 2.3.2) was developed, in the framework of ESPON programme, about “Governance of Territorial and Urban Policies from EU to Local Level”. The research re-proposed the classification of the Compendium, enlarged to a broader number of countries in the European areas. This study remarked some shifting from a “tradition” to another in many cases, but it has been criticised for the method and for the use of the spatial planning traditions as boxes and not as reference models (ESPON, 2007) (Stead & Nadin, 2009) (Janin Rivolin, 2016).

Figure 4.2. The EU Compendium classification of spatial planning traditions. Author’s own elaboration.

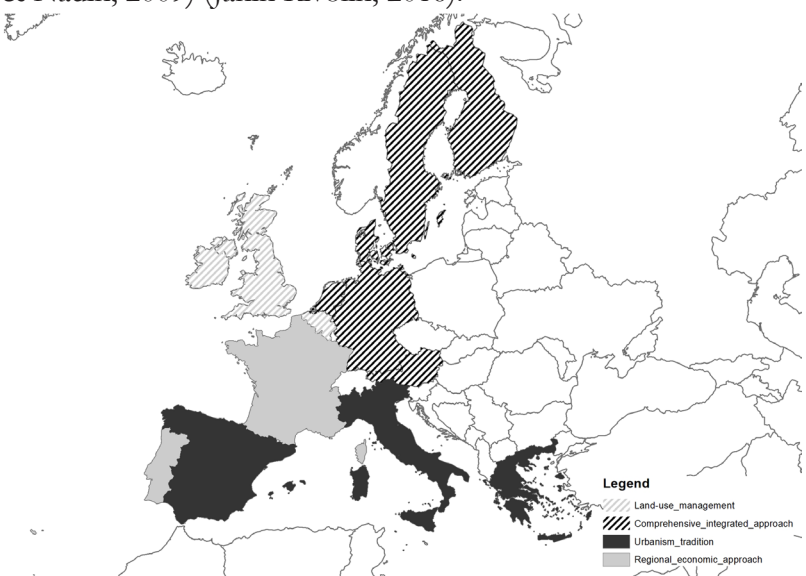


Figure 4.3. ESPON 2007 classification of European spatial planning traditions. Source: ESPON, 2007, p. 40.

“LEGAL FAMILIES”				
Davies et al. (1989)	“Continental” (civil law)			“English” (common law)
	DK, DE, FR, NL			UK
Newman and Thornley (1996)	Germanic	Scandinavian	Napoleonic	British
	AT, DE	DK, FI, SE	BE, ES, FR, IT, LU, NL, PT	IE, UK
“IDEAL TYPES”				
CEC (1997)	Comprehensive-integrated	Regional economic	Urbanism	Land-use management
	AT, DE, DK, FI, NL, SE	FR, PT, (DE)	ES, GR, IT, (PT)	IE, UK, (BE)
ESPON (2007)	Comprehensive-integrated	Regional economic	Urbanism	Land-use management
	AT, DK, FI, NL, SE, DE, BG, (BE, FR, IE, LU, UK), EE, HU, LV, LT, PL, RO, SL, SV	FR, DE, PT, (IE, SE, UK), HU, LV, LT, SK	ES, GR, IT, CY, MT	BE, IE, LU, UK, (PT, ES), CY, CZ, MT

Table 4.1. Spatial Governance in Europe: legal families and ideal types. Author’s own elaboration based on Nadin and Stead, 2008.

4.1.2 The spatial planning traditions

The first spatial planning tradition is the *regional economic planning approach*, that is characterised by an important role lead by the central government that has to manage the spatial development across the country in order to achieve broad social and economic objectives. Employment and social conditions across the country are different from a region to another and have to be equalised.

The second one is the *comprehensive-integrated approach* to planning in which spatial planning has specific hierarchy of plan at national and local level that are coordinated by the public sector. The system has to be mature for this tradition because it requires well-organised institutional mechanisms. Two sub-categories have been identified by the *EU Compendium* for this tradition: the Nordic one, where local authorities have a great influence, and the Germanic and Austrian one, where spatial planning is highly performed through the federal states or regional governments.

The third tradition is the *land-use management*, mainly showed in the UK, characterized by local level of government governing spatial transformation to ensure a sustainable growth and development.

The last one is the “*urbanism*” tradition, performed in the Mediterranean countries. It is based on great relevance of architecture, urban design, townscape and building control. In this tradition the zoning regulation is fundamental, but it does not provide a great level of public control on spatial transformations and market has an important role in the effective spatial development (European Commission, 1997).

Table 4.2. Characteristics of the European spatial planning families. Author’s own elaboration based on Stead and Nadin, 2009.

	Legal basis	Scope of planning	Scale of planning	Locus of Power	Public or private	Maturity of the system	Distance between goals and outcomes
Regional economic approach	Mixed	Wide	National planning	Centre and local	Public	Mature	Mixed
Comprehensive integrated	Mixed	Wide	Multi-level planning	Mixed	Public	Mature	Narrow
Land-use management	Discretion	Narrow	Local	Centre	Mixed	Mature	Narrow
Urbanism	Code	Narrow	Local	Local	Mixed	Immature	Wide

These traditions have to be used as theoretical models, but it is clear that no country is actually fully represented by only one of them. The constant evolution of planning systems could concern few aspects and not all the seven elements are taken into account by the EU Compendium. This issue leads to difficulties in using this method in order to represent the spatial planning system in a country (Nadin & Stead, 2008). However, the *EU Compendium* has the merit of developing a wider notion of planning system, also a new view on institutional role (Janin Rivolin, 2012).

4.2 SPATIAL GOVERNANCE AND PLANNING SYSTEMS

It is clear from the reported experience that it is not simple to characterize the “nature” of a spatial planning system and some studies are now focusing on the concept of “planning cultures”. Authors are arguing that planning systems comparative studies and typologies are not able to fully explain the global, European phenomena that are changing the spatial planning practice.

Moreover, for proponents of this approach, the institutional and legal structures could not be representative of systems where many other actors are involved (Getimis, 2012). However, planning cultures are integrating parts of the planning systems and could not be considered apart. Spatial Governance and Planning System (SGPS) could be defined as an “institutional technology”: technology because it is a complex of methods and actions that are set out to reach a specific goal and institutional because the technology has a configuration developed through social, legal and historical patterns (Janin Rivolin, 2016). The SGPS could be considered the “hinge” between the government system and the territorial production and consume system. The SGPS allow the public authority to guide and control the spatial transformations through the allocation of land-use and spatial development rights (see Figure 4.4) (Janin Rivolin, 2012). In general terms, “*territorial governance is manifest across the globe as a complex formal and informal process of interactions, both vertical (between policy levels) and horizontal (between policy sectors and between public/private operators) that, in modern states, are allowed and conditioned by national spatial planning systems*” (Cotella & Janin Rivolin, 2010, p. 2).

Each spatial governance and planning system is reported to have different functions, in 1993 Healey and Williams have identified

three main ones: a plan making function, a developmental function and a regulatory function (Healey & Williams, 1993).

A more detailed classification has been developed by Mazza, identifying one general function and three specific ones, that are differently used and performed in each SGPS:

- an information function, present in every planning tool, that has the objective of constructing a clear planning process and promote public confrontation and consent building;
- a regulative function, that is based on the need for a fixed regulation for recognising and ensuring the land-use rights;
- the strategic function, that wants to set the vision and the strategies to achieve it;
- a design function, that concerns the identification of policies and projects that guide spatial transformation and conservation (Mazza, 2003) (Janin Rivolin, 2008a).

Figure 4.4. Planning system as a 'hinge' and two spheres of interaction in territorial governance. Source: Janin Rivolin, 2008, p. 172.

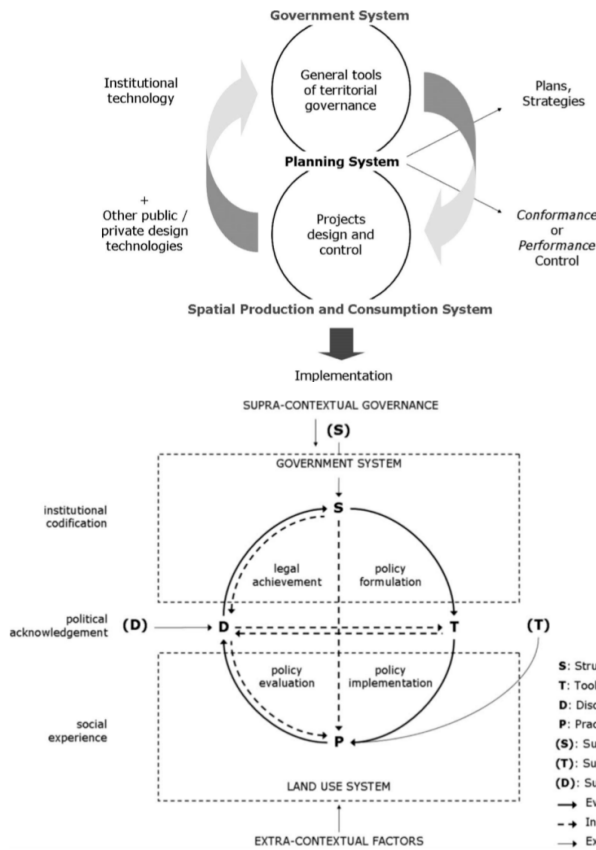
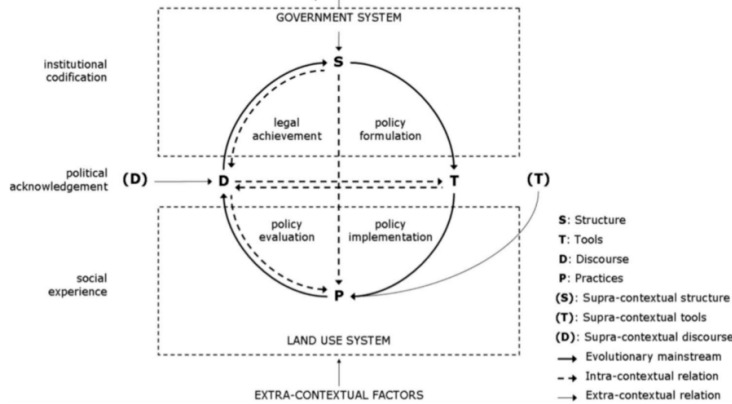


Figure 4.5. Simplified model of planning system operation. Source: Janin Rivolin, 2012, p. 73.



If the comparative studies on planning systems are mainly focused on *structures* (S)¹ and *tools* (T)² and the ones on planning “cultures” are focused on *discourse* (D)³ and *practices* (P)⁴, the study of SGPS as “institutional technology” could be explained through a synchronic diagram underlining the relations interplayed between them. *Structures* are influencing *practices* and *discourses*, in turn *discourses* influence *tool* (mutual relation) and *practices* (Janin Rivolin, 2012). The interaction between planning tools and control ones could be different in different countries and the evaluation of their mutual relations has led to the identification of three spatial governance and planning systems in Europe: the performative model, the conformative model, these first two models are historically affirmed, and the more recent the neo-performative one. Differences between the three models mainly stand in the process of spatial planning and in the phase in which the effective control on spatial transformations is performed (Janin Rivolin, 2016).

Strategy	Plan	Project	Control	Permit
Strategy	Plan	Project	Control	Permit
Strategy	Project	Control	Plan	Permit

Figure 4.6. SGPS models (from the top: conformative, performative and neo-performative systems) and their process (the phase in which development right are assigned black contoured).Source: Janin Rivolin, 2016.

4.2.1 Performative

The performative model has been adopted after the WWII, mainly in UK and Ireland. The background for this model stands in the civic, legal and administrative traditions In this model public authorities do not produce legally-binding plans, but only generate a collective strategy; then, the local authorities have discretionary power of deciding if proposed projects are performing in accordance to the overall vision (Janin Rivolin, 2008a). The advantages and disadvantages of the performing planning could be resumes as:

- “better control of spatial transformation and of property income;
- more flexibility and political autonomy in the design of public strategies;
- pivotal function of spatial development control through technical evalua-

1 Structure could be defined as a “set of legal provisions allowing the operation of territorial governance in a specific context and the establishment of organisms and agencies deputed to the same objective” (Cotella & Janin Rivolin, 2010, p. 4).

2 Tool are the operational instruments put in practice to achieve the priorities defined at different territorial levels (Cotella & Janin Rivolin, 2010).

3 Discourse is the continuous process concurring to the definition of goals and priorities and it involves different community actors (Cotella & Janin Rivolin, 2010).

4 Practices are “the interactive processes that [...] address the implementation of spatial policies and land development goals” (Cotella & Janin Rivolin, 2010, p. 5).

tions;

- *better accountability of political and of technical responsibilities;*
- *trigger of a virtuous circle in territorial governance processes;*
- *uncertainty, affecting all developers and applicants and, particularly, the weaker players in the planning game;*
- *the discretionary nature of planning decisions that confer valuable development rights, implying a vulnerability to corruption almost comparable with the “conforming planning” case;*
- *major administrative costs and capacity limitations, due to the necessity to evaluate and negotiate each development project in the absence of formalized standards” (Janin Rivolin, 2008b, p. 176).*

4.2.2 Conformative

The conformative model is typical of Southern and Mediterranean countries in Europe and it is also reported to be the more traditional and spread in the EU and worldwide (e.g. in USA). According to Janin Rivolin, the model has its background on the idea that the implementation of the collective strategy could take place only if the public power is able to conform the spatial development projects to it. This “conforming activity” is led through legally-binding planning tools, specifically zoning maps, which has a legal value and the main consequences for the model are:

- *“creation of binding property rights (once the plan is approved, new use rights in land cannot be or can hardly be revoked);*
- *creation of additional property income (new use rights in land imply higher property values), counteracting possible changes in public strategies;*
- *rigidity and difficulty of public strategies (any change in public strategies implies new assignments of use rights in land, with the before mentioned consequences);*
- *incentive to spatial development but public control reduced to an ‘administrative burden’ (conformance control, with scarce or no possibility of improving projects apart from their formal coherence with the plan);*
- *decrease of political and of technical accountability in planning (because of the difficulty of public strategies and of development control reduced to an administrative burden);*
- *possible creation of decision-making contexts openings to corruptive practices (because of the decrease of political and of technical accountability in planning);*

- *trigger of a vicious circle in territorial governance processes” (Janin Rivolin, 2008b, p. 174)*

The conformative SGPSs perform the control function in the plan and after its approval, the government could only verify the conformance to the plan prescriptions, standards and indicators (Janin Rivolin, 2016).

4.2.3 Neo-performative

A third model of planning has arisen recently in North-Western European countries, even if they are characterised by the civil law juridical tradition, they have evolved their planning systems. This is the proof that first studies mainly focusing on legal and administrative traditions were not using the right method: the legal system does not determine the SGPS and is not an obstacle to renew it (Janin Rivolin, 2016). This spatial governance and planning system is based on the control of future projects performed before the approval of the plan, through the involvement of stakeholders in the planning process, which create the legally-binding condition (Janin Rivolin, 2016).

4.3 FURTHER EVOLUTIONS OF CLASSIFICATION

The identification of spatial governance and planning systems, which are spread in the European Union, has been the basis for other analyses on more specific topics. Berisha, Cotella, Janin Rivolin and Solly have developed a new comparative study based on materials gained through the recently concluded ESPON COMPASS project. The “Comparative Analysis of Territorial Governance and Spatial Planning Systems in Europe” (COMPASS) project started in 2016 and ended in 2018 and basically, its goal was to provide a comparative report on changes in territorial governance and spatial planning systems in Europe. The study was developed on 32 countries, 28 EU Member States and 4 ESPON partners countries; for each nation, data have been provided by national “experts” and, then, reviewed by the project team. The results are some general recommendations to strengthen strategic and visionary dimensions, sectoral integration, territorial cooperation and the use of Cohesion Policy as a planning tool (ESPON, 2018).

Starting from this project data and information provided by nation-

al experts, the authors have compared the mechanism of land-use and spatial development right allocation and the prevalence of State or market in guiding the decisions. In particular, five questions were asked to experts in order to address if their SGPSs are more similar to the conformative model or the performative one. Then, other five questions were about the public control of spatial transformation in their SGPSs, ranging from the a pure State-led model to a totally market-led one (Berisha, Cotella, Janin Rivolin, & Solly, 2020). From the answers of national experts organised on an X-Y diagram, it was possible to cluster in five different SGPSs typologies (see Figure 4.7) according to the level of public control on spatial transformation:

- the first one (A) comprehends *State-led systems*. In this category spatial development is controlled by the State, despite their different system of allocation of development right (e.g. France is a conformative system, but able to guarantee the State interests, and the UK is performative one);
- the second one (B) comprehends *market-led neo-performative systems*. In neo-performative SGPSs, the control function, as previously described, takes place before the approval of the planning tool by a public-private negotiation. However, market interests seem to prevail in this category;
- the third one (C) comprehends *conformative systems*, except France. In this category the public authority uses legally-binding plans and, after their approval, the market seems to drive the spatial development following the zoning regulations;
- the fourth one (D) comprehends *proto-conformative systems*, mainly spread in the Balkan area and in non-Eu countries. These nations are performing spatial planning systems based on a rigid top-down hierarchy and on dirigisme of the State on implementations of plans;
- the last and fifth one (E) comprehends *misled performative systems*, that assign development rights by a case-by-case negotiation process and lead to detailed negotiated plans. In these systems, spatial developments are mainly guided by market interests (Berisha, Cotella, Janin Rivolin, & Solly, 2020).

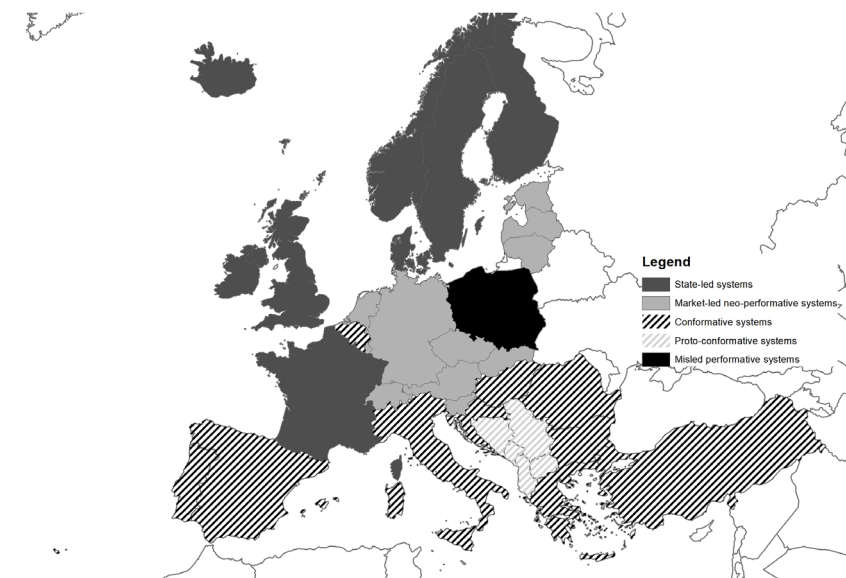


Figure 4.7. New SGPSs types. Author's own elaboration based on Berisha, Cotella, Janin Rivolin and Solly, 2020.

4.4 SGPSs AND TOD: THE ANALYSIS

Transit-Oriented Development is a spatial development strategy and it is performed in a spatial governance and planning system. The nature of each national SGPS is obviously a major concern when comes to the effective implementation of a TOD strategy, because the method used for land-use and spatial development rights provision could affect the result. For example, in an ideal conformative SGPS planning tools are developed and become legally-binding without a negotiation process with private actors; this could provoke the lack of interest in investing in proposed development areas for investors.

In the case of TOD strategies, station areas are not always appealing for real estate companies and also for the community (e.g. in the Netherlands) (Poiani & Stead, 2014a). In order to face these issues, the role of the government, with a strong political willingness of introducing TOD as development strategy, is fundamental not only in the specific act of technical planning, but also in leading the engagement and communication processes to involve and prepare private investors and community to this new development model (Newman, 2009). Strong leadership in the planning process is necessary for the success of TODs (Cervero, 2009).

Due to the influence on the success of a TOD strategy both of

the SGPS allocation of development rights, but also of the public actors capacity to lead the process the classification provided by Berisha, Cotella, Janin Rivolin and Solly has been used as starting point for selecting the countries analysed in the following chapters.

4.4.1 Research questions and objectives

This research work has been driven by the desire of providing a framework on European status of Transit-Oriented Development as a strategy useful to perform more sustainable patterns of urban development. As previously explained in Chapter 2, TOD is a strategy theorised by Calthorpe, but performed since the end of XIX Century in Europe, even without an explicit reference to this concept, that was not already existing. However, post-WWII developments in almost all the European countries were based on urban settings which favoured the car-dependency, sprawl and other major social and environmental related issues. The current need for new models to move towards sustainable development have produced a return of Transit-Oriented theory in the international planning debate.

This work tries to answer to three research questions:

- *Is Transit-Oriented Development a strategy performed in Europe?*
- *How is TOD performed in different SGPSs?*
- *How do each country SGPS elements influence TOD implementation and effectiveness?*

To answer these specific questions have been developed a study divided into 5 phases, explained in the following paragraph.

4.4.2 Method of the analysis

The phases for the selection of the case studies analysed in this work, are:

1. Research for the existing literature on TOD concerning the former EU15 Member States, available online⁵ and in the Politecnico of Turin libraries and institutional repository⁶. The research is made mainly across English literature, but also some document in French and Italian are used for specific case studies and according to the author's language competences. For each country, the key words used in the research are: "Transit-Oriented Development_name of the country" and "TOD_name

of the country";

2. A review of the available literature is done in order to understand (see paragraph 4.4.3):
 - the number of TOD related documents for each country;
 - the way in which TOD is analysed;
3. Choice of countries that are used as case studies. They belong to the three SGPSs typologies observed in the former EU15 countries (*State-led systems, market-led neo-performative systems, and conformative systems*). The selection is based on differences between nations belonging to the same spatial planning system typology, in term of:
 - spatial development patterns and issues;
 - governmental organisation;
 - availability of literature on TOD;
4. Analysis of three components⁷ for each selected country, land use and planning systems in order to understand the structures and tools and TOD practices reported by literature, effective or potentials:
 - The land-use planning system;
 - The transport planning system;
 - Review of the (effective or potential) TODs identified in the country and classified by the scale of intervention;
5. Final considerations about the selected countries are done, systematizing the discovers of the analysis in order to answer to answer to the research questions. The basis for these conclusions will be:
 - the number of implemented and potential TODs for each nation and consequentially for each SGPS, reported by literature;
 - the presence of land-use and transport integration in structures and tools;
 - the recurrence in spatial planning of key elements for a successful TOD.

⁷ As already explained in Chapter 2, the implementation of effective TOD policies should be supported by an integration between land-use and transport planning in different dimensions:

- *Vertical integration (between institutions of different levels);*
- *Inter-sectoral (between different sectors);*
- *Inter-territorial (between neighbouring authorities);*
- *Intra-sectoral (different sections of the same sector) (Geerlings & Stead, 2003).*

4.4.3 Analysis of the existing literature in the former EU15 framework

The research and review of the literature available on TOD is the first step to organize further analysis work. The former EU15 na-

⁵ The search engines used for this phase are "Google" and "Google Scholar".

⁶ PORTO (Publications Open Repository Torino).

tions have taken into consideration in this phase. As previously described, this phase of the research study is based on the availability of documents online and in the Politecnico of Torino repository. It is important to remark that in this phase the analysis is based on secondary sources (articles, books and reports). Documents the document are categorized according to the country in which the Transit-Oriented Development experience is located. Then, for the countries selected for a more detailed examination, also primary sources, like laws, policy or strategic documents and plans, are going to be added to better comprehend the relation between planning and TOD.

⁸ In some cases, the same document reports case studies from different countries, so the effective number is lower.

A wide number (110⁸ in total) of books, articles and papers discussing TOD in different countries have been found. The 90% of documents are in English language and only the remaining part is in Italian or French (see Figure 4.10); the language used for treating Transit-Oriented Development is important, because English provides to a wider audience the possibility to discover case studies not belonging to their nations. The scale in which TOD strategies are reported is mainly regional, 44%, or local, 39% (see Figure 4.11), with some literature about the national perspective of Transit-Oriented Development. Moreover, regional and local scales represent the scales in which usually TOD is performed.

Focusing on the main subjects of documents and on the way in which TOD is faced, some general categories have been selected (see Figure 4.12):

- *general concept of TOD* is the category of documents treating Transit-Oriented Development in its general concerns and providing consideration on benefits and treats or potentials and limits of the implementation in a country, region or city, without performing specific analysis;
- *effective implementation* includes the documents in which TOD have been really implemented;
- *potential implementation* is the category, gaining sources that identify policies, plans or areas that follow Transit-Oriented Development principles, but are not implemented yet;
- *transferability of TOD* is the category referring to studies about the possibility of import or export TOD from or to a specific nation;

- *measurability of TOD* is the category comprehending all the studies about attempts of measuring the key elements for TOD (Design, Density, Diversity or Node-Place model-based measurements);
- *transport policies and TOD* is the category in which are included documents talking about TOD in relation to transport policies in general;
- *sustainable transport and TOD* is the category reporting the sources that talk of TOD in relation to a wider sustainable transport objective;
- *other*.

According to the percentage of documents for each category, the majority of sources are focusing on the implementation of TOD, both effective (27%) or potential (23%); also, the category of measurability of TOD is well-represented and highlights the relevance of research on experimental quantitative methods useful in determining the characteristics of an area in relation to Transit-Oriented Development requirements.

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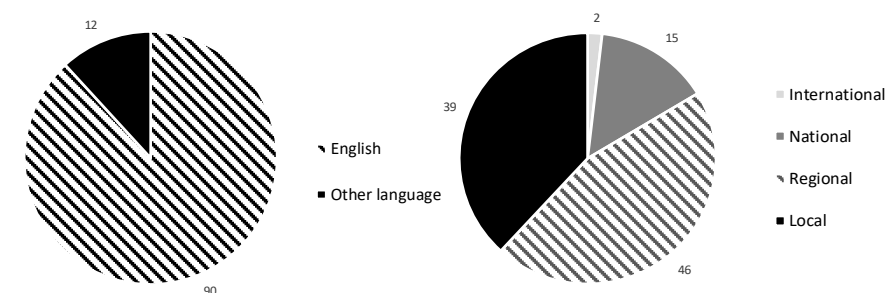
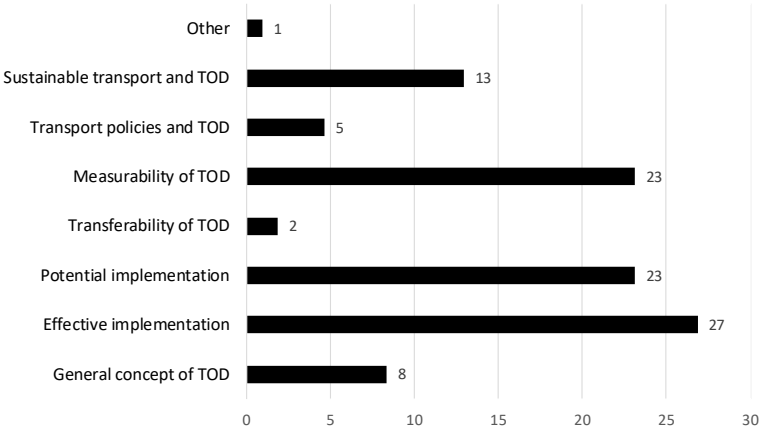


Figure 4.8 (on the left). Percentage of documents found in English and other languages (Italian and French). Author's own elaboration.
Figure 4.9 (on the right). Percentage of documents according to the scale in which TOD topic is treated. Author's own elaboration.

Table 4.3. Analysis of the literature for the former EU15 countries sorted according to the number of documents available. Author's own elaboration.

Nation	N°	Language		Scale				Main subject							
		English	Other language	International	National	Regional	Local	General concept of TOD	Effective implementation	Potential implementation	Transferability of TOD	Measurability of TOD	Transport policies and TOD	Sustainable transport and TOD	Other
Netherlands	20	20			7	8	5	2	6	2	2	4	3	1	
Italy	17	9	8	1		10	6	1	6	2			7	1	
Germany	12	11	1		1	4	7	1	3	3			1	4	
Sweden	10	10			3	4	3	2	2	1		3		1	1
Denmark	8	8		1		5	2		5	1				2	
France	8	5	3			5	3		2	2		3		1	
United Kingdom	8	7	1		3	4	1		1	5		1		1	
Belgium	6	6			1	5				3		1		2	
Portugal	6	6				3	3	1		1		4			
Greece	4	4				1	3			3		1			
Austria	3	3					3	1	1					1	
Finland	3	3				1	2	1				1		1	
Ireland	3	3			1		2		2	1					
Spain	2	2					2		1	1					
Luxemburg	0														
TOT	110	97	13	2	16	50	42	9	29	25	2	25	5	14	1

Figure 4.10. Percentage of documents according to the specific topic. Author's own elaboration.



4.4.4 Choice of the case studies

From the review of the existing literature, depicted in the previous paragraph, some countries have emerged as most concerned by TOD; eight countries have been selected (see Figure 4.11):

- four⁹ for the *State-led systems* category: Denmark, France, Sweden and United Kingdom;
- two for the *market-led neo-performative systems* category: Germany and the Netherlands;
- two for the *conformative systems* category: Belgium and Italy.

These countries are characterized by spatial development patterns and issues that are common in many cases, as in the rest of Europe. Urban sprawl, pressures for new development around major cities, lack of an efficient public transport system in small cities and regional disparities are major concerns for spatial planning. In the following chapters, the land-use and transport planning system are going to be analysed, due to the need for understanding if an integration (vertical and horizontal) is possible and could lead to TODs. Additionally, the effective or potential implementation of TOD strategies for each selected nation will be analysed, trying to understand if Transit-Oriented Development is recognised as a possible solution for urban issues and as sustainable strategy for future developments.



⁹ The higher number of countries analysed for his SGPS is linked to the interest in treating a country for each SGPS (France for conformative system category, UK for the performative one and Denmark and Sweden for neo-performative one). Additionally, Denmark and Sweden are both analysed due to the presence of interesting TOD experiences in both the countries.

Figure 4.11. Selected case studies. Author's own elaboration.

	SGPS	ALLOCATION OF LAND-USE AND SPATIAL DEVELOPMENT RIGHTS	GOVERNMENT	SPATIAL DEVELOPMENT PATTERN AND ISSUES	AVAILABLE LITERATURE ON TOD
Denmark	state-led systems	neo-performative	Unitary	Housing problems in the biggest cities, rural areas decrease of population and lack of services	8
Sweden	state-led systems	neo-performative	Unitary	Regional disparities due to lack of accessibility of certain areas	10
United Kingdom	state-led systems	performative	Unitary	Urban sprawl around major cities, need to properly govern future developments	8
France	state-led systems	conformative	Unitary	Urban sprawl, saturation of transport	8
Germany	market-led neo- performative systems	neo-performative	Federal	Regional disparities, economic development performed by biggest	12
Netherlands	market-led neo- performative systems	neo-performative	Unitary	Relatively small area with high densities, Increasing pressure for new	20
Italy	conformative	conformative	Unitary	New constructions and huge amount of disused buildings, lack of transport connections in peripheral areas	15
Belgium	conformative	conformative	Federal	Urban sprawl, car-dependency in transport, lack of integration between urban development and public transport	6

Table 4.4. Some characteristics of the eight selected countries. Author's own elaboration.

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05

STATE-LED SPATIAL PLANNING SYSTEMS and TOD

5.1 CHARACTERISTICS OF THE STATE-LED SPATIAL PLANNING SYSTEMS

In this chapter some countries are going to be analysed, which are included by a recent study of Berisha, Cotella, Rivolin and Solly (see paragraph 4.3) in the group of nations where the “spatial governance and planning system” is mainly lead by a strong public power whatever is the model of allocation of spatial development rights. Most of the countries are neo-performative systems in this group, as in the case of Denmark and Sweden, and also performative, but which have the capacity to guarantee the public power influence on spatial planning postponing the negotiations with stakeholders within detailed plans. France is a particular case, because it displays the characteristics of a conformative spatial planning system, but has the capacity to defend the State’s interests in spatial planning thanks to the strong role kept by the central government in spatial policies (Berisha, Cotella, Janin Rivolin, & Solly, 2020).

5.1.1 Choice of the case studies

Accordingly to the need of considering countries where is possible to compare the State-led planning systems to the presence of more or less effective Transit-Oriented Development experiences or research studies, four States are going to be analysed. For the regional case of the Nordic Region, Denmark and Sweden have been selected, due to their TOD implemented and potential strategies. The two cases were also interesting for the totally different geographical characterisation of spaces and for the different shades that TOD has in different contexts: for Sweden growing around a network system which should become everyday more efficient is a need mainly due to the high distances between cities and to regional disparities, for Denmark having a compact development around a good transport system is due to small spaces, to the presence of geographical discontinuities, as the big number of islands. United Kingdom has been selected as the only representative of the performative spatial planning system, the State has been one of the first in implementing a TOD for facing to urban development problems of London and the approach is currently applied for single projects. The last country analysed is France where despite of the conformative characterisation of planning system has a strong presence of the public

power in the definition of urban developments, it also concerns the TOD experience, among other the *contrat d'axe*, which is mainly the result of public-public forms of co-operation.

5.2 THE NORDIC REGION

The Nordic region, comprehensive of Sweden, Finland, Iceland, Norway and Denmark, has always been considered in a grouped category from an international point of view due to similarities in their governance, but there are differences in how each country organizes its spatial planning system (Nordregio, 2019). Nordic countries also have common characteristics about political principles and lifestyles which have always been key factors for trans-national co-operation, an example is the “Nordic Co-operation” which reunites the ministers of the involved states to provide shared visions and documents (Nordic Co-operation, 2019).

Anyway, two nations of the region are going to be analysed, because of the common and well-established tradition of basing the urban development choices on the transportation opportunities and vice versa and different spatial characteristics. In fact, Denmark and Sweden have many common spatial policy elements, but they are also deeply different in the geographic organisation of the country: Denmark is relatively small with a quite well-distributed urbanisation, instead Sweden is a big nation with few big cities, mainly concentrated in the Southern area. The choice of these two countries is also related to the fact that they are member states of the European Union, but only Finland of the Euro-zone; instead, Iceland and Norway are members of the EFTA (European Free Trade Association) (Nordic Council of Ministers, 2018).

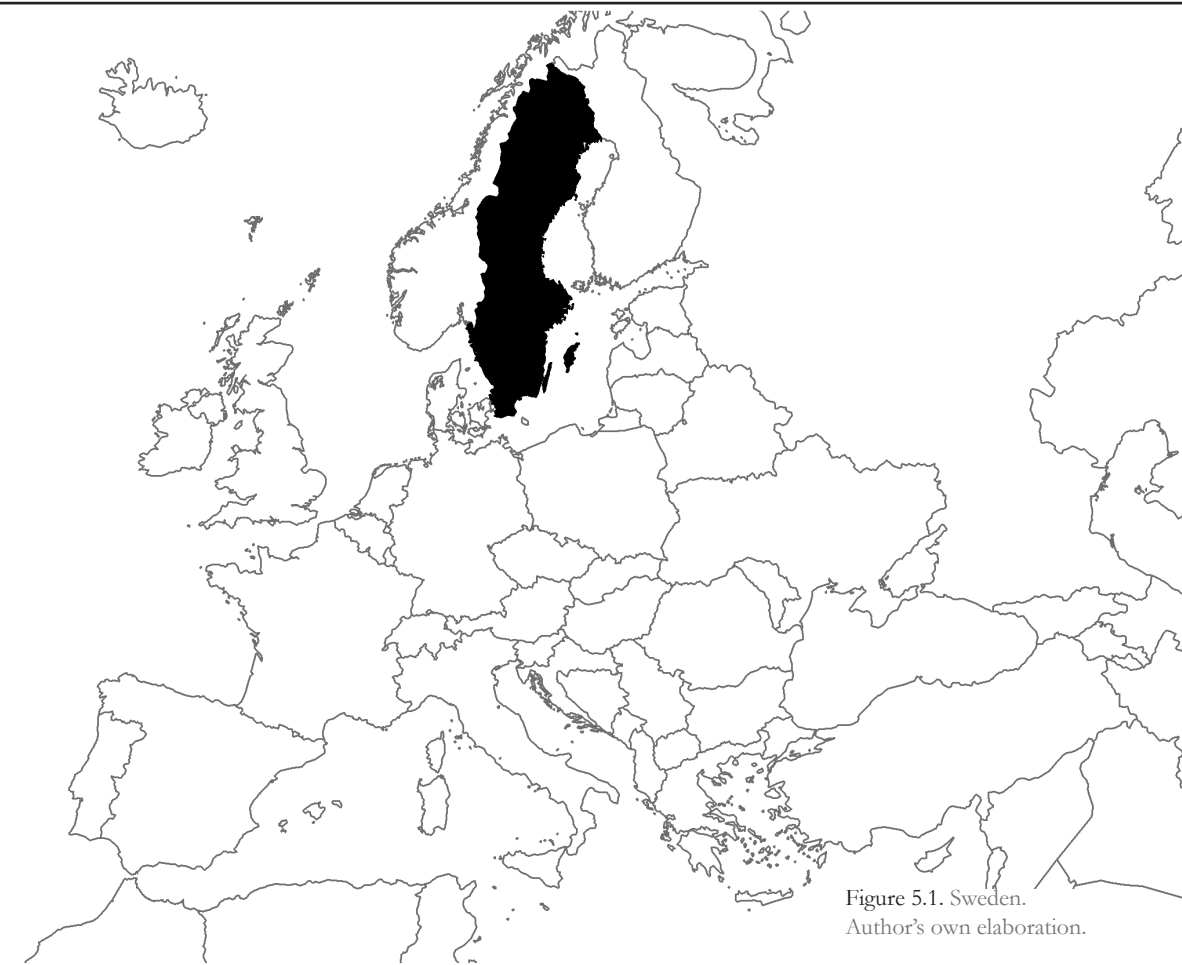


Figure 5.1. Sweden.
Author's own elaboration.

5.2.1 Sweden

The first country part of the Nordic Region which is going to be analysed is Sweden, situated in the middle of Scandinavia; with a size of about 450.000 square kilometres is the third biggest nation of Europe, but with a low total population of just 10.3 million inhabitants and a density of just 20 inhabitants per square kilometre (World Atlas, 2017b). As anticipated, Sweden has a settlement pattern which is mainly concentrated in big metropolitan regions, where more than two-third of the population lives. It could be defined as an “archipelago” model, with the 24 major urban areas “floating” in the expanse of woods, rural areas and minor municipalities (Böhme, 2002).

The causes of this particular physical development stand in the late industrialisation in the country, where in the ‘30s still the greater part of population was living in rural areas, while in other European nations the migration to urban areas was already happening. In 1980, there were only 20 towns with more than 50.000 inhabitants and the Stockholm, Goteborg and Malmo metropolitan areas were

the only ones providing good possibilities for spatial development and were represented the main “expanding regions” (Stojanovski, 2013). As in other European countries, the city development has followed a dispersed pattern in order to accommodate private cars during the past century (Stojanovski, 2013). Still today the main problem concerning the Swedish territorial governance are the regional imbalances, due to different degree of population, labour opportunities and accessibility (Spatial Planning and Energy for Communities in All Landscape, 2019).

Sweden is a constitutional monarchy and parliamentary democracy with three main level of government:

- National;
- 21 Regions or *Län*;
- 290 municipalities.

The Legal system belongs to the civil law founded on the classical Roman Law, but it has also been influenced by the German interpretation of this tradition, mainly highlighted by the dependence on statutory law (Bodleian Libraries, 2019).

5.2.1.1 Land-use planning system

For what concerns spatial planning, the EU Compendium included Sweden in the “comprehensive-integrated” tradition. In recent studies, it is also considered a country with a “neo-performative” system of territorial governance, where the power is mainly held by the public authorities and the building rights are assigned case-by-case through a co-operation between municipalities and private actors (Janin Rivolin, 2016).

In general, the tradition for physical planning in Sweden is based on a “municipal planning monopoly”.

The legislative evolution concerning spatial planning has followed four main steps:

- in 1907, the Town and Planning Act (*Stadsplanelagen*) was enacted and introduced the “municipal planning monopoly”, according to the idea that each municipality should guide its development and should keep the property rights. The law was criticised because of its flaws in governing the rural development and urban expansions which resulted to be poorly controlled;
- in 1947, the Building Code (*Bylagg*) changed some elements and

introduced the detailed plans at the municipal level which were compulsory to define future urban expansions in a more controlled way;

- in the 1987, the Swedish legislation was reformed and two new laws were enacted: the Natural Resources Act (*Naturresurslagen* or NRL) and the Planning and Building Act (*Plan-och bygglagg* or PBL). They introduced the capability of the National level of government to intervene on local decisions when they are in conflict with the national interest;
- in 1998, the Swedish Environmental Code (*Miljöbalken* or MB) was adopted, substituting the NRL, but keeping the PBL, in order to promote the sustainable development of the country.

The national level is responsible for the framework legislation that defines the system of land-use planning, provides the guidelines that municipalities have to follow in their plan-making process, defines the building code and selects areas which should be absolutely preserved from development (OECD, 2017c). There are different Ministries influencing with their policies the spatial planning of Sweden, but there are only providing general national policies.

The national level of government should intervene with the municipal planning, on comprehensive plans, detailed plans and area regulations when one of the following 5 conditions happen:

- a national interest is not considered;
- inter-municipal planning issues have not been coordinated;
- an environmental quality standard is not followed;
- the protection of shores is lifted but is conflicting;
- the regulations or planned buildings are unsuitable to health,

security, disaster, flooding or erosion risks (MLIT, 2014).

Additionally to ministries, at the national level have an important role the “National Board of Housing, Building and Planning” (*Boverket*), which is incorporated into the Ministry of Finance and the responsibility for supervising the municipal and country planning activities (from legislative, procedural and architectural perspectives), assessing the national planning regulation accordance with EU policies and providing statistics internationally and in Sweden (Boverket, 2019).

At the regional level, two main bodies with competences for planning: the County Council (*Landsting*), which is a body directly elect-

ed every four years and is mainly responsible for health, transportation, and the County Administrative Board (*Länsstyrelsen*), which is a decentralized part of the national administration and has to represent the national government's interests in planning processes and to ensure the respect of the national guidelines and codes (OECD, 2017c). Regional Plans concerning the spatial development of the region could be realised, but they are voluntary and not legally-binding, so there is no *Län* actually realising this kind of documents. The only exception is the Stockholm Region, because of the special law called "Stockholm County Act" of 1987, which oblige the capital city to have a Regional Plan (MLIT, 2014).

The only document produced at the regional level is the Regional Development Strategy, that should be aligned to the *National Strategy for Sustainable Regional Growth and Attractiveness*.

The local level is the one having the stronger spatial planning competences and its main authority is the City Council, directly elected every four years. Municipalities have the juridical monopoly on spatial planning, and it is developed through three instruments:

- the Comprehensive Plan (*Översiktsplan* or OP) is not legally-binding and it is referred to the whole municipal area. It basically provides an overview about the urban development, ensuring the alignment to national interests and environmental issues;
- the Detailed Plan (*Detaljplan* or DP) is the legally-binding plan and it is not referred to the whole municipality, but only to the area with planned major urban development. The DP is developed together with the residents and the stakeholders and the County Administration Board should verify its coordination with upper level strategies and interests;
- the Area Regulation (*Områdesbestämmelse* or OB) (Nordregio, 2004).

The end of the planning process is represented by the release of the Building Permission (*bygglov*) that is granted only if the presented project is in accordance to the DP (Janin Rivolin, 2016).

Planning scale	National level		Regional level		City level
Authority	Six Ministers	National Board of Housing, Building and Planning (<i>Boverket</i>)	County Council (<i>Landsting</i>)	County Administrative Board (<i>Länsstyrelsen</i>)	City Council
Instruments	National Strategy for Sustainable Regional Growth and Attractiveness	-	Regional Plan (only in Stockholm) (not legally-binding). Regional Development Strategy.	-	Comprehensive Plan (OP) (not legally-binding). Detailed Plan (DP). Area Regulation (OB).
Responsibilities	Providing guidelines and frameworks for development (without spatial elements); Intervention in case of municipalities not following the national interests.	Ensuring the accordance between national policies to the European ones; Supervising the town and country planning activities. Providing statistics.	Providing a strategic spatial plan (not-legally binding); Providing guidelines for the regional development.	Supervising the elaboration of the Detailed Plans (DP); Ensuring accordance between the municipalities' plans and the regional and national interest.	Elaboration of the plans; Releasing of the Building Permissions.

5.2.1.2 Transport planning system

Transport planning in Sweden has the same levels of the land-use planning system, but with reinforced responsibilities at the Regional level, whose tasks were partially changed in 2012 by the new legislation which emphasizes the strategic level of regional transport planning, and also the interest in enhancing methods for costs-benefits analysis (Johansson, Winslott Hiselius, Koglin, & Wretstrand, 2017).

At the National level of government, the Ministry of Infrastructure is the responsible for the Transport Policy and the *Swedish National Transport Plan*, even if it is usually developed by the Swedish Transport Administration (*Trafikverket*) and then submitted to the government for the adoption. The national plan has a long-term vision of 10 years and the last one has been adopted in 2018 and will endure until 2029. The *Trafikverket* has also the responsibility for developing the implementation plan, with a 6 years vision, in order

Table 5.1. Land-use planning system in Sweden.
Author's own elaboration.

to define the implementation steps during the period and assess the impacts of the plan on the transportation system (Trafikverket, 2018). In recent years, the Transport Administration is considering with a renewed interest how urban planning could help to reduce the need of private cars in cities; because of difficulties in changing the built environment to fit it for transport, without big investments, the attention is focusing on reducing the space available for car traffic and in developing roads and railways in more efficient ways. The Swedish Transport Administration also encourages local administrations to work with users and with other municipalities to co-ordinate planning and policies (Eriksson, 2015).

Regions have the responsibility for local public transport and almost everyone has a politically controlled body, the Public Transport Authority (PTA), that sets the policy direction for regional and local public transport, additionally to the timetable and service planning. The County Council is responsible for the development of Regional Transport Plans, which lists projects to be delivered, but there are not possibilities to have funds for all of them (Rye & Wretstrand, 2019). Locally, the municipalities provides most roads and cycling and walking infrastructures, developing Urban Mobility Strategies or Plans, but mostly the local infrastructure developments or renewals are contained in Comprehensive Plans (OP) (City of Stockholm, 2012).

Table 5.2. Transport planning system in Sweden. Author's own elaboration.

Planning scale	National level		Regional level		City level
Authority	Minister of Infrastructure	Swedish Transport Administration (Trafikverket)	County Council (Landsting)	Public Transport Authority	City Council
Instruments	Transport Policy	Implementation Plan (6 years vision)	Regional Transport Plan (12 years vision)	Regional Public Transport Policy and service planning	Comprehensive Plan (OP) (not legally-binding). Urban Mobility Plan
	Swedish National Transport Plan (12 years vision)				
Responsibilities	Setting the National goals for transport system;	Implementing the national plan;	Listing the regional interest projects which should be funded.	Regulating the public transport service (timeline, operators, etc.).	Underlining in the OP the spatial implication of transport goals; Setting a strategy for a more sustainable urban mobility.
	Defining the national infrastructural developments and funds.	Monitoring the effects of each action.			

5.2.1.3 Swedish TOD strategies and projects implemented and potential

Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD strategy	Potential Single project TOD	
Stockholm new towns	x						
Stockholm Comprehensive Plan		x					
Hammarby Sjöstad			x				
Skurup					x		x
Önnestad					x		
Malmö					x		

Table 5.3. TOD (implemented and potential) case studies reported by literature in Sweden. Author's own elaboration.

From the previous analysis is clear that transport is still remaining a sectoral policy and the integration between land-use and transport planning could be difficult, especially if the responsibilities for each sector are not shared by the same planning level. Land-use planning is still performed strongly by municipalities and regions have almost no competence in setting the future spatial development; on the contrary, transport planning is more widely spread through the three level of planning and each one has a specific task.

However, the Swedish case study has showed the existence of different TOD experiences, which have been analysed by different authors.

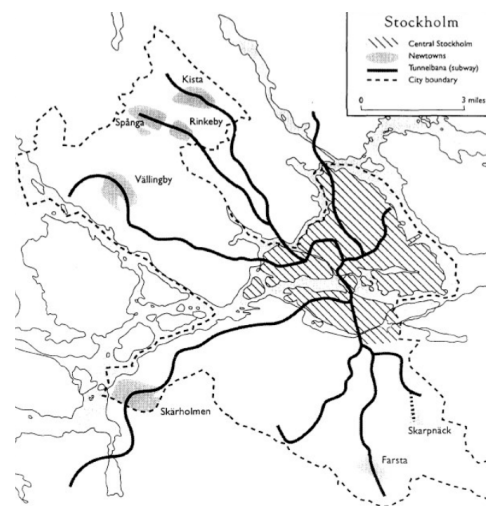
Historically between the end of the XIX Century and the beginning of the XX Century, as in many other European countries and, especially capital cities, Stockholm was interested by a suburban development which took inspiration from the “garden suburbs”. In that period, investments on railway lines connecting the new centres to the city dramatically arose the real estate values and many private investors financed this kind of development. Two examples are the Roslagsbana which connected Djursholm to Stockholm (10 minutes trip) and the Sältsjöbana which connect Slussen (Stojanovski, 2013). Between 1950 and 1970, with the increasing population in

the city, the first generation of satellite towns were designed, including Vällingby, Farsta, Skärholmen, Järva, and Täby; each town contained 80.000 to 100.000 inhabitants with a maximum distance of 1 kilometre from a subway station. The policy was called the ABC, which provided the formula for the regulation of local land-use mix:

- A = Arbete (jobs);
- B = Bostad (housing);
- C = Centrum (services).

The city was able to develop simultaneously both the urban development and the public transport system, but in the second generation of satellites cities, Spånga, Kista, and Skärpnack, the prevalence of more specialised communities in each area, without a social and land-use mix as for the first five cities. Consequently, these new towns were deeply dependent on the rest of the region and the use of cars was higher than in the precedent generation (Pojani & Stead, 2018).

Figure 5.2. Tunnelbana development of Stockholm and ABC cities.
Source: Matthew Ian Burke (https://www.researchgate.net/publication/238733275_Employment_decentralisation_in_South_East_Queensland_Scoping_the_transport_impacts/figures).



From the late '80s the focus was mainly the infilling or redevelopment of existing urban areas. Generally, the most relevant reported case is the Hammarby Sjöstad project in Stockholm realised by the City of Stockholm for the bid to host the 2004 Olympics, as part of the ecological Olympic village. The bid was unsuccessful, but the site has been converted from an industrial area to a mixed-use district

with efficient public transit connections thanks to the presence of the light rail Tvärbanan. The efficiency of the integration between the land-use and the transport system in this project is proved by the fact that only 21% of trips made by residents are by private cars, the 52% by public transportation and 27% by bicycle (C40 Cities, 2016). Hammarby Sjöstad is defined as an example of “green

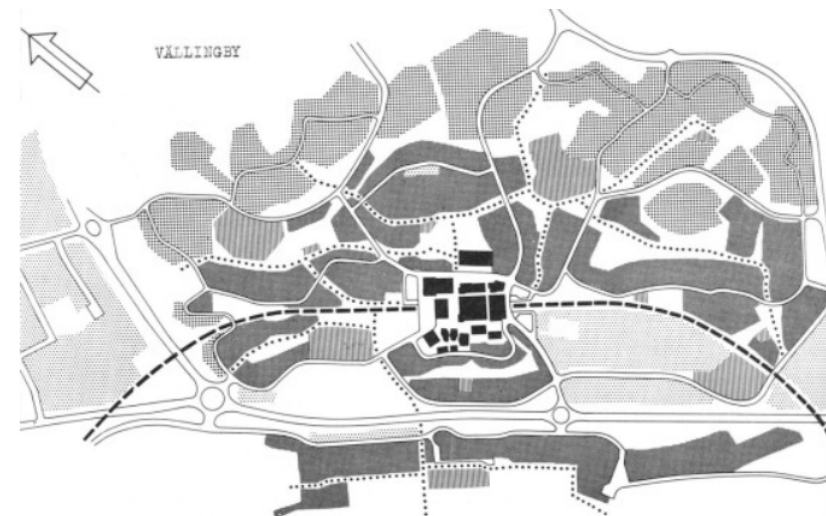


Figure 5.3. Vällingby central neighbourhood.
Source: Living Rail (http://81.47.175.201/livingrail/index.php?option=com_content&view=article&id=746:2014)



Figure 5.4. Hammarby Sjöstad waterfront.
Source: Urban Green-Blue Grids.

TOD” because of the prominent use of parks, walkways and green spaces through the area and also to the preservation of the natural landscape (Cervero & Sullivan, 2011) (Suzuki & Iuchi, 2013). Still focusing on Stockholm, the discussion about new potential development based on TOD principles is strong, mainly due to the need to decongest the city centre. One proposal of 2014 was to create a new line of the Tunnelbana, connecting three cities in the southern part of the region: Älvajö, Hagsätra and Arstafältet. The project is supposed to be completed by 2035 and some studies have been developed about the potential attractiveness of the area according to the future scenario: if a TOD strategy is going to be implemented in these areas the values will be higher (Stojanovski, Alam, & Janson, 2014). Even if the regional level of planning is weak in almost every part of Sweden, the Stockholm Region seems

Figure 5.5. Extension of the Tunnelbana project. Source: SVT Nyheter (<https://www.svt.se/nyheter/lokalt/stockholm/sa-har-blir-nya-tunnelbanan-fridhemsplan-alvsjo>).



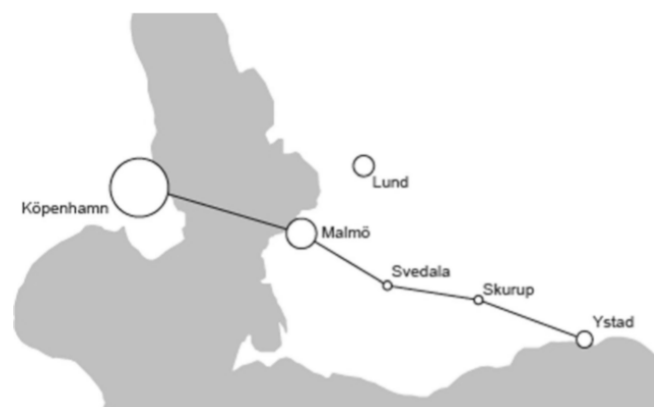
to be a leading example of how it is possible to coordinate rail transit and urban development (Pojani & Stead, 2018).

Also variation of the TOD concept are analysed as potential future scenario, the Bus Rapid Transit (BRT), the Light Rail Transit (LRT) could be a potential solution to reach the most sprawled parts of cities, thanks to their major flexibility compared to railways (Stojanovski, 2013).

Goteborg is cited by Stojanovski as one of the few cities that have kept their tramway system and have integrated it to bus-ways

and nowadays the city has a system efficiently covering all the city and a future development in the former northern industrial area, Norra Älvstranden, is supposed to create a dense and diverse urban environment. Hypothesis of TOD strategies are not only inserted in big cities frameworks, but also in medium-dimension urban centres; an example are the studies on the municipality of Skurup, which is also one of the railway stops of the line connecting Malmö and Ystad and the Öresund Region.

Figure 5.6. The Malmö-Ystad railway line. Source: Illustration by Jens Bengtsson.



Since the opening of the station in 1874, Skurup grew thanks to the connection with the two major cities and still today the municipality wants to claim its right to grow even more in the region. Passengers in the Skurup station have doubled between 2000 and 2013 and more than 40 trains pass every day in each direction. The history and the mobility pattern of the city could be combined into a TOD strategy, but it is only a potential implementation (Qvistrom & Bengtsson, 2015).

Another small-town object of studies on possible TOD strategies is Önnestad, consisting of about 1.350 inhabitants according to 2010 statistics and located in the North-West of the Kristianstad region. The municipality has a railway station, closed in 1978 for insufficient travel usage and reopened in the 2012 thanks to a Trafikverket's program. The municipality took the opportunity and developed a Comprehensive Plan in which further expansions are inserted in the northern and southern part of the railway: the future development is expected to respect the green areas and landscape, characteristic of the historical village, according to the Green TOD principles (Nilsson, 2014).

All these municipal experiences of proposal for TOD strategies, started after national funding programs or local initiatives, are using as principal instruments Comprehensive Plans, which not represent anymore only the idea of the spatial development in a city, but are having more and more a strategic vision of the future of the municipality integrating various sectors, among other land-use and transport planning (Ptichnikova, 2012). The recent Comprehensive Plan of Stockholm published in 2018 is the prominent example of this new generation of plans integrating in a single document all the sectoral strategies approved by the City Council, from energy policies (*Fossil fuel free Stockholm 2040*), to environmental programme, to the Urban Mobility Strategy. The plan openly refers to an expansion strategy which concentrates investments on focus areas near public transportation hubs and their connection with the city centre (City of Stockholm, 2018).

Another municipality which has made of transport network one of the key factors not only for city development, but also for the regional and international cooperation is Malmö, located as Skurup in the Öresund region. In its Comprehensive Plan of 2014 integrates

different sectoral strategies, trying to prioritize public transport, cycling and walking by creating a more dense, mixed-function and connected city (City of Malmö, 2014).

In conclusion, Sweden has a good number of implemented and potential TOD strategies, both for big metropolitan areas and to middle and small sized cities. The integration between transport and land-use planning has a long tradition and it is reinforced in the new generation of plans. However, the lack of a strong regional power in spatial planning could slow down the co-operation between different municipalities and generate competition in some case; this evidence is highlighted by the presence of an effective TOD mainly in Stockholm, where the regional planning level is present.



Figure 5.7. Denmark.
Author's own elaboration.

5.2.2 Denmark

Denmark is the second nation belonging to the “Nordic Region” which is going to be analysed. This country has opposite geographical characteristics compared to the previous one: it is mainly composed by flat areas and only in the central part of the Jutland Peninsula it is possible to find some hills. Denmark also counts about 500 islands, 88 of which are inhabited. The total area is about of 43.000 square kilometres, one-sixth of the Swedish extension, and the population is much more concentrated with 5 million inhabitants and a population density of about 131 inhabit/km² (World Atlas, 2017a). The development pattern has concentrated the urban population in five major urban areas: Copenhagen, Århus, Odense, Ålborg and Esbjerg, but one-third of the population lives in the Copenhagen metropolitan area (URBACT, 2019).

Public sector has a strong role in Denmark and the Danish welfare system is based on a strong role of the government in all the policy sectors and this approach has succeeded in providing a high level of well-being with free access to education and health, also thanks

to the high taxation (48% of the GDP).

Focusing on spatial planning the *EU Compendium of Spatial Planning Systems and Policies* had inserted in 1997 the Danish case into the so called “comprehensive-integrated approach”, thanks to the tradition of coordinate different level of government and different sectors through a good degree of vertical and horizontal integration (Galland & Enemark, 2012). Another classification concerning the spatial planning systems puts Denmark, as Sweden, in the countries characterized by a “neo-performative” model of planning, where building permits are assigned after negotiations with private investors (Janin Rivolin, 2017).

5.2.2.1 Land-use planning system

As for Sweden, Denmark has three level of government, each one has different responsibilities and instruments for land-use and transport planning:

- National;
- 5 Regions (before 2007 there were 14 counties);
- 98 Municipalities (before 2007 there were 271) (OECD, 2017a).

The spatial planning systems also refers to three typologies of zones in the country: the urban areas and the recreational areas, where there are first and second houses and where it is possible to establish further developments and the rural areas, where any land-use is banned except for agriculture and forestry (Galland & Enemark, 2012).

The changes are referring to the 2007 “Reform of Local Government”, which has strengthened the role of the State in spatial planning and has reduced the local bodies, but the nation has a long history of reforming its planning system (Ministry of Environment, 2007) (Ostergard, 2009). The first town-planning act was in 1925, but it was not used and in 1938 a new act imposed to urban areas with more 1.000 inhabitants to adopt a “town planning by law”, but that regulation was only referring to urban areas and was not effective in preventing urban sprawl. In 1949 the problem was tried to be solved by an act (*Byreguleringsloven*) which focused on spatial planning across municipal borders and was followed in 1960 and in 1963 by acts on rural areas and land regulations. Between the ‘70s and the ‘80s the reforms started changing the regional and local lev-

el of government creating the 277 municipalities and the former 14 counties. In this period, there was the introduction of the comprehensive planning approach, which still characterizes the planning activity at all the levels. In 1992, the new Planning Act (*Lov om Planlægning*) expressed a further decentralisation of the planning activity and reducing the delivery period of the Ministry of Environment reports on spatial development.

As anticipated the spatial planning system had other modifications in 2007; actually, spatial planning in Denmark must ensure:

- “a desirable development of the country as a whole and of the individual regions and local authorities, based on overall planning and socio-economic considerations;
- the creation and conservation of valuable buildings, urban environments and landscapes;
- the preservation of open coastal areas as a continued important nature and landscape resource;
- the prevention of air, water and soil pollution and noise nuisance;
- the involvement of the public in the planning process as much as possible” (Ministry of Environment, 2012, p. 8).

After 2007, there have been other amendments regarding spatial planning, housing and environment:

- Local planning to deal with climate change and simplification of the act (2012)
- Protection of nature (2011);
- Protection of the environment (2011);
- Country district development, the retail trade and protection of coastal areas (2011);
- Management of the risk of flooding from water courses and lakes (2009);
- Construction of small buildings in country zones (2009).

In general terms, the Danish planning system could be defined as three-tier system of spatial development plans and two-tiers system of land-use plans, because every level of government prepares a strategic framework for spatial development, and only two instruments are really setting the land-use destination of an area.

At the national level, the authority responsible for spatial planning is the Ministry of Environment (*Miljøministeret*) who is in charged for preparing every general election (four years) a “National Planning

Report” (*Landsplanredegørelser*) in which are specified the visions and perspectives for the planning topic; additionally, the ministry has to prepare a “*Summary of National Interests in Local Planning*” containing the requirements that local plans should meet to be aligned to the national policies. Finally, the “*National Planning Directives*” (*Landspladirektiver*) sets the rules in planning and through this document the national government could promote specific projects (Enermark, 2002).

National planning is expressed through reports, binding instructions, guidelines and intervention in municipal planning for themes and projects of international, national or regional interest (COMMIN). Also, an agency is part of the national level of planning, the Nature Agency (*Naturstyrelsen*), which is the administrative authority which is responsible for facilitating the planning system and monitoring the land-use planning tasks carried at the local level. It also represents Denmark at the international cooperation of spatial planning and in the environmental impact assessment (Galland & Enemark, 2012) (Ministry of Environment, 2007).

The regional level of government produces the “Regional Growth and Development Strategy” which is published in the first two years after the elections and should describe the future development, according to the national planning, the collaborations between the regions and other public authorities and the actions that are going to be implemented by the Regional Council (Ministry of Environment, 2012).

Finally, Local Councils are responsible for both the delivery of a strategic instrument, the Municipal planning Strategy, and also a land-use binding comprehensive instrument, the Municipal Plan (*Kommunerplaner*). It serves both as a strategy for spatial, economic and social development, but also to define the priorities of development in the municipality and the guidelines for land use; it is not legally binding, but it has to be followed as much as possible by the Local Council (Galland & Enemark, 2012).

The last instrument for land-use planning, and also the one which is legally binding for the property is the Local Plan (*Lokalplaner*) and it is usually composed by detailed projects for the main development areas of the municipality, with a scale ranging from 1:10.000 to 1:1.000 (OECD, 2017a).

Planning scale	National level		Regional level	City level
Authority	Ministry of Environment	Nature Agency	Regional Council	Local Council
Instruments	National Planning Report (every four years), Summary of national interests in local planning, National Planning directives	-	Regional Growth and Development Strategy	Municipal Planning Strategy, Municipal Plan (not legally binding), Local Plan.
Responsibilities	Definition of objectives of the national planning, Setting of the requirements for local planning.	Monitoring the implementation of plans at the local Representing Denmark in international cooperation.	Setting of patterns for future development in different sectors.	Setting of a municipal planning strategy, Regulating land-use in towns and the countryside.

5.2.2.2 Transport planning system

The Denmark infrastructure system is changed a lot in history, basically adapting to new commercial routes and technological advances in transport system and until the XVIII Century the main mode of transport was shipping. With the start of agricultural activities and to the growth of villages a street network was realised between towns. The industrialisation process in XIX Century the railway network was implemented and began the dominant mode of transport and towns started arising along railway stations. Programmes for connecting the whole country has their major example in the national plan of 1962 for creating the “Big H”, a network of motorways and railways which nowadays is completed (Ministry of Foreign Affairs of Denmark, 2008).

Transport system in Denmark is claimed to be one the most efficient in Europe and also Denmark is one of the European countries where the public transportation covers a larger share of passengers (Vad Mathiesen & Kappel, 2013). Transport policy is deeply influenced by the idea of sustainability, since 2009 when the Danish Government adopted its document “Sustainable Transport – Better infrastructure”, which was a long-term transport policy oriented to a “green” dimension. The main objectives in the policy are:

Table 5.4. Land-use planning system in Denmark.
Author’s own elaboration.

- the reduction of cars and the shift to greener vehicles, producing less CO₂;
- the improvement of public transport to create an alternative to cars;
- the set of new measures which guarantee accessibility to stations to cyclists;
- the replacement of fossil fuels with greener technologies (Danish Government, 2009).

Since then, other national initiatives have been developed by the Ministry of Transport (*Transportministeren*), responsible for transport planning. The first one is the 2012 “A Greener Transport System in Denmark”, which highlighted again the need to shift to more efficient transport modes and to cleaner energy sources, not only for passengers but also for freights transportation. The document also talk about one of the prominent priorities in national level infrastructure investments: the completion of the “Fehmarn Belt” a railway connection between Hamburg and Copenhagen which should allow to reduce the travel time to 2 hours and also decrease the car dependency for travels between Germany and Denmark. The new connection is part of the TEN-T European project and is supposed

to increase job opportunities (Ministry of Transport, 2012). The importance of the bike as mode of transport emerges in every national document and in 2014 a specific strategy for bicycles was developed by the Ministry of Transport, promoting:

- a further connection between cycling and public transport,
- the improvement of the recreational routes for cyclists, in order to make bikes part of holiday activities, and the support of bicycle tourism;
- the creation of new and safe

er routes to schools and leisure activities and cultural initiatives to promote cycling (Ministry of Transport, 2014).

The Ministry of Transport is responsible for the setting of policy about transport, both comprehensive, as the ones of 2009 and 2012, and more “modal” as the one of 2014. Then, as for spatial development issues, a governmental agency, the Danish Transport, Construction and Housing Authority (*Trafik-, Bygge-og Boligstyrelsen*) is responsible for the management of the transportation systems and for ensuring the correct implementation of national strategies (Danish Transport, Construction and Housing Authority, 2019).

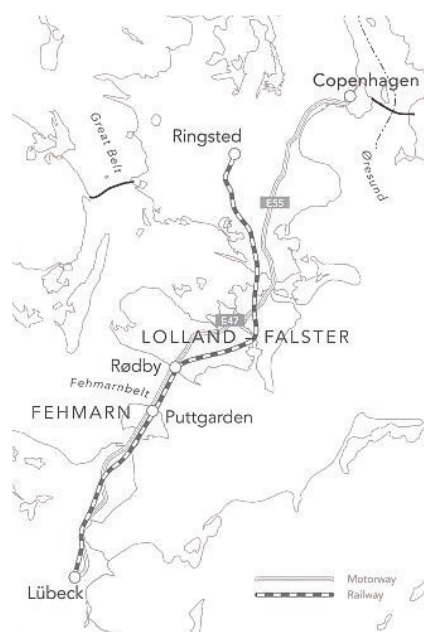
The Regional Councils are responsible for integrating the transport planning into their Regional Growth and Development Strategies which are comprehensive strategic plans, mainly setting the priority projects which are going to be implemented (North Denmark Region, 2015).

Also at the local level the transport and mobility planning is integrated into the municipal planning strategies and plans, ensuring the accordance between infrastructure investments and developments and new urban expansions or renewals (OECD, 2009).

Table 5.5. Transport planning system in Denmark.
Author's own elaboration.

Planning scale	National level		Regional level	City level
Authority	Ministry of Transport	Danish Transport, Construction and Housing Authority	Regional Council	Local Council
Instruments	National Transport Policies	-	Regional Growth and Development Strategy	Municipal Planning Strategy, Municipal Plan
Responsibilities	Setting priority projects at national level, Setting of regulations and taxes, Creating a theoretical framework for the development of local discussion on mobility.	Management of the transport systems, Implementation of national strategies, Monitoring regional and local policies on transport.	Setting of priority transport-related initiatives to be founded.	Setting of local policies for sustainable transport and mobility.

Figure 5.8. The “Fehmarn Belt” map.
Source: Crossing the Baltic (<http://crossingthebaltic.com/2012/10/25/the-fixed-fehmarn-belt-link-a-story-of-tunnels-and-bridges/>).



5.2.2.3 Danish TOD strategies and projects implemented and potential

Table 5.6. TOD (implemented and potential) case studies reported by literature in Denmark. Author's own elaboration.

Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD strategy	Potential Single project TOD	
Copenhagen Finger Plan 1947	x						
Ørestad City			x				
Copenhagen Finger Plan 2014				x			

The Danish land-use and transport planning system, thanks to the prominence of the strategic instruments, and to the coordination of different level and sectors, have a good integration. However, the strategies have a lack of really representing the spatial effects of policies and tend to be an ideological position of the government in place (Galland & Enemark, 2012). The integration in a single instrument of transport policies for planning and land use, both at regional and local level, has a long tradition started in 1947 with the first regional plan of Denmark, the “Finger Plan” concerning the Copenhagen Capital Region (see *paragraph 2.3.2*). Based on the British town planning experience of “new towns”, the plan was able to guide the metropolitan development around Copenhagen along the five main axes, guaranteeing green spaces between the “fingers”. The plan is provided as a great *ex-ante* example of TOD, and moreover of the European experience of integration between urban development and transit (Ministry of Foreign Affairs of Denmark, 2008) (Vejre, Primadahl, & Brandt, 2007).

The Danish capital did not stop growing and in 1973 and 1989, two new regional plans were developed, always following the transit-oriented development principles, providing industrial services and facilities within 1 kilometre from the railway stations and promoting the electrification of the existing lines (Cahasan & Clark, 2017). In the 1990s, for make Copenhagen internationally competitive were developed some mega-projects, the most famous the Ørestad New

Town and Metro, the Ørestad bridge connecting the Danish capital with the Swedish city Malmö and the redevelopment of the Copenhagen Harbourfront. The Ørestad New Town is an example of TOD and it was a new finger in the Amager island in the south of the city and was supposed to be completely built up by a public cooperation between the state and the city. The project could be divided in four main districts: the Ørestad North, which is nearest to Copenhagen, the Ørestad South, the Amager Common District and the City. The Ørestad City is in a strategic international position, between the centre of the capital and its airport and it is served by 2 metro station, a regional railway station and a motorway. Instead both the Ørestad North and South are connected by two metro stations, but all the area is designed to have a great accessibility to public transport and car parkings are restricted for residents (Knowles, 2012).

Transit-Oriented Development is still a highly used strategy in Denmark and another example is the development of new Finger Plan in 2013 by the Ministry of the Environment, because of the reform of 2007, covering the 34 municipalities and dividing the area in four zones: the core urban region, the urban peripheral region, the green wedges and the rest of the Greater Copenhagen area. The main principle of the plan is “requiring location near station”, which perfectly represents the TOD idea behind the regional development, and the plan imposes that big urban development should be located near stations. The regulations contained in the plan also strengthen the responsibility of municipalities and private investors to provide optimal solutions to locate in a proper way new development projects (Ministry of Environment, 2013). “Near the stations” is one of the



Figure 5.9. The Ørestad development project. Source: Greater Copenhagen Investments (<https://www.investcph.com/projects/development/orestad>).

more repeated expressions through the plan and it remembers that TOD in Denmark is not about research or theory, but about real implementation.

The City of Copenhagen has also published its Municipal Planning Strategy and Municipal Plan in 2014 and 2015, following the directives of the new Finger Plan. The city strategy is based on the provisions for future population growth (100.000 more inhabitants in 2027) in Copenhagen and one of the objectives is “dense and sustainable city around stations” recognizing the benefits from dense, mixed-use and well-designed areas around stations as an attraction factor for new residents, but also for private companies (City of Copenhagen, 2014) (City of Copenhagen, 2015).

Figure 5.10. Urban development areas in Copenhagen, defined by 600 metres buffers around existing (light areas) and future stations (dark areas). Source: City of Copenhagen, 2015.



Figure 5.11. United Kingdom. Author's own elaboration.

5.3 UNITED KINGDOM

In the United Kingdom is widely diffuse a way of planning that tries to integrate the public transportation and the land-use. Historically the most famous attempt in UK to create a brand-new regional development based on public transport was the “Greater London Plan” of 1944: Patrick Abercrombie, one of the most prominent town planners of the time was member of the committee that had the responsibility to design and develop the new town plan. He had as main objective to reduce the density of the city of London, creating a set of new towns all around the city, connected with railroad lines and new roads that were supposed to make workers’ commute to the workplace easy. This approach was successful in providing a control on the capital population growth, assuring to the inhabitants a higher quality of life thanks to the creation of the “green belt” around London (Van Roosmalen, 1997).

The integration between land-use and transportation has been part of the common mindset of planners in UK, even if it is not always openly referred as a TOD strategy, but the strategic nature of the

British spatial planning has been through the years to set objective that wanted to develop new areas thanks to transit, providing new chances of mobility and housing.

5.3.1 Land-use planning system

The planning system in the United Kingdom is strongly characterised by the common law¹ legal system. This type of legal system is more flexible than other in Europe, based on the model of a liberal state, and it has effects even on the planning system, defined as “performative” (Janin Rivolin, 2008), based on the evaluation case-by-case of needs of public authorities and private actors and using the negotiation as a method to define the spatial asset of the region/town. The process is possible thanks to the ruling freedom left to the regional and local government, which can implement the guidelines set at higher government levels, without binding zone instruments (Nadin & Stead, 2008).

The UK is divided in four constituent countries:

- England;
- Scotland;
- Wales;
- Northern Ireland.

Every country has a specific Secretariat with responsibilities in planning, which has to follow the main guidelines fixed at the national level. The bodies deputy to planning at the central government level are: the *Department for Communities and Local Government*, the *Department for Environment and rural affairs* and the *Department for transport*, each one has to promote development and growth through spatial planning, not providing plans, but mainly frameworks, that regional and local governments must respect (Janin Rivolin, 2016). At lower level, in almost every country, the spatial planning is managed by three tiers of government:

- County councils (county scale) are responsible for transport, minerals and waste planning. UK is divided in a number of “metropolitan” and “non-metropolitan” counties and the “Great London”;
- District councils, borough or city councils (city scale) are responsible for all the matters of planning that do not belong to the county councils’ level;

- Parish or town councils (neighbourhood scale), not always existing, are important for the possibility of the Government to have an exchange of ideas on planning at the lowest possible level and they could be asked to design “Neighbourhood Plans”, mainly concerning small green areas, streets and cemeteries, that could become effective and be directly developed by the local community through a “neighbourhood development order” (Department for Communities and Local Government, 2015) (OECD, 2017d).

It is important to notice the lack of a proper “regional scale” planning in England, due to the Localism Act of 2011, before it, regions were deputy to define Regional Spatial Strategies (RSS), plans with specific strategic objectives on the development. The reform wanted to give to local governments higher participation to the choices linked to spatial development, but as sentenced by the all-parties Commons Communities and Local Government Committee “*the intended abolition of regional spatial planning strategies leaves a vacuum at the heart of the English planning system which could have profound social, economic and environmental consequences set to last for many years*”.

Table 5.7. Land-use planning system in United Kingdom.
Author’s own elaboration.

Planning scale	National level	County level	City level	Neighbourhood level
Authority	Ministry of Housing, Communities and Local Government	County Council	District, borough or city Council	Parish or town councils
Instruments	National Planning Framework	Sector-specific Plans	Local Plan	Neighbourhood Plan
Responsibilities	Setting of national guidelines for the spatial development.	Setting of waste and minerals management policies, setting of transportation developments.	Setting of a development strategy, management of human and economic resources needed, involvement of community and stakeholders.	Definition of a vision and defining community’s priorities, setting of neighbourhood projects.

5.3.2 Transport planning system

Effectively perform an integration between land-use planning and transport planning is not simple, because they are of different department, at the national government level and, even at the local one, they are not concentrated in a single authority (Hull, 2005).

In the past decades, two important steps in the United Kingdom for the enlightenment of the relations between transport planning and other planning components were the guidance “A new Deal for Transport” (2008) and the “Ten years Transport Plan”. In those two documents the integration with different transport modes, land-use planning, environment and social policies was pointed out.

The spatial planning is referring to the “National Planning Framework”, the transport planning has a national framework called “National Policy Statement for National Networks” of 2014 that has to fix priorities in the development of new infrastructures, mainly referred to the Strategic Road Network (SRN) and it has to be considered a “*planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks*” (Department for Transport, 2014). The vision of this national policy is:

“*The Government will deliver national networks that meet the country’s long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system. This means:*

- *Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs;*
- *Networks which support and improve journey quality, reliability and safety;*
- *Networks which support the delivery of environmental goals and the move to a low carbon economy.*
- *Networks which join up our communities and link effectively to each other”* (Department for Transport, 2014).

The document also recognise the fact that in many case, the matter of transport is deeply linked to the spatial planning policies and that an integration is needed, even because of the impact of new infrastructures that affect many components of the built and un-built environment, but all these consideration are mainly referred in quite general terms.

Additionally, it is relevant the fact that before 2002 the national department responsible for transport, spatial planning and environ-

ment was the same (Hull, 2005).

The main infrastructural objectives are set out at the national level, the local authorities (county councils), with the representatives of the passenger and the stakeholders (rail operators, bus operators, district councils, disability group, etc.), are responsible for the development of Local Transport Plans (LTP) and Local Implementation plans for transport (LIP). The LPTs have a duration of five years and have to be presented to the Department for Transport to be approved, in order to check out the coherence with the National Transport Goals. It has to take into account all the impacts on health and well-being of inhabitants and users and to provide effective solution for elders, children and disable people. The plans must analyse the actual situation of the plan area through effective data and identify:

- Strategic corridors;
- Local hubs;
- Significant gateways.

Furthermore, the plans have to use Strategic Environmental Assessment (SEA) in developing and monitoring the plan (Government for Transport, 2008).

As it has already be mentioned for spatial/land-use planning, the *Localism Act* of 2011 eliminated in England the Regional Spatial Strategies (RSS), that also included elements on integration between different planning “sectors” and where an appropriate scale to evaluate the regional development from different point of view. Nowadays, County Councils are the main responsible for the implementation of transport objectives on the territory.

Table 5.8. Transport planning system in United Kingdom.
Author’s own elaboration.

Planning scale	National level	County level	City level
Authority	Department for transport	County Council	District, borough or city Council
Instruments	National Policy Statement for National Networks, Transport Investment Strategy	Local Transport Plan (LTP)	-
Responsibilities	Setting the most important infrastructural interventions and manage funds distribution.	Set of the local policy for transport, consultation with the interested association, community and districts/boroughs.	Consultation with the County Council.

Table 5.9. TOD (implemented and potential) case studies reported by literature in United Kingdom. Author's own elaboration.

5.3.3 English TOD strategies and projects implemented and potential

Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD strategy	Potential Single project TOD	
Greater London Plan	x						
Hampstead Garden Suburb			x				
Alconbury Weald			x				

As previously said, United Kingdom has a tradition where Transit Oriented Development-like strategies have been used in different contexts, but there is not an open reference to the term “TOD”. The integration between land-use and transport planning is a priority of spatial planning policies since the end of 19th Century, when the effects of the Industrial Revolution started showing in the UK, and it was the first country been interested by these changes. Historically, the constantly increasing population of London (2 million inhabitants in 1840, 5.5 million in 1891 and 8.6 million in 1939 (World Population Review, 2019)) led to a dispersion phenomenon of population because people preferred commuting to work and having an individual house, instead of standing in the crowded city centre, thanks to the transport systems development; firstly, it was performed by high-medium classes and then by labour classes (Vernet & Coste, 2017). The need of relying with the dispersion phenomenon was satisfied by the first “garden city” (Howard, 1902) project of Parker and Unwin that developed the project for the Hampstead Garden Suburb in 1907. They broadly took inspiration from the principles of Ebenezer Howard: the result was a typical “suburb” composed by cottage houses, each one with its own garden. The project was thought for the working class that had to easily commute to London.

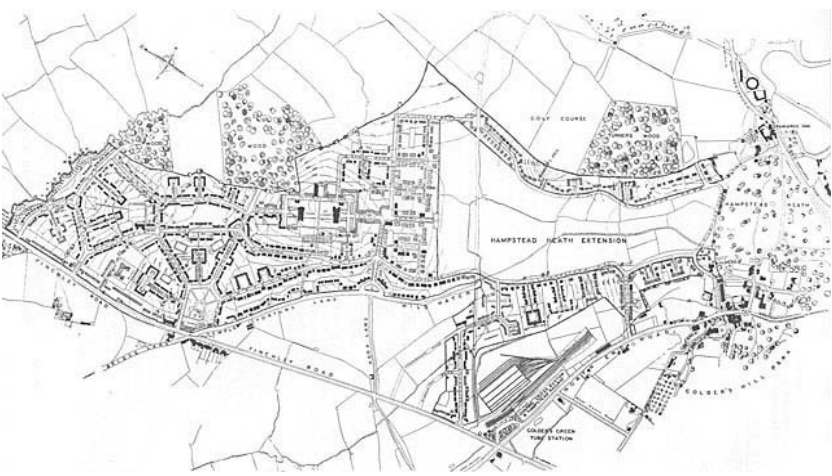


Figure 5.12. Hampstead Garden Suburb: Plan. Source: Unwin, 1971.

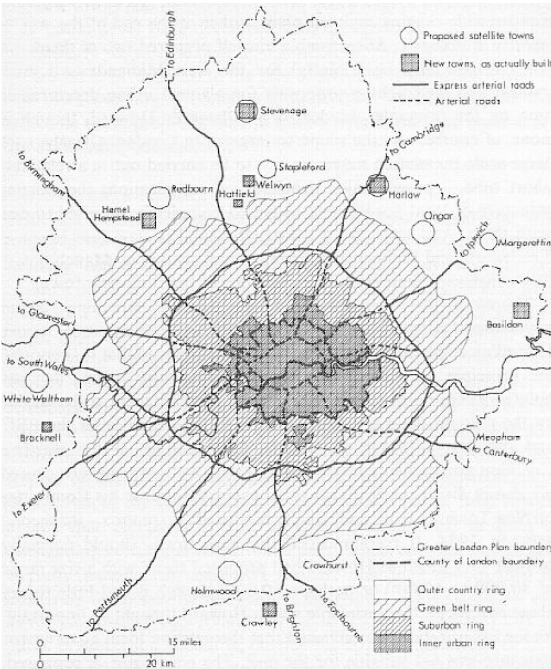
After this first attempt of solving the congestion problem of the County of London, the Greater London Plan was developed in 1944; it is most known example of Plan in UK unifying “garden city” and “green belt” principles, firstly underlined by Patrick Geddes (North Light, 2019). Patrick Abercrombie (1879-1957) was the architect and urban planner in charge for the plan and he integrated the development of new towns around the core of the city of London, the set of a green belt and the connection of the cities with the city centre through a transport system of roads and railways, both already existing at the time and to be constructed. The Plan subdivided the Region of London in different buffer zones, the first one in charge of the County of London and the other three of the Region of London:

- the inner one with high density (185/250 inhabitants/hectare);
- the second zone with lower residential density (125 inhabitants/hectare);
- the Green Belt, that had to stop the growth of the City of London;
- the outer zone in which the decentralisation of people and industries had to happen (Van Roosmalen, 1997) (Abercrombie, 1945) (Abercrombie & Forshaw, 1944).

This Plan is an example of a Transit Oriented Development strategy ante-litteram, because the term was not formally theorised, but it used new urban development forms and transit to solve the current problems. Obviously, the results led to new problems in the

suburbs dominated by low-dense residential areas and exacerbated the dispersion pattern, speculation on land values (private companies were responsible for the construction of new residential neighbourhoods), but it was successful to stop the inner City of London growing in space. The plan was both using a system of motorways and railways for connecting new towns with the city centre, in this sense it is not possible to say it is only focused on heavy rail transit, as modern TOD theories.

Figure 5.13. The Four Rings of London.
Source: Greater London Plan (Abercrombie, 1945).



Another milestone in the planning policy of the Greater London Authority (GLA) was the London Plan of 2004, then updated in 2008 and 2011 (LSE Cities, 2015), mainly for better supporting the Olympic Games in 2012. Then, in 2012 another the plan “The Greatest City on Earth” was developed to manage the post-Olympic scenario, with the 2020 vision for the city. Both those strategic

plans were thought at a regional level and then were supposed to be implemented by the different boroughs, with detailed planning policies.

In the 2011 Plan, the strategy treats in and integrated way different “geographical and locational” aspects as:

- Transport;
- Economic development;
- Housing;
- Culture;
- Social issues;
- Environmental issues.

The Transit-Oriented Development strategy is not openly referenced in the final document, but it is clearly cited the importance of integration between the transport system (already existing and not) and the urban development (Greater London Authority, 2011).

Even in the 2013 plan, the GLA identified 6 main themes on which the whole strategy is built on:

- Transport;
- Quality of Life;
- Housing and land;
- Standing up for London, it is the most controversial element in the strategy, but it actually consists in a set of actions that want to give more relevance and autonomy to London at national and European level;
- London Living;
- International competitiveness.

Once again, it is possible to see how public transport is a strong component in this strategic framework that has the purpose to make London the “Greatest City” of the World; the recognition of the value of an integrated policy that brings together all the aspects listed (Greater London Authority, 2013).

The regional strategic framework produced from the GLA is an upstanding example of TOD, but other case studies around the UK could be cited to underline not only the institutional focus on the need for integration, but also the population one. In the North Essex inhabitants started a campaign, called CAUSE (Campaign Against Urban Sprawl in Essex) to request new development areas (41.000 homes in three new towns) located in areas accessible to

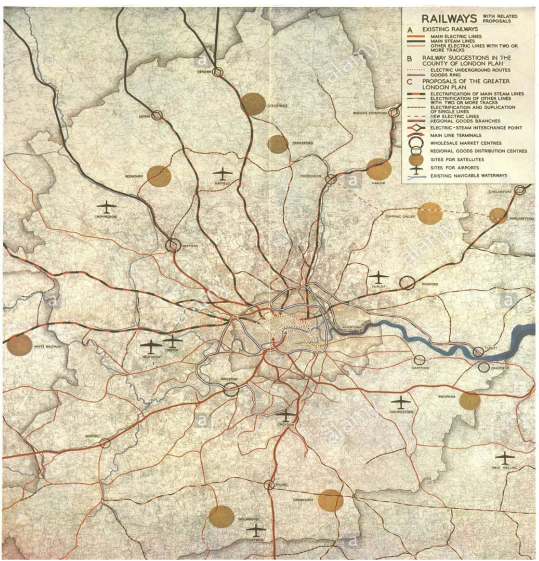


Figure 5.14. Railway system proposals of the Patrick Abercrombie plan.
Source: Greater London Plan (Abercrombie, 1945)

sustainable infrastructures (CAUSE, 2019).

Furthermore, Alconbury Weald is a brownfield development in Cambridgeshire, South England, that has been projected as a site with a high accessibility to public transport, high-quality and safe cycle paths and with a walkable design. The project, developed by “Urban & Civic”, also mixes different land-uses: schools, an enterprise zone, commercial centres, a health centre, green spaces for sport and leisure, community facilities and 6.500 residential dwelling. In this case, it is a single new town and not a network that is going to be developed, but the TOD key principles of diversity, design and density are fully incorporated (CPRE, 2016) (Urban & Civic, s.d.).

In conclusion, until 2011 the spatial planning system of UK has allowed a good integration between land-use and transport planning, mainly performed at the regional level of government. After the Localism Act of 2011, the situation is changed with a possible alternative function of integration that could be set at the Counties level, but without an effective scale of integration. Despite of this, the tradition of new towns located in proximity of transport system nodes is going on.

Also, the strategic framework typical of the town and country planning tradition in UK has been fundamental to guarantee the effectiveness of these policies, until now.



Figure 5.15. France.
Author's own elaboration.

5.4 FRANCE

France is the last analysed country for what concerns the state-led planning systems in Europe. It is the second largest country in Europe and has a total area of 643.801 square kilometres, a population of about 66.800.000 people and a population density of 104.36 inhabitants per square kilometres (World Atlas, 2017c). The constant growth of the French population in metropolitan areas and in coastal municipalities in recent years (+0.5% average annual rise between 1990 and 2010) has caused many problematic issues in urban areas:

- Saturated transport infrastructure;
- Proliferation of new constructions;
- Urban sprawl;
- Changes in the property market and consequently the pushing out of low-income population (Gautier & Masclaux, 2015).

The emerging problems have been faced through the change in the nature of the spatial planning instruments by recent reforms in the spatial planning legal framework.

5.4.1 Land-use planning system

Differently from the previous nations analysed, France is not characterized by a performative or neo-performative system of spatial planning, but could be grouped in the “conformative” model.

According to the EU Compendium, France is part of a “regional-economic” spatial planning tradition, thanks to the great attention to two main aspects in the planning activity: making France more economically attractive and competitive and ensuring cohesion and equity between different regions (Direction Générale de la Coopération Internationale et du Développement, 2006).

The general organization of the government is centralized and strongly hierarchical, with a strong presence of the central government in all the administration functions, but in recent years a strong decentralisation operation was led by the State (Janin Rivolin, 2016). France is organized in a four-tiers system of government and every level has election every 6 years (Dohoros & Loyik, 2013), but only two have direct responsibilities in the land-use planning:

- the national level;
- the 18 Regions (13 metropolitan and 5 overseas), whose governing body is the Regional Council;
- the 101 Departments, but from 2015 have been partially substituted by the “Metropolitan areas” (*Métropoles*) that have larger powers;
- the 35.357 Municipalities (*Communes*) in 2018.

The great fragmentation of the territorial organisation was partially reviewed since 2014, providing a simplification which has led to the system described below, before regions were 28 and also municipalities were 1.000 more than today; the reform, called “*Loi de modernisation de l'action publique territoriale et d'affirmation des métropoles (MATPAM)*”, was thought for simplifying the complex territorial government system and to make it more efficient (Janin Rivolin, 2016) (Gibelli, 2018). A series of important acts was started since 2000 to change the spatial planning system, the first one in 2000, called “Urban Solidarity and Renewal Act” (SRU), updated the old planning instruments at regional and local level, introducing the Regional Development Schemes (SCOT) and the Local Urban Development Plans (PLUs). Another important step for the overall reform was in 2014, when the “Housing and Renovated Urban

Planning Act” (ALUR) was adopted; it modified the inter municipal local urban development plans. (Gautier & Masclaux, 2015).

However, for what concerns spatial planning the national level of government has no responsibilities, but could only influence it through sectoral policies and through the setting of the legal framework (OECD, 2017b).

Instead, the regional level of government is the highest responsible for spatial planning, the Regional Councils develop Regional Spatial Planning and Development Schemes (*Schéma Régional D'Aménagement et de Développement Durable² du Territoire* or SRADDT), giving the general spatial strategies and zoning regulation for areas in different municipalities; this type of plan is legally binding for lower level of government. SRADDTs are going to be replaced from 2018 by *Schéma régional d'aménagement, de développement durable et d'égalité des territoires* or SRADDET (Regional planning, sustainable development and equality schemes) that will include also sectoral planning which now is separated, including transport planning and climate planning. The metropolitan level of government, which is represented by Metropolitan areas, has been created from a typology of inter-municipality co-operation, which was called until 2010 “urban community”. The *Métropoles* should adopt the *Schéma de Cohérence Territoriale* (SCoT) in order to implement general spatial strategies and zoning regulation for the lower level of government. SCoTs are long-vision plans with 20 years visions, are not mandatory, but metropolitan areas are forced to adopt it if they want to create new development in undeveloped areas (OECD, 2017b).

At the local level, the main plan is the *Plan Local d'Urbanisme* or PLU, which contains the general framework for different sectoral policies, from transport to housing policies, and it also fix the land-use conditions and the areas for future developments. The plan is formalised by three other documents: the Presentation Report, Management and Durable Development Projects (*Projet d'Aménagement et de Développement Durables* or PADD) and the Management and Programming Orientations (*Orientations d'Aménagement et de Programmation* or OAP) (Prévost, Molines, Dehan, & Bandet, 2012) (Janin Rivolin, 2016). In many cases, the PLU should be substituted by PLUi (*Plan Local d'Urbanisme Intercommunaux*), the same plan but at inter-municipality level, because it is considered the optimal size to

² *Développement durable* is the French translation for sustainable development concept, adopted in 1987 for the Brundtland Report (Lebeis, 2007).

Table 5.10. Land-use planning system in France. Author's own elaboration.

deliver urban development.

Planning scale	Regional level	Metropolitan level	City level
Authority	Regional Council	Metropolitan Council	City Council
Instruments	SRADDET	SCoT	PLU/PLUi
Responsibilities	Definition of the general spatial planning future developments and giving zoning regulations for areas of relevance at regional level. Definition of guidelines for transport planning and climate planning	Setting of metropolitan spatial developments, including consideration on environment, mobility, climate, landscape and commercial management	Definition of land-use regulation. If sectoral plans are in revision phase the PLU or PLUi could incorporate their topics

5.4.2 Transport planning system

Transport planning in France is remaining a separated sector from land-use planning, but in many cases, they are integrated in the same policy. According to Banister, transport planning in France is divided in two different phases: a first one started in the '50s oriented to road investments due to the stagnation of the rail-oriented planning which was developed by the State and the second started in 1973 with the market rehabilitation of public transportation (Banister, 2002). As for land-use planning, the National Government is mainly responsible for setting guidelines and for the international and interregional transport systems (Heddebaut, 2017). Then, Regions are responsible for the rail passenger supply (TER) and for planning the regional transport system in the SRADDET; before the SRADDET included the climatic, transport and ecological planning, the instrument for transport regional planning was the Infrastructure, Transport and Inter-modality Regional Plan (Schéma Régional des Infrastructures et des Transports or SRIT), which should operate to achieve the objectives set in the SRADDET. At the Metropolitan level, transport planning is integrated in the SCoT that is thought to be a reference for different sectoral policies

and it unifies the regional plans in order to allow municipalities to refer to a single document for their areas (Ministère de la Cohésion des Territoires et des Relations avec les Collectivités Territoriales, 2019). The Métropole also has the responsibility for providing the inter-municipality public transport system. Finally, at the local level the main plan for the transport sector is the Urban Mobility Plan (Plan des Déplacements Urbains or PDU) compulsory for municipalities with more than 100.000 inhabitants, that sets the municipal policies for mobility, the local transportation system improvements and so on. It also promotes more efficient and clear-energy transport modes. Also the main land-use planning document, the PLU, contains measures for transport, providing coherence between it and urban planning (Prévost, Molines, Dehan, & Bandet, 2012).

Planning scale	Regional level	Metropolitan level	City level
Authority	Regional Council	Metropolitan Council	City Council
Instruments	SRIT/SRADDET	SCoT	PDU PLU/PLUi
Responsibilities	Setting of regional transport objectives and projects. Management of the regional transport system.	Declination of regional sectoral policies in the metropolitan areas.	Definition of urban mobility policies, management of the local transport system, Aligning urban development to transport system improvements and projects.

Table 5.11. Transport planning system in France. Author's own elaboration.

5.4.3 French TOD strategies and projects implemented and potential

Table 5.12. TOD (implemented and potential) case studies reported by literature in France. Author's own elaboration.

Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD strategy	Potential Single project TOD	
Lille Metropolitan Area	x						
Armentières			x				
Île-de-France				x			x
Contrats d'axe				x	x		

The integration between transport and land-use has started in France with the convergence in some planning instruments of all the sectoral policies with spatial effects. In practice and literature this integration has often led to experiences which could be recognized as TOD, even if Transit-Oriented Development is not a sustainable mobility strategy in the French agenda (Liu & L'Hostis, 2014). The presence of tools which could help implementing TOD strategies in practice is a good starting element for France, where many cities are suffering for the urban sprawl development model (Bonin & Tomasoni, 2015). However, densification around regional stations is having a key role in all the recent SCoT and urban policies, due to more and more long distance between homes and workplaces, and densification is also promoted by the "Grenelle 2" law of 2010 (Bentayou, Cauhopé, Hasiak, Perrin, & Richer, 2015). One case study, analysed in different papers, is the one of the Lille metropolitan area, in the Northern part of the country with almost 1.2 million inhabitants, 87 municipalities and a very low population density, about 18 inhabitants per square kilometre. In 1991, started an urban transformation project in Lille, in a former military area, near the railway station. Another project was implemented in Armentières, it started in 2006 and is an urban renewal project near the station in an area which was empty before. Both the experiences are documented as TOD, but the achievement of this kind of strategy should be supported by an improvement of the railway connections in the case of Armentières (L'Hostis & Liu, 2014). Other studies are more oriented to regional TOD and not to single

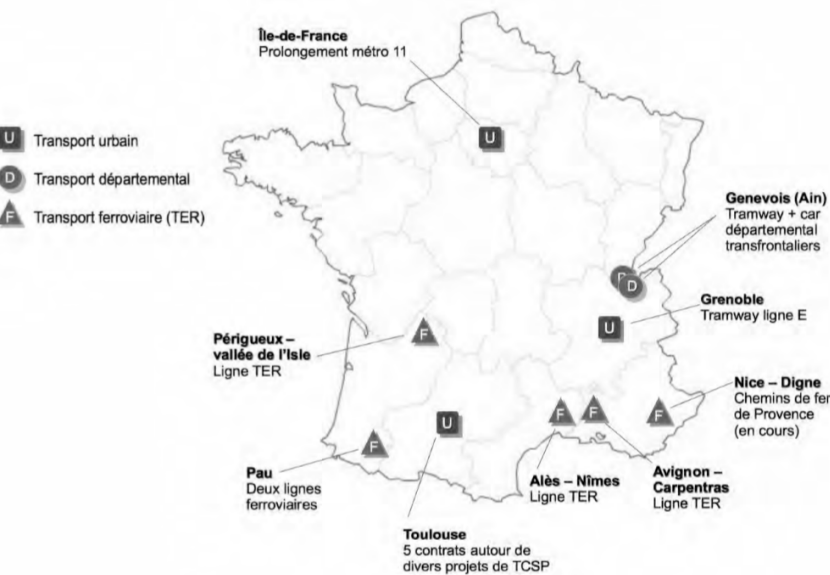
projects, for example the case study of the Île-de-France has been analysed by L'Hostis and Darchen for characterizing it as a transit-oriented development. In the region public transport has a long history, with a railway network established from the XIX Century, a reintroduced light-rail in '80s and bus rapid transit in '90s. Analysing frequencies of rail transport, the transport modal share, the population density and the average block size in the areas near the stations, the authors have highlighted that urbanisation is more dense near public transport hubs, but design is not suitable for walkers and bikers (L'Hostis & Darchen, 2015).

Far from the research for undeclared TOD experiences around France, there are other studies mainly based on a quite recent practice, the "*contrat d'axe*". This type of contracts are tools created for legitimise projects trying to promote an urban densification around regional stations. The first experiences have been developed in Toulouse and Grenoble at the beginning of 2000, but other experiences have been reported in Nîmes-Ales. Here, twelve different Municipalities, crossed by a railway line and presenting totally different urbanisation patterns, have decided to create an inter-municipal project. More recent is the contract Avignon-Carpentras, adopted in 2014 for the re-opening of the railway line between the two cities (Maulat, 2015). In all the case, *contrats d'axe* are developed through a public-public partnership between different stakeholders, usually belonging to the urban planning and transport planning sectors; this is the main difference with TOD which is usually developed with public-private partnerships. Another difference is the theoretical approach to transit-oriented development which could be considered opposite to territorial experimentation approach provided by contracts: in fact, classical TOD strategies and project are promoted through Public-Private partnerships, instead *contrats d'axe* are possible thanks to a Public-Public collaboration. TOD and *contrats d'axe* are still sharing the main objective: to create a dense, diverse well-designed urban development along a transport node or line, in accordance to accessibility criteria (Bentayou, Perrin, & Richer, 2015).

In conclusion, France is a nation where TOD has been implemented even if in not openly expressed ways and also new experiments, *contrats d'axe*, on integration between land-use and transport plan-

ning are trying to be implemented.

Figure 5.16. Map with all the contrats d'axe in France in 2014.
Source: Bentayou G.



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06

MARKET-LED NEO-PERFORMATIVE SPATIAL PLANNING SYSTEMS and TOD

6.1 CHARACTERISTICS OF THE MARKET-LED NEO-PERFORMATIVE SPATIAL PLANNING SYSTEM

This chapter has its focus around countries belonging to the category of market-led neo-performative spatial planning systems.

Differently from the nations analysed in the previous part, where the public power has a strong control on spatial transformation, in this group spatial development is the result of a negotiation between public actors and private ones (Berisha, Cotella, Janin Rivolin, & Solly, 2020).

In some cases, the lack of strong state power has been a major concern for the implementation of Transit-Oriented Development strategies in both the case studies.

6.1.1 Choice of the case studies

The two nations selected as case studies are Germany and the Netherlands, whose characteristics have many geomorphological differences: the German territory with its wide surface and various morphological conditions and the Dutch one distinguished by its low rise on the sea level and several issues concerning land availability for development. In both cases, Transit-Oriented Development has been an implicit idea beyond past spatial policies and plans and, in recent years, it has been re-discovered and implemented in some specific projects.



6.2 GERMANY

Germany is a Federal Republic divided into 16 States or Länder (Baden-Württemberg, Bavaria, Brandenburg, Hesse, Lower Saxony, Mecklenburg-Vorpommern, North-Rhine Westfalia, Rhineland-Palatinate, Saarland, Saxony, Schleswig-Holstein and Thuringia). Among them, there are three self-governing city-states which are the smallest in terms of dimensions, but the most populated ones: Berlin, Bremen and Hamburg. The overall population of Germany is about 84.000.000 inhabitants (data available for 2018) and it has an average density of 251 inhabitants per square kilometre, but with strong density variations in different areas, reaching 3.898 inhabitants/km² in Berlin, 2.236 in Hamburg and 1.697 in Bremen (World Atlas, 2017a) (German Culture, 2020). Also, morphological conditions are really diverse through the German territory, that covers 357.104 square kilometres, ranging from mountains areas to the northern German Plain, creating different vocation for each state: some Lander are mainly rural and others are deeply urbanised with huge disparities in terms of growth and development.



6.2.1 Land-use planning system

Accordingly to the *EU Compendium of Spatial Planning Systems and Policies*, Germany represents an example of the “comprehensive-integrated” approach, referring to the vertical integration between different levels of government thanks to top-down and bottom-up process and to the horizontal integration between different policy sectors. The SGPS of the nation is considered as neo-performative. Germany has a four-tiered government:

- Federal State level of government;
- 16 Länder or States;
- 402 administrative districts (*Kreis*), which could be counties or county-free cities;
- 11.092 municipalities (OECD, 2017).

The basis for the interaction between the different levels responsi-

ble for spatial planning are two principles:

- The “counter flow principle” or *gegenstromprinzip* which guarantees a mix of top-down and bottom-up decision making processes, in which upper-local plans are developed through the cooperation of local authorities and then local authorities have to conform their planning instruments to the upper-local directives and strategies (Mertins & Paal, 2009);
- The “local self-governing principle” which guarantees to municipalities the binding regulation of land-uses (Janin Rivolin, 2016).

Moreover, land-use planning patterns are deeply influenced in Germany by the Christaller’s Theory of Central Places which highlights a “decentralised concentration” of many medium-small towns spread through the country along transport axes. The theory is centred on the idea that settlements (central-places) provide goods and services for the surrounding market area, but not all the towns have the same supply: bigger cities have a wider range of opportunities for consumers. In this sense, the distances between towns are related to the transport cost a person is willing to pay to reach the needed goods. Christaller found that in Southern Germany the distances between cities of a certain size were almost equal and developed his theory (Christaller, 1968) (Pahl Weber & Henckel, 2008) (Mertins & Paal, 2009).

At the Federal and State level of planning, cities are classified and according to their size different services and activities are allocated (Federal Office for Building and Regional Planning, 2001). The Federal State is responsible for the setting of the legislation on spatial planning; the Federal State Law on Regional Spatial Planning (*Bundesraumordnungsgesetz* or ROG), enacted in 1965 and successively updated, defines the planning principles and gives the framework in which Länder started developing their States laws. Another key law is the Federal State Building Code (*Baugesetzbuch* or BauGB) which regulates the urban planning in central-places, environmental protection and historical monuments protection and has incorporated the ROG contents (Umwelt Bundesamt, 2018). Evenly, the Federal Constitution of 1949 treats the topic of spatial development whose objectives have to be sustainable development and promotion of equal life conditions towards all the states (SPECIAL. Spatial Plan-

ning and Energy for Communities in all Landscapes, 2019). The Federal State through the Ministerial Conference on Territorial Planning (*Ministerkonferenz für Raumordnung* or MKRO), which reunites the ministers responsible for spatial planning of all the different states, provides a sort of coordination between the Länder spatial planning policies by specific guidelines; the last designation of shared strategies and principles by MKRO has been done in 2016, replacing the one of 2006 (Conference of Ministers responsible for Spatial Planning, 2016) (Beherend, 2017).

The States are the main responsible for spatial planning both from a legal point of view (they are required to approve State spatial planning legislation), both for the development of the State Spatial Development Plan¹ (*Landesentwicklungsplan*). The planning at this level has to include “the spatial structure, the division of the state in potential development areas and open spaces to be preserved, natural resources which have to be safeguarded, designation of special development centres and area to be supported” (Pahl Weber & Henckel, 2008, p. 73).

The Länder is also responsible for the Regional Planning², which could be developed by the state itself or by associations or counties or middle-tier state bodies, accordingly to different state laws; the “regional area” definition should be given by the State Spatial Development Plan, mainly taking in consideration the catchment areas of high-order centres (Turowski, 2002). However, Regional Plan (*Regionalplan*) is more concrete than the state one, which has mostly advisory contents; it resumes the upper-level policies and strategies and definition of lower-level centralities, identification of small-scaled development axes, co-ordination of the regional, municipal and sectoral planning and the identification of future settlement zones to restrict communal land-use, so it is a binding plan (Mertins & Paal, 2009) (OECD, 2017).

The lower level of government responsible for planning is the municipal one: municipalities have to prepare two plans:

- The Preparatory Land-use Plan (*Flächennutzungsplan*) is created to set the land-uses for the overall municipality area through maps and a memorandum containing the objectives of the plan. It is important because through regulating the whole municipal territory it protects the public interest, avoiding the presenta-

¹ The name could vary from a State to another and also the responsible government department for spatial planning could be different (Pahl Weber & Henckel, 2008).

² Every Länder has this level of planning apart from Saarland and the three city-states.

Table 6.1. Land-use planning system in Germany. Author's own elaboration.

Planning scale	Federal State level	State Level	Regional Level	Municipal level
Authority	Conference of Ministers responsible for Spatial Planning (MKRO)	Länd	Länd/association/counties	Municipal Council
Instruments	Strategies for Spatial Development in Germany	State Spatial Development Plan	Regional Plan	Preparatory Land-Use Plan, Binding Land-use Plan
Responsibilities	Defining general guidelines for State Planning and for the spatial development in Germany, Coordinating state strategies.	Definition of the spatial structure, potential development area.	Definition of future development areas, Definition of small-scaled development axes.	Objectives and land-use regulations for all the municipality, Specification of development parameters and land-use for restricted areas.

6.2.2 Transport planning system

Transport policies in Germany have some phases that differ from a period to another, accordingly to the government political orientation, but also to the historical context: after the WWII the rapid economic recovery, also known as “*Wirtschaftswunder*”, and the need of a massive reconstruction of cities have led to the creation of a highway and motorway network, developed through a huge use of federal investments. Since then, the environmental concerns of transport arose and the goals of federal policies were not any more focused on a rapid satisfaction of the traffic demand, but on the modal shift to sustainable transport and to the reunification of Germany, also in terms of the transport system (Fichert, 2017). In the ‘70s the first masterplan, concerning transport infrastructures, has been adopted by the Federal State (updated in 1973, 1977,

1980, 1985, 1992), followed by many mode-based policies, the more recent are: in 2009 the airport concept, in 2009 seaport concept, in 2002 and 2012 the national plan for bicycle traffic (Fichert, 2017). However, recently a new “Federal Transport Infrastructure Plan” (*Bundesverkehrswegeplan* or BVWP) was enacted in 2016, developed by the Federal Ministry of Transport and Digital Infrastructure; the plan has the responsibility of autobahns, interregional highways, long-distances railways, waterways and airports with a vision-oriented to 2030. The Federal State is also the owner of the railroad system, nationalised since the XIX Century, and managed by Deutsche Bahn (DB).

The Land is responsible for the regional, local public transport and for the roads and railways not afferent to the national level; the instrument used for the State transport policy is the “State Development Plan for Transport” (*Landesentwicklungsplan*) (Directorate General XVI, 2000).

At the local level, the instrument, guiding the municipal strategies and actions on transport, is the “Urban Transport Development Plan” which usually faces: the accessibility issues, the equal mobility for all, the local public transport and the promotion of sustainable mobility (City of Berlin, 2015b). This planning tool is mostly

Table 6.2. Transport planning system in Germany. Author's own elaboration.

Planning scale	Federal State level	State Level	Regional Level	Municipal level
Authority	Federal Ministry of Transport and Digital Infrastructure	Länd	-	Municipal Council
Instruments	Federal Transport Infrastructure Plan	State Development Plan for Transport	-	Urban Transport Development Plan, Local Public Transport Plan
Responsibilities	Setting of the overall policy framework for transport, Definition of projects concerning roads, railways, airports and waterways.	State policy for transport, Definition of projects for regional railways and roads.	-	Definition of local strategies for transport, Setting of LPT parameters, Setting of regulations for private vehicle use.

a strategic framework for the most operative “Local Public Transport Plan” that defines the walking distances from stops, the service hours, the connection, the barrier-free accessibility and the vehicle standards for use (City of Berlin, 2013). Urban growth depends on adequate connection to the transport system as well as on the potential of area applicable for settlement (Mertins & Paal, 2009, p. 43).

6.2.3 German TOD strategies and projects implemented and potential

Table 6.3. TOD (implemented and potential) case studies reported by literature in Germany. Author's own elaboration.

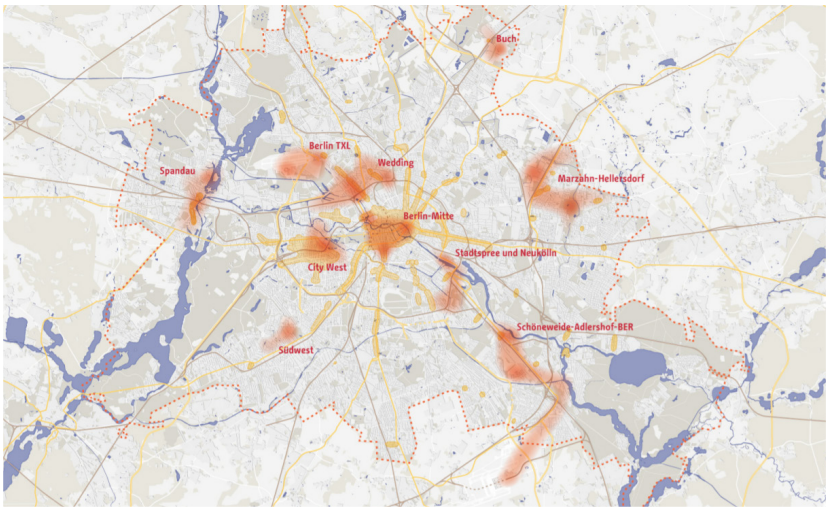
Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD strategy	Potential Single project TOD	
Berlin	x						
Munich Central Corridor		x					
Stuttgart Region	x						
Scharnhauser Park			x				
Vauban			x				
Rieselfeld			x				

In this paragraph different experiences which could be categorized as TODs strategies and projects are going to be analysed, but starting from the overall view provided by Federal Transport Infrastructure Plan of 2016 it is possible to understand that the integration of transport planning and spatial/urban planning is relevant also at the national level. Each national project is supposed to be assessed from a spatial and urban development point of view, in addition to the environmental assessment (Federal Ministry of Transport and Digital Infrastructure, 2016) Event though, Transit-Oriented Development is not openly cited in the document and neither in the MKRO “Concepts and Strategies for Spatial Development in Germany”, but the integration between spatial and land-use planning is cited, also due to the importance of transport in the creation of the “Christaller systems” (Conference of Ministers responsible for Spatial Planning, 2016). This is a relevant element because not all

the national transport policies refer to spatial impacts of proposed projects.

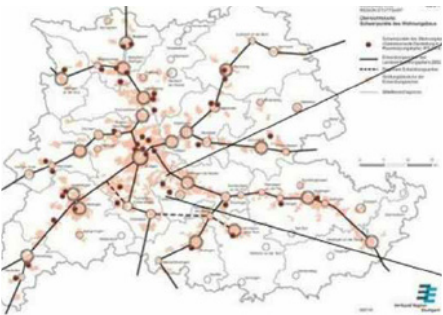
The first case study of “implicit” Transit-Oriented Development is Berlin; until the XIX Century it was a mid-size city and a big population increase and consequent urban development occurred between 1870 and 1920. The city spread its diameter of about 35 kilometres and the introduction of a railway system (S-Bahn) was necessary, together with a tram network. The S-Bahn axes guided the regional development, that has been concentrated along its trail and the old asset is still visible today. Then, like the major European cities, Berlin reported an increase of private motorization and the political priorities become oriented in creating a more efficient road system: the main motorways have been connected through rings. After WWII, with the division of the city in an Eastern part and West one, the role of transportation became different: in Western Berlin the mobility was car-based and major urban development were planned without a rail connection, instead, in the Eastern part, public transport became more and more significant. After the reunification in 1990, the vision of a regional public transport-oriented development was recovered and, following the institutional integration, policies started managing the integration between land-use and transport planning (Kunst, 2016). Companies managing the railway system played a leading role after the reunification with mega-projects proposals for the revitalisation of stations and surrounding zones; an example is the redevelopment of Potsdamer Platz, which was along the Berlin Wall and with the reunification gained a central position in the city. Deutsche Bahn (DB) started the construction of railway tunnels connecting the old stations of Anhalter and Potsdamer with the overall system, simultaneously private firms, like Sony, started the redevelopment of the area (Peters, 2010). Even the “Berlin Strategy 2030”, the latest strategic document for the city, strategic development areas are located along the U-Bahn and S-Bahn lines (City of Berlin, 2015a).

Figure 6.3. Strategic development areas in the Vision 2030 for Berlin. Source: City of Berlin (https://www.stadtentwicklung.berlin.de/planen/stadtentwicklungskonzept/download/strategie/karte_tr_uebersicht.pdf)



The “Stuttgart Regional Plan” of 2009, promoted by the VRS (*Verband Region Stuttgart*), is reported as a TOD strategy with strong horizontal integration between land-use and transport planning. The “State Development Plan for Transport” of the Baden-Württemberg State is the strategic framework delivers the not prioritized list of transport projects, then the “Regional Transport Plan” develops the integrated concept for mobility, following the State guidelines. The Regional Plan, interacting with the sectoral planning, delineates “growth poles” and “spokes” that are located along the railway or other public transport lines and designated for future development. Each municipality must follow the regional planning strategies and adequate their land-use plans in order to guide the city growth near transport stations. An example of a locally implemented TOD in the Stuttgart Region is the Scharnhauser Park, in the Municipality of Ostfildern; the area was a former US military base and has been redeveloped together with the extension of a light rail line (Buehler, Jung, & Hamre, 2014).

Figure 6.4. Central places, axes, growth poles and regional centres. Source: Buehler, Jung, & Hamre, 2014, p. 16.



A corridor TOD project, the Central Rail Corridor district, has been developed in

Munich near the regional transport hub, the Hauptbahnhof. The redevelopment generated an area with residential, offices, services and public spaces, with high standards in urban design. The project is located in the East-West direction of the S-Bahn line and documents were forecasting 16.000 residents increase and 19.000 more jobs. The Central Corridor has been thought by a comprehensive strategy, including dwellings, accessibility, transport and design regulations in order to respect the TOD characteristics (Hale, 2009).



Figure 6.5. Scharnhauser Park project. Source: Land8 (<https://land8.com/scharnhauser-park-gets-multi-million-dollar-rainwater-management/>).



Figure 6.6. Munich Central Corridor Project. Source: Munich in time (<https://munichintime.weebly.com/munich-to-day.html#>).

Always concerning a local experience of TOD, it is possible to analyse the Freiburg case study; the city is known as one of the more successful municipalities in the use of sustainable transport, with a 68% share of trips by walking, cycling and public transportation. As for the previous cases, the turn in a sustainable perspective of the transport system happened since the ‘70s with a set of projects for extensions of light rail and railway lines, but the main docu-

ment providing transit-oriented land-use has been adopted in 2008, focusing high-intensity developments along transport routes. Especially two suburban neighbourhoods in Freiburg, Rieselfeld and Vauban, have been redeveloped around extensions of light rails. Both the neighbourhoods are “environmentally-conscious”, thanks to energy-efficient buildings (City of Freiburg, 2019) and to the promotion of sustainable mobility. They have a high mix uses of residential, commercial, educational, religious and recreational areas, thought for favouring the inclusion of women, families, elderly and disabled people (Beuhler & Pucher, 2011).

At the neighbourhood level, sustainability objectives have been reached: Vauban is now a carbon neutral area (in terms of stationary energy use) thanks to the setup of a local heat and power station, it has high recycling values on water and waste and emissions generated by transports have been cut away through a good LPT supply and disincentives in owning private cars (there is no parking in residential lots and who wants a space for its private vehicle should lease or purchase one in a multi-storey parking at the perimeter of the area) (Scheurer & Newman, 2009).

The successful experiences in the realisation of sustainable neighbourhoods have led the City of Freiburg to develop its own Charter, where the principles of its urban development approach are expressed; one is about orienting the development areas along public transportation lines:

“Public transport must be closely tied to any urban development concept and must be given general priority over personal means of transport. the objective is to carefully and consistently increase urban density along public transport routes and to locate services around the stops of tram lines or other public transport nodes which have a central function and high user frequency” (City of Freiburg, 2010, p. 8).

However, in the case of Freiburg TOD projects some negative aspects are reported: the Vauban and Rieselfeld areas, created as an inclusive part of the city, have become market-oriented growth neighbourhoods, where the “sustainability” concept has been used as a way to privilege the middle-class. The consequence is a gentrification process in the areas, Vauban is one of the more expensive zones of the city; additionally, some local squatting collectives, first-

ly used as an example of tolerance and vibrancy of Freiburg, have been removed by their original location, in order to create commercial and touristic spaces (Mössner, 2015).



Figure 6.7. Aerial view of Vauban neighbourhood. Source: City of Freiburg (<https://www.freiburg.de/pb/208764.html>).



Figure 6.8. Aerial view of Rieselfeld. Source: City of Freiburg (<https://www.freiburg.de/pb/208560.html>).



Figure 6.9.

The Netherlands.
Author's own elaboration.

6.3 THE NETHERLANDS

The Netherlands, or Kingdom of the Netherlands, is a parliamentary constitutional monarchy located in the centre of the European Union; the name of the state openly recall to a topography characteristic: the half of the country territory lies below the sea level in the Northern part. This issue has been faced through the so called “Delta Works”, a set of storm surge barriers, dykes, dams and sluice gates, protecting the state from waters. They represent the greatest flood protection system in the World (Holland, 2019). The nation counts a great amount of reclaimed land (about 17% of the total area) or polders. Instead, in Southern areas, it is possible to find some hills, but none of them is higher than 600 metres above sea level (Briney, 2019). Economic development and, consequently, the spatial one show great differences in the diverse parts of the nations: the western areas, located along the coast, are overdeveloped and are performing an environmentally unsustainable urban development pattern, on the contrary, the eastern regions are underdeveloped (Goedman, Houtsma, & Zonneveld, 2008).

In terms of geo-statistics, the Netherlands has a total area of 41.543 square kilometres and it has an overall population of about 17 million inhabitants with an average population density of 502 inhabitants per square kilometre (World Atlas, 2017b).

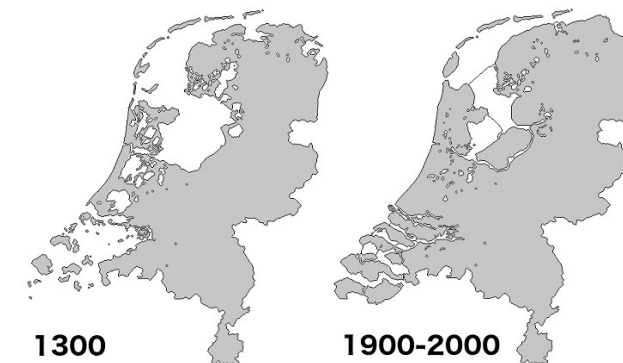


Figure 6.10. The Netherlands territory in 1300 and in 2000, showing the reclaimed land.
Source: Brilliant Maps (<https://brilliant-maps.com/netherlands-land-reclamation/>).

6.3.1 Land-use planning system

The spatial planning policies in the Netherlands have received international recognitions as providers of good practices, thanks to the early attention to the contention of urban growth with the “concentrated deconcentration” strategy applied since the ‘60s and, then, to the explicit sustainable urban development policies from the end of the ‘80s (Goedman, Houtsma, & Zonneveld, 2008) (Lodder, Rotmans, & Braungart, 2014). Nonetheless, recently many critiques have been advanced to the Dutch planning system, reporting its “failures” due to planning decisions at national and local levels driven by economic, technology and demographic growth. Different phases of spatial planning could be found according to past temporary needs, ranging from the “compact city” models introduced by the State to VINEX³ neo-traditional houses, from the functional separation in the ‘80s to functions integration in recent years, from a spatial planning steered by the State in the XIX Century to a market-led one which still endures now (Lodder, Rotmans, & Braungart, 2014) (Pojani & Stead, 2018).

³ The VINEX was a supplement to the Fourth National Policy Document on Spatial Planning, adopted in 1993 and providing a vision for 2015. The policy was focused on societal changes and it wanted to provide a new of designing and using spaces. In the VINEX has been introduced the “ABC” locational policy that aimed to ensure “the right business in the right place” (Galle & Modderman, 1997).

Table 6.4. Chronological list of different spatial planning concepts in the Netherlands after WWII. Author’s own elaboration, based on Pojani and Stead, 2018.

Period	Spatial planning concepts	Objectives
'40s and '50s	Concentric growth	Preserving green spaces between different urban centres
'60s and '70s	Concentrated deconcentration	Suburban development in new towns or growth centres around existing cities, prevent urban sprawl
'80s and '90s	Compact city/ VINEX/ ABC policy	Increasing density in existing suburbs, mainly around station areas
2000	Urban networks	Urban growth should be accommodated along transit corridors
2010	Growth in economic poles	Avoiding degrowth in major cities

The EU *Compendium of Spatial Planning Systems and Policies* identified the Netherlands as part of the comprehensive-integrated approach, as Germany, according to the system characterisation based on co-ordination of different levels of governance, on the integration between sectors as housing, water, transport, culture and heritage and the participation of stakeholders in the planning process (PBL Netherlands Environmental Assessment Agency, 2018). However, even if the Dutch spatial planning system was working since 1965, year of the enactment of Law of Spatial Planning, and has produced many good practices, in 2008 a major reform of the old law has been approved. The new legislation, commonly called Spatial Planning Act (*Wet Ruimtelijke Ordening* or WRO) wants to create a more decentralised government, delegating national tasks to provinces and municipalities and reforming the planning tools. A new motto “local when possible, national if necessary” has been behind the idea of the reform (Zonneveld, 2005). However the levels of government did not changed and, as before 2008, the Netherlands has a three-tier spatial planning system where the levels of government are:

- The national level, with the two ministries, cited above as responsible for these policies;
- The provincial level, with 12 provinces responsible for spatial planning;
- The local level represented by 355 municipalities and 3 special municipalities in the Caribbean Netherlands (OECD, 2017).

The national level is the one which has been more revised by the new Law of Spatial Planning, losing the power to enforce certain projects of national interests by using the former PKB plan (*Planologische Kernbeslissing*). Additionally, the three ministries originally responsible for national spatial planning (the Ministry of Housing, Spatial Planning and Environment, the Ministry of Agriculture, Nature and Food Quality and the Ministry of Public Works) have been unified in two:

- The Ministry of Infrastructure and Water Management;
- The Ministry of Economic Affairs, Agriculture and Innovation (Gerrits, Rauws, & de Roo, 2012).

The national level is responsible for the creation of a comprehensive vision, the “National Policy Strategy for Infrastructure and Spatial Planning” (*Structuurvisie Infrastructuur en Ruimte* or SVIR), for the whole Dutch territory, integrating spatial, infrastructure, mobility and environmental planning (MLIT, 2015) (Netherlands Government, 2019). Under the national level of government are determined the important areas for economic and social development, but also relevant areas and issues about natural and cultural heritage preservation, energy plants and water safety (OECD, 2017). In the last SVIR of 2013, 13 national interest and central government goals have been highlighted, except them, provinces and municipalities could independently develop their structural plans (Ministry of Infrastructure and the Environment, 2013)

The lower level is the provincial one, responsible for developing a Provincial Structure Plan (*Structuurvisie*), that is almost free of determining the specific spatial issues which have to be faced through municipal plans in the area; the plan also has to co-ordinate the provincial road network. The Provinces are also in charge of monitoring the municipal planning and intervening if decisions of one local plan have negative impacts on other municipalities (OECD, 2017). Both the national and provincial levels of government have a further instrument, the “Imposed Land-Use Plans” (*Impassingsplan*), which could be referred to several municipalities and it is developed in presence of upper-local interests needing a specific implementation; this instrument was introduced in the 2008 WRO to partially counterbalance the loss of the national authority and it allows provinces and the State to have a proactive role in the definition of

land-uses, not only evaluating it ex-post (Gerrits, Rauws, & de Roo, 2012). Additionally, a set of rules for local plans are set at two levels (PBL Netherlands Environmental Assessment Agency, 2018). The level responsible for the legally-binding regulation of land-use is the municipal one. The Municipality must prepare two documents:

- Municipal Structure Plan, similar to the national and provincial ones, that determines the general vision for future development;
- Land-Use Plan (*Bestemmingsplan*) that provides a zoning regulation for the whole municipal territory; for areas where it is not foreseen use transformation, a Management Ordinance is provided.

Municipalities have great influence and veto power in the implementation of a certain transformation, but also other actors influence the development realisation, like the twenty-three Water Boards, managing the related infrastructures, that have to be consulted, housing association and associations of municipalities (OECD, 2017).

In general, all the three levels of Netherlands spatial planning are in charge of realising a “structure plan”, which contains the strategic spatial vision for development, but it is self-binding and not effective on the lower level of planning (OECD, 2017).

A special condition of planning is concerning the Randstad region and the capital city of Amsterdam. The Randstad is the metropolitan region formed by the city of Amsterdam, the Hague, Rotterdam and Utrecht, it is the most urbanised, economically developed and populated area of the Netherlands and it has a regional level of government, shared between the State, four Provinces, two hundred municipalities, 12 water boards and many public and private actors managing the transport system (Van der Burg & Vink, 2008). The Randstad Region is responsible for developing a Structural Plan (*Randstad Structuurvisie*), containing a long term spatial strategy, and the last one was adopted in 2008 and was entitled “Randstad Holland towards 2040” (Randstad Centre for Strategic Planning and Design, 2008).

For Amsterdam there is a metropolitan level of spatial planning, focusing on the capital area and the Schiphol Airport; the planning instrument formulated from this level is the “Amsterdam Metropol-

itan Area Development Scenario” (the last one was adopted in 2007 and it represented the starting point for the regional planning vision), it is an informal collaboration between the 36 normal municipalities, two provinces and the City of Amsterdam (MLIT, 2015).



Figure 6.11. The Randstad region.
Source: van der Burg, Vink, 2008.

Table 6.5. Land-use planning system in the Netherlands.
Author's own elaboration.

Planning scale	State level	Provincial Level	Municipal level
Authority	Ministry of Infrastructure and Water Management, Ministry of Economic Affairs, Agriculture and Innovation	Province	Municipality
Instruments	National Policy Strategy for Infrastructure and Spatial Planning (SVIR), Imposed Land-use Plan	Provincial Structure Plan, Imposed Land-use Plan	Municipal Structure Plan, Land-Use Plan
Responsibilities	Definition of relevant area for economic and social development, major infrastructures projects, energy plans and waterways, Identification of issues related to cultural and natural heritage to preserve.	Defining issues and strategies for landscape, Defining of green spaces to preserve, Defining future urbanisation areas.	Defining the spatial development vision for the municipality, Zoning regulation of the municipality.

6.3.2 Transport planning system

Transport planning in the Netherlands is performed in an integrated way into spatial planning policies, at all the level of government. Since the '90s, when the national ABC and VINEX policies were introduced, the spatial development has been seen in relation to the accessibility by public transportation (Dieperink & Driessen, 2000). The State provides through the SVIR the overall spatial development, also referring to the transport system enhancement which is necessary on the national road, waterways, railways and airways networks. Then, the Ministry of Infrastructure and Water Management, responsible for transports develops specific sectoral plans; the most recent is regarding the future of public transport, titled "Moving forward to 2040", adopted in 2016, followed by a document "Public Transport in 2040" containing the outlines shared between the central government, the provinces and transport operators (Ministry of Infrastructure and Water Management, 2016). Then, lower levels of government are responsible for the integration in their structural plans of foreseen infrastructural projects for provincial and local roads, waterways and cycling systems. They also

Table 6.6. Transport planning system in the Netherlands. Author's own elaboration.

Planning scale	State level	Provincial Level	Municipal level
Authority	Ministry of Infrastructure and Water Management	Province	Municipality
Instruments	National Policy Strategy for Infrastructure and Spatial Planning (SVIR), Public Transport Plan	Provincial Structure Plan	Municipal Structure Plan, Mobility Plan, Mobility Implementation Plan
Responsibilities	Definition of the infrastructural projects for future, Setting of strategies and goals for the public transportation system.	Definition of the provincial spatial vision, also concerning transport infrastructures	Setting of future local transport system and infrastructure projects, Definition of long-term vision for the local mobility, Implementation of single projects.

have to provide strategies to improve accessibility and local public transportation. At the municipal level, a "Mobility Plan", containing the long-term vision on mobility, and a "Mobility Implementation Plan" are prepared and have to describe future changes in the local transport system and how and where they should happen.

6.3.3 Dutch TOD strategies and projects implemented and potential

Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD	Potential Single project	
Amsterdam		x					
Almere		x					
Hoofddorp		x					
Stedenbaan	x						x
Arnhem and Nijmegen				x			x

Table 6.7. TOD (implemented and potential) case studies reported by literature in the Netherlands. Author's own elaboration.

As for the other analysed nations, Transit-Oriented Development is reported to be an intrinsic principle in the Dutch spatial planning since the WWII: all the spatial planning concepts, previously listed, characterizing the Dutch planning policies and practice, have used the transport system to structure the cities network and prevent urban sprawl, unsustainable for the lack of land space in the Netherlands (Bertolini & le Clercq, 2003). TOD in this nation has its background in the idea of a "compact city" development, within cities densification and around railway stations and in the Netherlands in several cases the integration between multiple land uses and transit hubs have produced good results (van Lierop, Maat, & El-Geneidy, 2017). However, not all the policies, enacted since the post-war period, were effective in creating Transit-Oriented Developments, in the sense we commonly refer to like places with mixed uses and attention in creating a dense, diverse and well design area. Two examples are the ABC policy and the VINEX, introduced for reducing urban sprawl but not reaching the objectives of creating attractive environments. The first one was based on the idea that each firm could have a perfect location, according to the accessibil-

ity of each area to public transportation:

- A, areas have an optimal accessibility to transport connecting to the agglomeration but also to the country;
- B, areas are well connected at a local or metropolitan level;
- C, areas are accessible by express motorways.

The result of this locational strategy was the creation of mono-functional zone with low flexibility and not fitting the desires of the business community (Dieperink & Driessen, 2000). The same result has been obtained through VINEX policies for what concerns residential areas: these ones were supposed to provide the needed housing supply in city outskirts and near already built areas. The new residential developments were supposed to be connected through public transport to the city centre, but in many cases, it was not possible and, moreover, it has generated an automobile-dependent commuting pattern (Alpkokin, 2012).

The spatial outcomes of the '80s and '90s policies in the Amsterdam and Utrecht region (known as Randstad North Wing) were analysed by Bertolini in 1999. The paper shows the absence of re-

lation between the location of new urban developments and the access to public transport and future projects were almost located along the motorways and near their exits; even though, the application of the Node-Place model to the stations of the region showed the majority of them standing near the equilibrium line and performing a good accessibility (Bertolini, 1999) (Savini, Boterman, van

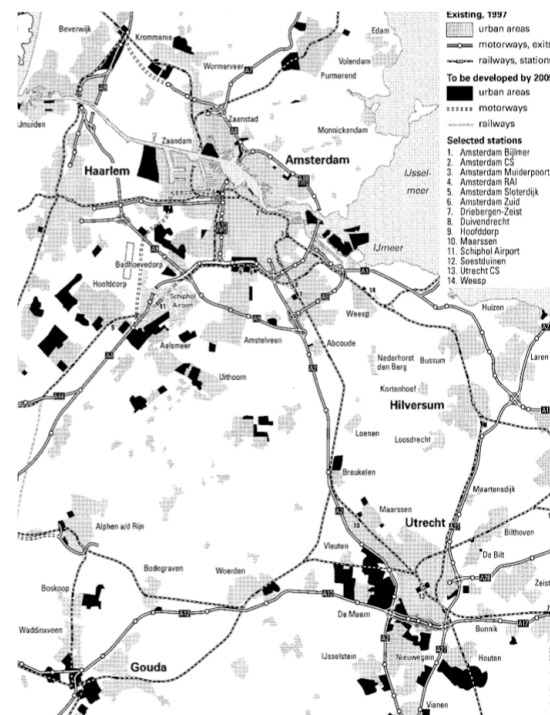
Gent, & Majoor, 2016).

Together with national locational policies, also the community preferences have affected the results obtained by TOD strategies in the Netherlands: public transport is used for distances lower than European averages, because of the great use of cycles as main transport modes. People prefer to work and live in distances reachable by bike and even when commuters use railway services, they tend to live at some kilometres distance from the station and using the bike for the first part of the travel. Not many people are living in the proximity of a station, as commonly referred to in TOD. Also, the recent lowering of power in affecting spatial planning of the national level of government has left some difficulties in implementing Transit-Oriented Development: cities are the main responsible for urban development and they often compete for private investments, not considering the national and provincial guidelines for best development localisation.

Municipalities also want to have economic advantages from the sale or rent of the land to private developers and it is economically more convenient for them to invest in large and cheap areas on greenfield, than into fragmented and expensive areas around stations (Pojani & Stead, 2014a). At the same time, some design expedient could be effective in creating around stations urban environment, capable to encompass the cultural elements, which currently perform as barriers to Dutch Transit-Oriented Development (Pojani & Stead, 2015).

Even if some Dutch spatial planning policies have not been effective in integrating spatial and transport planning in Transit-Oriented Development strategies, many examples of "implicit" TOD developments could be found in the Amsterdam urban region, where some urban extensions have been built along transport corridors. The first and the largest one is Almere, a new town located on a land area reclaimed in the '60s. It is a town of about 200.000 inhabitants and became a municipality in 1984, in the period of the VINEX policy. Differently from other contemporary experiences, the area mixed residential buildings, but also multi-media firms plants. In line with the TOD characteristics, Almere hosts the station in its city centre. Another new town which has been developed along a railway line is Hoofddorp, situated in an area drained in

Figure 6.12. Urban developments, existing in 1997 and foreseen by 2005, in the Amsterdam Utrecht Region.
Source: Bertolini, 1999.



1853, since then a quite large village grew here. Then, in the 1960s with the increasing population in the region, the government chose it as a suitable place for urban development. Its railway connection with the capital city and the proximity with the Schiphol airport have been major reasons for the attractiveness of this municipality (Koopmans & Huussen, 2007). Other attempts to generate kind of Transit-Oriented Development in the Amsterdam area have been basically failures due to their mono-functional purposes which resulted unattractive for private investors and residents:

- the IJburg residential expansion connected by light rail to the city centre only in 2000, after twenty years from the construction start;
- Zuidas business district, connected by train to Amsterdam centre and accessible by motorway;
- Amstel, Sloterdijk and Bijlmer monofunctional areas (Bertolini & le Clercq, 2003) (Pojani & Stead, 2018).

Figure 6.13. The Amsterdam region.
Source: Bertolini & Le Clercq, 2003.



Keeping a focus on the Amsterdam metropolitan area, recently Pojani and Stead have made a set of interviews with the different potential stakeholders for a TOD strategy in the area: the City of Amsterdam, the Province of North Holland, the Ministry of Infrastructure and Environment, the Dutch Railways (NS) and the exchange platforms and networks. The results showed how the

interest in Transit-Oriented Development is high for the city and for the railway operator, but decentralisation of spatial planning, the different ideas of planners on TOD and competition between city are obstacles to the creation of provincial or national policy. However, the City of Amsterdam is focusing its development areas along public transport lines and stations (Pojani & Stead, 2014b). The City of Amsterdam Structural Plan for 2040 has six spatial tasks that show many similarities with TOD:

- Density the city to accommodate more business and people;
- Transform the mono-functional areas and create an urban mix of residential and business uses;
- Public transport on regional scale should be linked and must become faster, more comfortable and more frequent;
- High-quality layout of public space is going to be pursued thanks to more spaces for cyclists and pedestrians, to the quality and diversity of street frontages and to edifices refurbishing;
- Recreational use of green space;
- Converting sustainable energy (City of Amsterdam, n.d.).

A 2014 research focuses on the potential regional TOD in the Arnhem-Nijmegen City Region, located in the Gelderland Province, is the third-largest one in the country. Even if the Randstad is still the main economic centre, also this area is growing and is supposed to become the second biggest economic zone of the Netherlands. The policy vision of the region is “centred on creating more housing and employment and providing higher levels of mobility”, also for reverse the tendency of using cars. The analysis is based on the calculation of a potential TOD index in the station areas. The results show that the Nijmegen and Arnhem cities score higher value of potential TOD index, compared to the rest of the regional areas, but some interesting hotspots are highlighted in the whole region, creating a possible future scenario for a TOD strategy (Singh, Fard, Zuidgeest, Brussel, & van Maarseveen, 2014).

The last case study reported as Transit-Oriented Development policy is the Stedenbaan (City Line) project for the Randstad South Wing. The “Structure Vision Randstad 2040” highlighted the need for a relation between mobility and urban development, the Stedenbaan project seems trying to satisfy this necessity (ESPON TANGO, 2013). The area of the project comprehends 65 municipalities,

the City Regions of the Hague and Rotterdam, three sub-regions of municipalities cooperating through joint agreements, the Dutch Railways (NS) and ProRail (rail infrastructure manager). The strategy was based on the possible improves of the existing railway network of the region through service enhancement and, at the same time, with spatial developments around station areas. The identified project areas are 32 existing stations and 13 potentially new ones along the Stedenbaan lines and buffer zones surrounding them have been studied in order to perform an intensification of land uses. Each station area has different characteristics, that have been systematized in nine potential typologies of development areas according to the present degree of access by public transport, the degree of access by car, degree of mixed uses and local density of inhabitants and jobs. The nine kinds of developments are: rural areas, small towns, outskirts of cities, cities of the future, business sites, regional crossroads, Randstad hubs, creative cities and city centres.

Figure 6.14. The Arnhem-Nijmegen City Region.
Source: Singh et al., 2014.

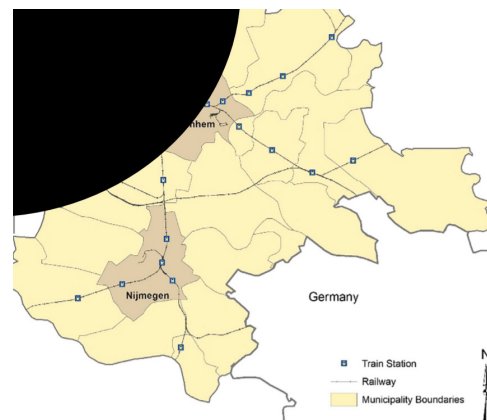
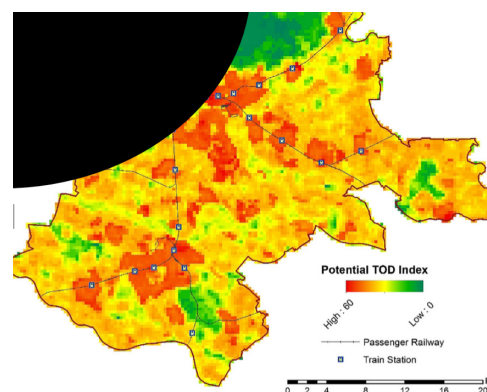


Figure 6.15. Potential TOD Index in the Arnhem-Nijmegen City Region.
Source: Singh et al., 2014.



The last case study reported as Transit-Oriented Development policy is the Stedenbaan (City Line) project for the Randstad South Wing. The “Structure Vision Randstad 2040” highlighted the need for a relation between mobility and urban development, the Stedenbaan project seems trying to satisfy this necessity (ESPON TANGO, 2013). The area of the project comprehends 65 municipalities, the City Regions of the Hague and Rotterdam, three sub-regions of municipalities cooperating through joint agreements, the Dutch Railways (NS) and ProRail (rail infrastructure manager). The strategy was based on the possible improves of the existing railway network of the region through service enhancement and, at the same time, with spatial developments around station areas. The identified project areas are 32 existing stations and 13 potentially new ones along the Stedenbaan lines and buffer zones surrounding them have been studied in order to perform an intensification of land uses. Each station area has different characteristics, that have been systematized in nine potential typologies of development areas according to the present degree of access by public transport, the degree of access by car, degree of mixed uses and local density of inhabitants and jobs. The nine kinds of developments are: rural areas, small towns, outskirts of cities, cities of the future, business sites, regional crossroads, Randstad hubs, creative cities and city centres. The “spatial survey” document was published in 2006 and since then different processes have taken place in order to ensure the strategy implementation: signed agreements for qualitative and quantitative goals between public actors and the negotiation with private developers for the development of the station areas (Balz & Schrijnen, 2009) (Bertolini, Curtis, & Renne, 2012) (Balz & Stead, 2014).

The initiative has been a platform for the coordination between different actors involved in the spatial planning process at provincial, regional and local levels of government, trying to maximize synergies for territorial development and avoiding competition within cities thanks to the Province role in the process (ESPON TANGO, 2013). After the first agreement signed in 2006, creating the “Administrative Platform for the South Wing”, a second phase of the project started in 2011, with a new agreement extended to 47 municipalities. This was named “StedenbaanPlus” and its objec-

Figure 6.16. The Stedenbaan stations classification.
Source: Papa, 2009.



Figure 6.17. The Stedenbaan stations and their catchment areas.
Source: Staricco & Vitale Brovarone, 2018.



tive by 2020 is to build 80% of new constructions around transit nodes (Staricco & Vitale Brovarone, 2018). A specific paper, focusing on the cycle-train modal share in stations of the Stedenbaan projects, has underlined the need of improves in the perception of connectivity between the station and the surroundings to affect the bicycle share, but also a good quantity and quality of bike parking, station facilities are key factors to enhance the use of the railway (La Paix Puella & Geurs, 2015).

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07

CONFORMATIVE SPATIAL PLANNING SYSTEMS and TOD

7.1 CHARACTERISTICS OF THE CONFORMATIVE SPATIAL PLANNING SYSTEM

The conformative SGPS (see paragraph 4.2.2) is the last one analysed in this work and represents the most worldwide spread and “traditional” approach to spatial planning. It bases the planning process on setting of legally-binding regulation of land-use transformations and on giving spatial development rights through plans, that are prescriptive and could not be modified, rather than by long processes of plan modification. Public control in this spatial planning system is relatively low, with different degrees, but usually market leads the spatial transformation (Berisha, Cotella, Janin Rivolin, & Solly, 2020).

Additionally, each level of government produces plans and lower levels must adapt to them and sectoral divisions of plans could be constraints to vertical and horizontal planning integration which is a key element in the development of comprehensive strategies, as TODs ones, for reach successful objectives. Overcoming the sectoral, the top-down approach, characterizing this SGPS, is experimentation and some good practices are later analysed.

7.1.1 Choice of the case studies

The selected case studies are Italy and Belgium, because of their differences in morphology and urbanisation patterns: the first one is a Mediterranean country with an extremely various territorial morphology that has led to an urbanisation process concentrated in specific areas. Instead, the second one is located along the Atlantic coast and has a mostly plain territory that has brought to spread urbanisation within the whole national territory, with a high car-oriented kind of development.



Figure 7.1. Italy.
Author's own elaboration.

7.2 ITALY

Italy is the second country classified as having a conformative spatial governance and planning system analysed in this document; the first one was France, but it is an exception because of the strong power the central government has in the spatial planning-related decisions. Italy has a geographical characterization that ranges from extended mountain areas in the North and in the centre to the great Po Plain and to coastal areas. The overall population is 62.000.000 inhabitants with a population average density of 210 inhabitants per square kilometre (World Atlas, 2017). The various territorial morphology of the country has steered to an urban development concentrated in major cities along coasts and in plain areas, with a “sprawled” development pattern. The urban issues started after WWII when the economic growth led to an increasing pressure of real estate firms to build; the result was an uncontrolled development, in some case also illegal. The urban development was not equally distributed among Italy, due to the historical and economic differences between different regions, the more critical areas are the

Po Valley, which now is considered as a “megacity region” (Fregolent, 2012) and the coastal strips, containing the major mobility infrastructures and biggest cities, as Rome, Naples, Venice, Genoa and Bari (Romano, Zullo, Fiorini, Marucci, & Ciabò, 2017). Additionally to the urban issue, common to the European countries, Italy is affected by frequent and numerous “disasters”, due to its hydrogeological and geological instability, like earthquakes, landslides, flooding (National Civil Protection Department of Italy, 2018).

The integration between environmental, land-use and transport planning issues seem to be central in a country where there are many risks endangering settlements, infrastructures and cultural heritage.

7.2.1 Land-use planning system

The 1997 *EU Compendium of Spatial Governance and Planning Systems and Policies* has identifies Italy as part of the so call “urbanism” planning tradition, characterized by “*strong architectural flavour and concern with urban design, townscape and building control*”, also underlining the lack of strategic national framework for spatial development (European Commission, 1997) (Janin Rivolin, 2002).

Italy has four levels of government:

- National level;
- Regional with 20 Regions, 5 of them benefit from a special status which guarantees broader powers and responsibilities. All the Regions also have a legislative power;
- Provincial level with 86 Provinces and 14 Metropolitan Cities;
- Local level with 7904 Municipalities.

The general framework for land-use planning is set by National Urban Planning Law, n.1150 of 1942, containing the list of instruments and responsibilities for spatial planning, handing out them between the national level and municipalities. Since the approval of the law, the national level has been characterized by a lack of action of the State in the development of the so-called Territorial Coordination Plans, which originally were one of its responsibilities. At the local level, the law established the instrument which is still governing urban planning the Regulatory General Plan (*Piano Regolatore Generale* or PRG), based on zoning practice (OECD, 2017b).

Moreover, spatial planning has never been an issue treated at the na-

tional level, the lack of interest of governments to act in this sector is also emphasized by the missed renewal of the urban planning legislation is a comprehensive law, despite the many proposals arrived from the National Urban Planning Institute (INU) (Cotella & Janin Rivolin, 2011). The original law has been integrated many times in order to introduce new dimensions, not only concerning strictly urban planning, but there is not a unique code summarizing all (Oliva, 2015). In 2001 a partial Constitutional Reform has modified the art. 117 which defines the repartition of national and regional competences and the shared ones; territorial governance has been defined as a shared one, and the State has to define the overall policies for big strategic infrastructures (Camera dei Deputati, 2015).

Since 1977 following the Presidential Decree n.616, Regions have legislative functions and spatial planning became a regional activity and started a great legislative production ended with experimentations and evolution of the outdated national law (Salone, 2013). The planning instruments at this level are the Regional Territorial Plans and Regional Landscape Plans, but it is possible to integrate them into a single document. PTR contains the strategies and objectives for the regional development, that has to be implemented by a lower level of planning. Instead, the PPR is a plan focused on the preservation, valorisation and management of the territorial landscape values; the two instruments are usually developed in a common planning process.

The intermediate level between the regional and the local is the provincial one, in 2014 the law n. 56, known as “Delrio Law”, has redefined the functions and election of the provincial bodies and have introduced a new one: Metropolitan City (MC). At the present day, there are 14 MCs in Italy, Bari, Bologna, Cagliari, Catania, Florence, Genoa, Messina, Milan, Naples, Palermo, Reggio Calabria, Rome, Turin and Venice (including the ones of special status Regions) and 86 provinces; the president of the MC is the Mayor of the main town of the area and the Metropolitan Council is composed by the mayors of the other municipalities. The new organisation of this level of government is an example of the willingness and necessity to redefine the spatial planning system, creating a new body, but also new instruments (strategic plans) to integrate different sectors of planning in a complete vision (Barbieri, 2016). The provincial

level is responsible for:

- Strategic territorial development;
- Integrated promotion and management of services and infrastructures;
- Management of the relations between municipalities and upper levels of government (Camera dei Deputati, 2019).

The first planning tool is the Provincial Territorial Coordination Plan (*Piano Territoriale di Coordinamento Provinciale* or PTCP), which contains the national and regional policies and strategies, defines the environmental areas to preserve, zones interested by seismic and hydrogeological risk and infrastructures at the provincial level. PTCP is not a legally-binding instrument for the local level of government, but provides indications for the city planning activity. After the 2014 reform, the MC is also responsible for the drafting of Metropolitan City Strategic Plans, defining the metropolitan vision every three years and has to be contextualized in the long-term vision of the PTCP (Osservatorio sulle Fonti, 2019) (Barbieri, 2016) (Fusero, 2017).

At the local level, as previously said the main instrument is the PRG, but in some Regions experimenting new approach to spatial planning it has been replaced by two instruments: a Structure Plan (STRU) or a Territorial Development Plan (PGT) containing the strategic vision for urban development, but also operative plan with zoning functions (OECD, 2017b). The way implementation of the plan takes place could be:

- direct, when the building permit is giving by the municipality after evaluating the concordance of the project to the plan;
- indirect, when an Implementation Plan is needed to guarantee more details for the project phases. Implementation plans could be differentiated in: Detailed Plan (*Piano Particolareggiato* or PP), Productive Settlement Plan (*Piano per gli Insediamenti Produttivi* or PIP), Social Housing Plan (*Piano per l'Edilizia Economica Popolare* or PEEP), Executive Plan (*Piano Esecutivo Convenzionato* or PEC) and Recovery Plan (*Piano di Recupero* or PdR).

The temporal dimension of Regulatory General Plan is a great issue, because there is not an established term when instruments have to be updated, so in many cases, the same plan remains for several years (Cirianni, Panuccio, & Rindone, 2013) (Romano, Zu-

Table 7.1. Land-use planning system in Italy. Author's own elaboration.

llo, Marucci, & Fiorini, 2018); an example is the PRG of Turin, approved in 1995 and still in charge, but with more than 300 variations, because of the inadequacy of the original instrument to face strategic transformations of the city (Centro Einaudi, 2019).

Planning scale	National level	Regional Level	Province Level	Local level
Authority	-	Regional Council	Provincial Council Metropolitan City Council	City Council
Instruments	-	Regional Territorial Plan (PTR) Regional Landscape Plan (PPR)	Provincial Territorial Coordination Plan (PTCP) Metropolitan City Strategic Plan	Regulatory General Plan (PRG)
Responsibilities	Setting regulations and laws for territorial governance.	Setting of the socio-economic development objectives; Guidelines for the territorial development setting; Landscape and environmental.	Integration of regional and national guidelines and policies, definition of risk area, setting the objectives and action for metropolitan infrastructures and services, provincial territory zoning; Definition of a vision for the MC.	Definition of the future zoning functions for each area: land-uses, location of services and infrastructures.

7.2.2 Transport planning system

Transport planning, as territorial planning, is a shared competence between the national and regional levels of government, but in this case, the central government has developed the expected policies. The Minister of Infrastructures and Transports is the body responsible for the development of the definition of the transport policy, strategies and priority projects concerning the transport system and, obviously, the national choices have an impact of the territorial development, influencing lower levels of government. The “National Infrastructures, Transport and Logistic Strategies” is the strategic document set out by the Minister; it provides recognition of the present state of the Italian transport system and the vision

for the future. The strategic framework is supposed to be implemented by the “Transport and Logistic General Plan” (*Piano Generale per i Trasporti e la Logistica* or PGTL) in which the objectives for the transport system and the guidelines have to be defined. Then, a programming economic document is foreseen: the “Pluriannual Planning Document” (*Documento Pluriennale di Pianificazione* or DPP) in which the public investments for the projects are defined every three years. In general, the national Transport Planning Policies is oriented in three moments: planning, programming and projecting (Ministero delle Infrastrutture e dei Trasporti, 2016).

At the regional level of government, the Regional Council is responsible for the adoption of the “Regional Mobility and Transport Plan” (*Piano Regionale della Mobilità e dei Trasporti* or PRMT), which is developed by the responsible Department of the Region¹. The PRMT is a strategic document and it not always provides specific actions and the implementation of the plan is usually subordinated to more sectoral plan which usually differentiates the transport system in mobility and logistics or in other ways defined by each region (Regione Piemonte, 2018) (Regione Veneto, 2019).

The provincial level of government is responsible for managing and implementing the provincial road system, but also to develop strategies for sustainable development in the area, through the efficient allocation of infrastructures. The Provincial Territorial Coordination Plan includes transport system planning, introducing the upper-level transport policies and promoting new ones accordingly to the provincial needs. In some cases, the Provinces are also responsible for the development of Provincial Transport Plans, because of Regions yielding some of their competences through specific regional laws, which mainly regulates the supply of Public Transport concerning more municipalities and the management of the provincial roads.

The local level of government is responsible for the regulation of urban traffic, for the provision of the Local Public Transport, for mobility management and local infrastructure enhancements. The instruments used for local transport planning are two:

- Urban Mobility Plans (*Piani Urbani della Mobilità* or PUM) or Sustainable Urban Mobility Plans (*Piani Urbani della Mobilità Sostenibile* or PUMS), that have a strategic and quite integrated ap-

¹ Due to the Regional legislation, which could differ a lot from a region to another, the regional departments could be more or less integrated among different sectors related to territorial planning.

proach with medium-long term visions (10 years) and provide the local policies on the passengers and freights transportation, accessibility, non-motorized mobility, road security and multi-modal mobility. Both the plans are referring to the municipal territory, but also to surrounding areas;

- Urban Traffic Plans (*Piani Urbani del Traffico* or PUT) have a short-term duration (2 years) and are focused on motorized passenger transport and on the improvement of the parking condition, the setting of circulation among the city, the reduction of pollution and energy efficiency. This plan is only concerning the strict municipal territory (IRPET, 2015) (OfficeP-RIME Projects and Research on Infrastructures, Mobility and Environment, 2016)

Table 7.2. Transport planning system in Italy. Author's own elaboration.

Planning scale	National level	Regional Level	Province Level	Local level
Authority	Minister of Infrastructures and Transports	Regional Council	Provincial Council/Metropolitan City Council	City Council
Instruments	National infrastructures, transport and logistic Strategies; Transport and Logistic General Plan (PGTL).	Regional Mobility and Transport Plan (PRMT)	Provincial Territorial Coordination Plan (PTCP)	PUM/PUMS PUT
Responsibilities	Definition of national strategies, policies and guidelines for transport; Definition of priority projects at national level.	Setting of regional guidelines, objectives and actions for the improvement of regional transport system.	Integrating of regional policies and developing strategies and proposing projects for the implementation of more efficient and sustainable mobility and logistic in the provincial/metropolitan area basin.	Setting of the passenger and freight transport policy, enhancement of accessibility and promotion of sustainable modes of transport; Definition of the Local Public Transport (PUM/PUMS); Definition of measures and projects to improve the motorized circulation, enhance safety, reduce pollution (PUT).

7.2.3 Italian TOD strategies and projects implemented and potential

Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD strategy	Potential Single project TOD	
PTCP of Metropolitan City of Bologna	x						
Regional Metro System Project in Campania Region	x						
Catania		x					
Salerno-Calvanico railway line							x
Turin-Torre Pellice railway line							x
Milan Metropolitan Railway System							x

Table 7.3. TOD (implemented and potential) case studies reported by literature in Italy. Author's own elaboration.

Today, the integration between transport and land-use planning is far from happening in the Italian planning framework. The main obstacle is the strong sectoral nature of the different planning instruments, which try to refer to each other in some case but merely reporting other strategies or actions, not assessing the impacts of a system on the other. The conformative and prescriptive nature of the plans is a major issue because the overall future functions and developments of areas and infrastructures are included in a future scenario, which could be partially realized or not at all (Riganti, 2003).

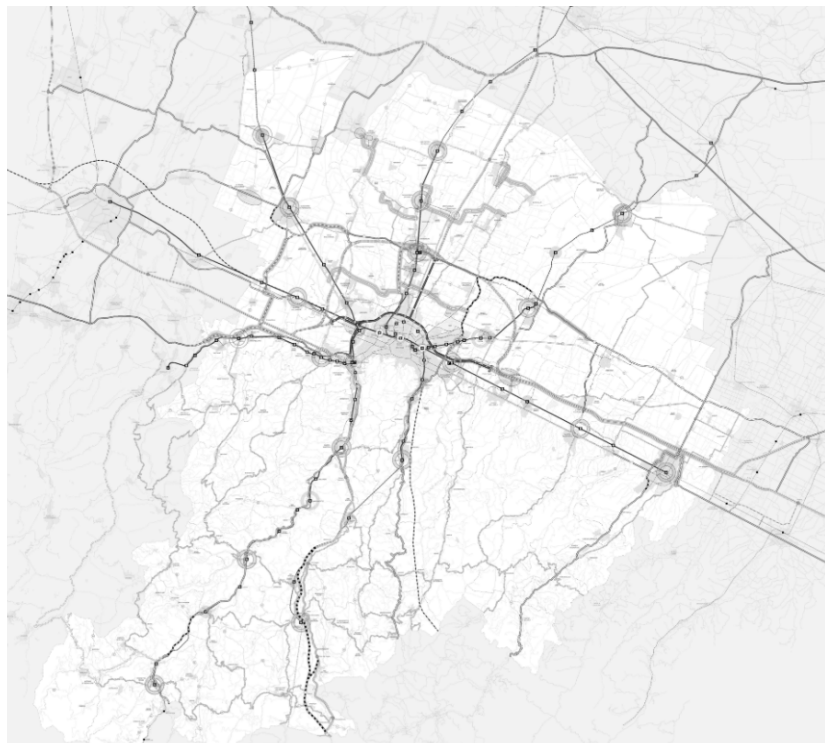
However, even the sectoral approach to spatial planning which still remains the key issue of the Italian case, many researches have been developed on specific case studies where land-use and transport have been integrated in a virtuous way.

A first case study is identified in the Provincial Territorial Coordination Plan of the Metropolitan City of Bologna, approved in 2008 because, in this plan, policies to encourage the Public Transport usage in the metropolitan areas and to avoid the urban sprawl which was interesting the main city surrounding were introduced. The plan established the “valorisation of the area near railway stops of the MRS² with services, commercial activities and new residences”, exploiting the undeveloped parts in a radius of 600 meters from the station, especially the ones already included by PRGs as poten-

² Metropolitan Railway System (*Sistema Ferroviario Metropolitano*).

tial transformation sites (Metropolitan City of Bologna, 2004). The plan was promoting a metropolitan level of TOD, but the main weakness was the scarce involvement of the Region, responsible for the rail infrastructures and rail services, in the planning process. The other limit was provided by the conformative planning system present in Italy, which makes necessary modifications of all the PRGs of the municipalities interested in the potential TOD developments. The Plan was partially successful, because 60% of the rail-served have a new residential greenfield, but it was not enough to stop urbanisation in cities not served by railway stations, as Granarolo (Staricco & Vitale Brovarone, 2018a).

Figure 7.2. Strategic mobility and infrastructure development. Source: PTCP of Bologna (<https://www.cittametropolitana.bo.it/pianificazione/Engine/RAServeFile.php/f/tav4A.jpg>).



Other PTCPs in Italy have expressed the importance of polycentric territorial model, but in different ways: for Milan, Florence and Rome the polycentric structure is recognized as already present and as a structural factor to be enforced, for Naples instead the polycentrism is a strategy to balance the too high polarization on the main city. Also, the integration of the MRSs in the plan is a key element

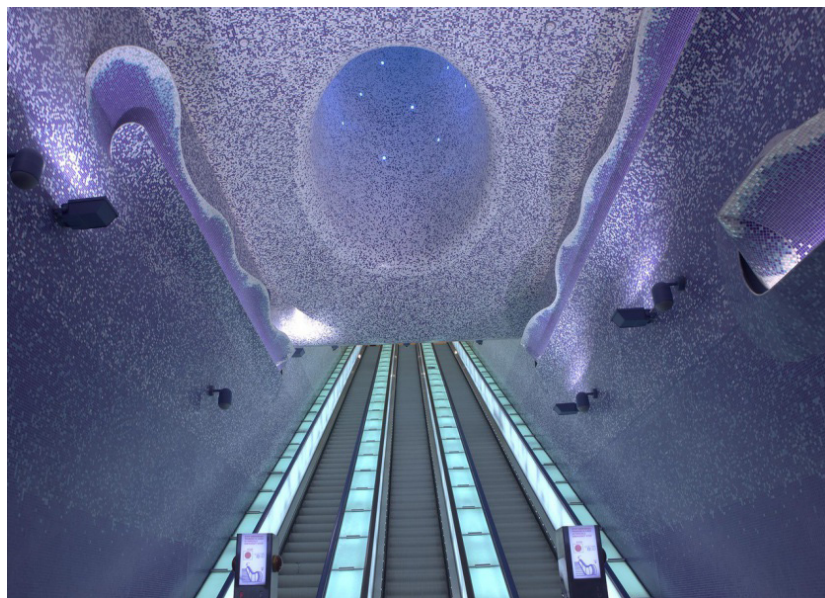
for creating a territorial equilibrium, if there is only a radio-centric development perspective around the main city, it will create congestion problems and also a weakening of the role of surrounding town; instead, the objective of TOD is to create areas where many activities could happen, not only residential areas whose inhabitants depend on bigger cities activities. The PTCP of Bologna seems to create a structured approach that integrates the polycentric model to analyse areas surrounding the stations to verify the potentials of each one, even in accessibility and sustainable mobility modes view (Staricco, 2015).

Another case study broadly used for TOD researches is the Regional Metro System project in the Campania Region; the project started in 1996 for the metropolitan area of Naples and then extended in 2001 to the whole regional territory and was based on strategies concerning transit investments, urban development and operational policies. The possibility to exploit the future project (started in 2006) of the high-speed railway line connecting Rome and Naples was a major factor in the decision of developing such a strategy. The strategy was focused on the architectural quality of the stations and the surroundings (the Line 1 stations have been designed through the “Art Metrò” project), the connection of the existing poles, the location of new developments in the surroundings of existing stations (Cascetta & Pagliara, 2008) (Nuzzolo & Coppola, 2008). The results of the implementation showed a significant increase in attractiveness of public transport and an increasing number of transit ridership in all the metropolitan region, also confirmed by ISTAT³ data with an 27% increase between in the first 10 years of the project, also thanks to an integrated timetable and a unified ticket for all the system (Cascetta & Pagliara, 2009). Other important elements in the partial success of this project has been the adaptation of the planning instruments at the different level of government: the Campania Region has reformed the mobility system, the Metropolitan City of Naples, former province, developed a new PTCP (approved in 2016) and the Municipality of Naples adopted a new transport plan in 1997, then the so-called “100 stations Plan” and a variant of the PRG in 2004, showing the willing of public institutions to integrate the land-use and transport planning. Anyway, some negative impacts have been reported, because of the urban

³ Italian National Institute of Statistics.

renewal surrounding, some station areas resulted in a gentrification process, due to the increasing of real-estate values (Papa, Angiello, & Carpentieri, 2016). A study has also provided analysis based on the Node-Place model in the Naples Metropolitan Area, through the use of a tool called SNAP (Station Network Accessibility Planning), which unifies the rail network, the rail station catchment areas and socio-economic data. The study results are coherent with the Metropolitan City plans, but some suggested densification around the station could not be achieved due to the presence of land-use regulations and urban morphology (Papa, Moccia, Angiello, & Inglese, 2013).

Figure 7.3. A photo of the Toledo Metro in Naples designed by Oscar Tusquets Blanca. Source: Antonella Campidoglio (<http://www.antoniettacampilongo.it/2016/11/30/le-stazioni-dellarte/>)



An interesting case of integrated policies at the local level is provided by the city of Catania, located along the Ionian coast of Sicily in the urban continuum connecting Messina and Siracusa. The city has always been characterised by a car-oriented development with a poor provision of LPT. The renewal of the land-use and transport plans began in 2009 has led to two plans, the PRG and the PGTU (*Piano Generale del Traffico Urbano* or General Urban Traffic Plan), that integrate the public transport system with the future development. Some strategic areas are identified by the municipality in the surroundings of the stations and are distinguished by transforma-

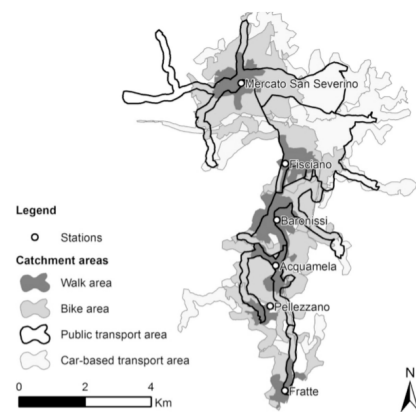
tion regulation in which densification, mixed uses, walking and bicycle accessibility are provided (La Greca, Martinicio, & Barbarossa, 2013).



Figure 7.4. Railway lines and TOD application areas in Catania. Source: La Greca, Martinicio, & Barbarossa, 2013, p. 3.

Other studies on Italy are regarding the evaluation of integration between land-use and transport, based on the Node-Place approach. A recent paper from Nigro, Bertolini and Moccia analyses node indicators (describing the transport quality analysing frequency, ticketing and directions), place indicators (job and residential densities, places of education) and feeder transport indicators (walking paths, bike lanes, traffic intensity, road size, road slope, feeder transport, feeder lines, bus stop accessibility, frequency, fare integration, passenger facilities, car parking and car parking accessibility). The area analysed comprehended 6 municipalities in the Campania Region: Salerno, Pellizzano, Baronissi, Fisciano, Mercato San Severino and Calvanico. The results of the study lack of accessibility in the catchment areas of the stations and the differences from one town to another regarding the station accessibility and location; all the stations are more nodes and not places. Moreover, the paper wanted to highlight the need to include feeder transport in the analysis of multiple feeder transport for low-density areas, as these municipalities (Nigro, Bertolini, & Moccia, 2019).

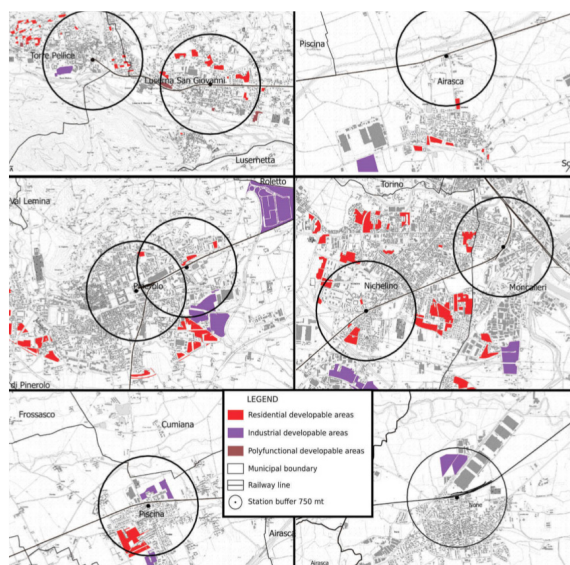
Figure 7.5. Catchment areas by transport mode.
Source: Nigro, Bertolini, Moccia, 2019, p. 117.



In the Italian context, the urban transformation proposal are still far from the approach encountered in other European States, because of the strong persistence of the urban design dimension and of limits provided by the sectoral, bounded and legally-binding approach to planning which is not fairly integrated, excepting precise good practices (Papa E. , 2009).

Another research study, focused on the exploration of potentialities and constraints in the implementation of TOD in suburban and rural stations, along the railway line connecting Turin and Torre Pellice. The selected approach assesses the 3Ds, Density, Diversity and Design in a 750 metres buffer around station areas. The discovers of this research are mainly related to some limits of applying a quantitative method, that could not be representative of the real potentialities of implementing TOD; the case-by-case study of each station areas and the related municipality is suggested to planners (Staricco & Vitale Brovarone, 2018b). Instead, the Node-Place and TOD index approaches have been used in order to assess the

Figure 7.6. Future development areas identified by PRGs of analysed municipalities.
Source: Staricco and Vitale Brovarone, 2018b, p.11.



presence of potential TOD areas along the metropolitan railway system of Milan. These measurements are suggested as instruments to use in the planning process to manage local interventions and guarantee a general coherence among actions in station areas (Pucci, 2018).



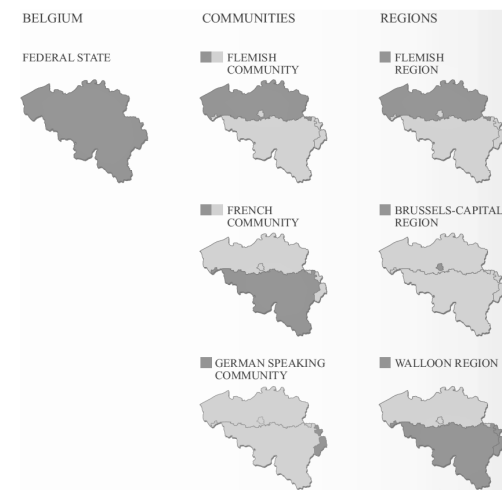
Figure 7.7. Belgium.
Author's own elaboration.

7.3 BELGIUM

Actually, Belgium is a country characterised by really dense and dispersed spatial organisation patterns, with few big cities and a lot of medium-sized cities with less than 5.000 inhabitants. Belgium also has a record as Europe's most urbanised nation (Urbact, n.d.). Historically, an integration between land-use and transport planning was performed towards the end of the 19th Century, when it was necessary to easily move the working population from cheap residential housing hubs in the countryside to the workplace by tramways or railways, supporting them with cheap tickets. This kind of policy, since the first "Belgian Housing Act" of 1889, was maintained to prevent congestion in big cities. After the 2nd World War, the spread of private car-ownerships led to new development patterns car-centred that still dominate the mentality of the population (Caset, Derubber, Boussauw, & Witlox, 2017). Even if it is possible to see positive transportation trends in the last years, as the increase of 50% of the number of train passengers between 2001 and 2010 and gaining of both public trans-

port and bicycle markets between 2005 and 2011 (Boussaauw & Vanoutrive, 2017), there is still a strong need for spatial development and public transport policies integration, mostly to stop the de-urbanization processes (bringing more and more people in the countryside in stand-alone houses that are impossible to reach through public transports) and to convince people to use more public transportation systems (Caset, Derubber, Boussaauw, & Witlox, 2017). Belgium is moving from a passive and rigid system (inherited by the “Spatial Organisation and Town Planning Act” of 1962) to a more strategic and participatory one (Hanocq).

7.3.1 Land-use planning system



Belgium is a federal state divided into 3 regions (Wallonia, Brussels, Flanders), 3 linguistic communities (see *Figure 7.8*), 10 provinces (5 in Wallonia and 5 Flanders), 581 municipalities (Hanocq). The Federal Government, the Regions and the linguistic Communities share the upper tier of the State organisation, then it is possible to find as an intermedi-

ate level the Provinces and at the lower one the Municipalities.

The competences of the Federal Government are: social security, public debt, monetary policy, prices and income policy, protection of savings, nuclear energy, State-owned companies, the federal scientific and cultural institution and obligations towards the European Union and the NATO (Belgium, 2019a).

Linguistic Communities have powers in the following sectors: “culture, education, the use of languages and matters relating to the individual which concern on the one hand health policy and on the other hand assistance to individuals” (Belgium, 2019c). According to the basic law “Spatial Organisation and Town Planning Act” of 1962 (Albrechts, 2001) (ESPACE, 2004), both Federal Government

and Linguistic Communities have a limited influence on spatial planning, that is mainly a competence of regions and lower bodies, but they still influence the spatial organisation through other policies that are in their powers as “scientific research, railroads, national defence, regulation of air transport and ground mobility, energy policy” (Hanocq).

Regions have powers in “economy, employment, agriculture, water policy, housing, public works, energy, transport, environment, town and country planning, nature conservation, credit, foreign trade, supervision of provinces, communes and intercommunal utility companies” (Belgium, 2019e).

Provinces could only work under the control of other authorities on topics like education, social and cultural infrastructures, tourism, highways and waterways, etc. They are competent on all the residual topics that concern only the provincial area and are not interest of other bodies (Belgium, 2019d); it is important to notice that in Flanders there are some competences concerning spatial planning shared between the Region and the Provinces, but there are not anymore in Wallonia (Hanocq).

The Communes or municipalities were the oldest bodies when the State was created in 1831 and they have a large autonomy in the

Table 7.4. Land-use planning system in Belgium.
Author's own elaboration.

Planning scale	National level	Regional Level	Province Level	Communes level
Authority	Federal Government	Regions	Provinces	Communes
Instruments	Federal Plan for Sustainable Development, Regional Zoning Plans	Regional Plan for Sustainable Development, Regional Spatial Development Plans, Implementation Plans	Provincial Structure Plans, Provincial Implementation Plans	Municipal Structure Plans, Municipal Implementation Plan
Responsibilities	Setting of strategies for sustainable development, Setting of a general strategy for each Region.	Strategic land-use policies for the development of the Region, Implementing the RSDP in specific areas.	Specifying of the vision of the RSDP.	Definition of the strategic vision for the development of the whole municipal area, Regulatory zoning plan at detailed scales.

powers they exercise: town planning, education, housing, social welfare, police forces, maintaining the registers of births, deaths and marriages, plus the registers of the population. They have to perform all the requested tasks from higher-level authorities (Belgium, 2019b).

The national level influences the spatial planning with two main instruments, but still it does not formally exist in the distribution of competences strictly related to territorial governance:

- the Federal Plan for Sustainable Development (FPSD) that was required since 2014, when the 2030 Agenda for Sustainable Development was adopted. This plan required further coordination between the Federal State, the Regions and the communities. There are 3 bodies of the Federal Government that have to implement, improve and adopt this document:
- the Federal Institute for Sustainable Development;
- the Task Force on Sustainable Development (TFSD);
- the Federal Council for Sustainable Development (FCSD) (ESDN, 2019).
- the Regional Zoning Plan (OECD, 2017a) are historical plans which regulate 80% of the use of land in Belgium and consequently they are incorporated in the lower level legislation and it divides the territory into potential development areas.

Regions have the competences for defining the strategic vision for their own territory through different tools:

- the Regional Plan for Sustainable Development is a vision mainly connected to the need for a transition to sustainable development. For the organisation of Belgium institutions, the FPSD only concern the Federal level and each region had different policies on sustainable development: Flanders adopted in 2016 the “Vision 2050”, Wallonia adopted its second sustainable development strategy in 2016 and the Brussel Capital Region has approved the “Regional Sustainable Development Plan” in July 2018 (ESDN, 2019);
- the Regional Spatial Development Plan that sets up the land-use strategic policies for the region area;
- the Regional Implementation Plan⁴ that is a focus on specific territorial parts of regional relevance, with more detailed information, but it only exists in Flanders.

Regional Planning practices have always been not so strong in the past decades in Belgium, only focusing on being an ensemble of different strategies; this trend has changed since the 1997 “Spatial Structure Plan for Flanders” was adopted. It gave a new strategic vision to the regional plans and it started integrating different “sectoral spatial demand”, like housing, transport and industry and introducing sustainability as a key element (Albrechts, Healey, & Kunzmann, 2003).

As previously said, the intermediate level of government is composed of the Provinces, but only in Flanders the 5 Provinces still have spatial planning competence and they could produce:

- the Provincial Structure Plan⁴, it is still a strategic document with a long-term vision;
- the Provincial Implementation Plan⁴ is a provincial instrument for the specification of the Regional Zoning Plan (ESDN, 2019).

At the Commune level, there are two main instruments for spatial planning:

- the Municipal Structure Plan, which defines the vision for the development of each municipality;
- the Municipal Implementation Plan, which defines the detailed scale regulatory plan for specific areas at a scale of 1:1.000 or 1:5.000.

In general terms, in Belgium, all the levels with spatial planning competences have a strategic plan and an executive plan, but they are supplemented with urbanistic rules (Hanocq).

7.3.2 Transport planning system

The Transport system is regulated in Belgium by the Laws produced at the Federal State level, but there are no plans produced at this level; the responsibilities of the central government are:

- “*Safety policies and measures*;
- *Environmental policies relating to transport*;
- *Optimum integration of all modes of transport*;
- *Railways and infrastructure, including the legislation, supervision and public financing of the Belgian National Railway Company (SNCB)*;
- *Civil aviation*;
- *The control and regulation of traffic and transit of goods, and*

⁴ Existing only in Flanders.

- *Security measures concerning building and repairing roads, ports, waterways, dikes, airports (cooperation agreements between federal and regional administrations are required);*
- *Road transport and infrastructure (shared competence);*
- *Driver licenses;*
- *Regulation of road transport;*
- *Vehicle registration*” (Division of Powers, n.d.).

At the Regional Level, there should be a Regional Mobility Strategy, as it exists in Wallonia, but Flanders has decided to integrate the strategic view of transport in their “Vision 2050”. Instead, the Brussels Capital Region is currently developing the plan “IRIS 2”, focused on mobility (Smart City, 2018). The regional competences are:

- *“Construction, maintenance and control of roads;*
- *Construction, maintenance and control of waterways;*
- *Regional bus company”* (Albrechts, 2001);
- Provision of Regional Public Transport.

The local level competences are:

- *“Construction, maintenance, and control of local roads;*
- *Parking policy”* (Albrechts, 2001);
- Provision of Local Public Transport.

Belgium has a spatial planning system that divides responsibilities between four levels, for what concerns the land-use, and between

Table 7.5. Transport planning system in Belgium. Author’s own elaboration.

Planning scale	National level	Regional Level	Provincial Level	Communes level
Authority	-	Regional Department of Mobility	-	Municipal Department of Mobility
Instruments	-	Regional Mobility Strategy	-	Local Traffic Plan
Responsibilities	-	Development strategy for regional roads, waterways and construction of a coherent systems of mobility throughout the Region, with the provisioning of RPT.	-	Development strategy for new local roads, maintenance and provisioning of the LPT system in the Municipality area.

two levels for transport, so the integration could be possible at the regional and municipal level, but it is not really implemented through plans.

7.3.3 Belgian TOD strategies and projects implemented and potential

Reported Case Study	IMPLEMENTED			POTENTIAL			Research
	Regional TOD strategy	Local TOD strategy	Single TOD project	Potential regional TOD	Potential Local TOD strategy	Potential Single project TOD	
Station Radar Project				x			x
Flemish Rhombus				x			x

Table 7.6. TOD (implemented and potential) case studies reported by literature in Belgium. Author’s own elaboration.

The implementation of strategies with the focus on the integration between land-uses and transportation has never been high on the agenda of institutions in Belgium, as highlighted by Caset et al. in 2017. However, in the *Flemish Spatial Policy Plan*, the importance of mixed-use residential and commercial activities around transit hubs is considered (Caset, Derubber, Boussauw, & Witlox, 2017). Additionally, some research works are trying to create the basis for the integration of TOD strategies in the regional policies: for example, in Flanders the “StationRadar” project has already involved stakeholders in different transport regions in order to show the potential of the Node-Place Model application in the Flanders Region (Caset, Teixeira, Boussauw, Derubber, & Witlox, 2019).

The concentration of studies is on Flanders and on the “Flemish Rhombus”, the region which interconnects the Brussels, Antwerp, Ghent and Leuven and encompasses Mechelen, Sint-Niklaas, Aalst and Dendermonde. The rhombus deeply suffers from stern traffic congestion. Also because there are some parts with a strong deficit of heavy rail-transit connections, so studies also involve light-rail scenarios (Vermote, Macharis, Hollevoet, & Putman, 2014).

In any case, the Belgium case is mainly at a research level and there are no real policies trying to implement an integration between

land-use and transportation. The hope is that in future the researchers' studies will help developing new strategies both at regional and local levels.

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CONCLUSIONS

In this final part of the thesis the overall discovers of the research are described, focusing of the presence in each SGPS and in the analysed countries of the key elements to perform TOD in the future.

08

TOD in EUROPEAN COUNTRIES

8.1 TOD STRATEGIES IN DIFFERENT SPATIAL GOVERNANCE AND PLANNING SYSTEMS

In this final chapter, all the pieces of evidence detected in the analytical part concerning the eight national case studies are systematized in order to answer the three research questions:

1. Is Transit-Oriented Development a strategy performed in European countries?;
2. How is TOD performed in different SGPSs?;
3. How do SGPS elements in each country influence TOD implementation and effectiveness?.

To answer these questions some comparative analyses are going to be done. The first one, answering the first question, concerns the present situation of TOD in analysed European, comparing different TOD experiences reported by literature for each country. The second part of the analysis is based on the relevant strengths and weaknesses that TOD displays in each country. Then, the final part, trying to answer to the third question is based on the analysis of two components that are both relevant for future use of TOD approach in spatial development strategies:

- The elements of Spatial Governance and Planning System that affect the effectiveness in TOD implementation;
- The level of integration between land-use and transport planning in each SGPS.

8.1.1 Is Transit-Oriented Development a strategy performed in European countries?

The analysis of the existent literature shows that Transit-Oriented Development is an approach common to many European countries, even if it has been “implicit” for most of the time. Especially in capital cities and in surrounding regions, TOD-like urban development models were adopted to address the increasing demand for residential areas in cities, started from the half of the Nineteenth Century to WWII (Carlton, 2007). London, Berlin, Copenhagen, Stockholm and Amsterdam have urban development patterns that have been shaped along transit network in time. Today, after a long period of unsustainable urban development almost all-around Europe, characterized by urban sprawl and the use of private vehicles, Transit-Oriented Development is coming back as a possible ap-

proach to integrate land-use, transport and environmental planning and to reverse the present unsustainable trends (Cervero, 2009).

The research study has tried to give a comprehensive view on the literature about eight national case studies and the overall situation is that seven on eight nations are reported by literature to have effective or potential TOD strategies to be developed at different levels (regional, local and project scale). Only Belgium has not any reported effectively implemented TOD, but research studies are trying to set a scientific framework for the development of a regional strategy in Flanders; the expected result is a more and more integrated approach between land-use and transport planning, in order to revert the current sprawled development pattern (Caset, Teixeira, Boussauw, Derubber, & Witlox, 2019).

For the Nordic countries analysed, Denmark and Sweden, regional Transit-Oriented Development strategies are mainly concerning the capital cities Copenhagen and Stockholm, which were developed following respectively the “Finger Plan” and the “Planetary Cluster Plan” (Cervero, 2009). These plans were following the “new towns” theory, creating new urban areas along transit lines. Sweden also reported a local strategy for the waterfront area, Hammarby Sjöstad, that is reported to be a “green TOD” landscape (Cervero & Sullivan, 2011). Still today, potential TODs are studied in both the countries, but particularly in Sweden, potential local ones are analysed by literature, because of the willingness of small-medium municipalities of increase their attractiveness through good transport connections (e.g. Skurup) (Qvistrom & Bengtsson, 2015). In the United Kingdom, the Greater London Plan of 1944 has represented the most relevant *ante-litteram* regional TOD, but today, without a regional level of government, the implementation of wide strategies could be difficult. Even though, the majority of recent projects are linked to brownfield development, with high accessibility to public transportation system, in order to satisfy the increasing population. In France Transit-Oriented Development has started being studied and implemented in more recent years; a regional TOD-like, not explicit, case study is the Lille Metropolitan Area where different development projects started near stations, both in Lille and Armentières (a small municipality in the surroundings of the city) (L’Hostis & Liu, 2014). Upper-Local experimentation

in France is the *contrat d’axe*, a typology of partnership between different stakeholders belonging to the urban and transport planning sectors, based on the need of creating more dense, diverse and well-designed urban developments along railway lines. This kind of contracts have been adopted in ten areas, but their nature is mostly experimental (Bentayou, Perrin, & Richer, 2015).

In marked-led neo-performative systems, Transit-Oriented Development-like approaches to growth have been used in the past for Berlin and Amsterdam, but more recent experiences have shown some weaknesses. In Germany, Rieselfeld and Vauban neighbourhoods have been projected looking at light rail connections with the city of Freiburg as a core element to disincentive the use of private cars. These experiences, led by the idea of “sustainable neighbourhood”, are not successful from a social sustainability point of view (Mössner, 2015). Also, the Netherlands performed TOD-like unsuccessful urban policies because of their lack of attention to the community and private companies’ needs, the VINEX and the ABC policy. Even though, a new town along the railway line, Almere, and densification of a rural centre, Hoofddorp, occurred in the past with successful outcomes. In the Netherlands, TOD is a wide analysed topic in the research field. The great problem in the Netherlands is municipal competition and promoting co-operation between neighbouring cities seems difficult, but it is not impossible, as shown by the Stedenbaan project experience.

The conformative systems of Italy and Belgium are the ones with less reported experiences of TOD application. However, in Italy using “classic” planning instrument it was possible to create Transit-Oriented Development strategies for Bologna metropolitan area and for the area of Naples, and then for the whole Campania region.

From the overview described above and also reported in a more complete way in *Table 8.1*, Transit-Oriented Development experiences are registered in every analysed country, with different degrees of implementation, effective and potential experiences or research studies, reported by the available literature. Effective and potential experiences are the ones already implemented or that are going to be implemented; instead, research studies could focus both on potential experiences, supporting their implementation through

measurements or other considerations, and on the study of possible areas for TOD application. However, the quantity of reported case studies is not a sufficient indicator to establish in which SGPS Transit-Oriented Development is better performed. In the following paragraph, the strengths and weaknesses when it is necessary to implement TOD for each country are going to be reported.

Table 8.1. Synthetic table of the TOD experiences in the eight analysed countries.
Author's own elaboration.

SGPS	Country		Effective			Potential			Research
			Regional TOD strategy	Local TOD strategy	Single TOD project	Regional TOD strategy	Local TOD strategy	Single TOD project	
State-led systems	Sweden	Stockholm new towns							
		Stockholm Comprehensive Plan							
		Hammarby Sjöstad							
		Skurup							
		Önnestad							
		Malmö							
	Denmark	Copenhagen Finger Plan 1947							
		Ørestad City							
		Copenhagen Finger Plan 2014							
	United Kingdom	Greater London Plan							
		Hampstead Garden Suburb							
		Alconbury Weald							
	France	Lille Metropolitan Area							
		Armentières							
		Île-de-France							
		Contrats d'axe							
Market-led neo-performative systems	Germany	Berlin							
		Munich Central Corridor							
		Stuttgart Region Plan							
		Scharnhäuser Park							
		Vauban							
	Netherlands	Rieselfeld							
		Amsterdam							
		Almere							
		Hoofddorp							
		Stedenbaan							
Conformative systems	Italy	PTCP of Metropolitan City of Bologna							
		Regional Metro System Project in Campania							
		Catania							
		Salerno-Calvanico railway							
		Turin-Torre Pellice railway line							
		Milan Metropolitan Railway System							
	Belgium	Station Radar Project							
		Flemish Rhombus							

8.2 TOD EFFECTIVENESS AND SPATIAL GOVERNANCE AND PLANNING SYSTEMS

The effectiveness of Transit-Oriented Development is related to different factors, but for this final evaluation of the eight national case studies are taken into account the integration between land-use and transport planning and the presence in the SGPSs of some elements reported by Newman as necessary for the effectiveness in TOD strategies.

8.2.1 How do each country SGPS elements influence TOD implementation and effectiveness?

Transit-Oriented Development is one of the possible approaches, using an integrated approach between land-use and transport planning. Integration between these two components, and additionally the environmental one, in policies and planning, is a key element for implement sustainable development models and improving the quality of life in urban areas (Stead & Geerlings, 2005) (Staricco & Vitale Brovarone, 2018b). In this sense, the degree of integration between land-use and transport planning in each country is a relevant element that could increase or decrease the implementation of TODs strategies. In previous chapters, authorities, responsibilities and instruments for both the sectors of planning were analysed, and now in order to evaluate the integration three¹ factors, reported as crucial by Geerlings and Stead, have been considered:

- The *vertical integration* between different levels of government;
- The *inter-sectoral integration* between sectors at the same level of government;
- The *inter-territorial integration* between neighbouring authorities or authorities (Geerlings & Stead, 2003, p. 188).

The outcomes have been widely differentiated from different countries, also among the same Spatial Governance and Planning System.

Sweden has a good *vertical integration* both in transport and spatial planning policies, thanks to specific boards that ensure the respect of national guidelines at lower levels of government. On the contrary, the *inter-sectoral* integration is medium, because it is only performed at the local level through the Comprehensive Plan (OP), where future urban developments and transport goals are integrat-

¹ Additionally, Geerlings and Stead report the *intra-sectoral integration* between different sections of the same departments, but it has not been analysed, because of lack of information gained about this specific topic (e.g. the mobility and logistic).

		Vertical integration	Inter-sectoral integration			Inter-territorial integration		
SGPS	Country	Evaluation	Evaluation	Authority	Instrument	Evaluation	Authority	Instrument
State-led systems	Sweden			City Council	Comprehensive Plan (OP)		County Council	Regional Development Strategy (not used by any County)
	Denmark			Regional Council/ City Council	Regional Growth and Development Strategy/Municipal Planning Strategy		Regional Council	Regional Growth and Development Strategy
	United Kingdom			No level	No level is sharing both the responsibility for transport and land-use planning		County Council	County Council produces only sectoral plans, not spatial strategies
	France			Regional Council/Metropolitan Council/municipal groupings	SRADDET/SCoT		Regional Council/Metropolitan Council/municipal groupings	SRADDET/SCoT
Market-led neo-performative systems	Germany			State level	State Spatial Development Plan		Federal State/State/associations/counties	State Spatial Development Plan/Regional Plan/Strategies for Spatial Development in Germany
	Netherlands			Province/Municipalities	Structure plans		Provinces	Provincial Structure Plan (not legally-binding)
Conformative systems	Italy			Provinces	PTCP		Regions/Provinces	PTR/PRMT PTCP
	Belgium			Municipality	Sectoral plans		Federal Government	Regional zoning plans

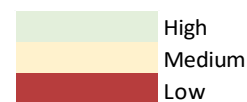
High

Medium

Low

Table 8.2. Land-use and transport planning integration in the eight analysed countries

Table 8.2. Land-use and transport planning integration in the eight analysed countries. Author's own elaboration.



ed. The regional level of government is not setting Regional Development Strategy (RDS), and only the Stockholm region is obliged to have a plan; although, Regions are setting transport plans and regulating the transport services, without coordinating it with general spatial development policy. Due to the absence of a regional level of government managing both spatial and transport planning, the *inter-territorial integration* between local authorities could be difficult. This is a major concern when comes to implement Transit-Oriented Development in areas different from the capital city. In Denmark, the integration is high in all three different factors. In fact, *vertical integration* thanks to the four national planning documents (three concerning spatial planning and one concerning transport policy) and to the presence of national agencies monitoring planning at the regional and local levels. Also, the *inter-sectoral integration* is high, due to the use of same planning instruments for spatial/land-use and transport planning both at the regional and at the local levels of government. The *inter-territorial integration* is good thanks to the regional level of government planning. In the UK, the *vertical integration* is medium because there is a lack of an intermediate level of government between national and local levels for what concerns land-use planning, but also transport planning is only performed by two out of three levels of government. Also, the *inter-sectoral integration* and *inter-territorial* one are not well-performed due to the lack of an intermediate level responsible for both land-use and transport planning. France, like Denmark, performs well in all the three dimensions of integration, thanks to recent reforms that try to set a more integrated approach to different sectors of planning. Germany and the Netherlands, despite them belonging to the *market-led systems*, have quite a different level of integration in all the three dimensions. Germany has a well *vertical integration* thanks to the “counterflow” (*gegenstromprinzip*) which creates a top-down bottom-up process in spatial planning: lower level has to adapt to higher levels policies, but higher levels have to take into account the lower level requests and orientations. Also, *inter-territorial integration* is good in this country, thanks to a good organisation in various level of planning; instead *inter-sectoral integration* between transport and land use is medium only Länder have State Spatial Development Plans concerning both land-use and transport, but at the national and lo-

cal level the sectoral approach prevails. The Netherlands has a quite different situation, performing a medium vertical, inter-sectoral and *inter-territorial integration*. The independence between planning levels could be only overcome by the *inpassingsplannen*, a procedure used for regulating spatial developments in areas of upper-local interest. The *inter-territorial integration* is medium, due to the lack of an intermediate level between the national and the local one creating a common framework for transport and land-use regulations: Provinces are reluctant to use their powers.

Countries with *conformative systems*, Italy and Belgium, are the ones performing low *inter-sectoral integration*, due to the sectoral approach which includes in low degree transportation in spatial and land-use planning tools. *Vertical integration* is reported as medium for both, due to the persistence of a top-down approach in these policies. In Italy, the *inter-territorial integration* is medium due to the presence of institutional bodies, as Region and Provinces and Metropolitan Cities that work with local authorities and provide a framework for spatial development and transportation, common to several municipalities. However, lower level of government is responsible for the land-use planning and the provision of local public transport and it not always performed taking into account the policies of other neighbouring municipalities. Instead, in Belgium *inter-territorial integration* is medium because the only upper-local co-ordination is given by the Regional Zoning Plans of the Federal Government for what concerns land-use, instead Regions and Municipalities are in charge for transport planning.

Further considerations, about the potential effectiveness of Transit-Oriented Development in the selected case studies, are done using six “strategic” components for TOD successful implementation, five are theorized by Newman and Cervero and one has been added by the author:

- a *forward-looking* urban planning;
- a *strategic planning framework* identifying the centres where development need to occur and in what density and mix and connect them with rapid transit lines;
- a *statutory planning base* defining the density and design of each centre (Newman, 2009);
- a *regional level of government* responsible for land-use and transport

planning. This last parameter has been added after the analysis of the case studies, in which the lack of a regional level of government has emerged as a major barrier to the development and implementation of a TPD strategy.

- a *strong leadership* of public actors to achieve the goals (Cervero, 2009);
- presence of *public-private relations* in the planning process is a variation of the original public-private funding mechanism reported by Newman, that is more linked to the single TOD strategy and it is not assessable referring to general SGPSs.

It is important to remark that these six elements have been chosen because of their fitting to the scale of the analysis, referring to national Spatial Governance and Planning Systems and, especially, to structures, tools and practices related to transport and land-use planning. However, they could be more detailed and organized in different ways if the purpose was the evaluation of single strategies and projects, an example is the identification of critical factors for the implementation of TOD proposed by Thomas et al. in 2018 (Thomas, et al., 2018).

The *State-led systems* are the ones with higher potential effectiveness in implementing TOD strategies, even if Sweden and UK are penalized from missing a regional level of government in charge of both land-use and transport planning. France has integrated into its planning tools more integrative and strategic ones, keeping the statutory planning typical of a conformative nation, but in the TOD experiences the relations have been mostly between public actors from different sectors and this is a limit when the attraction of private investors. Instead, *market-led neo-performative systems* are experiencing the opposite problem with partial or absent control on spatial transformation after the adoption of plans and private interests overcoming the public ones. The last ones, *conformative systems*, are lacking in the strategic framework and forward-looking planning due to the difficulties to adapt plans to new needs.

State-led systems are more advantaged in successfully implement TOD strategies, mostly thanks to their public control on spatial transformations that avoids the prevalence of market interests on the general ones. Nevertheless, *State-led systems*, except for France that adopted more recently the approach, have a long tradition in

integrating transport and land-use planning when the TOD concept was not existing, promoting developments along transport routes. This tradition is threatened in UK and Sweden by the lack of a regional level of government, but the community and local institutional awareness about the need of the sustainability of TOD is a good chance for overcoming the current limits. In France, Transit-Oriented Development has its strength in the recent reforms of the spatial planning system, which have moved forward a more strategic framework at upper-local levels of government, but the strong public power is affecting the implementation of experiences, as the *contats d'axe*, because private actors are less involved than in usual TOD strategies. It is important to balance public and private needs to make TOD happen (Bertolini, Curtis, & Renne, 2009). The opposite problem has been reported for market-led systems and conformative ones, where the public control is lower due to the recent neo-liberal reforms in spatial planning for the first system and due to the low-adaptive and not strategic planning tools and to the process of allocation of transformation right for the second system. An example in Italy is the missed modification of PRGs of municipalities interested by the PTCP of Bologna, the result was urban developments in cities not served by railway stations, in discrepancy with the plan strategy (Staricco & Vitale Brovarone, 2018a). However, Transit-Oriented Development is an object of many pieces of research in all the European countries and its presence in the national and international discourse about spatial planning is a good starting point for future adoptions of the approach in territorial strategies.

		Forward-looking urban planning	Strategic framework	Statutory planning	Regional level of spatial planning	Strong public leadership	Public-private relation
SGPS	Country						
<i>State-led systems</i>	Sweden						
	Denmark						
	United Kingdom						
	France						
<i>Market-led neo-performative systems</i>	Germany						
	Netherlands						
<i>Conformative systems</i>	Italy						
	Belgium						
		<div> <div></div> <div></div> <div></div> </div>					
		<div> <div></div> <div></div> <div></div> </div>					
		<div> <div></div> <div></div> <div></div> </div>					

Table 8.3. Strategic principles for Transit-Oriented Development.
Author's own elaboration.

8.2.2 How is TOD performed in different SGPSs?

The analysis of different TOD experiences in the eight national case studies and their present SGPSs have led to the identification of some strengths and weaknesses for the TOD strategies implementation.

As reported in *Table 8.4*, State-led systems are the ones better performing today Transit-Oriented Development, thanks to an established tradition of TOD-like developments, even before the Calthorpe's theorisation, and thanks to public authorities willingness to keep on performing this kind of development strategy. In France, the public dimension in the *contrat d'axe* experiences seems to prevail and the lack of a private involvement has generated some problems in the effective implementation. However, the main difficulty emerged is the lack of an appropriate level of government in the United Kingdom and Sweden to perform both spatial and transport planning; this void is deeply affecting TOD implementation, even if small municipalities in Sweden and the community in UK are interested in using transport nodes as growth poles for future developments.

In countries belonging to the market-led neo-performative systems, the main concerns are linked to the market negative effects on urban developments. In the German case, some gentrification processes have been reported in Freiburg, especially in the Vauban neighbourhood, where private developers take advantages from the idea of a “sustainable” city, raising rentals and generating a substitution in the population living in the area. In the Netherlands, the problem is the same: municipalities are competing to emerge, due to the reluctance of provincial level of government to intervene on local decisions. The results are local authorities trying to attract investors with low-cost development areas, that are not considering stations area, where properties are fragmented and costs higher. Additionally, in Netherlands, the community cycling behaviour enlarges distances between homes, workplaces and stations, which seem to be less attractive than other counties.

In the conformative system, the issues are mainly concerning the limits of land-use planning tools and the sectoral approach to transport. Even if some regional TOD experiences are reported in Italy, difficulties are mainly in adapting local land-use regulation instruments to upper-level strategies, but also the low strategic dimension in planning tools is affecting the real implementation of Transit-Oriented Developments. Moreover, both in Italy and Belgium the research is providing studies on possible future implementations around railway stations.

		STRENGTHS	WEAKNESSES
State-led systems	Sweden	Well-established tradition of TOD in the capital region; Local planning tools integrating transport and land-use planning; State-level co-ordinating and monitoring spatial developments.	Lack of an effective regional level of planning to co-ordinate both spatial and transport planning.
	Denmark	Well-established tradition of TOD in the capital region; Willingness to keep on implementing spatial development through TOD; International co-operation with Malmo; State level actively involved in developing spatial policies.	
	United Kingdom	Community mobilisation for more transit-oriented new towns (CAUSE campaign); New town tradition along transport routes.	Lack of an effective level of planning to co-ordinate both spatial and transport planning; Removal of the regional level of planning.
	France	Willingness to experiment TOD strategies; SRADDET/SCoT as possible tools; for promoting TOD; Increasing inter-sectoral integration at local level.	Lack in involving private stakeholder in <i>contrat d'axe</i> projects.
Market-led neo-performative systems	Germany	Presence of regional strategies promoting TOD near stations.	Regional level without explicit competences in transport; Reported gentrification process recent TOD-like experiences.
	Netherlands	Well-established tradition of TOD in the capital region; Experimentation of co-ordination between municipalities; Research attention on TOD.	Provincial level of government not imposing on municipalities; Community behaviours not fitting the TOD approach; Municipal competition; Municipal lack of interest in building around stations, because of more economic convenient investments.
Conformative systems	Italy	Willingness to experiment new strategies integrating transport and land-uses both at regional and local level; Opportunities for TOD developments along existing railway lines, reported by research.	Local planning tools difficult to update; Lack of a strategic dimension in spatial planning instruments; Strong sectoral dimension for transport planning.
	Belgium	Need for a new development model against urban sprawl; Research studies about potential TOD implementations.	Sectoral approach to transport and land-use.

Table 8.4. Strengths and weaknesses for TOD implementation in each country.
Author's own elaboration.

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FINAL CONSIDERATIONS

The research work described in this thesis has its base in the assumption that Transit-Oriented Development is a model that could be successfully used to promote sustainable development. The integration between public transport system and land-uses, proposed in TOD strategies, could help to overcome the actual problems related to environmental challenges in urban areas and reduce emissions produced by private transport modes. A wide discussion, study and use of the concept followed its definition by Calthorpe in 1993 as “*moderate and high-density housing, along with complementary public uses, jobs, retail, and services [...] concentrated in mixed-use developments at strategic points along the regional transit system*”. Also, it recently became part of the United Nations “New Urban Agenda” as one of the models seeking social-mix, affordability, accessibility and appropriate density in new developments or redevelopments areas.

The Transit-Oriented Development definition has thirty years, but the approach was present in Europe, since the beginning of XX Century, when the need to allocate the increasing population was faced through the construction of “new towns” along transit routes. After WWII, the model has been widely used in Europe to plan the post-war reconstruction and to avoid congestion in centres of big cities. The most famous case of *ante-litteram* TOD is the Copenhagen “Finger Plan”, which established new developments along five railway lines of the capital region, and the concept is still used today in Danish spatial planning. Other examples of TOD have been reported worldwide after its definition, from Japan to Australia, passing from the USA. The European context seems to have a renewed attention to Transit-Oriented Development not only for the already implemented strategies, but also in the potential future ones. The “resurgence” of TOD in Europe and in the international, as interpreted by Pojani and Stead, the need to govern territorial processes, like urban sprawl that are affecting, with different degrees, all the urban areas and have been reinforced by car-friendly policies.

But is TOD implemented in the EU and are there the elements for future implementation of this kind of strategy? This was the question pushing the research on the eight countries, belonging to three different Spatial Governance and Planning Systems (according to their allocation process of transformation rights and on the level of public control on spatial transformations), and having the wider available literature on TOD.

The outcomes of the study are perfectly aligning the characteristics of TOD experiences with their positive and negative factors, with the attributes of each country land-use and planning system and with the level of integration in spatial planning.

The first category analysed was *State-led systems* (Sweden, Denmark, UK and France) that has the most established tradition of Transit-Oriented Development implementation, but also a good degree of integration between land-use and transport planning together with the presence of the main strategic principles future TODs implementation. Denmark is the country where the good integration and the presence of strategic elements are providing the best framework for Transit-Oriented Development strategies. Although, Sweden and UK have a reported critical factor in the absence of a regional level of government sharing responsibilities for both land-use and transport planning; this problem should be overcome to allow municipalities to perform strategies that are inter-territorially integrated. Especially, in Sweden where regional differences are very high due to accessibility problems, the enhancement of public transport system and integrated spatial developments along transport nodes, could help municipalities grow and become more attractive, but also regions to become more balanced in terms of territorial and economic developments. In France, the last country belonging to this category, the strong public authority has led to an approach non effective for TOD implementation, which requires a Public-Private Partnership, and in this case, the solution is a major involvement of private stakeholders and of the community in the planning process.

The second category comprehends the *market-led neo-performative systems* (Germany and the Netherlands) where Transit-Oriented Development-like policies were adopted in Amsterdam and Berlin, but

now some issues due to the market overcoming public authorities are reported. In the Netherlands is necessary to promote, as for Sweden and UK, a higher relevance of Provinces in transport and land-use planning, creating positive relations between neighbouring municipalities, which are interested by mutual competition to attract investors. Additionally, the community must be involved in order to better fit the design of TOD areas with the cycling tradition of Dutch people. However, the Stedenbaan project has shown that *inter-territorial integration* is possible, even in this critical framework. Germany is performing TOD regional strategies, but troubles have been reported linked to high private interests leading to gentrification processes. In both the case studies and in general, in the SGPS, an increasing public control on regional and local spatial planning strategies and community involvement to ensure common interest to be protected are required.

The third, and last, category analysed are the *conformative systems* (Italy and Belgium) that have lower possibilities to effectively implement TOD strategies, even if the approach has been used in several planning experiences in Italy and is hoped in Belgium for contrasting urban sprawl. The sectoral approach of this SGPSs, jointly with the nature of local planning tools regulating land-uses through rigid plans, not easy to modify and even more to update, without an expiry have limited in the past the implementation of virtuous upper-local strategies and will affect it in the future. The shift to more adaptive strategic planning tools in order to have instruments always updated to changing needs is required.

From the research, *State-led neo-performative systems* emerged as the ones where TOD has already been successfully implemented and the strategic elements for future application are present; this evidence confirms that the public control on spatial transformation is important together with the method of allocating development rights. Even though, inside a single SGPS the situation of each country in terms of spatial and transport planning systems organisation, integration between the two and the presence of strategic principles are very dissimilar, highlighting that features of a SGPS are not a sufficient factor for understanding the potentialities of Transit-Oriented Development in a State. The SGPSs classification

adopted could have influenced the different result inside a category, but other categorizations are present for the European framework and could be used in other studies, to better comprehend the relation between them and TOD.

The method adopted in order to develop the research is based on the evaluation of each country land-use and transport planning structure and tools, but in the framework of the thesis it was impossible to investigate the planning system through policies, plans, regulations and laws, but a more general approach based on scientific literature was necessary. Consequently, a more complete evaluation could be performed enlarging the number of countries analysed, from eight to the whole EU28, in order to better relate TOD to all countries and their SGPS. Even in the case of a completion, surely this approach is missing some elements of practices, not necessary established by organisation of the planning system. It could be possible to discover them from single-country analysis that could be a proper evolution of the research, trying to better frame Transit-Oriented Development in the spatial and transport planning system through the study of plans and policy documents. Here, strategies addressing to TOD could be present without being reported by the literature.

In conclusion, the research tried to develop a method to evaluate Transit-Oriented Development in different European Spatial Governance and Planning Systems providing a first attempt of applying this approach to TOD-related studies. Even though the results have various degrees of consistency between countries of the same SGPS, a general consideration is that not always the structure and tools of land-use and transport planning systems help create the better working framework for TOD. However, the experimentations and innovative approaches to planning try to overcome the limits of systems and in all the analysed countries awareness is arising on the need of integrating transport and land-use planning to achieve sustainable development and TOD is taking even more attention, at least among researchers, as a potential model to follow.

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DEDICATION

This work would not have been possible without the support I received from the most important people in my life.

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ANNEX

LITERATURE AVAILABLE for EACH COUNTRY

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