

# The future of economic activity in the city

*Developments and challenges in the Netherlands*



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Cover photo: Werk aan de Muur, n.d.

Before you lies my thesis 'The future of economic activity in the city'. In this research, developments and challenges of locations of economic activity are elaborated. Therefore, a new typology of locations of economic activity has been created which made it possible to distinguish different developments at different locations of economic activity in the city. This thesis has been written as part of my study Human Geography – Business and Location at Utrecht University in combination with my internship at Buck Consultants International. Therefore, I want to thank Sergio Petralia from Utrecht University and Jordi Hubers, and Paul Bleumink from Buck Consultants International for their guidance and support in writing this thesis.

I hope you enjoy reading.

Daan Bruinekreeft

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# Table of contents

<b>1. Introduction</b> .....	<b>- 1 -</b>
1.1 <i>Research Orientation</i> .....	- 1 -
1.2 <i>Problem definition</i> .....	- 2 -
1.3 <i>Scientific relevance</i> .....	- 2 -
1.4 <i>Societal relevance</i> .....	- 2 -
1.5 <i>Reading guide</i> .....	- 3 -
<b>2. Theoretical Framework</b> .....	<b>- 4 -</b>
2.1 <i>Diversification</i> .....	- 4 -
2.2 <i>Mixing functions in urban planning</i> .....	- 6 -
2.3 <i>Urban locations of economic activity</i> .....	- 6 -
2.4 <i>Macro developments</i> .....	- 8 -
2.4.1 <i>Digitalization</i> .....	- 8 -
2.4.2 <i>Branding</i> .....	- 8 -
2.4.3 <i>Sustainability</i> .....	- 8 -
2.4.4 <i>Flex work</i> .....	- 9 -
2.4.5 <i>Pressure of housing market</i> .....	- 9 -
2.4.6 <i>Policy</i> .....	- 9 -
2.5 <i>Micro developments</i> .....	- 12 -
2.5.1 <i>Quality of locations of economic activity</i> .....	- 12 -
2.5.2 <i>Economic DNA</i> .....	- 13 -
2.5.3 <i>Urban challenges</i> .....	- 13 -
2.6 <i>Location choice</i> .....	- 13 -
2.7 <i>Location and business</i> .....	- 14 -
2.8 <i>'Strijd om de ruimte'</i> .....	- 15 -
2.9 <i>Conceptual model</i> .....	- 15 -
<b>3. Methodology</b> .....	<b>- 17 -</b>
3.1 <i>Case study area</i> .....	- 17 -
3.2 <i>Data collection</i> .....	- 18 -
3.4 <i>Typology</i> .....	- 19 -
<b>4. Results</b> .....	<b>- 23 -</b>
4.1 <i>Descriptive statistics</i> .....	- 23 -
4.2 <i>Functional mix in practice</i> .....	- 25 -
4.3 <i>Rotterdam</i> .....	- 26 -
4.4 <i>Arnhem</i> .....	- 28 -

4.5 Amersfoort.....	- 29 -
4.6 Deventer .....	- 30 -
4.7 General obstacles .....	- 32 -
4.8 Fictional scenarios .....	- 33 -
4.8.1 Scenario 1 Possible transformation from obsolete office buildings to residences within a promising business office environment .....	- 34 -
4.8.2 Scenario 2 The function of companies with high environmental categories.....	- 35 -
4.8.3 Scenario 3 Combining houses and companies with low environmental categories.....	- 37 -
4.8.4 Scenario 4 Balance between residences and companies .....	- 39 -
<b>5. Conclusion and discussion .....</b>	<b>- 41 -</b>
<b>6. Recommendations .....</b>	<b>- 43 -</b>
<b>7. Literature.....</b>	<b>- 44 -</b>
<b>8. Appendices .....</b>	<b>- 49 -</b>
8.1 Appendix A: Interview with government .....	- 49 -



# 1. Introduction

## *1.1 Research Orientation*

Ever since the existence and growth of urban centers, labor kept originating in denser areas. In the 20<sup>th</sup> century, there was a strict division of working areas and residential areas within cities. This was in line with the model of Fordism, a system of mass production using dedicated machinery and (semi-)skilled labor to optimize efficiency, introduced by Henry Ford (Jessop, 2020). Nowadays, the division of working and living in urban areas is rather vague expressed in urban areas. Urban areas have a bigger set of functions and services than they used to have (Pols et al., 2009). Mixing functions in urban areas has positive effects in general, but how does this apply to urban locations of economic activity?

In the Netherlands, space in inner cities is scarce. There is a so-called 'Strijd om de ruimte' (Battle of space), which means that many different actors want different activities in the inner city, which results in a clash because these activities can not all be housed on the same land. The results of these contradictions are seen in present socio-economic society: There is a huge housing shortage and a shortage of housebuilding sites, less space for working sites, and more pressure for space for recreation (Stadszaken, 2021). These shortages of space within the city often translate into more focus on the housing supply side but neglect the importance of urban locations of economic activity (Buck Consultants International, 2020). The city is not only a place where people live. As said before, a city is also a place home to locations of economic activity, recreation possibilities, and general services. These different facilities all have different dynamics and their importance within the city structure. It is debated that functionally mixed urban areas would be more economically profitable, have more urban vitality and sustainable transport behavior, and increased safety in public space (Dovey & Pafka, 2017). Therefore, the importance of urban locations of economic activity cannot be neglected.

Locations of economic activity have an important role in the urban structure because they provide the spatial conditions for economic activities. The growing economy mirrors itself in the demand for modern, sustainable, and suitable locations of economic activity. Business operations are changing and are getting more sustainable and companies and institutions are setting different criteria for real estate and its environment (Gemeente Enschede, 2020). Concepts like 'next economy' and the 'gig economy' are emerging in present socioeconomic society, the former meaning the rise of phenomena like smart industry, smart logistics, and circular economy in economics and the latter meaning the growing amount of temporary, flexible jobs and freelancers (Stec Groep, 2020). Therefore, the quantity and quality of locations of economic activity in the future can be questioned because vital and optimal business operationalizations are crucial for the regional economy. Keeping locations of economic activity attractive is furthermore a way to attract and maintain talent in the region, as well as maintaining job accessibility.

The development of urban locations of economic activity, in general, is also subject to the ongoing Covid-19 pandemic. Working from home has grown largely during the lockdowns and it is the question of whether this trend will continue in post-corona times (Hoogendoorn, 2020). When work continues to take place more at home, the development of urban locations of economic activity is affected.

## *1.2 Problem definition*

This research focuses on the development and challenges of different locations of economic activity in an urban context and how they influence and get influenced by the city. Furthermore, possible solutions for the optimization of these developments and challenges will be highlighted in this report by looking at how these locations of economic activity will develop in the future. Eventually, the developments and challenges that different types of urban locations of economic activity face and how governments are coping with these challenges and developments are pictured. This translates into the following research question:

*How are different locations of economic activity developing in an urban context and what will their prospects look like?*

To answer this research question, three sub-questions will be used. First, it is important to look at different types of locations of economic activity, which results in the following sub-question:

- Which types of urban locations of economic activity can be distinguished and what are relevant trends and developments with a spatial-economic impact on urban locations of economic activity?

Secondly, the supply and demand of different urban locations of economic activity have to be pictured, which results in the second sub-question:

- To what extent does the current supply of locations of economic activity in urban areas match the changing needs for work in the city due to new developments?

Lastly, it is important to what extent the municipality can influence these developments in the last sub-question:

- Which (legal planning) instruments do municipalities have and how can these contribute to the improvement of the coordination of supply and demand?

The sub-questions will be answered using primarily qualitative research by the use of interviews, supported by secondary data that describes the appearance of urban locations of economic activity and policy documents.

## *1.3 Scientific relevance*

This research will provide more insights into the importance of urban locations of economic activity in the city. There is little literature available about the developments of locations of economic activity in the city, how they behave within the city, and what this behavior thrives. Regional municipalities tend to have visions on the regional development of their locations of economic activity like Van Dijk (2011) who pictures locations of economic activity only in Groningen. Furthermore, research like Yang, Xiong, Zhuo, and Cai (2021) for instance draw attention to home-work movements by using mobile phone data but this only describes the movements and does not focus on locations of economic activity. This shows that there is a real gap in the literature, especially on higher scales, about urban locations of economic activity and how they function within cities. By researching different cities in the Netherlands qualitatively, these urban locations of economic activity and their developments will be pictured.

## *1.4 Societal relevance*

Furthermore, this research is relevant because it pictures how locations of economic activity behave in the city and how they develop. As concepts like 'next economy' and 'gig economy', which indicate the next phases in the economy with new economic forces, gain

more importance in policy regarding locations of economic activity to optimize their dynamics in an ever-changing urban context, it is important to know how these locations of economic activity develop regarding such changing circumstances (Kuipers, Streng & Geerlings, 2020). This way, regional economies can be optimized by holding and attracting business in the region. Therefore, results from this paper can be used by for instance policy makers who want to address certain problems a city can experience with locations of economic activity or optimize different developments in general. As outcomes of this research have been tried to generalize, these outcomes can also be applied to unique cases that have not been researched.

### *1.5 Reading guide*

In chapter two, the theoretical background of the relevant literature of locations of economic activity will be pictured and a conceptual model has been projected. . Chapter three will discuss the methodological considerations which lead to the typology. This is followed by the results in chapter four, which results in conclusions and discussions discussed in chapter five and recommendations in chapter six.

## 2. Theoretical Framework

First, it is important to explore existing relevant research of the topics discussed in the introduction. This helps understanding trends and developments regarding locations of economic activity. Before tracking down what these trends and developments are, it is meaningful to examine what different functions are in the city, how they interact with each other, what possible advantages and disadvantages are of different functions, and how they are portrayed in Dutch policy.

### *2.1 Diversification*

As said in the introduction, the urban structure is home to a set of different functions. The idea of the importance of diversity in a city is not from this century. Jane Jacobs (1961) already stated sixty years ago that different buildings are needed in a city for entrepreneurial businesses and healthy districts. She was against the modernist view of zoning areas and flagged the importance of the productive nature of co-functioning relationships which could be accomplished by mixed-use areas (Dovey & Pafka, 2017). The top-down zoning system dominantly applied in the 20<sup>th</sup> century reflects two historical tasks: the post-war desire for hierarchical administrative structures and the need for an industrializing society to separate uses. They both are losing their importance rapidly (Rantanen & Rajaniemi, 2020). In the last 50 years, the functional mix has been one of the most dominant urban planning paradigms. This mixed-use of the city is addressed in two forms, first as the mix of function at the minimum scale and second, as describing the main spatial morphology and their properties in the physical environment, the city (Wandl & Hausleitner, 2021). The concept of mixed land-use can be interpreted differently by different actors. Where the concept of mixed land-use refers to particular site developments of megastructures in the United States, it refers to the city development in which different functions are integrated into an area in Europe (Lagendijk, 2001). The latter is used in this research where the type of functions can be divided into the categories residence, working, facilities, infrastructure, and landscaping. The functions of residence and working are the most important referring to functional mix policy in the Netherlands.

Mixing functions takes place on different levels: at the building, building block, and area level. Mixing functions at the area level is already happening for a longer time and does not necessarily result in interaction and quality of life in an area. On the other hand, mixing functions at the building block level is seen as most promising. The block level shows to have interesting possibilities, like flexible and double use of space, exchange of flows like energy and materials, a vivid public space, and efficient logistical access (College van Rijksadviseurs, 2019). Interaction is mostly taking place on the ground floor, which encourages mixing functions on these levels in buildings. Because mixing functions can take place at different levels, the term 'functional mix' is used in this research, although 'land-use mix' has a similar meaning. This is because the term 'land-use' arouses the notion that land is used for a single function and focuses on the larger scale rather than the smaller scale (Dovey & Pafka, 2017).

Mixing the use of land in cities has certain positive effects: it shortens distances between attractions and services which lowers vehicle dependency, stimulates street life intensity, and increases walkability and public health (Dovey & Pafka, 2017). Therefore, it is proven that a mixed-use approach in urban design brings social, economic, health, and environmental benefits (Harris, 2017). Moreover, different functions and services are practically needed within cities. A growing population needs more basic infrastructure, like telecommunication and clean water, to support the livelihood of both citizens and businesses (Kim, 2020). However, mixed land-use also has drawbacks. It causes more traffic, but

moreover, different end-users in the area can have opposing interests, and therefore, a function mix in an area is not always a reasonable outcome (Baar, 2018).

Furthermore, more direct spatial synergy arises when parking facilities can be shared for living and working. This saves land area, and it is financially faster feasible to solve the parking underground, which is in favor of the quality of the public space (Pols et al., 2009). Another possible advantage is the greater chance of continuity in the use of buildings. The diversity of buildings is increasing, and this stimulates the ability to cope with social, technological, and economic developments. In a varied multifunctional area, the chance of vacancy is lower because the buildings in this area are suitable for more groups of users or functions (Pols et al., 2009). However, this intensively mixed-use area causes more traffic because employees, customers, and visitors often come by car. Therefore, a well-established infrastructure in terms of public transport, roads, and parking lots is needed in the area (Duncan et al., 2010). Achieving a jobs-housing balance is one of the most important ways to contribute to reducing motorized travel in land-use planning (Cervero & Duncan, 2006). The disadvantages and advantages of mixing functions are portrayed in table 1.

Table 1: Advantages and disadvantages of functional mix and separation

	<b>Advantages</b>	<b>Disadvantages</b>
<b>Functional separation</b>	<ul style="list-style-type: none"> <li>• Fewer restrictions for companies on business parks</li> <li>• Lower land prices on business parks</li> <li>• Good accessibility</li> <li>• Higher expandability for companies</li> </ul>	<ul style="list-style-type: none"> <li>• Less compact urban design</li> <li>• Higher chance of vacancy</li> <li>• More travel movements in the city</li> <li>• Less pleasant living environment</li> </ul>
<b>Functional mix</b>	<ul style="list-style-type: none"> <li>• Higher support base facilities and investments for more end-users</li> <li>• Lower chance of vacancy</li> <li>• Fewer travel moments in the city</li> <li>• Higher social safety</li> <li>• More attention to public space in mixed areas</li> <li>• More stimulation of cross-pollination of companies for innovation</li> <li>• Are capable to give impulses to surrounding neighborhoods</li> </ul>	<ul style="list-style-type: none"> <li>• Not every area is suited for a functional mix</li> <li>• Opposite interests of different functions can be contradictory</li> <li>• More rules for companies in mixed areas</li> <li>• Higher land prices</li> </ul>

Source: Pols et. al, 2009; College van Rijksadviseurs, 2019.

The functional mix differs per area in the city which creates different types of areas. Areas in the city can be distinguished into three different zones (College van Rijksadviseurs, 2019; De Zwarte Hond, 2019):

- The commotion zone, which houses highly urban services and interaction;
- The noise zone, which houses industry and logistics;
- The rest zone, which houses residences, recreation, and offices.

Although different areas can be distinguished, the areas do not necessarily show to have hard borders in a city and different zones run gradually in each other.

## 2.2 Mixing functions in urban planning

In the Netherlands, the functional mix was revived by the 'compacte stadbeleid' (compact city policy). Where land-use plans, environmental nuisance categories, and zoning were used to separate functions in the city, restructuring, transformation, and urban condensing are used for mixing functions in the 'compacte stadbeleid' (Van Baar, 2018). Transformation is a well-known instrument for area development in the Netherlands to build new houses. Regional plans are furthermore interesting instruments to implement a higher level of the functional mix. In the governmental regional plan, it is decided which locations are suited for the use of residences. Aspects that influence these decisions are spatial integration, nuisance in the environment, housing needs, accessibility, and availability of land (Informatiepunt Leefomgeving, n.d.).

Environmental nuisances categories of companies are nowadays still of importance in the functional mix. In the Netherlands, the 'Vereniging van Nederlandse Gemeenten' (VNG, which stands for 'Association of Netherlands Municipalities') determined what the physical distances have to be per environmental nuisance category between companies and residential and mixed areas (Ministerie van Infrastructuur en Waterstaat, n.d.). However, some literature states that this reasoning is obsolete and that mixing functions can be done by determining the environmental performance of companies. Therefore, for every zone of commotion, noise, and rest, which are mentioned before, maximum traffic congestion and environmental nuisance can be determined in the form of smell, noise, dust, light, and danger. Parties can be active in an area as long as they operate inside of the given performance requirements, regardless of their function (College van Rijksadviseurs, 2019). Next to the determination of whether a specific type of function may locate in a specific area, it is also important in which proportion the functions are divided in the area. This can be determined on different levels. Research shows that a maximum of 80 percent of one function and a minimum of 20 percent of another one already leads to a higher quality of life in an area compared to a monofunctional area (Atteveld & De Bies, 2021). This is on the condition that the functions do not interfere with each other. The division in functions in an area can be measured in different ways. Floor space, users, and land use can be used to measure these functions. They are shown in table 2. Because floor space is directly related to planning, it is mostly used to indicate the division of functions (Provoost, Keeton & Gerson, 2010).

Table 2: Measuring functions with different measurements.

	<b>Living</b>	<b>Working</b>	<b>Services</b>
<b>Users</b>	Residents	Employees	Visitors
<b>Land use</b>	Ha	Ha	Ha
<b>Floor space</b>	M <sup>2</sup>	M <sup>2</sup>	M <sup>2</sup>

Source: Provoost, Keeton & Gerson, 2010.

## 2.3 Urban locations of economic activity

Now that light is shed on functions in the city, the available literature on the division of functions in areas can be portrayed. This helps determine what locations of economic activity are which lays the foundation of the research question.

In the past, industrial areas were referred to as the areas where industry and logistic companies were settled. Slowly these industrial areas evolved to business areas because smaller and less environmentally harmful companies located themselves in specific locations. In present times, the merit of the economy is becoming more and more important (Van Baar, 2018). Therefore, it is important to show what locations of economic activity are.

According to Verhoeven, Doove, and Kawabatha (2015), a location of economic activity is a site that is designated and suitable for its purpose for use by trade, industry, commercial and non-commercial use, and services. This definition also includes locations of economic activity that are partly used for offices. This is a wide definition, so therefore it is also useful to know what a location of economic activity is not. According to Nijssen and Kermers (2013), a location of economic activity is not a place where:

- The terrain is used for resource, oil, or gas extraction;
- The terrain is used for water extraction;
- The terrain is used for agricultural purposes without processing industry and logistics;
- The terrain is used for landfills.

Different types of locations of economic activity can be distinguished. Nijssen and Kermers (2013) distinguish mainly three types:

1. Seaport sites: A location of economic activity of at least 1 hectare gross of which some of the lots have a loading or unloading quay and are located along deep waterways that are accessible to large sea-going vessels.
2. Business parks: A location of economic activity of at least 1 hectare gross intended and suitable for use by trade and industry. Some commercial and non-commercial services can also be provided in these areas, such as office buildings and retail, but together they have a minority share in the land area.
3. Economic Zones: A location of economic activity of at least 1 hectare gross suited for commercial and non-commercial services. On these terrains, some trade and industry can be located but they have a minority share together on the terrain.
4. Office locations: A location of economic activity where a majority of the buildings on terrain are suited for use by offices.

Economic zones can be divided into five terrains or combinations of them (Nijssen & Kermers, 2013). These are:

1. Retail, furniture boulevards: Well-arranged and often easily accessible locations with large-scale (peripheral) retail where services or goods are delivered directly to the consumer such as hardware stores, garden centers.
2. Educational locations: locations with clustering of higher education activities and to them affiliated activities often in a campus-like environment.
3. Care locations: locations with clustering of medical activities and affiliated business activities attached to it. Care locations can have the appearance of medical parks for business-to-business companies or a university medical center that also caters to spin-offs and starters.
4. Platform-related activities: locations on the aviation platform located in front of service activities. This can include maintenance, catering, and related services.
5. Agribusiness complexes: only fall under the definition of an economic zone when it comes to a combination of greenhouses, processing industry, and logistics in one location of economic activity.

However, some literature states this categorization is quite obsolete (Ecorys, 2018; Ponds & Woerkens, 2017; College van Rijksadviseurs, 2019). There are more factors nowadays which determine the typology of a location of economic activity, proving that preferences of companies for locating themselves in a certain area or location of economic activity has changed. Moreover, the function of living has become more present in traditional locations of economic activity. Rather than focusing on only the activity, locations of economic activity also show changes based on accessibility, physical presence, building size, urbanity, function mix, connectivity, and spatial concentration (Van Dinteren et al., 2019; Provincie Noord-Holland, 2020; Gemeente Amsterdam, 2017; Metropoolregio Rotterdam Den Haag, 2018). Therefore, it can be stated that the typology of Nijssen and Kermers (2013) is outdated. Because of the lack of other theoretical typologies, a new typology has been created which will be elaborated in the methodology.

The possibility of mixing businesses depends on the category of the businesses and their grain size. Some businesses do not belong in an area where living and working are mixed. Think for example of noise or smell-intensive industries that pollute the surrounding area (Pols et al., 2009). It was common to find factories next to central stations in cities before the '70s. Since the expansion of the city swallowed these factories up, they moved out because they were too big and their environmental categories were too high to mix with residences and other functions.

## *2.4 Macro developments*

To help answer the first sub-question, developments and trends in and around locations of economic activity have to be described. Several developments influence the developments of urban locations of economic activity. They can be divided into macro and micro developments, where macro developments refer to developments accounting for a country, in this case, the Netherlands, and micro developments refer to developments accounting for a region or city (Barbour, 2017). Macro scale developments will be discussed in the following section.

### *2.4.1 Digitalization*

Urban locations of economic activity are being exposed to impacts in a changing economy. This means that urban locations of economic activity are constantly subject to change, which in return influences the formation or disappearance of locations of economic activity. First, and maybe most importantly, in present society, technology innovates at a rapid speed (Parviainen, Tihinen, Kääriäinen & Teppola, 2017). Digitalization and its technological improvements allow for organizational and cultural change within businesses (Moşteanu, Faccia & Cavaliere, 2020). With the digitalization of for example data systems, solutions, education, jobs, culture, and many more, organizations work better when they redesign their structure, provided services, and work processes. The increasing opportunities given by digitalization and innovation of it puts pressure on companies to identify new business opportunities in the early stages, critically reflect on a companies' current strategy and requires managers to adapt aspects of their business models or design new ones (Rachinger et al., 2019).

### *2.4.2 Branding*

Secondly, social performance or social responsibility is growing in importance among companies. In general, there can be spoken of a positive relationship between socially responsible practices and economic performance (Lassala, Apetrei & Sapena, 2017). Although this relationship is doubted by other literary contributions, another positive effect is the image boost of the company gained through social performance. When a company shows to have a positive social image in practice, its reputation gets improved (Oh, Hong & Whang, 2017).

### *2.4.3 Sustainability*

This is in line with the third development which influences locations of economic activity, which is sustainability. The aim for a circular economy is becoming more present among companies and governments, where the use of finite sources gradually reduces. The principle of a circular economy rests on three pillars: preserving and improving natural resources, optimizing the resource yield, and promoting the effectiveness of systems (Parida & Wincent, 2019). Since the Industrial Revolution, economic performance has contributed to

environmental problems where the use of finite resources caused pollution, ozone layer depletion, climate change, and global warming (Shaltegger, Hansen & Lüdeke-Freund, 2016). However, nowadays companies place sustainability more and more on the corporate agenda, which shows that being a leader involves meeting economic and environmental goals (Parida & Wincent, 2019).

#### *2.4.4 Flex work*

While urban centers remained their position as the core location of paid work, a growing minority of workers shows to work in flexible or non-standard forms. There seems to be a revolution in how economic activity is taking place within cities: cars, trains, cafés, and co-working spaces are all locations in which working tasks are being performed (Shearmur, 2020). Self-employment contributes highly to the growth of these flex-workers. These self-employed often work in non-standard workplace locations, which includes work at home and on the move. They are part of the gig economy, where permanent jobs are decreasing, and loose chores are gaining shares (Wheatley, 2020). In general, flex-work can be described as 1) flexibility in the employment relationship, 2) flexibility in work schedule and 3) flexibility in where work is being executed. These categories are non-exclusive (Waples & Brock Bastin, 2021). The current Covid-19 pandemic appeals to digitalization, where more work is done from home or other places than the original company location.

#### *2.4.5 Pressure of housing market*

In the Netherlands, there is a great housing shortage in almost all cities. The demand for housing facilities especially emerges in urban residential and working areas. This will come at the expense of present urban locations of economic activity. For the province of Zuid-Holland, it is for instance expected that fifty percent of the deprived locations of economic activity will be transformed into housing facilities by 2030 (Metropoolregio Rotterdam Den Haag, 2018). However, all this housing will have a significant space claim on locations of economic activity, followed by more jobs needed in different sectors. Moreover, urban locations of economic activity and especially business parks are initially designed as favorably as possible for businesses. However, adding homes in these locations may make the area less business-friendly properties which makes companies leave (Pen, 2018). These problems that arise when building in inner cities will be examined more in paragraph 2.7.

#### *2.4.6 Policy*

The developments stated above are almost all subject to policy implications. The macro-economic policy operates on different parts of the economy (Christiano, Eichenbaum & Trabandt, 2018; Friedman, 1995). The policy also connects the bridge between micro and macro factors because policy can differ between scales. There is various agreement to what extent policy in macroeconomics helps achieve several goals. However, it is undisputed that policy implications affect these macroeconomic developments.

A policy can be implemented using instruments, which is how governments can accomplish their targets. Policy instruments are everything an actor can use to reach a certain goal and come in various kinds. Hoogerwerf and Herweijer (2008) distinguish the juridical, economical communicative, and physical management models of instruments. In the juridical management model, standards are formulated concerning desired and undesired behavior. Here, the desired behavior is influenced by instruments that oblige, prohibit, or allow by law. The economic management model applies financial consequences to behavior, like paid parking lots in cities to reduce parking incentives. The communicative management model tries to influence behavior by the transfer of knowledge. Last, the physical management model tries to influence behavior by the implementation of something physical,

like speedbumps to slow cars down. There are several instruments that municipalities can use to achieve policy goals in area development (Verbruggen, 2019):

1. First, municipalities can use the 'shaping markets' principles where a framework is created in which market parties can operate. Here, the municipality provides insights into the vision of policy and what kinds of developments are possible or desired. Examples of this are the master plan and image quality plans, which take away risks from investors by providing clarity of vision.
2. Secondly, regulating the market by applying rules causes private parties to be less able to act independently on the market. The most used instrument in the Netherlands is the land use plan, which indicates what is possible and not possible on a location. A land-use plan is a more detailed version of a 'structuurvisie', or structure vision, which indicates the direction of a larger area and is more juridical tied.
3. Third, municipalities can stimulate the market by giving incentives that make it financially more attractive for private parties to enroll in certain investments. This is largely done in areas that have less potential. Examples are instruments that provide subsidies or investments done in services like infrastructure.
4. Last, municipalities can make use of 'capacity building', where the government invests in enlarging the networks of private parties which creates a better environment for area developments. This is done for instance by setting up formal and informal forms of cooperation (Daamen, Franzen & Van der Vegt, 2012).

However, more kinds of policy instruments can be used to stimulate developments in locations of economic activity. In table 3 they are shown and divided into the categorization of Hoogerwerf and Herweijer (2008).

*Table 3: Policy instruments that can be used on locations of economic activity.*

<b>Policy instrument</b>	<b>Elaboration</b>
<i>Juridical instruments</i>	
<b>Note of principles</b>	Before starting the Land-use plan procedure, gather insight into the most important themes within the plan area.
<b>Urban preconditions</b>	Integral properties that are determined in an area.
<b>Land-use plan</b>	A plan where the use of an area is determined and based on this, rules are applied. These rules concern at least how the land and its real estate.
<b>Enforcement of policy</b>	Supervision and control of legislation
<b>Regional plan</b>	A long-term document that guides how an area will grow and respond to change in possible developments.
<b>Visual quality plan</b>	A document that describes what the appearance of buildings and their surroundings have to look like.
<b>Coordination of governments</b>	Communication between the involved governments within the spatial catchment area of the urban development.
<b>Market structuring</b>	Purposefully demarcate the rights to contribute to policy goals. By determining or changing these rights, certain interactions will be less or more attractive by market parties.
<b>Vision on locations of economic activity</b>	A document that steers locations of economic activity to become future proof.

<b>Municipality Preferential Rights Act</b>	The establishment of preferential rights enables the government to buy first. If an owner decides to sell his land, he has to offer it to the government first.
<b>Financial instruments</b>	
<b>Subsidies</b>	Financial fees from the government.
<b>Financial penalties</b>	Financial punishments.
<b>Communicative instruments</b>	
<b>Public-private partnerships</b>	Cooperation between the government and private parties.
<b>General information</b>	An active form of provision of information that is not necessarily aimed at a certain target audience. General education aims to influence knowledge, attitude, or behavior or to achieve awareness.
<b>Physical instruments</b>	
<b>Transformation</b>	Conversion of real estate to give substance to a different function.
<b>Maintenance of public space</b>	Maintenance, (re)arrangement, and regulation of the use of public space. This includes all measures to maintain the public space and adjust it to the desired functions or quality requirements.
<b>Urban reparcelling</b>	Merging and/or dividing the rights under land and buildings with urban functions.
<b>Land Exploitation Act</b>	A budget is set up to display the land cost and land revenues of a spatial development plan.
<b>Restructuring</b>	Planned and mostly large-scale intervention in the built environment of a city to renew deprecated areas to let it meet desired requirements.

*Source: Kenniscentrum voor beleid en regelgeving, n.d.; Stec Groep, 2021; Overheid.nl, n.d.; Kenniscentrum InfoMil, n.d.*

Zooming in on locations of economic activity, especially obsolescent locations, there are several restructuring possibilities where municipalities can stimulate developments. Traa and Knoben (2009) distinguish five restructuring possibilities:

1. **Facelift:** Using a facelift in a location of economic activity refurbishment of physically obsolescent public space and buildings.
2. **Revitalization:** Using revitalization, the existing economic function is being held, however strong interventions in the location are needed to secure the economic position of the location of economic activity in the future, like improving the infrastructure.
3. **Heavy revitalization:** Heavy revitalization builds on the principle of revitalization but adds acquisition of land in the location of economic activity to be ready for new buildings. Furthermore, also soil remediation and the construction or refurbishment can be part of the process. Facelift and (heavy) revitalization are part of a sliding scale.
4. **Reprofiling:** Reprofiling of a location of economic activity causes the location of economic activity to change function but here, the work function remains. Reprofiling of an area often requires demolishing of existing buildings and new infrastructure.
5. **Transformation:** In contradiction to reprofiling is a transformation in a location of economic activity a development that withdraws the economic function from the area and a new function is added.

Restructuring a location of economic activity can occur in two different ways. The first way is the area-oriented, in which a location of economic activity is completely transformed in one go. Here, all buildings are removed and new buildings will be built. The second way is parcel-oriented, where transformation is more fluent and where not all buildings have to be

transformed or removed (Pols et al., 2009). The parcel-oriented method can in practice be elaborated in three ways. One where a vacant building is transformed, one where buildings that are well located are transformed, and one that takes function mix categories into account (Pols et al., 2009).

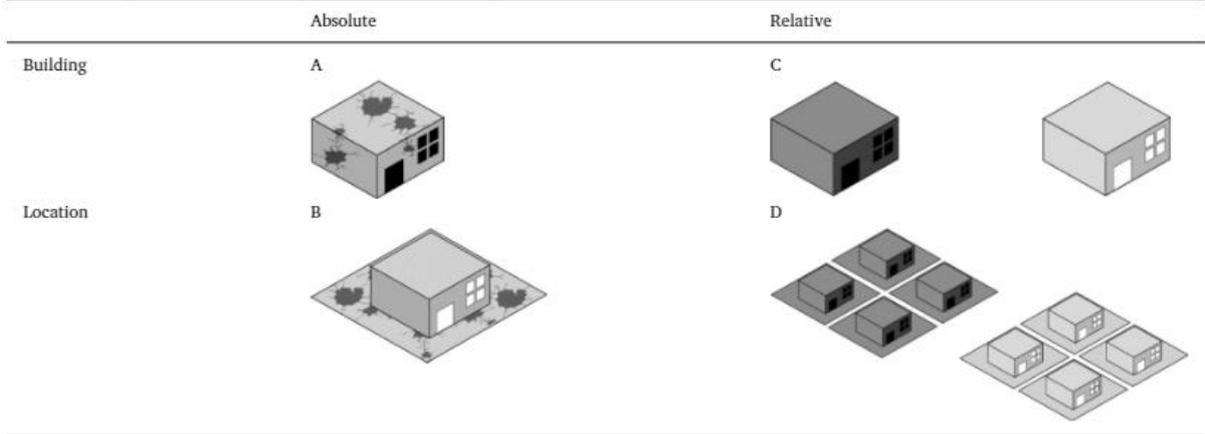
2.5 Micro developments

In the next section, micro-scale developments are discussed which can differ largely between regions. Micro developments are often partly the result of macro developments, while macro developments are often not influenced by micro factors (Barbour, 2017).

2.5.1 Quality of locations of economic activity

The quality of the environment of locations of economic activity has become more important nowadays. Companies want to locate themselves in an area that is well-accessible (Van Dinteren et al., 2019). Obsolescence of locations of economic activity is a problem in the Netherlands. Buitelaar, Moroni, and De Franco (2021) distinguish different kinds of obsolescence pictured in figure 1. The types are based on absolute or relative factors and building or location obsolescence. In scenario A the building itself is deprived, also called ‘physical deterioration’, whereas in scenario C the building is deprived when compared to other buildings. In scenario C a building loses its marketability because other buildings are performing better, or the preferences of occupants have changed. In scenario B the location is deprived whereas the building on the location is not. Scenario D however shows that a location itself performs worse, relatively, compared to other locations or user preferences (Buitelaar et al., 2021). The relative forms of obsolescence shown in the figure often are referred to as ‘economic obsolescence’, where ‘economic’ is used because the balance in supply and demand has changed respectively (Korteweg, 2002; Van der Laan, 2017). Furthermore, the absolute types of obsolescence can be referred to as ‘technological obsolescence’, where obsolescence is a result of the absence of maintenance (Van der Laan, 2017).

Figure 1: Four types of building obsolescence based on causes.



Source: Buitelaar et al., 2021.

Economic obsolescence is, as said before, a result of a change in the needs of the building properties or preferences of occupants. This is in the first place a result of the tertiarization of the economy, where more companies are service-based and thus have different needs at their business location than companies in the primary or secondary sector (Aneja, 2017). This is also the reason that nowadays offices are more found in business parks. Secondly, the rise of the network economy has led to a more intertwined network of consumers, companies, and suppliers. This enables companies to be footloose, where they

are hardly dependent on a certain location. Therefore, hard (physical), as well as soft (communicational) factors of infrastructure, are more important for the success of a location of economic activity (El-Anis, 2021). These new developments in demand for locations of economic activity influence local demand-supply balances, where supply should follow the amount and quality of location of economic activity demand (Kumar & Dahiya, 2017).

### *2.5.2 Economic DNA*

Furthermore, the locational economic quality of a region is important regarding its locations of economic activity. Every evolving system like a city is unique and initial conditions and developments determine the path dependency of a city. This can be referred to as the economic DNA of a region. This economic DNA refers mostly to non-physical factors in a region, like culture and the mindset of entrepreneurs but also clustering and distribution of economic activities (Wilson, 2010). Although it is very hard to adjust regional economic DNA to one's desire, it is proven that the economic DNA of a region impacts the success of certain economic developments (Votsis & Havisto, 2019).

### *2.5.3 Urban challenges*

Cities are evolving at a rapid pace and have big urban challenges to cope with. Urban challenges occupy investing collectively in the quality of the living environment for an economically competitive business environment. These challenges are rather specific per region but are mostly in line with national challenges. They engage in long-term developments that occur within cities. When applying this concept to urban locations of economic activity, it is important to provide enough dwellings in which companies can settle for different business sectors and support them with needed facilities, while maintaining enough space for other facilities which a city needs and urban challenges the city must cope with (Gebiedsontwikkeling, 2011). Recognizing important area developments for the future is an important aspect of urban challenges, and therefore, new developments around locations of economic activity have to be in line with local challenges in general (Van Dijk, 2011).

### *2.6 Location choice*

Apart from the macro and micro-developments that urban locations of economic activity are subject to, the role of companies and employees on locations of economic activity is also sufficient. Elaborating the behavior of companies and employees helps explain a part of the spatial-economic aspects of locations of economic activity. Companies have strong preferences for their location choices, which are furthermore bound to company-specific characteristics. A company's location has a strong influence on how it functions and how it develops, resulting in possible competitiveness and expansion (Martyniuk-Pęczek et al., 2017). Where most research first gave attention to location differences between countries and at border sites, which focuses mostly on the institutional context, more research now is done about spatial heterogeneity at sub-national levels (Falaster & Ferreira, 2020). However, the institutional structure can differ sub-nationally just like religion, language culture, and education, where differences are clearer seen between urban and rural areas.

Each type of firm has different location preferences. Small and medium enterprises (SME's) have different location preferences than large businesses and location preferences also vary by type of company and sector (Van Noort & Reijmer, 1999; Martyniuk-Pęczek et al., 2017). As SME's are widely seen as the regional drivers of competitiveness, innovation, growth, and innovation, spatial planners and authorities need to attract these companies (Martyniuk-Pęczek et al., 2017). Different typologies of location factors have been developed. Van Noort and Reijmer (1999) for instance divide them into 'hard' and 'soft' factors, where 'hard' factors are often measurable in costs like office space and 'soft' factors are

unmeasurable factors, like the social climate of a location. Another more recent typology for location choice that has been developed is that of Vaillant, Lafuente, and Serarols (2012), who distinguish location-related motivations, personal motivations and infrastructure, and economic motivation.

There seems to be a difference in location factors between SME's and large businesses in the Netherlands. Large businesses seem to value 'soft' factors more than SME's and SME's take a diverse but limited number of factors into account. Large businesses further value physical infrastructure more and the availability of local labor and their costs. Furthermore, smaller businesses tend to stay closer to home, where they have access to (social) capital, customers in the local area, and available facilities (Martyniuk-Pęczek et al., 2017). When looking at different 'hard' factors, these can be distinguished as in table 4.

*Table 4: Locational factors for companies.*

<b>Locational factors</b>	<b>Examples</b>
<i>Business lot</i>	Appearance, costs, sizing
<i>Ownership situation</i>	Rent vs. buy and the costs
<i>Proximity to customers and suppliers</i>	Proximity of customers and sellers
<i>Accessibility</i>	Infrastructure and its quality, congestion, proximity public transport, digital accessibility
<i>Sectoral proximity</i>	Productivity, knowledge transfer, recruitment
<i>Spatial diversity</i>	Knowledge institutes, complementary services

*Source: Van Dijk and Pellenburg, 2000; Mariotti, 2005; Porter, 2004.*

For most Dutch companies, it seems that accessibility is the most important factor determining where to locate their company, followed by the availability of desired personnel and the living quality and quality of life in the municipality. Other factors that companies value are internet speed, agglomeration effects, economic profile, and land prices (Stadszaken, 2018).

When turning the perspective, employees also have their reasons to choose to work for a certain company. Rampl (2014) shows that locational considerations, the work itself, salary, and advancement opportunities are the four most important factors for an employee to choose to work for a company. The location of a company becomes part of the identity of the company as people associate characteristics of the city in which the company is located with that company. This suggests that a company located in a more attractive location has a higher labor pool potential because when a potential employee is not willing to work in a location where a company is located, this company is unattractive for the employee (Sommer, Heidenreich & Handrich, 2016).

*2.7 Location and business*

Work is increasingly taking place in a wide variety of locations. This applies especially to the knowledge-intensive sector. Co-location of offices in a Central Business District (CBD) has been very important to communicate and connect with service workers, but nowadays, these interactions can largely take place using technology like smartphones (Lyons & Urry, 2005; Kesselring, 2015; Kwan, 2001). This varies per type of employment. Retail, factory, and hospitality for instance are more bound to a fixed location while much economic activity can take place in different sets of locations like homes or at catering industry facilities (Firth, 2012). Therefore, it is suggested that the geography of economic activity within cities should

be reconsidered, where specific locations of work can no longer be assumed as the only locations in the city where economic activity occurs (Stevens & Shearmur, 2020).

### *2.8 'Strijd om de ruimte'*

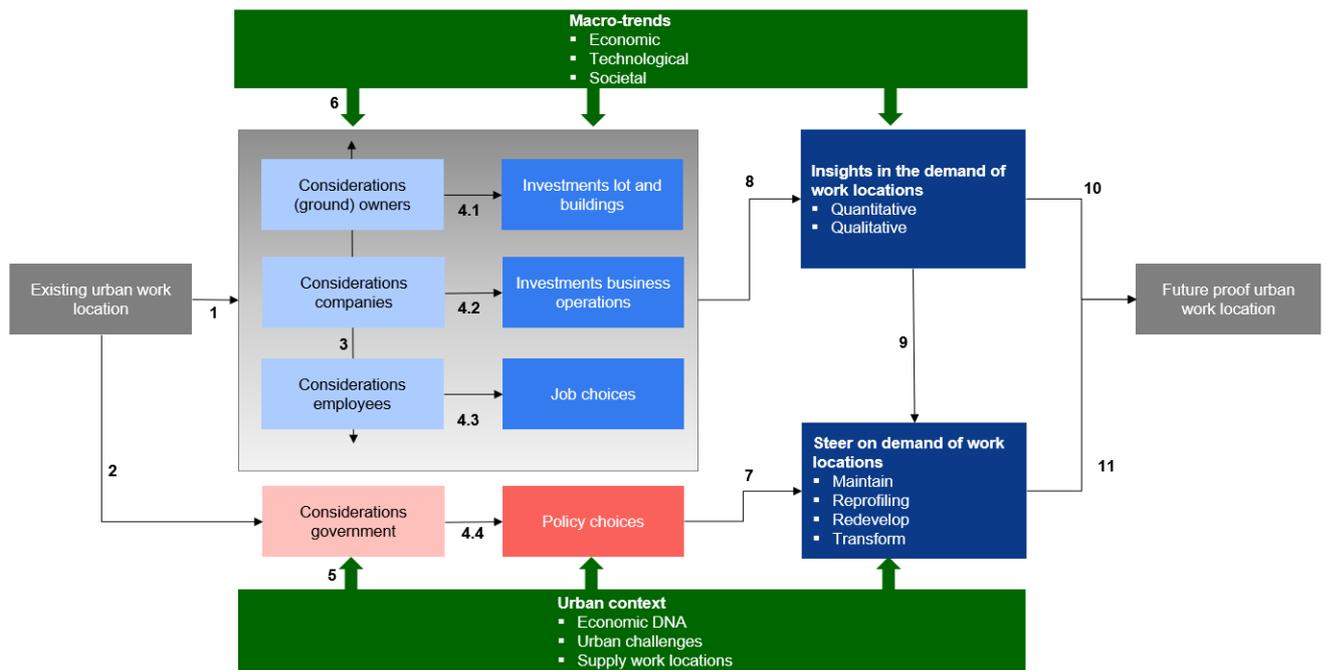
As said in the introduction, there is a so-called 'Strijd om de ruimte' in the Netherlands, which makes it hard to build within cities. This concept means there is conflict about what functions are needed, where they have to go, and how they influence each other. The Strijd om de ruimte has become more present because of the combination of more pressure on the housing market within cities on the one and the other hand because business locations have become scarcer within and around cities (Van der Linden, Groningen & Van der Werf, 2019).

The available living space and working space in inner cities is the main problem. Dutch cities count a lot of old business parks where renovation is needed and a possible function mix could take place (Rienstra, 2020). However, this is easier said than done. Because of the high number of different actors in business parks, it is hard for municipalities to buy land from them. Moreover, businesses in business parks do not always want to commit to selling land. As a result of complaints about noise, smell, or dust nuisance, companies fear that they will have to relocate or that their production processes will be limited. Landowners also find the jump in value in the case of a change of use from working to living attractive. Business is increasingly being driven out by complaints and land speculation, which is a disadvantage of existing businesses (Van der Linden, 2019). On the other hand, business parks show to be inefficient in different aspects. First, space is not used efficiently. 70 percent of buildings on business parks is not higher than 8 meters and parking lots are used unilaterally. Second, there is no social control on the site. In the evening, on the weekend and even in the daytime, there is little to no natural surveillance. This means that much money has to be spent on security. Third, more function division means more traffic between living and working. Business parks, therefore, show to be very car-dependent, which results in more rush-hour congestion and emissions. Lastly, Jane Jacobs described in the '70s that when noise pollution has a positive influence on stagnation. The monofunctional residential areas and business parks that were invented at that time contributed to undeveloped innovation (Jansen & Rienstra, 2020).

### *2.9 Conceptual model*

The theory discussed above translates into the following conceptual model pictured in figure 2. The discussed developments are influencing urban locations of economic activity and therefore the developments that they experience. Macro-trends on the one side and the urban context on the other side influence considerations of parties on all levels, resulting in a certain behavior of those actors which in turn leads to a new supply and demand of different locations of economic activity.

Figure 2: Conceptual model.



### 3. Methodology

In this chapter, the methodological approach is being discussed. First, the research method is discussed, followed by an overview of the area and the kinds of data collected.

In this paper, urban locations of economic activity and their developments are the objects of research. Therefore, the following research question is used:

*How are different locations of economic activity developing in an urban context and what will their prospects look like?*

This research aims to bring light to what urban locations of economic activity are subject to, what the differences are between them, and how this translates to the future. By doing qualitative research, improved understanding is achieved by making distinctions resulting from a studied phenomenon by doing empirical observations (Aspers & Corte, 2019). This is translated into primarily the use of interviews. More specifically, semi-structured interviews are used where a specific interview schedule is followed to address topics of research, but other relevant themes are also allowed to develop within the interview (Evans & Lewis, 2018). Furthermore, secondary data will be used to support these interviews to give a better view of the different locations of economic activity. The interviews are held with respondents who have sufficient knowledge of urban locations of economic activity or developments in an area. Therefore, the interviews with respondents are based on a select choice.

#### *3.1 Case study area*

The cities that are chosen to be researched are Rotterdam, Arnhem, Amersfoort, and Deventer. They are pictured in figure 3. These cities will be the point of interest in this research. The selected cities and their locations of economic activity will not give full coverage of all locations of economic activity in the Netherlands because every single location of economic activity is unique and subject to different external and internal factors. Therefore, the selection of the cities is established by choosing cities as representative as possible, which in return will increase the generalizability of this research (Creswell & Poth, 2016). The selection of the cities is based on whether the city is in the Randstad and in what province the city is located. This way, it can be researched whether the urban location of economic activity is subject to macro-socioeconomic influences that might be bigger than the city itself. The city's location concerning Randstad has also been chosen as one of the criteria because cities in Randstad experience the same phenomena, like high economic output and bigger housing shortages. Lastly, the chosen cities are all part of the so-called G44 cities, which are the 44 largest cities in the Netherlands. The G44 cities offer more jobs, experience higher population growth, and have a higher share in fast-growing firms than other cities in the Netherlands (Stedennetwerk G40, 2019), which makes them an interesting object of research. The classification of each city and its properties are shown in table 5.

Figure 3: Map of the Netherlands with selected cities.



Source: World Atlas, n.d.

Table 5: Classification of the cities subject to research.

	<b>Location with regard to the Randstad</b>	<b>Province</b>	<b>Residents (2020)</b>
Rotterdam	Inside	Zuid-Holland	651,157
Arnhem	Outside	Gelderland	161,348
Amersfoort	Inside	Utrecht	157,276
Deventer	Outside	Overijssel	100,719

Source: Centraal Bureau voor de Statistiek, 2021b.

### 3.2 Data collection

The interviews have been prepared using the theoretical framework as a starting point. Despite the use of guiding questions, there is room for flexibility posing more enhanced questions that elaborate on topics or answers provided by the interviewee. This way, the research can be provided with information that otherwise might not have been gathered (Evans & Lewis, 2018). The interview questions will be accessible, analyzable, and inviting. Inviting interviews to consist of questions interesting for the interviewee, which is captured with questions regarding their topic of expertise or of something they are part of. Analyzable interviews are interviews that provide answers for research, which is done by focusing on developments on locations of economic activity in the research questions. Lastly, accessible interviews are interviews that are well-interpretable, which is maintained by providing well-

explained questions that are ambiguously understandable (Hamilton & Finley, 2019). The interviews have been held in Dutch because of easier transfer of knowledge and clearer communication. Therefore, the transcripts of the interviews are also in Dutch. The interview question list is shown in Appendix A with the literature sources on which the questions are based. Contact persons of the municipality of Rotterdam, Arnhem, Amersfoort, and Deventer have been interviewed. The contacts of each municipality are shown in table 6. The respondents have been selectively chosen based on the knowledge and expertise of urban locations of economic activity in their municipality. Because of the Covid-19 measures, the respondents had to give consent to have live conversations. Therefore, only the conversation with one of the respondents of the municipality of Rotterdam has been held live. The conducted interviews have been recorded and are transcribed and analyzed. The results drawn from the interviews will be elaborated in the result section.

*Table 6: Contact person of each municipality.*

	<b>Contact person</b>	<b>Date of conversation</b>	<b>Location</b>	<b>Referred to as</b>
<i>Rotterdam</i>	Dries Zimmerman	13-09-2021	Live in Rotterdam	Municipality of Rotterdam
	Michel te Brake	29-09-2021	Online	Municipality of Rotterdam
<i>Arnhem</i>	Lianne Hendriks	21-09-2021	Online	Municipality of Arnhem
<i>Amersfoort</i>	Han Bruggink	22-09-2021	Online	Municipality of Amersfoort
<i>Deventer</i>	Raymond Schuurman	15-09-2021	Online	Municipality of Deventer

### *3.4 Typology*

As discussed in the theoretical framework, a new typology will be used. This typology is needed to answer the research question, in which it provides the division of different locations of economic activity. The typology is based on the work of Van Dinteren et al. (2019), Provincie Noord-Holland (2020), Gemeente Amsterdam (2017), Metropoolregio Rotterdam Den Haag (2018) and Copping, Hagens and Kruger (2017). This results in the distinction of urban locations of economic activity pictured in figure 4.

Figure 4: Typology of locations of economic activity and their characteristics.

<i>Type</i>	<i>Properties</i>
 <p><b>City center environment</b></p>	<ul style="list-style-type: none"> <li>▪ High variety of functions</li> <li>▪ High attraction</li> <li>▪ Dynamic and much interaction</li> <li>▪ Great public transport system</li> <li>▪ Slow traffic</li> </ul>
 <p><b>Mixed residential-work environment</b></p>	<ul style="list-style-type: none"> <li>▪ Mix of living and working</li> <li>▪ Small and non-nuisance companies</li> <li>▪ Supporting services</li> <li>▪ High quality of stay</li> <li>▪ Slow traffic</li> </ul>
 <p><b>Business office environment</b></p>	<ul style="list-style-type: none"> <li>▪ High representativity and high-rise buildings</li> <li>▪ Great disclosure by car and/or public transport</li> <li>▪ Central or strategical located</li> <li>▪ High concentration of offices</li> <li>▪ Function mix, sometimes with houses</li> </ul>
 <p><b>Innovative environment</b></p>	<ul style="list-style-type: none"> <li>▪ Variation in environmental categories (2-4)</li> <li>▪ Small and middle-scale allotment</li> <li>▪ Good disclosure by car and public transport</li> <li>▪ Often clustering around knowledge carrier R&amp;D companies</li> </ul>
 <p><b>Mixed business park</b></p>	<ul style="list-style-type: none"> <li>▪ Variation in environmental categories (2-4)</li> <li>▪ Small and middle-scale allotment</li> <li>▪ Good disclosure, especially by car</li> <li>▪ Located peripheral or central</li> <li>▪ Divergent mix of companies</li> </ul>
 <p><b>Functional business environment</b></p>	<ul style="list-style-type: none"> <li>▪ Higher environmental categories (3-6)</li> <li>▪ Large-scale allotment</li> <li>▪ Good (multimodal) accessibility</li> <li>▪ Located peripheral</li> <li>▪ Many industrial and logistic companies</li> </ul>

Source: TU Delft & INBO, 2010 ; Faber, 2010.

Further economic activity in the city which is not bound to a location of economic activity exists too. These are pictured in figure 5 These will not play a further role in this research but are displayed to show that there is economic activity within the city that is not taking place on locations of economic activity.

Figure 5: Types of economic activity outside of locations of economic activity.

	<b>Type</b>	<b>Examples</b>
	<b>Services, retail and leisure</b>	<ul style="list-style-type: none"> <li>▪ Education and health care services</li> <li>▪ Sports and event locations</li> <li>▪ Leisure locations</li> <li>▪ District centers and peripheral/large scale retail outlet locations</li> <li>▪ Defense</li> </ul>
	<b>Independent establishment</b>	<ul style="list-style-type: none"> <li>▪ Companies dispersed over the city</li> <li>▪ Located outside of work locations</li> <li>▪ Divergent sectors</li> </ul>
	<b>Working in residential area</b>	<ul style="list-style-type: none"> <li>▪ Areas with mostly a residential function</li> <li>▪ Business function is subordinate</li> <li>▪ Work from home</li> <li>▪ Business at home and independent</li> </ul>

Source: TU Delft & INBO, 2010; Faber, 2010.

First of all, the center environment is a diverse set of functions with retail, catering industry, and services where much interaction is taking place (Copping et. al, 2017; Provincie Noord-Holland, 2020). Because of its great attraction, this environment is supported by a well-working public transport system. Furthermore, housing is established in this environment (Van Dinteren et. al, 2019).

Second, the mixed residential-work districts are environments in the city that support both living and working in low nuisance categories. Therefore, this environment is typed by an attractive public space to stay which provides an attractive interaction environment for companies (Gemeente Amsterdam, 2017; Copping et. al, 2017).

The business office environment is typed by offices with service-based companies. This environment is highly connected by public transport and by car and can be mixed with different functions, which include supporting services in the area (Van Dinteren et. al, 2019; Provincie Noord-Holland, 2020). Furthermore, the appearance of the company buildings is important for end-user, who desires a high-quality office (Copping et. al, 2017).

An innovative environment can have a slight variation in its environmental categories. However, the companies here mostly have some kind of clustering, possibly around a knowledge carrier, where research and development can take place. The place is highly accessible by car and by public transport (Provincie Noord-Holland, 2020).

Mixed business parks are a collection of different companies in terms of size and sector. This results in different environmental categories as well (Provincie Noord-Holland, 2020). This environment is well accessible by car and possibly by heavy traffic. These work environments are found more near the edges of the city because they are less mixable with other functions, but this differs per business park (Copping et. al, 2017).

The functional business environment is typed by large allotment and high environmental categories with companies in the industrial and logistic sector (Provincie Noord-Holland, 2020). Therefore, a multimodal connection is needed in this location. These

work environments are found on the edges of the city because of their low mixable properties (Van Dinteren et. al, 2019).

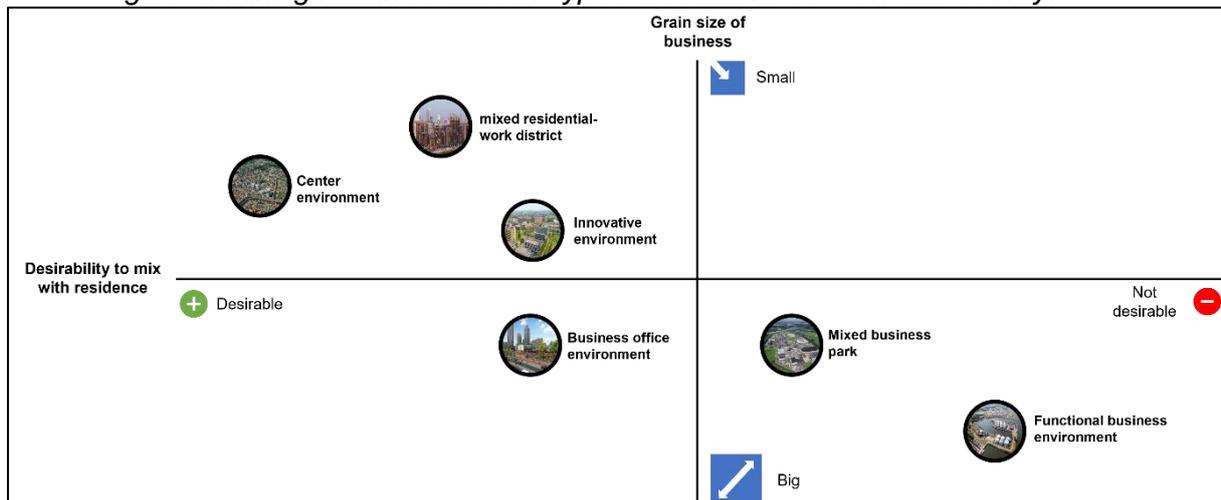
Services, retail, and leisure is a category of divergent functions. They consist of services, retail, or leisure companies that do not fit into or are not part of another work environment (Copping et. al, 2017).

A solitary company is a company in any sector that is not surrounded by other economic activity. Therefore, it is not a real work environment but it describes an individual place with economic activity.

Lastly, working in residential areas describes a minority of businesses or people working from home in a residential area. Their activities are of low environmental categories and the companies are small in building size and employees. When these companies grow bigger, they move out of the residential area (Copping et. al, 2017; Provincie Noord-Holland, 2020).

To give a view of how well mixable the different locations of economic activity are with other facilities, a matrix is portrayed in figure 6. As shown, the bigger and higher the environmental categories are of a company, the less desirable it is to mix them with other facilities (TU Delft & INBO, 2010 & Faber, 2010).

Figure 6: Mixing matrix of different types of locations of economic activity.



Source: TU Delft & INBO, 2010 ; Faber, 2010.

The typology has been presented to the respondents before each of the conversations. However, the typology has not been used as a guideline through the conversation because of possible misunderstanding of the typology and unclear categories. Rather than the categories of this typology, the categories ‘business parks’, ‘retail’ and ‘office locations’ have been used as a guideline through the conversations, because these concepts play a more prominent role in the policy of the municipalities, like for instance the policy vision of Metropoolregio Rotterdam Den Haag (2018) or Regio Arnhem Nijmegen (2020).

## 4. Results

Before the results of each government are highlighted, after which general results are shown, secondary data is provided to look at the differences in terms of the labor force, economic sectors, and stock space. This helps determine how the different cities relate to each other and portrays a step for the second sub-question, where demand and supply of different locations of economic activities are portrayed. To reflect on the functional mix that is treated in the theoretical framework, different policy documents are analyzed to give a view of how the functional mix is portrayed in the policy. This is important for answering the third sub-question.

### 4.1 Descriptive statistics

Locations of economic activity are the object of study in this research. Therefore, it is important to picture what they are dependent on, which is the labor force. In table 7, the total labor force, employment, and unemployment in 2020 of the Netherlands, provinces (PV), and researched municipalities are pictured (Centraal Bureau voor de Statistiek, 2021). Rotterdam shows to have a prominent amount of labor force compared to the other cities, which is in line with the population size shown in table 5. However, Rotterdam shows to have slightly higher unemployment in percentages.

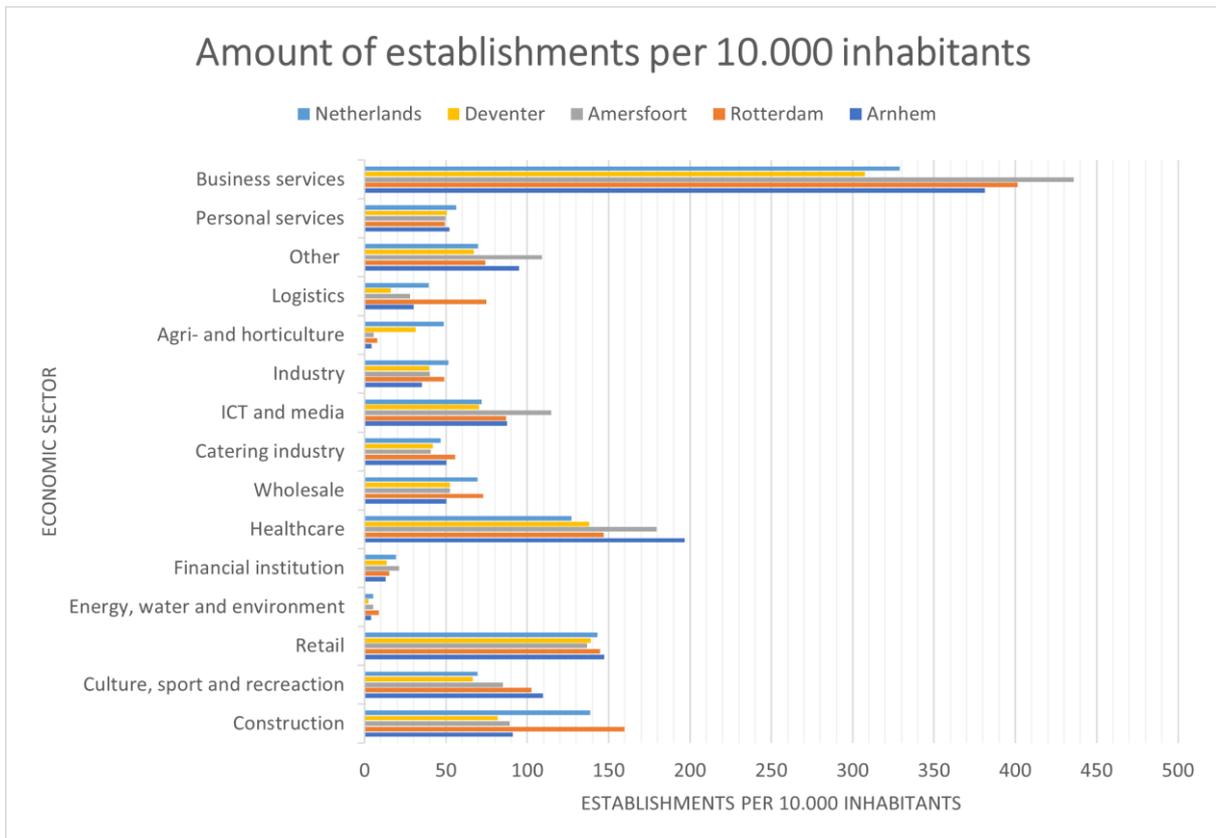
*Table 7: Labor force, employment, and unemployment in absolute and relative numbers in 2020.*

	<b>Labor force (x1000)</b>	<b>Employed labor force (x1000)</b>	<b>Employed labor force (% labor force)</b>	<b>Unemployed labor force (x1000)</b>	<b>Unemployed labor force (% labor force)</b>
<i>Netherlands</i>	9308	8951	96,16	357	3,84
<i>Overijssel (PV)</i>	617	595	96,43	22	3,57
<i>Deventer</i>	54	52	96,30	2	3,70
<i>Gelderland (PV)</i>	1120	1081	96,52	39	3,48
<i>Arnhem</i>	88	84	95,45	4	4,55
<i>Utrecht (PV)</i>	750	724	96,53	26	3,47
<i>Amersfoort</i>	89	86	96,63	3	3,37
<i>Zuid-Holland (PV)</i>	1953	1870	95,75	83	4,25
<i>Rotterdam</i>	329	311	94,53	19	5,78

*Source: Centraal Bureau voor de Statistiek, 2021a.*

Representation of different economic sectors may also differ per municipality. This is portrayed in figure 7 as establishments per 10.000 inhabitants to show relative differences between the municipalities. As shown, business services are best represented in all municipalities, followed by healthcare and retail establishments. Per category, most of the time municipalities can quite differ in establishments but they somewhat give the same representation throughout each category. However, it is noticeable that Deventer has a lower share in establishments in all the fifteen categories compared to the Netherlands in general, except for healthcare.

Figure 7: Establishments per 10.000 inhabitants in different economic sectors in 2021.

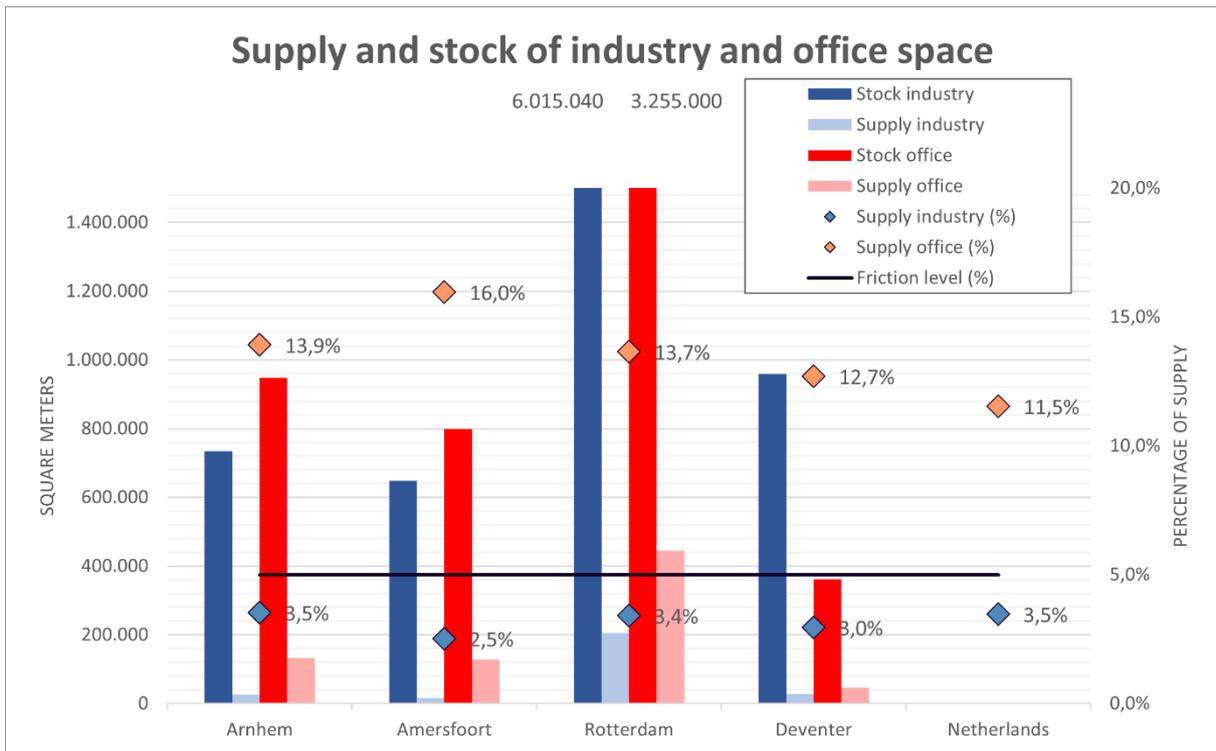


Source: Kamer van Koophandel, 2021.

Future demand and supply of different company buildings are important to react to the development of locations of economic activity. This way, proactive adjustments and developments of locations of economic activity can be executed to adapt to this future demand and supply balance. Here, the ongoing Covid-19 pandemic plays an important role, which makes it harder to predict how this balance will evolve (Van der Lee, 2021). Looking at office space, it is predicted that the demand for office space is decreasing which was already the case before Covid. Working from home and flexible work is becoming a bigger trend, which asks for less office space usage. Furthermore, is the economy stabilizing and shrinking in the future which causes financial services to decrease (Buitelaar et al., 2017).

The demand for business premises, especially in the logistic sector, shows to increase even further. Because of the growth of e-commerce which gained another boost in the Covid pandemic, more space for logistic services is demanded. This can also be seen in figure 8, where supply and vacancy of office and industrial space are portrayed. As shown, the supply of office space is above ten percent in every city, which is above the friction level. A healthy friction level is mostly assumed to be around five percent of the total stock (Stijnenbosch, 2013). Industry supply rates seem to be under this level in all research cities. Due to the lack of data, the data of office space is from December 2020 (NVM Business, 2021), which is during the Covid-19 pandemic, and from industry space is from January 2019 (CBS, 2020). Although industry space data is from before the pandemic, recent sources state that this trend of a lack of industrial space still can be seen (Van der Lee, 2021).

Figure 8: Stock and supply of office and industrial space.



Source: NVM Business, 2021; Centraal Bureau voor de Statistiek, 2020b.

#### 4.2 Functional mix in practice

As said in the theoretical framework, the functional mix is important in Dutch urban planning. Therefore, it is important to reflect on how the functional mix is treated in policy documents of Dutch selected cities to track down how the functional mix is implemented in this policy. This helps answer the third sub-question which focuses on the policy of municipalities regarding locations of economic activity.

In the following quote, a response note on the land-use plan of the ‘Havenkwartier’ in Deventer is shown (Gemeente Deventer 2020):

*“The planning rules state that the catering floor area may not exceed 15% of the business floor space of the other functions permitted on this location. The complainant believes that with such a large floor area, there is no longer facility/support catering and requests that the permitted catering - 3b will be limited to a maximum of 10% and also includes:*

- *that this facility/support catering per unit may not exceed 100 m2 and*
- *may not be operated independently”*

This is a successful example of how functions can be integrated into an area. In this case, it is desired that catering will not grow too strong and fulfill a supportive role in the area, which is translated through a maximum of 10 percent of total business floor space and limited to a maximum of 100 m2 per catering facility. Another example from Rotterdam shows how much of different functions are permitted to locate in the ‘Lijnbaankwartier-Coolsingel’ (Gemeente Rotterdam, 2016):

*“In the description in outlines is furthermore included that an addition of 500 houses has to be possible. Finally, it is in outline described that the retail function is strengthened by an addition of 15,000 m<sup>2</sup>. It is assumed that this also includes service provision, now under shops, according to the definitions, should also be understood to mean service-providing functions. The regulations of the current plan include a limitation of offices, namely to a maximum floor space of 425,000 m<sup>2</sup>.”*

Transformation of offices to housing and traffic nuisance that different functions can cause is also mentioned in the document. The numbers that are mentioned in the land use plan are relevant but could be more meaningful if they were also specified on block level in the Lijnbaankwartier-Coolsingel. This causes a greater functional mix and prevents zoning of functions. Another example of quoting the importance of the functional mix but not supporting this numerically is in the Spoorzone Arnhem-Oost. Arnhem mentions the ‘New Mix of Arnhem’, which is elaborated into (Gemeente Arnhem, 2021):

*“An attractive city area with a rich set of residential and business functions, which are making smart use of space, cause dynamics, liveability, and interaction that complement each other.”*

The importance of complementarity is mentioned but in what kind of proportions is not mentioned. It is of added value when this is elaborated in more detail, especially in concrete numbers. Lastly, an example of a preparation of decision making in the Kop van Isselt in Amersfoort is shown (Gemeente Amersfoort, 2021):

*“The area will be redeveloped into a highly urban area with houses, workplaces, societal and cultural services. This redevelopment is not possible based on valid land use plans, among others land use plan ‘Business parks and surroundings and highways’. Therefore, a new land-use plan/regional plan has to be drafted.”*

The decision mentions different functions and services to be placed in the area but again does not meet concrete numbers. These are also not mentioned in the land use plan ‘Business parks and surroundings and highways’. This could be implemented in the coordination progress of a new land-use plan. In conclusion, does the land use plan of Deventer picture a good example of how proportions can be implemented in policy documents. In the example of Deventer, this is done with catering but this can be done with any kind of function in any kind of area where functional mix takes place. This is displayed little in the present policy documentation. Although the used examples may form a natural functional mix, in reality, they are used in this research to show how functional mix can be elaborated better in policy documents.

Now those descriptive statistics have been shown of each city, results, and insights of the interviews will be elaborated. Of each city, the importance of the work function is portrayed, after which demand and supply, policy, tasks, and successes are elaborated. This helps answer all of the research questions.

### *4.3 Rotterdam*

#### *Importance of the work function*

The municipality of Rotterdam aims to be an inclusive residential city, where work is a part of the city. This is supported by the following quote:

“You do not want to become a 100% residential city without being able to work there yourself, that everyone has to work somewhere else in the region, so to speak, and everyone lives in the city, that is not the idea of a live-work city.” (Municipality of Rotterdam, 2021).

The reason to remain the work function in the city is furthermore supported to secure jobs for every type of employee. Low-skilled labor employees have a shorter radius to get to their work than high-skilled labor employees because they simply do not have the financial means to get there. Excluding this type of work in the city results in excluding the people that work there too.

### *Demand and supply*

The municipality of Rotterdam is shown to have a great shortage of business space. This is proven by the fact that the municipality of Rotterdam has to reject certain businesses that want to operate within Rotterdam. An example of this is that Rotterdam does accept city supplying companies but does not accept regional supplying companies, because regional supplying companies are not that hardly needed in Rotterdam.

When focusing on the office supply, there is a quantitative surplus and a qualitative shortage. The buildings that show vacancy in Rotterdam are the buildings that are depreciated and do not fulfill the functional implication by end-users or have a decentralized location (Municipality of Rotterdam, 2021). This leads to divergent visions between the Municipality of Rotterdam and the province of Zuid-Holland. The municipality sees the qualitative shortages of office supply and wants to build on the locations where offices are in demand. The province however only states a surplus of office space and does not see the need to build more office space.

### *Policy*

When it comes to policy implications in Rotterdam, then the municipality is already implementing instruments to steer in the right direction. The municipality of Rotterdam handles a ‘concentration policy’, where the municipality can reject certain types of business in certain locations. Furthermore, Rotterdam tries to condense on business parks by building houses on the site, to cope with the housing shortages.

### *Strong properties of Rotterdam*

The strongest property of Rotterdam is its harbor (Municipality of Rotterdam, 2021):

*“To state the obvious, we have a huge harbor here, the largest in Europe, and that still entails narrative activity. That's a unique selling point, even if you are in the logistics sector on the A15 corridor, yes then you are at the harbor and that is obviously a popular place.”*

The harbor attracts a lot of related activities in business to the city. A challenge however in Rotterdam is to create places where clustering of other types of businesses takes place. Furthermore, Rotterdam has great connectivity of both public transport and roads, which translates to the attraction of firms in the inner city: *“We have an international station in the city center that is really a top location for both office and retail”*.

### *Tasks*

The energy transition is an important task for Rotterdam. The municipality of Rotterdam (2021) shows that: *“energy transition is like a major task that hangs over our heads like a dark cloud”*, with which the municipality means that it is hard to fully contribute to the energy transition in time. In 2025 for instance, diesel vans may not enter the inner city

any more. Electrical vans will be used more in the future, but therefore, the electrical infrastructure has to be sufficient. Furthermore, the municipality of Rotterdam points out the importance of connectivity in Rotterdam. Rotterdam's connectivity is good but can always be better. The lack of space in Rotterdam is also a task that the municipality has to deal with. There is a great demand for business space that cannot be fulfilled.

#### *Successes*

One of the successes of the municipality of Rotterdam is that they already have a policy regarding locations of economic activity. This is already implemented to improve the density of business sites by adding houses. Furthermore, Rotterdam shows to remain businesses with higher environmental categories, to fulfill their economic and societal role within the city. Lastly, Rotterdam shows to connect the harbor and the city on locations of economic activity that are already taking responsibility in sustainability and the energy transition.

#### *4.4 Arnhem*

##### *Importance of the work function*

According to the municipality of Arnhem (2021), locations of economic activity fill up an economic and societal role. Economically because they generate money and societal because:

*"We know many local business sites in Arnhem, partly regionally, which means that many people from Arnhem or the immediate vicinity can find work there. So in that sense, locations of economic activity also have a very important social value."*

##### *Demand and supply*

Arnhem houses especially small and medium enterprises (SME's). However, the municipality sees a shortage of both supplies of existing buildings and new buildings. This may result in companies leaving the city (Municipality of Arnhem, 2021): *"At the moment that a company cannot find the desired building or the building cannot be renovated as desired, the company will also look for the migration to the region."* This would result in a net loss of jobs in Arnhem.

There is a surplus supply of office space in Arnhem. The municipality of Arnhem is already looking at which office locations could be transformed shortly. However, at Arnhem Central Station there is a shortage of office space. This is due to the high connectivity of the station, which is highly valued by companies that need office space. Arnhem Central Station is also well-connected with Germany.

##### *Policy*

In terms of policy, the municipality of Arnhem mentions that they do not have certain active instruments to cope with tasks but they aim to implement them soon. The municipality does mention that they make use of policy documentation to inform parties about developments.

##### *Strong properties of Arnhem*

On the other side, entrepreneurs are taking action on business sites in Arnhem. Here, entrepreneurs are taking steps for climate adaptation against heat stress. This is done by greening the business sites. The municipality of Arnhem encourages this by compensating a part of the green entrances of companies. Furthermore, there is a subsidy for companies if they want an energy scan, which shows the amount of energy they use and how they can decrease this usage.

### *Tasks*

A great task for the municipality of Arnhem is maintaining the businesses within the city. Because of the housing shortages, there is a great political reason to transform some old or unused business buildings into houses. However, the economic function of companies is important in a city. The municipality of Arnhem (2021) mentions the following about transforming companies into houses:

*“Sometimes it is not so bad in an area if, for example, in the middle of a residential area business activity is concentrated that is not future-proof, then it is fine that it transforms to housing. but sometimes you have to be in a kind of defensive position with good arguments to hope that that will work for economics and yes some people are not always aware of what economics signifies a step and that is often still the story you tell have to tell I notice”*

The argument that more houses have to be built in the city is logical, but most of the time, people forget what economic activities mean for the city (Municipality of Arnhem, 2021). A second task for the municipality of Arnhem is how they can successfully condense areas, which is in line with the task mentioned first.

### *Successes*

Successes that Arnhem has achieved are in the field of greening and climate adaptation on business parks. By collaborating with entrepreneurs, the entrances of companies have been greened. Entrepreneurs only had to pay a third of the total costs for this, because the province of Gelderland and the municipality of Arnhem both subsidized the other two-thirds of the total costs. Furthermore, companies can request an energy scan, which pictures the energy usage of the company and how it can be improved. The province of Gelderland subsidizes half of the energy scan costs and the municipality of Arnhem 25 percent. These measures stimulate entrepreneurs to be more sustainable and contribute to climate adaptation. The key driver to success is the collaboration between the province, municipality, and the entrepreneurs.

## *4.5 Amersfoort*

### *Importance of locations of economic activity*

According to the municipality of Amersfoort (2021), a good supply of locations of economic activity is of importance for living and working in a future-proof city: *“You have to make sure you have enough work for your residents and preferably as near as possible.”* This provides the right job for every inhabitant of Amersfoort in the city. Because there are many practically educated people in Amersfoort, this means that there have to be sufficient companies that give substance to these kinds of workers. Both high-skilled and low-skilled business is of importance in Amersfoort.

### *Demand and supply*

The municipality of Amersfoort experiences, like other cities, a great vacancy rate of office space. A significant part of this vacancy is being transformed into housing, but still, there is an oversupply. The municipality of Amersfoort furthermore sees a change in the use of office space. Where it was formerly used as only a place to work in, it is more and more being used as a meeting place. You can work from home if you want to (Municipality of Amersfoort, 2021).

In terms of business space, there is a significant shortage in Amersfoort (Municipality of Amersfoort, 2021): *“A good frictional vacancy rate is five percent and what you see now, is that companies are struggling to get suitable housing. If a company wants to move, then it is just not possible.”* New to be built business space is also expanded rapidly, which does not straighten the frictional rate.

### *Policy*

To make better use of the available space in Amersfoort, the municipality wants to condense the space where possible. However, the municipality wants to protect the business space that is needed within the city at the expense of housing: *“The point is that quantitatively approaching the housing task also immediately affects other forms of space usage.”* There is a “hunger” to transform business locations into housing, however, this business space has to be protected by certain limits (Municipality of Amersfoort, 2021). Furthermore, Amersfoort wants to introduce its inhabitants to ‘healthy urban living, which means that Amersfoort aims to have a high quality of life and to be a smart city. Lastly, the municipality of Amersfoort aims to bond with clusters and companies who are bound to or have a connection with Amersfoort and not necessarily with foot-loose companies who can leave the city from day to day.

### *Strong properties of Amersfoort*

A strong property of Amersfoort is that it is located centrally within the Netherlands. Locating in Amersfoort as a company, or citizen will provide you with a central location. Amersfoort also has a clustering of companies with geo-information.

### *Tasks*

The first task for the municipality of Amersfoort has to do with the lack of space. The available space has to be used more intensively by adding more housing space. This is not only quantitatively, but also qualitatively because houses in Amersfoort sometimes appear not to meet the right properties. Furthermore, a great task for the city of Amersfoort is to provide enough business space, both quantitatively and qualitatively, in the future.

### *Successes*

One of the successful implementations of using space efficiently is business park Vathorst. Here, large retail companies are located, where big parking lots are built beneath the company instead of next to the company. This saves a lot of space and makes the available space more functional. Furthermore, Hoefkwartier, which is a location with offices, has been partly redeveloped with the completion of the education in some buildings. This way, the vacancy rate of offices is reduced.

## *4.6 Deventer*

### *Importance of locations of economic activity*

According to the municipality of Deventer (2021), it is necessary to have attractive workplaces to be an attractive city. Furthermore, it is necessary to provide enough workplaces for mostly practically educated people. Deventer is also a city that focuses more on these functional businesses but is recently also focusing more on high-skilled businesses.

### *Demand and supply*

In terms of business space, there is much demand which cannot be saturated. This is because there is too little supply and the supply does not fit the demand, which states that qualitatively there is also a shortage of business space in Deventer. The qualitative supply for office space in Deventer is also too little (Municipality of Deventer, 2021):

*“For offices, not always an attractive working environment is provided... for employees it is more attractive to locate near the city center, you have access to the supermarket, have a drink, attractiveness of the environment or take a walk.”*

Deventer also has a little demand for office space in general. Furthermore, nowadays there is more demand for shared space in offices, which are not provided in many office buildings in Deventer.

### *Policy*

Deventer undertakes the first steps in developing future-proof business sites. These leading principles are a product of the agreement provided by the municipality of Deventer, which connects certain conditions with developments focusing on sustainable business sites. Furthermore, Deventer is implementing subsidies to stimulate developments. The municipality of Deventer also tries to increase the quality of the environment on locations of economic activity to increase its attraction towards companies. Lastly, the municipality of Deventer makes use of destination plans

### *Strong properties of Deventer*

According to the Municipality of Deventer (2021), a strong property is its location. Deventer is well connected, especially by highways. Deventer lies between Germany and the Randstad. Deventer is also accessible by its train station for office-related activities. A second strong property of Deventer is its business organization. Deventer has one of the largest business organizations in the Netherlands, which is crucial for putting large-scale projects into operation that require many contributions from companies.

### *Tasks*

Deventer experiences much fragmentation among owners on the location of economic activity in the city. This makes developments surrounding vacancy, sustainability tasks, and quality of public space more complex. The Municipality of Deventer (2021) also mentions the hard implementation of sustainability and energy transition on business sites: *“it is much easier putting solar panels on the roof for a few thousand euros than making a company hall completely energy neutral.”* Secondly, Deventer lacks human capital, especially younger people with certain skills. Therefore, Deventer tries to attract this group by providing an attractive living environment Deventer. Thirdly, Deventer experiences, like other cities in the Netherlands, great pressure on the housing market because of the lack of houses.

### *Successes*

A great success of the municipality of Deventer (2021) is the development of the ‘A1 Bedrijvenpark’, which is free of natural gas and energy-efficient. Therefore, this business

park shows to be future-proof and is an example of how a business park can look like in the near future.

#### 4.7 General obstacles

The general situation of both the business space market and office space market can be described as unhealthy. The business space market experiences low vacancy rates and high demand for space, which causes companies to locate themselves in a building that does not meet their needs or to leave the city. On the other hand, there is too much office space in general and too little demand to fill the vacant buildings. Only the central locations around multimodal nodes fulfill the needs of offices and thus are in demand.

Apart from the supply and demand of different kinds of real estate, there are more hassles municipalities experience. Looking at the general obstacles pictured by the municipalities, five different obstacles can be distinguished. They are pictured below.

- I There are types of business that are found dispersed over the city which however would rather be concentrated on a certain location;
- II Insufficient quality of public space or locational properties;
- III The affliction of business space due to housing shortages;
- IV Large-scale implementation of the energy transition, sustainability, and climate adaptation;
- V Successful mixing of housing and living functions.

These different obstacles can be treated differently by the use of policy instruments. In table 8, the obstacles are shown with possible solutions and policy instruments that can be used to achieve the solution. A note of importance is that the note of principles, urban preconditions, and the land-use plan has not been shown as instruments in table 8. The reason for this is that these three policy instruments are juridically widely applicable and can therefore be used for every obstacle.

*Table 8: coupling obstacles, solutions, and policy instruments.*

<b>Obstacle</b>	<b>Solution</b>	<b>Applicable policy instruments</b>
<b>I</b>	Locate companies together that are not mixable with other functions or could better be clustered in the city, like offices and industrial companies.	Regional plan, Vision on locations of economic activity
<b>II</b>	Maintain the quality of public space and invest in spatial needs of companies on locations of economic activity.	Visual quality plan, maintenance of public space, restructuring, urban reparcelling
<b>III</b>	Protect business from affliction by applying a minimal and maximal amount of land use that can be used by a certain function in an area.	Regional plan, vision on locations of economic activity, restructuring
<b>IV</b>	Inform and work together with companies. Provide financial fees to stimulate developments.	Regional plan, subsidies, public-private partnerships, general information
<b>V</b>	Condense areas with light business activity with residence above companies where possible or transformation of buildings.	Regional plan, transformation, urban reparcelling, restructuring

*Source: Kenniscentrum voor beleid en regelgeving, n.d., Stec Groep, 2021, Overheid.nl, n.d. & Kenniscentrum InfoMil, n.d.*

Not all obstacles apply to the same locations of economic activity. Based on the conversations, the obstacles can be applied to the different locations of economic activity of the typology, shown in table 9.

*Table 9: Coupling different locations of economic activity with desired developments and obstacles.*

<b>Location of economic activity</b>	<b>Desired development</b>	<b>Obstacles</b>
<b>City center</b>	Maintain dynamics and different functions, retail, and light forms of business activity. Condensing well accessible places.	III, V
<b>Mixed residential-work environment</b>	Combining living and working by implementing light forms of business activity in monofunctional areas.	II, III, V
<b>Business office environment</b>	Strengthen well-accessible public transport nodes and support them with facilities.	I, II, III, V
<b>Innovative environment</b>	Stimulate cluster formation of complementary businesses and education.	I, II, III
<b>Mixed business park</b>	Mix with residences when businesses have low environmental categories in the area, otherwise separate from residences.	II, III, IV, V
<b>Functional business environment</b>	Separate from residences to give room to big companies with high environmental categories.	I, III, IV

Table 8 shows that especially juridical and physical instruments are of importance to overcome certain obstacles. This has to do with the market, in general, does not solve these obstacles because there is less or no profit motive for developers. Therefore, it is needed to frame this legally to achieved the desired result or development. Obstacle IV is the only obstacle where mostly communicative or financial instruments can play a role. This is because developments of the energy transition, sustainability, and climate adaptation cannot be solved by the government implementing policy only. The government needs its companies to stimulate developments. That is why it is important to inform companies about developments and where needed, financial fees are provided. Awareness about the developments is needed among companies to steer developments in the right direction.

Furthermore, from table 9 can be conducted some type of business has to be concentrated on certain locations of economic activity and others not. The business office environment, innovative environment, and functional business environment belong to the locations of economic activity where the concentration of companies can be applied. However, this does not include that these locations of economic activity cannot profit from a functional mix. The functional mix is of value in a business office environment or a mixed business environment when nuisance criteria are considered. The city center environment and mixed residential-work environment have little hindering companies which make them great locations to mix functions.

*4.8 Fictional scenarios*

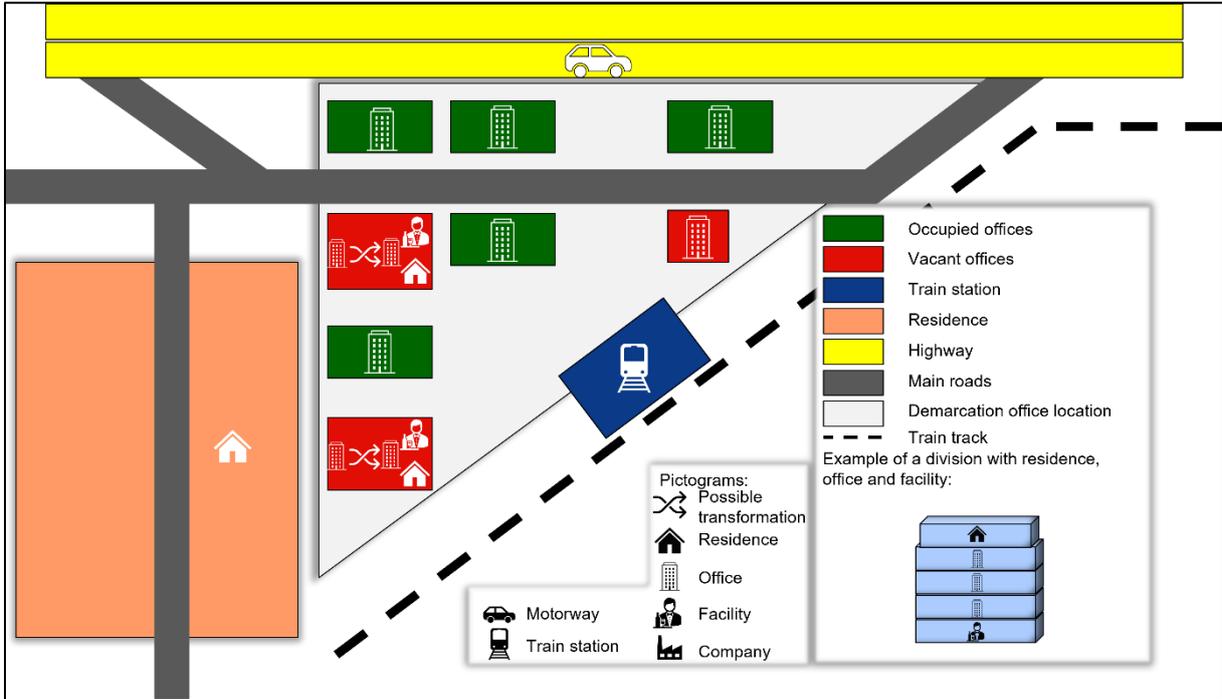
The obstacles that are mentioned often differ per location of economic activity. To clarify the obstacles on locations of economic activity, four fictional scenarios are portrayed with a location of economic activity with its obstacles. This helps answer the main research question with regard to different developments in different locations of economic activity.

Possible considerations, preferable developments, and useful policy instruments have been discussed after every scenario. Assumptions made in the fictional scenarios are based on the theoretical framework, data, and conversations with the different municipalities. The four scenarios picture a business office environment, functional business environment, mixed business park, and mixed residential-work environment. These locations of economic activity have been chosen because the conversations showed that most obstacles are found in these locations.

*4.8.1 Scenario 1 Possible transformation from obsolete office buildings to residences within a promising business office environment*

A situational sketch of a business office environment has been pictured in figure 9. The location is well accessible with a railway and a highway. This multimodal accessibility is of importance for office users. A residential area is located next to the location of economic activity. Furthermore, three of the eight office buildings are vacant because the offices are relatively deprecated. The vacancy is also a result of decreasing needs for office space by flexible work and digitalization.

*Figure 9: Situational sketch of a business office environment*



*Options of consideration*

Looking at the sketch, different developments could take place. The considerations that belong to these developments are as follows:

- Well-accessible office locations are in demand while being scarce. Therefore, this matches the needs of offices.
- There is a great need for more housing, which can also be completed around offices because these functions are well-mixable.

- Adding residences to an office location increases the dynamics of the location which creates a higher support base of certain facilities for both users of residences and offices.
- Investing in an office building with residences is financially more attractive for developers because residences generate more profit.

#### *Preferred direction*

In light of the strong multimodal accessibility that is gaining importance for office locations, it is desired to keep the area suited for offices. Furthermore, adding meeting places in the area, like catering and flexible meeting rooms, can help improve the interaction possibilities in the area, which can be implemented in the lower floors of the buildings. However, these functions must support the other functions in the area. When further space is left in the office buildings, the higher floors of the vacant buildings which are closest to the residential area can be transformed into residences. In addition, it is of interest that the buildings in the area have a sufficient appearance for the companies and apply to the need for flexible office space. Lastly, investing in the public space of the office location will help improve the overall appearance of the area, which is also of importance for office locations.

#### *Policy implementation*

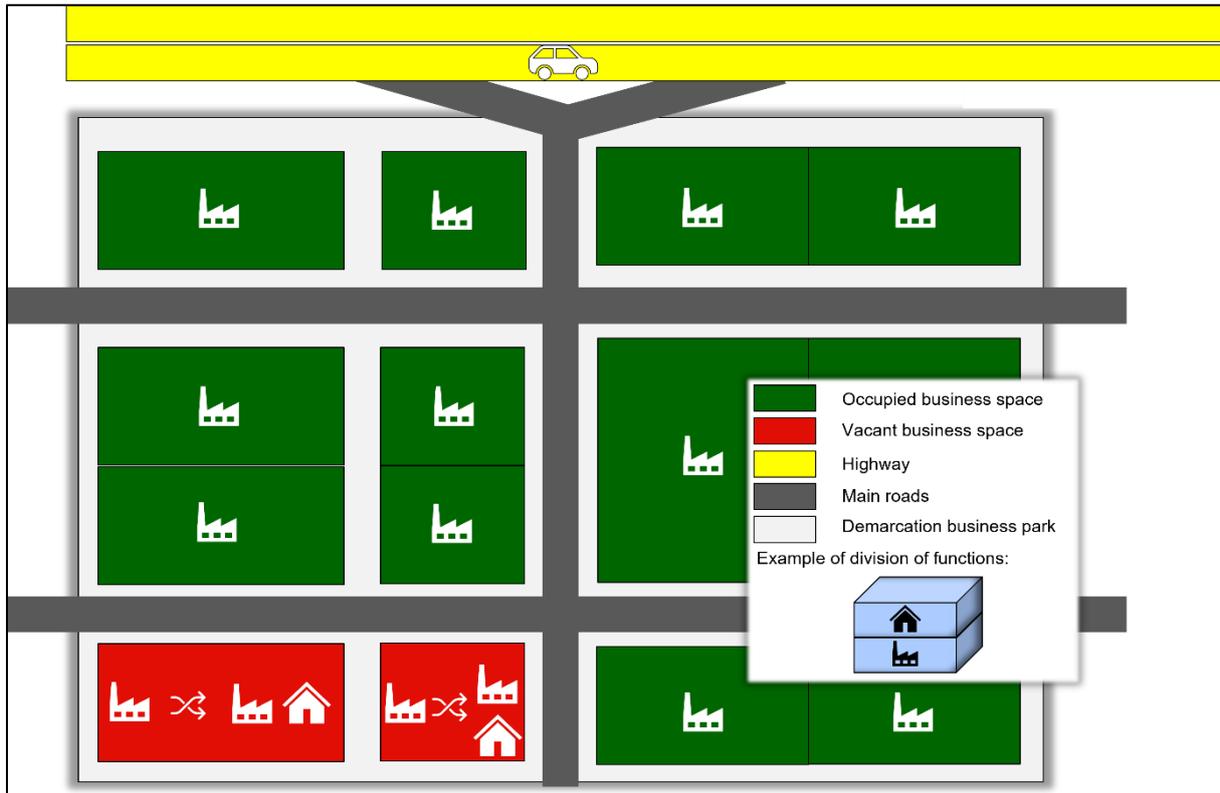
In terms of policy, it is important to ensure the function of offices in the area. Therefore, a land-use plan, urban preconditions, and a regional plan can be used to juridically bind this. An example would be that, in case of the presence of offices, facilities, and residences, 70 at least percent would be reserved for offices, a maximum of 20 percent for residences and 10 percent for facilities. The enforcement of policy is important to ensure a minimum amount of office space in the area. Not only the proportions of the functions are important, but also the places. Services and other places of interaction come into their own on the first floor with office space on top. Residences can be placed on top of the highest floors because they do not necessarily need interaction. Furthermore, a visual quality plan can make demands on the physical properties in the area to ensure sufficient quality of public space.

Next to these juridical binding instruments, transformation can change the function of real estate. Furthermore, restructuring can be used when the whole area needs to be addressed because of physical depreciation. Lastly, the quality of the public space of the environment of the office location can be increased through maintenance.

#### *4.8.2 Scenario 2      The function of companies with high environmental categories*

Figure 10 portrays a situation of a functional business environment. The area is characterized as well accessible by highway and there is large allotment in the area. Companies that have settled in this area have a higher environmental category and are thus hard to mix with residences. Furthermore, there are two vacant buildings next to each other. These could be transformed into residences or a mix of residences and companies. Because of the pressure of the housing market and the high environmental categories of companies on this location of economic activity, the question of whether these companies still belong in the city can be asked.

Figure 10: Situational sketch of a functional business environment.



#### Options of consideration

Based on figure 10, there are several considerations to be made:

- Businesses in this area fully relocate because of the housing shortages. The companies are also not that well mixable with residences.
- Maintain the function of the area as a business location. This can be accompanied by a qualitative improvement of the area or the buildings in the area to meet business requirements.
- Transform some buildings into residences to form a compromise of the points above. This can be done best in the vacant buildings but again it is important to keep possible company nuisance in mind.

#### Preferred direction

Zoned business functions are of importance for the city, also in the new economy. These are needed and give labor to all layers of the labor force. Therefore, this functional business area needs to keep its function to keep the diverse set of functions in the city, even under the pressure of the housing market. Furthermore, a possible scenario is to locate companies in this area with at least an environmental category of three, which enforces the concentration of nuisance companies in the city. This can be implemented with businesses or offices above the lots. Secondly, It can be considered to transform the vacant buildings into businesses with residences above. This is preferable in case of long-term vacancy and when residences do not experience nuisance from the companies in the area. However, this is under the condition that business keeps the dominant function in the area. This means for instance that residents can not object to an extension of a company in the area. A second reason to keep business in this area is the good connection with the highway. Therefore,

trucks can access the highway quickly and do not cause a further nuisance on the underlying road network.

#### *Policy implementation*

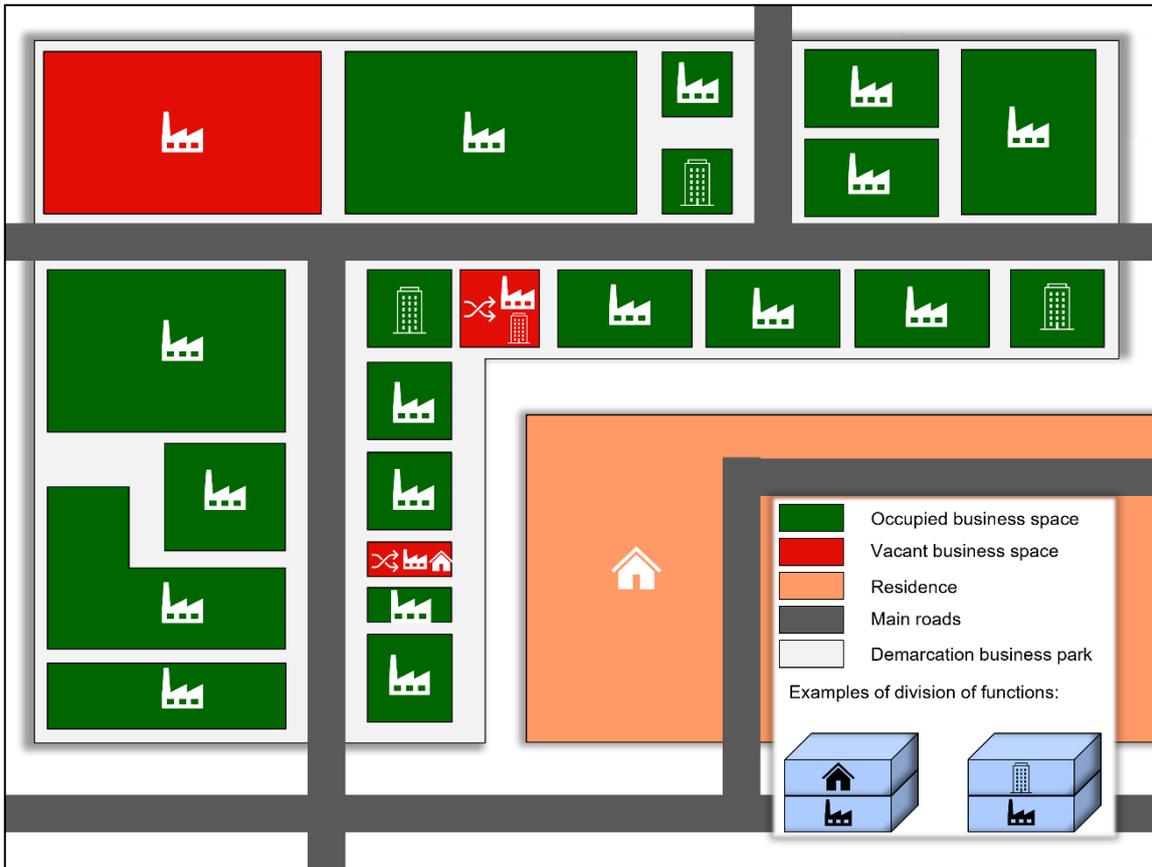
To keep business in the area, whether or not limited to certain environmental categories, it is important to legally bind this in the area. Through a land-use plan, urban preconditions, a regional plan, and the vision on locations of economic activity it can be determined how the area develops in the future and what type of business can locate in the area. This way, nuisance business is concentrated in the city while non-hindering business which is better mixable with other functions can locate elsewhere in the city. When residences do not find hindering from the companies they can be permitted under strict conditions because the business activity is the core function in the area.

Furthermore, it is possibly needed to make the area meet contemporary and future requirements. This can be done through restructuring and urban reparcelling, while transformation physically implements residences in the area. Restructuring and urban reparcelling can for instance also be used to combine two business spaces into one or vice versa. Maintenance of the public space is also of interest in this area but this is mostly in a functional sense, for instance by improving the accessibility of the area by trucks.

#### *4.8.3 Scenario 3      Combining houses and companies with low environmental categories*

In figure 11 a mixed business park is portrayed. Next to the business park, a residential area is located. The mixed business park is recognizable by the variety in size of company buildings. This results in a variety of businesses in the area with, in general, lower environmental categories. Furthermore, three buildings are vacant in the area. These could be transformed into residences.

Figure 11: Situational sketch of a mixed business park.



### Options of consideration

Just like with the business office location, there are similar considerations to be made:

- Transform vacant buildings into residences in favor of the housing shortage.
- Remain the buildings as they are. This can be done in combination with renovating business buildings or reparcelling the largest vacant building, to make them more future proof.
- Integrating residences as well as maintaining businesses in the area. This can be done in combination, where residences are implemented above businesses. This causes more dynamics in the business park.

### Preferred direction

The that can be made in this situation depends on the activities on the business park. When activities are predominantly non-hindering or hindering activities are concentrated in an area on the business park, residences can be added on the terrain. This is possible above businesses, which causes a more intensive use of the available space. The two buildings closest to the residential area apply first for this transformation, but development to a building with both business and office space is also possible. In this situation, it is again important to ensure the dominant function of work. Expanding of buildings in use by companies therefore must not be prevented by residents, if they maintain within the given environmental restriction. When the general nuisance is too great for possible residents, it is a better option to not implement residences. The admission of residences can also be applied in zones on the business park.

### *Policy implementation*

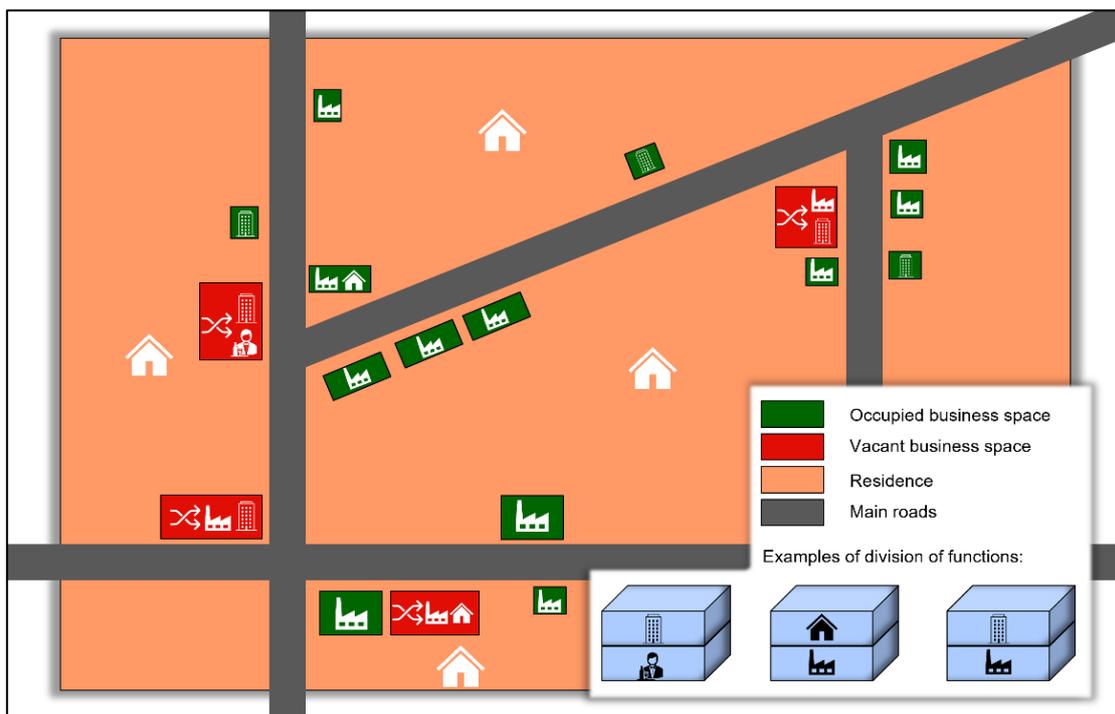
Juridical instruments can help permit certain functions in the area of the portrayed business park. Through urban preconditions, a regional plan, and a land-use plan the proportions of residence and business can be established in the area. Hereby, it is important to determine a minimal percentage of space that is suitable for businesses, to ensure this function in the area. Through the vision on locations of economic activity, the future of the location of economic activity can be communicated, which can inform for instance the companies in the area how the business park will develop in the future.

Through transformation, the first floor of business buildings with lower environmental categories can be transformed into residences, while the ground floor remains in use for companies. When the area needs to be addressed more intensively, restructuring or urban reparcelling can be used. These instruments can also be used to concentrate hindering companies in the area to encourage more mix between residences and businesses in the other parts of the area.

#### *4.8.4 Scenario 4 Balance between residences and companies*

The mixed residential-work area pictured in figure 12 is characterized by approximately an even ratio of residences and businesses. Companies located in this area have low environmental categories. Furthermore, businesses are not clustered in this area, which makes active policy hard to execute. Several buildings are vacant. These vacant buildings can be transformed into residences or a mix of both residence and business.

*Figure 12: Situational sketch of a mixed residential-work environment.*



### *Options of consideration*

The considerations to be made on this location of economic activity are as follows:

- Gradually transform the area into a residential area to cope with the housing shortages, starting with the vacant buildings.

- Maintain the business in the area under the condition that they do not have nuisance activities.
- Concentrate companies on places like central streets in the area. An advantage of this is that the delivery of goods is more effective because the companies are more accessible on central streets.

#### *Preferred direction*

There is no optimal development direction in this area and this varies by residential-work area. This is due to the lack of a dominant function in the area and rather a symbiosis of both residence and business. Therefore, it is important to reserve a minimum amount of space for both functions in the area. This is most important for the business function because of the affliction of business space by residential space. An example would be that both functions have a minimum of 40 percent and a maximum of 60 percent of space in the area. Furthermore, it is important to keep the business in the area, to prevent the area from developing into a monofunctional residential area, which decreases the interaction in the area. The vacant buildings in the figure can be transformed, where the ground floor still suits as a business function and the floors above a residence or office function. Because a mixed residential-work area has a large proportion of housing, it is also important to increase the quality of public space to increase the liveability in the area. Lastly, the large-scale concentration of businesses in the area is discouraged because the dispersion of businesses increases interaction in the whole area. However, locating businesses in more central places can be of added value when this does not cause too much zoning of the businesses in the area.

#### *Policy implementation*

In terms of policy, urban preconditions, a land-use plan, and a regional plan can be used to satisfy a minimum and maximum amount of the different functions in the area. These instruments can also be used to limit businesses with higher nuisance activity. In addition, these instruments can indicate where and what kind of buildings have to be built. Business buildings can be used more intensively by adding residences through transformation. Lastly, a visual quality plan and maintenance of public space increase the quality of public space in the area.

In conclusion, the fictional scenarios state the importance of concrete policy which focuses on the allowance and proportions of functions in different areas. By appointing minimal and maximal proportions of the functions in the area, the future certainty of especially business space in the city is guaranteed.

## 5. Conclusion and discussion

The main research question of this research is as follows:

*How are different locations of economic activity developing in an urban context and what will their prospects look like?*

The following sub-questions helped answer this question:

- Which types of urban locations of economic activity can be distinguished and what are relevant trends and developments with a spatial-economic impact on urban locations of economic activity?
- To what extent does the current supply of locations of economic activity in urban areas match the changing needs for work in the city due to new developments?
- Which (legal planning) instruments do municipalities have and how can these contribute to the improvement of the coordination of supply and demand?

The first sub-question is answered by the typology shown in the methodology and the developments have been elaborated in the theoretical framework. The theoretical framework showed that macro developments, like digitalization, branding, sustainability, flex work, the pressure of the housing market, and policy, influence locations of economic activity (Rachinger et al., 2019; Lassala, Apetrei & Sapena, 2017; Parida & Wincent, 2019; Shearmur, 2020; Pen, 2018; Hoogerwerf and Herweijer, 2008). Digitalization, flex work, and the pressure of the housing market seems to have the greatest influence on locations of economic activity, where flex work influences the demand and supply of real estate, digitalization influences the platform on which work can take place, and pressure of the housing market causes the threat of affliction of certain business space in the city. Furthermore, micro developments like the quality of locations of economic activity, economic DNA, and specific urban challenges influence locations of economic activity on the other hand (Buitelaar et al., 2021; Votsis & Havisto, 2019; Van Dijk, 2011). Here, the quality of locations of economic activity seems to be most important. Sufficient quality and presence of certain properties, like a train station, can create a support base for different kinds of companies in an area. Lastly, the typology creates a categorization of mainly six locations of economic activity shown in figure 4.

The second sub-question is answered by analyzing the secondary data about the supply and vacancy of different kinds of real estate. This showed that there is a shortage of business space and a surplus of office space in general (NVM Business, 2021; Centraal Bureau voor de Statistiek, 2020b). To confirm this secondary data, quantitative research has been executed. The conversations with the governments confirm the statistics which show that there is a shortage of business space and a surplus of office space. Especially the lack of business space is a burden because municipalities cannot provide the business space needed for companies. Furthermore, mixing the functions of work and residence is a pursuit for municipalities, which however is not practiced optimally in general. Mixing can be prevented by hindering functions, like companies with nuisance. Concentrating these in the city causes more places to be suitable for mixing functions. There are sufficient instruments that can promote these developments in different kinds of ways.

The third and last sub-question is answered by analyzing policy documents and instruments. This showed that there are different kinds of policy instruments that can be appealed for to promote different developments in an area (Kenniscentrum voor beleid en regelgeving, n.d., Stec Groep, 2021, Overheid.nl, n.d. & Kenniscentrum InfoMil, n.d.). Analyzing policy documents showed that these instruments could be implemented more intensively in practice. The conversations with the municipalities confirmed this. They put

different instruments into use to stimulate certain developments but are in some way searching for better solutions in terms of policy use.

To answer the research question, in this research, six different locations of economic activity have been distinguished (TU Delft & INBO, 2010; Faber, 2010). Each type has different options to deal with mixing functions in the area. For some, it is desirable to have multiple functions, for others it is preferred to divide functions or house only one function. Therefore, it can be stated that developments of different locations of economic activity will occur differently. Locations of economic activity that house more hindering companies should be separated from functions that might find nuisance from these companies. However, it is not profitable to relocate these companies outside of the city. Companies that cause high levels of nuisance are needed in today's and tomorrow's economy and give completion to different levels of the labor market than for instance offices. Outside of areas with companies with higher levels of nuisance, it is in many scenarios very promising to invest in a functional mix, which has more advantages than disadvantages in general (Pols et. al, 2009; College van Rijksadviseurs, 2019). However, it is always important to understand the context of the location which might give reasons not to invest in mixing functions in an area.

The results are in line with earlier research. As earlier research suggested that mixing functions can encourage interaction and livability in neighborhoods, mixing some kinds of functions will have opposing effects (Pols et. al, 2009; College van Rijksadviseurs, 2019). Interfering on locations of economic activity where condensing, concentrating, or mixing functions in general where possible furthermore helps to cope with housing shortages, although these cannot be fixed with just mixing functions.

The results of this research can be generalized to the national level of the Netherlands, as the main results of the different municipalities give the same view. However, it is important to note that each place and therefore each location of economic activity is unique and has its specific conditions and properties. Second, the results drawn from this research are done based on bigger cities in the Netherlands. Therefore, results portrayed in this research may be weaker in smaller cities and towns.

The selection of kinds of locations of economic activity in the typology has been important in this research. As there are many types of typologies of locations of economic activity made in the Netherlands, which are mostly applied to a narrow geographic area, implementing a different typology in this research would have led to different results. Secondly, the selection of cities that are subject to research is very important, because researching different municipalities which are subject to different circumstances might affect the outcomes. Lastly, the functional mix in its widest theoretical form is quite underrepresented. A bigger collection of theoretical knowledge and insights could contribute to better research.

The most challenging question to draw from this research is what exact proportions of different functions in each location of economic activity result in the most optimal scenarios. Atteveld and De Bies (2021) for instance found that at least 20 percent of one function and 80 percent of another one leads to more interaction in an area, but when does this interaction reach an optimum, and does this differ per function and location. Interesting research would focus on this optimal interaction, where data of the share of different functions in an area can be combined with the economic output, interaction levels, and livability.

## 6. Recommendations

Because this research could be of added value for policymakers, three recommendations can be drawn from this research.

1. The first recommendation is that business space in the city has to be reserved because developing business space is not that profitable for land developers and therefore, business space will lose out compared to residences. Therefore, it is needed to reserve a minimum amount of business space in areas that can juridically be bounded in policy documents.
2. The second recommendation focuses on the office market. Offices are highly dependent on location. Therefore, it is highly suggested to develop office space around highly connected locations to make these offices more future proof and gradually withdraw office space on locations which lack this connection.
3. The third and last recommendation is that communication through policy documents or other ways about developments and prospects on locations is important. This way, established firms or firms that might locate themselves soon are informed about the area and how the municipality wants to develop it. This communication can also help create a support base for climate adaptation and energy transition.

The future of economic activity in the city  
*Developments and challenges in the Netherlands*

## 7. Literature

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## 8. Appendices

### 8.1 Appendix A: Interview with government

Interviewer:.....

Date:.....

Respondent:.....

The function of respondent:.....

Do you give permission to let me to record the conversation?

Do you give permission for the use of your name in the research?

#### **The Importance of locations of economic activity**

*Locations of economic activity play an important role in the urban system. In addition, they are also a place with a lot of financial activity and they play a role in, for example, the energy transition. That is why the following questions are about the importance of locations of economic activity in your municipality. (Van der Lee, 2021; NVM Business, 2021; CBS, 2020)*

1. According to you, what is the value of locations of economic activity in your municipality?
2. For which companies are these locations of economic activity (mainly) important?
3. What do you think about the supply of locations of economic activity in your municipality concerning the demand of them, both quantitatively and qualitatively and per (type of) location of economic activity?

#### **B Location**

*Since every city and every location within the city is unique, this also affects the performance of the locations of economic activity located there. The following questions will relate to the location factors of work sites. (Martyniuk-Pęczek et al., 2017; Stadszaken, 2018; Van Dijk and Pellenbarg, 2000; Mariotti, 2005; Porter, 2004.)*

4. What are the distinguishing points of locations of economic activity in your municipality compared to other municipalities in the region?
5. What are the points of attention for locations of economic activity in your municipality compared to other municipalities in the region?
6. How does this differ per (type of) location of economic activity in your municipality? (Stadszaken, 2018)
7. Does the municipality still attract companies from outside the municipality today?
8. How do companies make their choice of location for a particular location of economic activity in your municipality?

#### **C Developments and tasks at locations of economic activity**

*Locations of economic activity have always been subject to different developments which often can hardly be influenced, such as economic, technological, and social developments. The following questions are about these developments and the challenges they lead to.* (Parviainen et al., 2017; Parida & Wincent, 2019; Wheatley, 2020; Gebiedsontwikkeling, 2011; Buitelaar et al., 2021)

9. To what extent are there bottlenecks in the field of supply and demand of different (types of) locations of economic activity in your municipality? Is there a difference per location of economic activity in which tasks arise from the developments that take place there?

10. How does the municipality deal with certain developments that affect locations of economic activity?

11. What are the challenges at locations of economic activity that the municipality has difficulty with?

12. What successes has the municipality achieved with tasks at locations of economic activity?

#### **D Controlling the supply of locations of economic activity at different scale levels**

*You can mainly distinguish three levels in terms of policy and coordination of locations of economic activity: plan location, municipal and regional. The following questions focus on the coordination with the supply of locations of economic activity at these different levels.* (Kenniscentrum voor beleid en regelgeving, n.d.; Stec Groep, 2021; Overheid.nl, n.d.; Kenniscentrum InfoMil, n.d.)

13. What prompts the idea of (re)development of a location of economic activity?

14. How does coordination take place with crucial parties in the (re)development of locations of economic activity at the plan location level?

15. Which parties are involved in the development/restructuring of locations of economic activity? For example, lot owners, park managers, or investors.

16. What forms of cooperation take place within the municipality in different areas in the development/restructuring of locations of economic activity? (economy, space, infrastructure)

17. Which (spatial economic) instruments do the municipality use for the redevelopment/restructuring of locations of economic activity?

18. How does coordination take place in the development of locations of economic activity with other spatial assignments? Such as intense pressure from housing construction

19. Are there certain regional guidelines that a municipality must comply with when developing/restructuring locations of economic activity?

20. How do you/the municipality view the coordination at the regional level?

21. To what extent is the attention paid to existing areas as compared to new areas when (re)developing a location of economic activity?

#### **E Future locations of economic activity**

*Finally, we will talk about the future vision of locations of economic activity in your municipality.*

22. What needs to be done to ensure that the supply of different locations of economic activity in the future is also in line with the demand for these that is appropriate for the new economy?

23. How do you think better coordination can take place on the three scale levels in the future?

24. What are new themes that should be addressed in the policy for the development of locations of economic activity?