

Transit Oriented Development in the Netherlands: key strategies for development and implementation

Master Thesis | Environmental and Infrastructure Planning

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Abstract

Transit Oriented Development (TOD) strategies in the Netherlands have known varying degrees of success. Cooperation on multiple levels of government and unique local circumstances contribute to their complex nature. The primary goal of this thesis is to recommend strategies for developing and implementing TOD in the Netherlands. In order to reach this goal, two primary cases have been researched: the Hub strategy in Groningen and Drenthe, as well as the transit node development strategy in North Holland. To research these cases, literature research as well as in-depth interviews with involved actors have been conducted. This thesis concludes that context is important in a TOD strategy, meaning there is no single strategy to recommend. However, it is recommended to take efforts to ensure stakeholder alignment regarding programme goals and financing. External factors, such as changing mobility trends and demands, should be considered during the entire process.

Keywords: Transit Oriented Development, Netherlands, public transit, mobility hub, transit node, Drenthe, Groningen, North Holland

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1 Introduction

1.1 Background and motivation

In a world of urbanisation and growing population densities, and where alternatives to private car dependence are increasingly sought after, the intention to move towards well-planned and integrated public transportation networks plays a growing role (Curtis et al., 2009). Transit oriented development (TOD) aims to integrate land use and transportation by encouraging dense and diverse development along transit corridors, ultimately working towards a more attractive, viable and sustainable (transport) environment.

However, academics have noted that the implementation of TOD and related strategies has been less than ideal in the Netherlands (Tan et al., 2013; Van Uum, 2013). A lack of cooperation and integration is often regarded as a reason these strategies more often than not do not meet their initial goals. There is no nationwide policy to speak of, the majority of new developments are still situated in primarily car-accessible locations (Planbureau voor de Leefomgeving, 2014), and the potential of existing major transit nodes is underutilised (Provincie Noord-Holland & Vereniging Deltametropool, 2013).

Because the Netherlands is a dense country where distances are relatively short, almost any integrated transit strategy will quickly end up crossing municipal and provincial borders. This means good cooperation between different levels of government becomes a necessity, while goals, willingness, and financing possibilities can differ or even clash (Tan et al., 2013; Van Uum, 2013).

With the aforementioned factors in mind, TOD in the Netherlands becomes an interesting case: while the need and interest for TOD are increasing, there is a lack of proper implementation. Some implementations are successful and have led to a rise in passenger numbers, such as RandstadRail in South Holland (Balz & Schrijnen, 2009; Tan et al., 2013). Other projects have seen criticism, such as the urban region of Arnhem and Nijmegen (Tan et al., 2013; Singh et al., 2014), in which the development of station surroundings was not part of the project. The scale of a properly integrated network means elaborate cooperation and collaboration become a necessity. This thesis will explore several cases of transit development in the Netherlands and their differences in approach, which roles are assigned to which actors and how the used approach affects the eventual strategy. Since insights and opinions can change over the course of the planning and implementation of the strategy, there is a longitudinal component as well: the current state of the cases will be compared to the originally planned strategies. This is especially relevant considering the renewed focus on sustainable transport, the emergence of shared mobility trends (Jittrapirom et al., 2017), as well as unforeseen factors like the Covid-19 pandemic, of which the longer-term effects on transportation are still uncertain (Gutiérrez et al., 2021).

The findings and conclusions of this thesis will provide insight into the approaches to TOD and related strategies in the Netherlands, and aim to help work towards more proper implementations of TOD in the future.

1.2 Research objectives

The aim of this master thesis is to evaluate the differences in approaches to TOD development and implementation in the Netherlands, as well as explore if and how opinions on TOD have changed over the past five years. This can aid both the further development of the transit nodes strategies in question, and, ideally, also other transit oriented development plans in general, and specifically in the Netherlands.

1.3 Research questions

1.3.1 Primary research question

Which strategies can be recommended for developing and implementing TOD in the Netherlands?

1.3.2 Secondary research questions

1. What are the characteristics of different approaches to transit strategy development?
2. Which actors are involved in these approaches and what are their roles?
3. What are the implications and consequences of the differences in approach?
4. How have transit oriented development approaches changed or evolved in recent years?
5. Which lessons can be learnt and what advice can be given based on these differences?

1.4 Structure

This thesis document is divided into seven chapters. The following chapter, the theoretical framework, is a literature review in which the underlying theory behind TOD strategy development and implementation is discussed. This includes general theories, such as the (institutional) barriers and success criteria affecting TOD, as well as ones more specific to the Netherlands. The third chapter discusses the methodology used in the research and discusses the choices made while conducting it. In chapter 4, an elaborate description of the researched cases can be found. In the fifth chapter, the analysis and results of this research are outlined, while chapter 6 draws conclusions from these results and provides strategy recommendations for TOD. The seventh chapter contains references to the academic and non-academic sources used in this thesis. The appendices, including the used interview guides, interview details, and the form of informed consent that was signed by interviewed policymakers, can be found at the end of this document.

2 Theoretical framework

The aim of this theoretical framework is to provide an overview of academic views on transit oriented development, both worldwide and in the Netherlands specifically. This includes an explanation of the concept itself, its success factors and implementation barriers, and an overview of what sets TOD in the Netherlands apart from the rest of the world. This information will be used to aid in answering the research questions, primarily by serving as comparison and reference material for the analysis of the collected data from documents and interviews.

2.1 The concept of transit oriented development

The concept of transit oriented development was first introduced in the United States by Peter Calthorpe (1993, in Staricco & Brovarrone, 2018), and has gradually made its way to the rest of the world, where it was adapted to fit into the local and regional planning theory and practice. This first section of the theoretical framework discusses the theoretical definitions of transit oriented development (TOD), exploring what the concept is perceived to mean by academics from different parts of the world.

Cervero & Kockelman (1997, p. 199) see the goals of TOD as analogous to those of philosophies like new urbanism and traditional town planning: a decrease in private car usage and an increased share of trips completed by walking, bicycling or using public transport. Eventually, this is supposed to lead to positive and lasting impacts on society, by reducing fossil fuel consumption and air pollution.

Lund et al. (2004, p. ii) adhere to a relatively simple yet specific definition of the concept: development with a relatively high density and with diverse uses (residential, retail, offices), close to an important transit node, such as a train station. The goal is to increase the usage of public transportation and to encourage walking and bicycling, eventually decreasing the dependence on the private car (Lund et al., 2004, p. 1).

Tan et al. (2013, p. 29), who focus on the situation in the Netherlands in their publication, are a bit more careful applying a strict definition to TOD, especially when looking at it from a European point of view. They choose to loosely define it as the realisation of new urban developments along transit corridors.

Modder (2013, p. 10) sees the primary goal of TOD as creating high-quality living and working environments, by providing high-quality and high-frequency connections between them. Increasing the density of destination (work) locations is also a requirement. Modder advocates a central approach to TOD and says this is the only way to achieve the speed, frequency, and ease of use a good transit network should have.

Geurs & Klinkenberg (2014, p. 202) describe TOD as an integral way of synchronising infrastructure and spatial design. This applies to planning, financing, and exploitation. They mention how this entails more than simply increasing the network capacity, but requires what they call ‘network synchronisation’: connecting different transport networks, and intelligently locating activity locations in relation to the transport network.

In conclusion, while there is no standardised definition of TOD, it generally focuses on the optimisation of areas close to public transport stations, preferably within walking distance (Lund et al., 2004). The high-quality, high-density, diversified station surroundings help make (public) transport more effective and viable, ultimately working towards a more sustainable urban (transport) environment, by decreasing the need for and dependence on private, motorcar-based transportation. These developments also have a positive effect on economic competitiveness and create more attractive living and working environments (Cervero & Kockelman, 1997; Geurs & Klinkenberg, 2014; Planbureau voor de Leefomgeving, 2014).

2.2 Success criteria for TOD

In this section, several success criteria for transit oriented development, as pointed out by academics, will be discussed. These criteria form an important foundation for a successful TOD implementation.

2.2.1 Critical success factors

Thomas & Bertolini (2014, p. 228-229) have developed a list of sixteen critical success factors that can play a part in whether a transit oriented development programme has the potential to become a success or not. Thomas and Bertolini divide these factors into three main categories: the plans and policies, the actors involved, and the eventual implementation. These are all general factors which apply to many, but not necessarily all TOD programmes across the globe. Throughout this thesis, some of these success factors will be referred to in order to compare them with real-life findings.

The table on the following page outlines all sixteen factors, with descriptions of how they can increase or decrease success in a transit oriented development programme.

#	Name	Increases success	Decreases success
<i>Plans and policies</i>			
1	Policy consistency	Very consistent over time in planning policy supporting TOD, e.g. specific station areas, transit corridors, and other transit-supportive and non-motorised-supportive land use planning	Very inconsistent planning policy supporting TOD, major changes over time
2	Vision stability	Very stable vision, e.g. city-regional vision for land use–transport planning or urban sustainability	Very unstable vision, major changes over time
3	Government support	Very good support of higher levels of government, e.g. provincial tax on gasoline to support public transit, national station location or regeneration policy, provincial funding for cycling infrastructure	No support of higher levels of government, no policies or funding
4	National political stability	Very stable national political agenda supporting TOD	Very unstable national political agenda supporting TOD, major changes over time
5	Local political stability	Very stable local (municipal or regional) political agenda supporting TOD	Very unstable local (municipal or regional) political agenda supporting TOD, major changes over time
<i>Actors</i>			
6	Actor relationships	Very good relationships between municipal actors at a regional scale, e.g. communication, overlap in goals and vision, roles	Poor or no relationships between municipal actors at a regional scale
7	Regional landuse transportation planning body	Presence of a regulatory regional land use–transport planning body	No regional land use–transport planning body (advisory or regulatory)
8	Inter-municipal competition	No competition among municipalities for new developments/funding	Very intense competition among municipalities for new developments/funding
9	Multidisciplinary Implementation Teams	Widespread presence of multidisciplinary teams implementing TOD	Sector-specific teams (e.g. solely planners or engineers) implementing TOD
10	Public participation	Very high public participation in land use–transport planning processes	No public participation, public not engaged or interested
11	Public acceptance	Very high public acceptance of high densities and public transit	No public acceptance of high densities and public transit
12	Key visionaries	Many influential key visionaries over time, e.g. elected, citizen or business leaders	No key visionaries over time
<i>Implementation</i>			
13	Site-specific planning tools	Widespread use of site-specific planning tools, e.g. FAR bonuses, leasing of air rights, density targets	No use of site-specific tools

14	Regional level TOD planning	Corridor-level planning, e.g. coordination of land use and transport in widespread transit corridors	No corridor-level or station area planning
15	Certainty for developers	High degree of certainty for developers, e.g. plans and policies supporting higher densities, tools to enable mixed uses at station areas, designation of areas for development/transit corridors	Uncertainty; developers are unaware of policies, tools and sites encouraging TOD
16	Willingness to experiment	Actors are very willing to experiment with new policies, practices and tools	Actors are unwilling to experiment with new policies, practices and tools

Table 2.1: The critical success factors for TOD programmes as defined by Thomas & Bertolini (2014, p. 228-229)

2.2.2 Density, diversity, design

Cervero and Kockelman (1997) have defined three defining characteristics of transit oriented development, the three Ds: density, diversity and design. Density includes factors such as the population and employment density of the area. Diversity refers to the difference in land uses in the area: for example residential, retail, and office space. Design concerns the layout of the surrounding area, including properties such as the street pattern, walkability, and the availability of parking facilities. These design elements could potentially incentivise or disincentivise transit usage. Cervero and Kockelman (1997) found that observing these three Ds does indeed lead to a decrease in the number of motorised trips, and promotes the use of alternative transport options, such as public transit. Lund et al. (2004), who researched TOD developments in California's Bay Area, confirm these findings and add that people living in close proximity to transit stops are more likely to use its services.

Lund et al. (2004) also found that travel time, number of stops and transfers, and location and accessibility of the destination influenced the likelihood of people using public transportation. If the destination is well-accessible by car (for example located near a motorway junction) and if parking is relatively easy, workers are more likely to use private transportation.

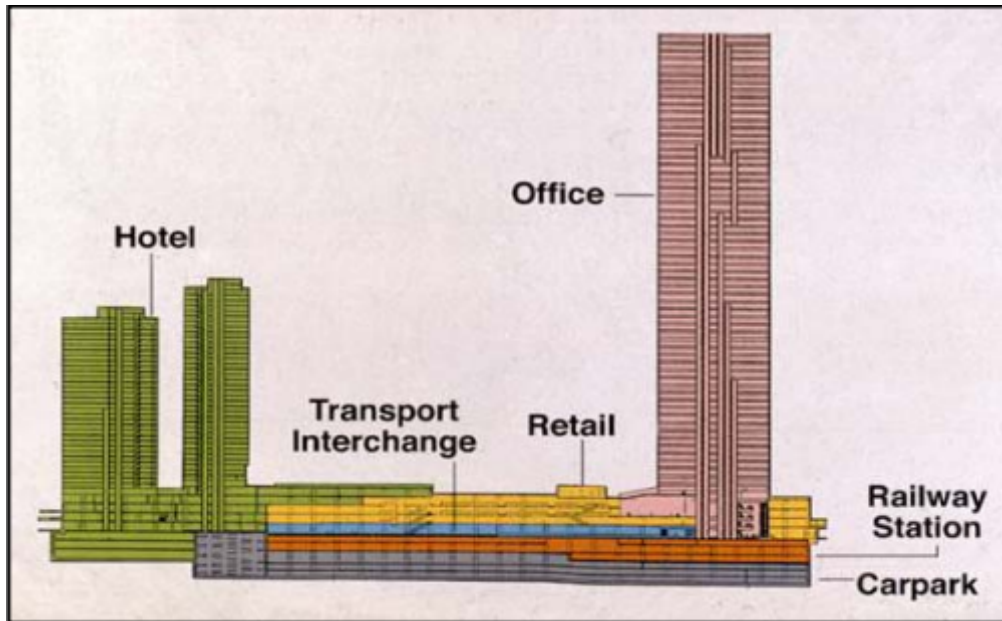


Figure 2.1: this railway station in Hong Kong is a fitting example of density, diversity, and design in TOD (Cervero & Murakami, 2008; p. 31).

In addition to the 3 Ds theory by Cervero and Kockelman (1997), which can be found in many TOD-related publications in some form or another, Cervero and Murakami (2008) argue that two additional Ds could be added to this theory. They propose distance to transit and destination accessibility as logical additions to the TOD literature, because research has shown that people living or working (preferably both) close to a transit station are far more likely to use public transportation. Destination accessibility includes the quality of the connection of a TOD network to the destinations of travellers, such as shops and offices. A TOD network of the highest quality and effectiveness will meet all five conditions to a large extent.

Density	Cervero & Kockelman (1997)
Diversity	
Design	
Distance to transit	Cervero & Murakami (2008)
Destination accessibility	

Table 2.2: the complete list of five Ds: the three Ds by Cervero and Kockelman (1997) with the two additional Ds by Cervero and Murakami (2008)

Van Wee et al. (2014) have developed several different ways of synchronising transport networks. This synchronisation can improve the accessibility of the network. The synchronisation options are in many ways similar to the 3/5 Ds theory developed by Cervero and Kockelman (1997) and Cervero and Murakami (2008) but build upon them as well. Besides spatial synchronisation, which pertains to physical facilities such as park-and-ride or high-density mixed-use developments, Van Wee et al. also mention temporal synchronisation which concerns the opening hours of facilities and optimising timetables.

2.2.3 (Inter)governmental cooperation

Solid cooperation between different layers of government is an important aspect of developing viable transit network plans. Integrating separate plans into a single TOD programme increases complexity. With this complexity, the importance of solid cooperation increases as well. When following its academic definitions, TOD not only involves transportation planning, but also land use planning, and potentially other planning disciplines as well. Staricco & Brovarone (2018) focus on how a regional planning approach can affect the outcome of TOD projects. They mention how European TOD programmes often have a more regional approach than American counterparts, which are more likely to focus on, for example, a single station and its surroundings.

A regional planning approach in TOD, in which several governments within the region cooperate, is especially important in networks where there are large differences in characteristics at play: for example, suburban areas have higher levels of private car usage and are often much less attractive to visitors than central urban locations. The best way to properly incorporate these differences in planning for transit oriented development is for the involved governments to cooperate in a regional planning approach, ideally overseen by a higher level of government, such as a province or even the national government.

A key part of this kind of cooperative planning is, according to Staricco & Brovarone (2018), keeping constant track of whether the involved actors are still fully acquainted with the direction the development plans are going in. It should be made sure that all stakeholders still agree on this direction and potential changes. The relevant actors should regularly confirm whether the plans are still feasible.

Staricco & Brovarone (2018) also conclude that a failure to involve potentially relevant actors might lead to an unwanted result for TOD plans. For example, they observed programmes in which the company that would eventually operate the vehicles and timetables, did not participate in the planning phase. This led to delays in train services but also delayed the realisation of the anticipated results. Pojani & Stead (2018) cite this as a reason for slower than anticipated transit development as well. Involving not just different layers of government, but any actors that could provide valuable input can be an important factor for a successful implementation of a TOD programme.

2.3 Implementation barriers

This section explores the different kinds of implementation barriers that can hamper transit oriented development programmes, or in some cases even cause them to fail to meet their intended goals.

A TOD network consists of nodes with a special role attached to them that goes further than just being part of a transportation system. The development of these nodes and the area surrounding them will not only improve the experience of travellers, but will also have economic and physical effects: it might attract new shops and offices and therefore create jobs (potentially taking them away from other places), but the local environment changes quite drastically, places might become more crowded with people and vehicles and therefore noisier. All of this contributes to the complexity of TOD planning. (Curtis et al., 2009). Additionally, going by the TOD concept, the densest and busiest places, for example bustling city centres, often require larger nodes with higher capacities. However, the density of these places often limits the room and ability for such a node to expand and reach this required capacity. This contradictory relationship between dense places and large nodes is described by Bertolini & Spit (2005, p. 9). It is less difficult to develop TOD in relatively undeveloped locations, but this also makes it less likely to succeed (Hess & Lombardi, 2004).

As Curtis et al. (2009) mention, TOD strategies are inherently complex because of the many factors and stakeholders involved. Thomas et al. (2018) state that the complexity of TOD strategies means solutions that work in one place, or for one strategy, are not necessarily transferable to other strategies in other places. An added effect of the inherent complexity of TOD is that measuring the potential impact of transit oriented development programmes can be challenging. This applies to gauging the current “transit-orientedness” of existing locations as well. Examples of attempts to analyse and quantify this include Provincie Noord-Holland & Vereniging Deltametropool (2013), for transit node development in North Holland (see also section 4.2) and Singh et al. (2014), for TOD in the Arnhem-Nijmegen city region (see also section 2.4.2.2). Singh et al. (2014) mention how these quantifications are vital to be able to objectively compare TOD strategies in different locations around the world, as well as to avoid making mistakes that have been made in past TOD endeavours (Renne et al., 2005, in Singh et al., 2014).

According to Rietveld & Slough (2005, in Curtis et al., 2009), institutional barriers are the most important limiting factor to sustainable transport planning, and therefore TOD (Curtis et al., 2009). Institutions are the formal and informal rules that decide how people and organisations behave. They also affect how legislation and regulation work. Tan et al. (2014) describe how institutional barriers related to TOD strategies are often context-dependent since every TOD case is complex and different. One of these barriers is the complexity of cooperation and the differences in goals and ideas between involved stakeholders. These goals and ideas are likely to change over time as well, for example in politics. The fact that

large TOD programmes often require years to even decades of planning makes them especially susceptible to these changes.

Large-scale complex transportation projects cost a lot of money and often take a long time to plan and implement. During this time, many things can happen that somehow impact the course of the project or might even put it in danger in its entirety. This could include political changes or an economic downturn. Ibraeva et al. (2020) mention how it can take a substantial amount of time before the final effects become visible, making it difficult to exactly pinpoint whether a TOD programme is a success or a failure. In a comprehensive TOD programme which comprises changes in many aspects, not all these changes will occur at the same time. One example they name is a changing demographic composition around a TOD location.

Bruno Latour provides an example of a failed large transit project in his 1993 book about Aramis, a rapid transit system which was supposed to be implemented in Paris, France (Latour & Porter, 1996). Aramis did not come to fruition and was officially cancelled in 1987. In his book, Latour concludes that no one in particular was to blame for making the project fail, rather, Aramis' demise was the result of all actors, and there were many, having a different understanding of what Aramis was ultimately meant to be. They never succeeded in eradicating enough of these different interpretations for these actors to accept an achievable compromise. An additional factor was that there was a certain lack of 'love' for Aramis in the actors involved: there were very few (politicians, planners, and engineers alike) who were interested enough to truly pour their hearts and souls into the project, which can be disastrous for a complex project like Aramis, requiring decades of committed effort (Latour, 1993, in Laurier & Philo, 1999).

In conclusion, there are several barriers to overcome on the way to a successful TOD implementation: the complex and long-term nature of TOD programmes makes them not just expensive, but also susceptible to political or economic changes. They have many implications for the surrounding environment, increasing the number of (potential) stakeholders. Aligning the wishes of all these stakeholders for many years can be a, sometimes insurmountable, challenge.

2.4 TOD in the Netherlands

This section describes transit oriented development implementations in the Netherlands in particular. The defining general characteristics of the unique situation in this country will be discussed. Several specific examples of TOD implementations in the Netherlands will be given, as well as a characterisation of their success, or lack thereof.

2.4.1 Characteristics of TOD in the Netherlands

Transit oriented development has been a topic of discussion in the Netherlands for roughly the last decade and a half. In a European context, most academic literature on transit oriented development stems from research done in or from the Netherlands (Van Lierop et al., 2017). Multiple regions in the Netherlands have started adopting transit node development strategies (*knooppuntontwikkelingsstrategieën* in Dutch) in the first decade of the twenty-first century, especially in the Randstad conurbation. Despite these efforts, these strategies have not seen a particularly high degree of success: in 2014, the Netherlands Environmental Assessment Agency (*Planbureau voor de Leefomgeving* or PBL) noted that new housing and workplaces are often still built at car-accessible locations, rather than at more urban, denser locations with good public transport connections. In parallel with Lund et al. (2004)'s findings, this is seen as detrimental to the general accessibility and effectiveness of public transport, and it means the large potential of transit nodes such as train stations is not fully utilised.

In the Netherlands, there is a high potential for government involvement, and while this was critical for several infrastructural projects (such as the HSL-Zuid high-speed passenger railway and the Betuweroute freight railway), this potential is not fully utilised when it comes to a nationwide strategy for dealing with increasing congestion (Tan et al., 2013). For the largest part of the second half of the twentieth century, the national strategy in the Netherlands was not aimed at utilising the existing infrastructure of both highways and railways. Rather, several towns in the Randstad were appointed “growth towns”, meaning they were supposed to alleviate the increasing population pressure in the bigger cities. However, these towns were not chosen based on existing infrastructure, meaning the potential of developing major transit nodes was underutilised (Provincie Noord-Holland & Vereniging Deltametropool, 2013). Only in the late twentieth century, the main strategy switched to one that divided potential workplace locations into central locations near a train station (A), locations with both a train and highway connection (B), and locations with only a good highway connection (C) (Provincie Noord-Holland & Vereniging Deltametropool, 2013). However, the Netherlands Environmental Assessment Agency (2014) concludes that most growth in the number of jobs was realised in peripheral office (C) locations and that the vast majority of employees in B locations depended on their private cars to travel to work.

In academia, there have been several ideas on how to implement TOD (and derivatives thereof) in the context of the Netherlands, which is different from the context of the United States, where many important publications on TOD originated, as well as the very concept itself.

Tan et al. (2014) divide TOD programmes in the Netherlands into two main categories: the large ones managed by the national government, and smaller, regional ones managed by (usually) provincial governments. Programmes of the first category are the result of national policy decisions and directives and have a large scope, meaning they are often too costly to be managed and financed by lower layers of government. Programmes of the second category have a smaller scope and are usually more collaborative in nature, which makes them more susceptible to institutional barriers than TOD programmes on a national scale.

Due to the relatively short distances between cities and towns in the Netherlands, it is likely for a TOD network to cross municipal or even provincial borders, complicating the involvement of governments and raising questions of institutional and financial responsibility for the network. However, due to the aforementioned lack of a national strategy, there is no other option but to ensure solid cooperation between provinces, municipalities, and other relevant layers of government and governmental agencies, such as metropolitan regions and transit authorities (Tan et al., 2013; Van Uum, 2013). This is not an easy task, however: the Netherlands is a decentralised state, where the authority over transport-related matters is divided between the national government, the twelve provinces, and the 342 municipalities (Rijksoverheid, 2023) in the country. Besides that, the idea of reaching a consensus is deeply rooted in Dutch culture (Tan et al., 2014). Transportation planning is no exception to this. As mentioned previously, a large number of stakeholders is inherent to complex projects like TOD strategies, but the decentralised and consensus-driven nature of Dutch politics and planning provides an additional and unique challenge.

Another defining characteristic of (public) transportation in the Netherlands is the major role of the bicycle (Geurs & Klinkenberg, 2014; Tan et al., 2013; Planbureau voor de Leefomgeving, 2014). It is used as a way to travel short to medium distances, but the bicycle also has great potential for travelling to and from transit nodes, such as train stations. The importance of the bicycle is increasingly noticed in that regard, as signified by the construction of large bicycle parking facilities in for example Utrecht (Planbureau voor de Leefomgeving, 2014). The fact that the bicycle is seen as a regular method of transportation by the majority of the population means the potential of transit nodes increases: the maximum distance people are willing to travel to a station increases when they have access to a bicycle. The advent of electric bikes in the Netherlands only increases this distance (Sun et al., 2020). Therefore, the importance of the bicycle as a transport option should be incorporated in any TOD implementation in the Netherlands. This, however, does not change the fact that private transportation is an important modality in the Netherlands: it takes up about half of the modal split in the Netherlands (CBS, 2010 in Tan et al., 2014). It is important to put parking facilities in place for people who do not live close to a transit station and depend on their cars (Van Lierop et al., 2017).

The larger distances people are willing to travel to stations, combined with the relatively high density of train stations (Planbureau voor de Leefomgeving, 2014), leads to the idea that TOD in the Netherlands should not be confined to a small area around a transit node because the radius of influence of any given station is decidedly larger than a station in most other countries. It should be noted that bicycle use is significantly less prominent on the destination side (e.g. workplaces and retail shops), apart from rental bicycles, and therefore the radius of influence of stations near this kind of development will be smaller (Tan et al., 2013).

Multiple academics note that TOD implementation has been progressing rather slowly or even standing still (Tan et al., 2013; Van Uum, 2013). They encourage the involved parties to “just get started” on implementing TOD and experiment with the concept using pilots in practice (Bertolini, 2013; Geurs & Klinkenberg, 2014). Theory says TOD can work in the Netherlands, provided there is proper preparation (including financing), an integral plan is present, and cooperation between different organisations and levels of government is well-arranged.

Thomas et al. (2018) note that it is challenging and often impossible to transfer policies and ideas from one country to another, because of cultural, legislative, and economic differences. Furthermore, they found that Dutch planning professionals are often characterised as hesitant or even unwilling to experiment with TOD-related ideas from abroad. They conclude that these factors make it hard to transfer TOD ideas and policies from one country to another, the Netherlands in particular. The consequence of this is that Dutch TOD policies usually are (or have to be) built from the ground up, which of course has implications for the time, effort, and money it takes to develop and implement them.

Rongen et al. (2022) have assessed the mobility hub subgroup of TOD programmes, of which the Hub strategy in Groningen and Drenthe (one of the researched cases in this thesis, see section 4.1) would be an example. They identify the importance of these hubs being close to transit destinations. They also highlight the importance of cooperation between governments and private parties, in order to make optimal use of the land and facilities in the vicinity of a (potential) hub location. However, they do note that this kind of TOD is relatively new and its implications cannot be fully understood yet.

2.4.2 Examples of TOD implementations in the Netherlands

Especially in recent decades, several projects have been carried out in the Netherlands which can be classified as TOD, with varying degrees of success. This section will provide a summary of two prominent examples of TOD implementations in the Netherlands. Note that the cases more specifically researched in this thesis (Groningen/Drenthe and North Holland) would also fall in the category of “TOD implementations in the Netherlands”. For the purpose of this thesis, an (elaborate) explanation of these cases can be found in chapter 4 of this document.

2.4.2.1 Stedenbaan

Stedenbaan is often regarded as the most notable example of regional planning in the Netherlands and the entirety of Europe (Staricco & Brovarone, 2018). It is a common subject in TOD-related academic literature.

In 2007, RandstadRail entered service, a light rail network between the cities of The Hague, Rotterdam, and Zoetermeer, in South Holland, one of the most densely populated areas in the world (Padilla et al., 2017). It features high-frequency light rail lines which were previously low-frequency heavy rail lines. The increase in frequency and the number of stops made the lines more attractive to the public, and a large growth in traveller numbers was realised. While it was originally not considered a TOD project, it does resemble TOD in many ways, an example of that being the relatively high density of development around the newly built station. This contributed to the rise in passenger numbers. An important reason for the success of RandstadRail was the cooperation between different levels of government, the fact that it was seen as an essential project by most involved parties for the several decades of its development, and the decision to build new developments close to the projected RandstadRail stations (Tan et al., 2013). RandstadRail is currently part of a larger project in Zuid-Holland (Tan et al., 2013), StedenbaanPlus, aiming to improve the quality of areas around stations (Geurs & Klinkenberg, 2014).

The organisations involved in the original Stedenbaan programme are the province of South Holland, five metropolitan regions, and the municipalities of Rotterdam and The Hague. This makes Stedenbaan a good example of cooperation between different levels of government in the Netherlands (Balz & Schrijnen, 2009). For every station, a 1200-metre catchment area has been drawn. Within these catchment areas, potential development opportunities have been identified. These opportunities have been divided into nine categories, ranging from “rural area” to “city centre”. In later years, more municipalities in the region joined the programme, prompting the name change to StedenbaanPlus, referring to the extended scope and covered area (Padilla et al., 2017).

2.4.2.2 Arnhem-Nijmegen

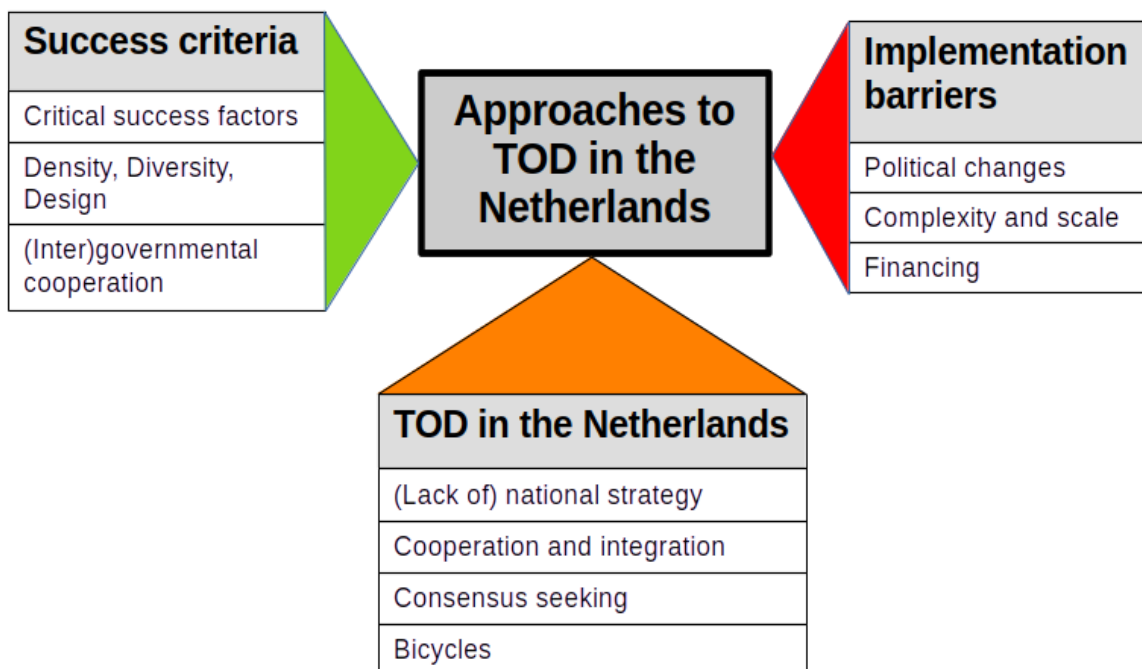
In the urban region of Arnhem and Nijmegen, Gelderland province, the main railway line running between these cities and along surrounding towns is being developed further. The most important goal is to make public transportation a competitive alternative to getting to work by car and therefore work towards a change in the modal split. The developments comprise 22 train stations, of which nine are situated in the two cities, while the remaining stations are located in surrounding towns (Huang et al., 2018). The plans include opening new stations and improving infrastructure so that frequencies can be increased. The station surroundings are also being worked on, in order to facilitate park and ride and transfer to and from other modalities such as buses and bicycles (Tan et al., 2013). An important criticism of this project is that it is more development-oriented transit (DOT) than TOD: the development

of station surroundings that are not directly related to transit itself (density and diversity) is not part of the project. Even though some stations still showed an increase in usage without these extra plans, Tan et al. (2013) argue the effects would have been larger if specific development plans had been part of the programme. A major reason for the absence of these plans is the involvement of many different parties and the difficulty to reach a consensus, which is only amplified when developments unrelated to the transit network itself are the subject of discussion.

In their study of TOD levels in the urban region of Arnhem and Nijmegen, Singh et al. (2014) identified several ‘hot spots’ with a high potential for transit oriented development. They noted that most of these hot spots are located in urban areas, implying locations outside of the urban cores of the two cities would not benefit much from transit oriented development. Another one of their findings was that there are several hot spots within the urban region where train stations are too far away to be of use, potentially signifying a mismatch between transit and development. Their recommendation is to provide a rapid bus transit system for these locations.

2.5 Conceptual model

Below, a conceptual model can be found, in which the theories and concepts discussed in chapter 2 are schematically arranged. These can all potentially affect approaches to transit oriented development (TOD) in the Netherlands, the main topic of this thesis and situated in the centre of the model. On the top left and right, the general success factors and implementation barriers can be found, while at the bottom the criteria specific to situations in the Netherlands are listed.



3 Methodology

This section describes the methodology of the research conducted for this master thesis. It elaborates on the qualitative research strategy, the methods of data collection and analysis, and the chosen cases. In its final section, the ethical aspects and the quality of the acquired data are discussed.

3.1 Research strategy

In order to answer the research questions posed in chapter 1.3, this thesis adopts a qualitative research strategy, consisting of in-depth interviews and a literature review. Since transit oriented development strategies are complex and context-specific in nature, specific insights and perspectives from different actors involved in TOD strategies are valuable. Following a qualitative approach in research allows for a deeper understanding of the approaches followed and the actors' reflections on them. It also allows for perspectives and viewpoints to emerge which were not anticipated beforehand. The research methods used for data collection and analysis will be elaborated upon in the sections below.

3.2 Research methods

This master thesis is primarily a case study of two cases of transit oriented development in the Netherlands. For one of these case studies, the primary research method was conducting in-person interviews with involved actors, while the other case study consisted of mostly literature research. Furthermore, literature has been used to provide an overview and comparison with TOD in general.

3.3 Data collection

This master thesis uses several main sources of data. The primary focus is the Hub strategy in the provinces of Groningen and Drenthe. For this part of the research, ten interviews have been conducted. The transit node strategy in North Holland is a focal point as well, in order to come to a more diverse palette of researched TOD strategies in the Netherlands. For data collection regarding this case, one interview has been conducted. Furthermore, secondary data was used, such as policy documents, as well as academic sources related to these cases and other TOD strategies in the Netherlands.

3.3.1 Interviews

In order to collect data for this master thesis, eleven semi-structured interviews have been conducted. Ten of these interviews were about the Hub strategy in Groningen and Drenthe, while the remaining interview was held with a representative of the province of North Holland, with the intention to collect comparison material. The following is a list of people interviewed, with a short description of their role and position in the project they are involved in, as well as reasoning as to why their participation was deemed valuable. Each interview is marked with a letter, which is used to refer to it in chapters 4 and 5. More details about the interviews can be found in appendix II.

3.3.1.1 Hub strategy Groningen/Drenthe

A total of seven interviews have been conducted with representatives of the organisations which are represented in the core team of the Hub programme. Every involved organisation has been visited: both the provinces of Groningen and Drenthe, the Ov-bureau, the municipality of Groningen, and the programme manager. One interviewee, a representative of the province of Drenthe, has been interviewed a second time.

Furthermore, four representatives of four different municipalities in the subject area have been interviewed. These municipalities all have different stakes in the programme and have different reasons to participate. In some municipalities, public transit does not play a large role in its modal split, likely making the Hub programme less interesting or less relevant to its interests. Others might have a bustling transit station where many people transfer from train to bus or vice versa. Sometimes a station is located near the town centre, making integration a likely goal, other times it is surrounded by farm fields, lowering the potential for ambitious TOD efforts. Other factors play a role as well; for example, some municipalities in the region are dealing with a shrinking population, which poses several challenges for transit development in the present and especially the future.

The following is an alphabetical list of interviewed participants. For every participant, a summary of his role in the project is provided, and the relevance of his organisation to the project is elaborated upon.

A. Kor de Boer, municipality of Zuidhorn

Kor de Boer is Policy Officer for Traffic and Transport and Heritage Conservation at the municipality of Zuidhorn, Groningen (since merged into the municipality of Westerkwartier).

In the Hub programme, two hubs are envisioned for the municipality of Zuidhorn: one at the railway station in the town of Zuidhorn itself, and one at the railway station in the nearby village of Grijpskerk. Both these stations are on the railway line between the cities of Groningen and Leeuwarden. Of these two hubs, the one in Grijpskerk is classified as a

medium-sized hub, while the hub in Zuidhorn will be large. The latter hub is located in close proximity to the town centre and situated across from the town hall. It is an interesting location because it already is an important transfer location for students from Friesland travelling to the Zernike Campus in the city of Groningen: there is a direct and frequent bus connection from Zuidhorn to this campus, meaning students from Friesland do not have to transfer at Groningen's main station. Traffic is projected to increase at this station; an extra rush hour connection to Groningen will be realised and the lasting roadworks at Groningen's ring road are expected to cause a rise in the number of public transit users in the area. The municipality has recently redeveloped the station area to accommodate this expected rise in usage.

B. Martin Courtz, province of Drenthe

Martin Courtz is the Advisor and Project Manager of Traffic and Transport at the Province of Drenthe. In this capacity, Martin Courtz is responsible for public transport infrastructure in the province of Drenthe. In the Hub strategy, he is part of the core team on behalf of the province. Both his position at the province and his involvement in the strategy's core team made him a valuable source of information for this research.

Martin Courtz was interviewed twice for this thesis, at different points in time and therefore at different points in the project process. A second interview was conducted in order to gain a more up-to-date view of the case since a considerable amount of time had passed. The first and second interviews will be referred to as B1 and B2, respectively.

C. Hindrik de Haan, province of Groningen

Hindrik de Haan is a representative of the public transport cluster at the province of Groningen. While he is not on the Hub core team, he collaborates with the province's project manager and plays an important role in the strategy on the province's side.

The province of Groningen is one of the two provinces involved in the Hub strategy, with 60% of the area's inhabitants. The largest and most important city in the area is also located in this province. Groningen is therefore an important factor in the strategy and its core team.

D. Frans Hamstra, Drietachtig BV

Frans Hamstra is the Programme Manager for the Hub strategy. He is part of the Hub core team and was externally hired by the provinces of Groningen and Drenthe, as an independent manager with the responsibility of making the strategy happen and making the hubs visible. Frans Hamstra also presents the developments in the strategy to representatives of the involved municipalities.

Hiring an external programme manager, instead of managing the programme with people from the organisations themselves, is an unusual choice. Because there are two equally important, but separate, main entities responsible for the Hub strategy, and a lot of smaller

governments (municipalities) are involved, it was thought to be a good idea to have a programme manager who could lead the front end of the strategy completely independently. It is interesting to find out what the implications of such an approach are and in what way discourse between stakeholders, as well as the final outcome, are influenced. This approach can also be compared to other TOD implementations in the country.

E. Menno Oedekerck, municipality of Groningen

Menno Oedekerck is a Policy Advisor for Public Transport within the Spatial Policy and Design department at the municipality of Groningen. Menno Oedekerck is part of the Hub core team, on behalf of the municipality of Groningen, but also takes the role of representing the positions, opinions, and capacities of municipalities in general. This means he can provide insight into the views of the city of Groningen specifically, by far the largest and most important city in the involved provinces, as well as an overview of how municipalities are involved, and what their general opinions on the programme are.

F. Peter Sijbolts, municipality of Bedum

Peter Sijbolts is Project Manager for public space projects at the municipality of Bedum, Groningen (since merged into the municipality of Het Hogeland).

One hub is envisioned for the municipality of Bedum: at the railway station in the town, on the train line between Groningen and Delfzijl. It is classified as a small-sized hub. Curiously enough, the regular bus line that runs through the town does not stop at the railway station. The municipality is planning to redevelop the station area and is working with NS and Prorail to achieve this. The Hub programme could hopefully be integrated with this plan. The station is located quite some distance from the town centre, in between the town's football fields and countryside pastures. The potential for an ideal, lively, and amenity-filled hub location is therefore quite low. It is interesting to see how a hub location like this is approached by both the policymaker's side and the municipality's side.

G. Theo Vlaming, municipality of Leek

Theo Vlaming is Policy Officer Traffic and Transport at the municipality of Leek, Groningen (since merged into the municipality of Westerkwartier).

Leek's main hub is projected to appear at the bus stop in the town centre. It is classified as 'small'. Leek is a commuter town with a large part of its population working in the city of Groningen. While the town lacks a railway station (since the Zuiderzee railway line between Groningen and Lelystad was never developed), it has a high-quality and very frequent bus link to the city. This so-called Q-link formula has proven to be unexpectedly successful in making people prefer public transit over their private car. The second hub in the municipality of Leek, again a small-sized one, will be called Midwolde A7. As its name suggests it is located on the slip roads of the A7 motorway, which is a stop for long-distance buses from Groningen to Drachten and Heerenveen (and vice versa). While Leek does not have a train

station, its size and its proximity to the city do produce a fair number of commuters, making the high-quality bus line a popular way to travel. It is interesting to see how this situation is handled from the Hub programme's point of view.

H. Johann Vogel, municipality of Delfzijl

Johann Vogel is a Technical Specialist within the engineering department at the municipality of Delfzijl, Groningen.

One hub, with the 'large' classification, is planned for the municipality of Delfzijl: at the railway station, which is the terminus of the railway line to the city of Groningen. Several bus lines also have a stop here. The station is located right at the edge of the town centre and there is a cafe inside the station's main building. The municipality has plans to redevelop the station area; the hub programme will be integrated with these plans. It is seen as a pilot project because it will be ready relatively early. The population of Delfzijl and especially the surrounding areas is shrinking and expected to shrink more in the coming decades. It is a challenging task to preserve an effective public transit system for areas with a declining, but also ageing population. The fact that amenities are disappearing from the villages means the reliance on transit to get to a larger town increases. This makes Delfzijl an interesting and quite unique subject in terms of transit development.

I. Hans Werner, Ov-bureau Groningen-Drenthe

Hans Werner is Transport Developer and Account Manager at the Ov-bureau Groningen-Drenthe, for the whole of the province of Groningen and the southeast of the province of Drenthe. He is not on the Hub core team, but is knowledgeable about the programme and is often part of consultations with involved municipalities, meaning he knows about the way discourse works between different layers of government.

The Ov-bureau Groningen-Drenthe is the governmental body responsible for developing and maintaining the public transport network in the provinces of Groningen and Drenthe. It operates on behalf of both these provinces, as well as the city of Groningen. While it is not tasked with maintaining the stops and stations and their facilities and surrounding area, it does develop the network of lines and composes the requirements the public transport company has to adhere to.

3.3.1.2 Node strategy North Holland

While the main focus in researching TOD strategies in the Netherlands, besides the Hub strategy in Groningen and Drenthe, lay in secondary literature, an interview was conducted as well. This was done to get a more personal view of the strategy in question (the node strategy in North Holland), as well as the state of TOD in general. The following is a description of the interviewee and his position in his organisation.

J. Paul Chorus, province of North Holland

Paul Chorus works for the province of North Holland. He is a member of the team that works on the transit node programme for his province. This programme is aimed at increasing the attractiveness and efficiency of station areas in the province and improving them in a synchronised manner.

The transit node strategy in North Holland is one of the main cases used for comparison with the Hub strategy in Groningen and Drenthe. Besides studying secondary literature, conducting an interview with one of the involved organisations is a valuable way to get a personal and up-to-date view of the programme in question and TOD strategies in general. Since the objectives of this thesis in part relate to subjective matters, involving the personal view of involved people is crucial.

3.3.2 Literature research

While the interviews were the main source of information for this thesis, several pieces of literature have been used as well in order to properly conduct the research. This literature includes policy documents from governments, as well as published articles involving transit oriented development. Including well-researched literature in this thesis is important and probably indispensable to reach a proper conclusion, since it provides a more neutral and substantiated view when compared to using only the interviews with actors involved in the researched cases.

3.3 Data analysis

3.3.1 Interviews

The semi-structured interviews are analysed using a code system. With this system, commonly recurring themes in different interviews can be grouped together. Similar statements made by several participants, independently from each other, often carry more weight and the code system provides insight into this. A list of codes used to analyse the conducted interviews is available in appendix II.

3.3.2 Literature research

Academic literature as well as policy documents from involved governments have been used in this thesis. These are valuable in outlining the theoretical framework and the case descriptions, but also in the analysis of the discussed cases. For this, the studied documents have been cross-referenced with information from the theoretical framework, as well as notions and ideas that came up in the interviews. More recent documents have been used to provide an answer to the question of how views on the known concepts have changed and which new concepts have emerged.

3.4 Ethical aspects and data quality

3.4.1 Interviews

It is important that the goal of the research, as well as how and for which purposes the acquired data will be processed, are clear to the interviewed participants. For this reason, all participants have been given a form for informed consent. This form makes clear, among other things, that the interview will be recorded and that its contents will only be used for this master thesis while keeping in mind the interviewee's preferences regarding anonymity. Each participant signed this form and kept one copy for their own administration. An exact copy of this form can be found attached to this thesis in Appendix I.

None of the participants requested any degree of anonymity, but most of them emphasised that they were speaking officially, on behalf of the (public) organisation they were working for (as opposed to voicing their personal opinion), and asked for this to be made clear in the final document. With that request being honoured, the author has tried to take into account the requirements for confidentiality to the best of his ability. However, it should be made clear that the people interviewed are individuals, and even though they try to represent their organisations' stances as well as they can, it is still possible some of their personal views will surface in the interviews. While it is nigh impossible to prevent this or to fully separate the interviewee's personal opinion from their organisation's, it is still a good idea to keep these possible differences in mind.

One participant requested for the full interview text to be emailed to him in order to be checked and approved. This request has been honoured and said approval has been given. In one case, the interview recording failed. A summarising report was sent to the participant for check and approval. This way, it could be ascertained that the participant stands by what they said, even though there is no auditory evidence of the interview available.

Finally, it has been made clear to the participants that this research was not commissioned by any entity related to the case in question, be it a province, municipality, or any other organisation. Furthermore, the implication of this is that what the participants said, or the conclusions derived from it by the researcher, will most likely not impact the specifics of the cases themselves in any way.

It should be noted that all conducted interviews were recorded and transcribed in full. The transcripts are not attached to the final thesis document for privacy reasons, but in order to preserve transparency and verifiability, the recordings and transcripts are and will remain available for reference by contacting the author of this thesis. As mentioned before, one interview recording failed and could therefore not be transcribed. However, the accuracy of a

summarising report of this interview has been verified with the interviewee by email. This email conversation is available for reference as well.

3.4.2 Literature research

An effort has been taken to verify a high level of data quality for the literature sources used in writing this thesis. In terms of the academic literature, it is important to make sure the cited information is reliable and current. For this reason, reliable articles by frequently cited authors have been used. The author has strived to use appropriately recent literature for the theoretical framework (chapter 2): that is, the vast majority of literature describing changes or developments is from the last decade, while the recency requirements for pioneering or defining literature are more lenient.

The policy documents used in this thesis, primarily used to research the two main cases, are all sourced from the organising government themselves, to ensure they reflect the perspective of the correct actors. Since this thesis has a longitudinal element as well, it is important to strictly separate documents reflecting the original plans and perspectives on the one hand, and literature which reflects later changes to these plans and perspectives on the other hand.

4 Cases

This chapter contains a detailed description of the researched cases, based on secondary literature research and the conducted interviews. Section 4.1 is about the Hub strategy in Groningen and Drenthe, while the transit node development strategy in North Holland is explored in section 4.2. The motivation, goals, and organisational and practical specifics of each of these two cases will be elaborated upon.

4.1 Hub strategy in Groningen and Drenthe

The Hub programme in Groningen and Drenthe is the main focus of this thesis. The strategy is primarily aimed at making transit nodes in these two provinces more pleasant places to spend time at. Transit nodes are locations where public transport users transfer between vehicles, be it from bus to train, train to the private car, or bicycle to bus. The provinces are expecting increased importance of these nodes as it is predicted more people will have to spend time at these locations, meaning a pleasant environment at these nodes is an important factor which contributes to a more pleasant journey. This section will explore the hub strategy and elaborates on the background, aim, and specifics of the programme.

4.1.1 Motivation

The provinces foresee an increased importance of transit nodes because they have observed several changes in the usage of public transport in recent years, and expect these changes to continue in the near future. One example is the success of frequent and fast transit lines which, rather than visiting every corner of every village, have only one stop on a main road along the village and expect passengers to walk or ride their bicycles there. The consequence of this is that there will be fewer stops, which in turn will see more usage per stop, potentially justifying the decision to make these stops more pleasant places to spend time at (Mul et al., 2016; Provincies Groningen en Drenthe, 2017).

Some people, for example the elderly, rely on a transit stop in front of their house and either do not have a car or bike or do not have the capacity to walk or cycle to a stop on the edge of the village. These people need a suitable alternative, in the form of tailored transport options, like car or bike sharing or a public taxi system. Ideally, transit nodes would facilitate these services, as well as provide a comfortable place to transfer between these services and regular public transit.

Furthermore, many basic services such as banks, schools, shops, and doctor's offices are changing their scale: they are moving from small villages to larger towns, concentrating in larger facilities, profiting from economies of scale and the proximity to other amenities. This means residents of smaller villages are required to travel to larger towns more often,

increasing the need for a proper solution, mainly in the form of the aforementioned tailored transport options (Provincies Groningen en Drenthe, 2017).

Park and ride locations currently come closest to what a Hub is envisioned to be: they are designed for and have ample space for parking and waiting. However, these locations are often purely functional in design and are usually gloomy and cheerless swaths of concrete. Especially on windy or rainy days, park and ride locations become unpleasant (Mul et al., 2016). Essentially, making use of these locations boils down to being a necessary evil for commuters and other users of public transit.

4.1.2 Organisation

The points in the previous section considered, the two provinces developed the Hub strategy. This development was catalysed by a revamp of the public taxi system: this system, providing elderly and disabled people with an affordable way of getting around, was becoming too expensive to maintain due to the ageing population, and the idea was to have at least part of its target audience switch to regular public transport instead (Interview B1). A core team for the hub programme was formed, tasked with outlining its goals and specifics while representing the opinions of their own organisation, as well as that of all municipalities in the two provinces. The members of this core team include three representatives of the Ov-bureau Groningen-Drenthe (the public transport authority of the two provinces), two representatives of each of the two involved provinces, and one person representing the city of Groningen. They have hired an external programme manager, who is tasked with putting the theory to practice and making sure the programme ideas actually become visible in the field. This programme manager also presents the developments to the provincial traffic and transport councils.

4.1.3 Goals

The hub programme's aim is to make transit nodes more pleasant and to minimise the 'damage' done to a traveller's satisfaction when having to transfer. While hubs should be uniformly recognisable as such, each hub has its own tailored set of facilities, meaning there is no one-size-fits-all package that applies to all hubs (Provincies Groningen en Drenthe, 2017). This is because every hub is different: in terms of location, setting, and facilities which are already present at the hub location, or available in the vicinity. An example: while Groningen's main station is by far the largest hub in terms of passenger numbers, it does not play a very important role in the hub programme, as a lot of facilities, comfortable waiting areas, and other requirements are for a large part already in place (Interview B1, Interview E).

The goal is to make a hub an integral part of the community it is situated in; its character has to fit its surroundings. This is why there are no plans for completely new locations, as the intention is to improve and optimise existing ones. In the long term, the ideal situation is that hubs transcend the transit function and fulfil several socio-economic roles. They could be

located near schools, doctor's offices, package collection points, or stores. This part of the Hub programme has common ground with the definitions of TOD mentioned in the theoretical framework (section 2.1). Integrating the hub location with facilities means there are usually people there, decreasing the risk of vandalism and other crime, making it more worthwhile to actually make the hub a pleasant place to stay, with, for example, plants, windows, (Mul et al., 2016)

While integration with shops and other facilities is an important aspect of the hub programme, especially in the longer term, it is important the hub area does not compete with other surrounding amenity areas. This is why hubs are, when possible, located near such centres that already exist. If this is not possible, for example when a hub is located on the main road on the edge of a village, the policy is that simple no TOD-style integration plans will be pursued, if they would compete with the facilities in the village itself (Provincies Groningen en Drenthe, 2017).

4.1.4 Programme specifics

Each hub location is categorised as either large, medium, or small. While every hub has a few basic facilities, the presence of extra facilities is largely based on its size classification, but even this is not set in stone and can be deviated from on a per-case basis. There are 55 hubs in total, 32 of which are located in Groningen, and 23 in Drenthe. A more detailed rundown of these figures can be found in the table below. The locations of the hubs are shown on the map on the next page.

	Groningen	Drenthe	Total
Small	14	13	27
Medium	9	2	11
Large	9	8	17
Total	32	23	55

Table 4.1: Hub locations in Groningen and Drenthe (Provincies Groningen en Drenthe, 2017)

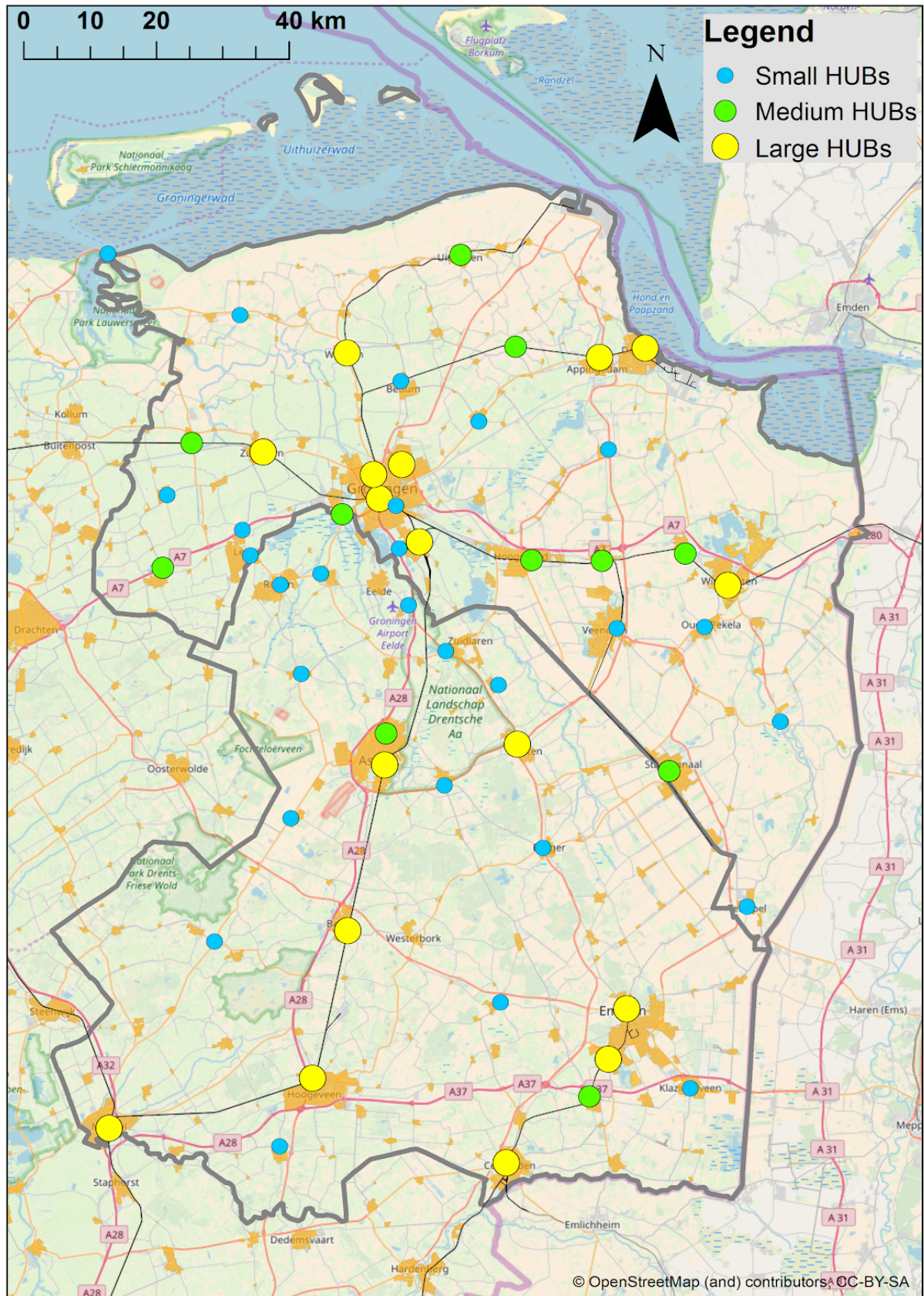


Figure 4.2: Hub locations in Groningen and Drenthe (based on: Provincies Groningen en Drenthe, 2017)

While each hub requires its own specific, tailored package of facilities, some are expected to be present at each hub location: parking for cars, bicycles, and taxis, travel information (such as bus schedules) and information about the environment (for example, a map of amenities in the area). For all other facilities, the hub's size is taken into account, but it depends mostly on factors specific to that hub. Hub facilities are divided into six categories: Health, Mobility, Shopping, Social, Tourism, and Working. These categories will be explored in the following section.

4.1.4.1 Categories of hub facilities

The Health category includes facilities such as hospitals, doctor's offices, and dentists. The Hub organisation notes that the number of actual hospitals is decreasing, centralising their activities, often in larger cities. An alternative for villages and towns is health centres, an increasingly popular method to keep health care available and accessible in these places. These health centres can provide services such as a doctor's office, dentist, pharmacy, et cetera. The centralised nature of these centres means the potential of a combination with a hub location is relatively large.

Mobility pertains to everything transit-related; it is a basic feature of every hub. This does not just include public transit; it is important that bicyclists and motorists are taken into account as well. They should have space to park, bicycles could be stored in lockers if their owner so wishes, and the transfer to other modes of transport should be pleasant and nigh effortless.

Shopping can include any kind of store, but the Hub organisation especially sees potential in shops in the food and service categories. Examples of these kinds of stores are convenience stores, butchers, and bakeries, but also bicycle repair shops and hairdressers. While the availability of these kinds of amenities is convenient for travellers, shops also make the hub area more lively and are able to keep a watching eye, helping to combat crime such as vandalism, a relatively common problem with today's transit hubs. An important requirement is, as mentioned before, that new shops at the hub location should not compete with already existing ones at a nearby location. In this case, it is preferred to not open any shops at the hub location at all.

Ideally, the hub locations become part of the community they are situated in. Even people who have no intention to use its transit functions should be able (and want) to make use of its facilities comfortably (Interview D). This is what the Social category pertains to: making sure the hub location and its facilities integrate with its surroundings, and with the community. This can be achieved in a wide variety of ways, for example a community centre, a school, a public toilet or garden, or an ATM. This way, the way the hub is experienced may shift from a transit hub with some community facilities to a community hub with transit facilities. Such a shift should be welcomed, rather than avoided.

Tourism includes places like museums, zoos, or art galleries. These places usually attract many people, most often from outside the area, making the combination with a transit hub ideal. The presence of a large number of tourists can also work as a catalyst for other facilities at the hub location, such as shops, making the hub more robust and worthwhile. Besides tourist attractions, restaurants and cafes are part of the tourism category as well.

The Hub organisation has noticed a change in the behaviour of working people: they are becoming more flexible and they work from home or work as freelancers. Having a hub provides a way for them to be able to flexibly work there can be valuable to them. An example would be a shared office, with cubicles and a photocopier. A shared workshop for freelance workers or tinkerers is also a possibility (Mul et al., 2016). People might also want to use these facilities while waiting for their bus to arrive (Interview B1).

4.1.4.2 Pilot projects

Pilot projects are an important aspect of the Hub strategy. Little to no prior research was done before starting up the Hub programme in practice, and valuable data on which aspects do and do not work is supposed to be collected through these pilot projects. For the programme itself, four hub locations have been appointed as pilots: Ten Boer and Zuidhorn in Groningen, and Gieten and Zuidwolde in Drenthe (Interview A, Interview C, Interview F, Interview G). Each of these four pilots has its own defining characteristics: Ten Boer is a small hub location on a main road along a village, and Zuidhorn is a larger hub within a village, with a train and bus station. Gieten is a large bus and coach hub at the interchange of two main roads, while Zuidwolde is a bus station in the middle of a village. This way, the workings and potential of a hub can be tested in different situations and environments which are similar to those of the other hubs. Besides these main pilot locations, hub facilities such as smart bicycle lockers will be tested through pilot projects as well (Interview B2).

4.2 Transit node development in North Holland

A primary focus of this master thesis is the implementation of a transit node development strategy in the province of North Holland, the Netherlands. This province has a relatively large population, especially when compared to Groningen and Drenthe. It also has a higher population density. The province contains the Dutch capital of Amsterdam and several other significant population centres, such as Haarlem (the provincial capital), Alkmaar, and Zaanstad. Amsterdam Schiphol, the Netherlands' largest airport, is also located in this province.

North Holland's transit node development strategy consists of eight so-called 'corridors' (Provincie Noord-Holland & Vereniging Deltametropool, 2013), which highlights an important part of the philosophy for this case: approaching some of the planning issues on a corridor scale, which is situated in between the network scale and the local scale.

4.2.1 Motivation

The transit node programme was born from the comprehensive spatial planning vision called “North Holland 2040”. In this vision, sixty-four transit nodes were appointed, of which sixty were national railway stations; the other four were large bus stations. North Holland regards itself as an attractive place for people and businesses to settle. Transit areas such as train stations have a high potential because of their accessibility and the presence of many amenities. The province’s vision is that valuable places like these should be developed in a cohesive way.

In the early 2010s, when work on the strategy was started, TOD and related improvement of transit areas was still a fairly new concept, at least for the province of North Holland. This is why it was primarily regarded as a research project at first. The results of this thorough research phase were presented in a book called “Maak Plaats: Werken aan Knooppuntontwikkeling in Noord-Holland” in 2013 (Provincie Noord-Holland & Vereniging Deltametropool, 2013). The book’s title translates to “Make Place: Working on node development in North Holland”; its main title refers to a Dutch verb meaning “to make room” and (potentially) to the spatial concept of place-making: giving a sense of place to a geographical space (Lew, 2017).

Besides the aforementioned general motivation for the entire programme, there are additional factors that served as motivation for some corridors specifically:

For the Zaancorridor, the major railway line between Amsterdam and Alkmaar, the High-Frequency Railway Transport Programme (Dutch: Programma Hoogfrequent Spoorvervoer or PHS for short), the national government's plan to increase the frequency on several rail lines, prompted the province to explore the opportunities and possibilities for a node development strategy.

For the Kennemerlijn (the railway line between Haarlem and Uitgeest, connecting the cities of Haarlem and Alkmaar, serving towns such as Heemskerk, Beverwijk and Bloemendaal), on the other hand, the motivation was born out of necessity and urgency. The Dutch national railways lowered the service frequency on the line because of profitability issues. Several municipalities in the area asked the province to help them create a plan to keep the line viable and to keep it from (potentially) being closed. This resulted in what is called the "corridor dialogue", which will be elaborated upon in the next section.

4.2.2 Organisation

The province of North Holland employs around eight people who work in the transit nodes programme. One of these people is the programme manager, who oversees the entire programme. Then there are several project leaders, who generally focus on one or several corridors. Furthermore, two people aid the project leaders based on their expertise, both from theory and practice.

The programme is primarily organised by the province of North Holland, which employs all the people who are working on it. However, since the programme comprises a large area and involves matters relating to the national railway system, proper consultation and cooperation with the national railways (NS) and national rail infrastructure maintainer (ProRail) is important and a key characteristic of the programme's development. Besides, since the programme for a large part has its roots in the Dutch national government's high-frequency railway travel programme, cooperation with and involvement of the national government of the Netherlands is a necessity as well. Furthermore, there is elaborate and careful consultation with the many municipalities in the province; they all have their unique viewpoints and preferences. Moreover, the municipalities often have authority over the relevant plots of land situated near transit nodes.

For several separate corridors, the province created an intergovernmental cooperation structure called the "corridor dialogue", in which several municipalities were invited to cooperate and propose plans to further strengthen and improve the corridor in question, as well as the stations and surrounding areas. Besides the province and the relevant municipalities, the dialogue involved local communities, nature organisations and project developers. For the corridor dialogue, an external agency was involved to lead the collaboration in the right direction.

4.2.3 Goals

The strategy builds upon the fact that North Holland already features a well-developed physical network of railways and bus lanes. The goal of the strategy is therefore to provide a better and more efficient transit network, for example by better utilising the capacity of existing transit nodes and connections, especially in off-peak hours. Other provisions include an improved transfer experience between different modalities and introducing different kinds of amenities near transit nodes (Provincie Noord-Holland & Vereniging Deltametropool, 2013).

4.2.4 Programme specifics

The strategy has ten core points, boiling down to increasing transit frequencies, especially on the main intercity lines (between firstly The Hague, Schiphol Airport, and Almere, and secondly Alkmaar, Amsterdam, and Utrecht), realising the majority of new housing developments near transit nodes, focusing on the development of work locations in

transit-accessible areas, locating major regional amenities near transit-accessible locations, and improving the transfer experience near nodes (Provincie Noord-Holland & Vereniging Deltametropool, 2013). These core points show how both the transit and the development aspects of TOD are taken care of in this strategy.

A key element of the strategy is the integral approach: rather than focusing on just one node, or a set of nodes, the strategy applies to the entire province, while dividing it into eight corridors of nodes, radiating into all directions from Amsterdam. The corridor is described as the ideal scale for implementing TOD (Provincie Noord-Holland & Vereniging Deltametropool, 2013). The eight corridors are outlined in the table below.

Name	# of stations ¹	Type
Ring Amsterdam	8	Mixed
Zaancorridor	13	Mixed
Schipholcorridor	9	Destination
Amsterdam - Utrecht	12	Destination
Amsterdam - Almere - Lelystad	12	²
Zuid-Kennemerland	18	Mixed
Gooicorridor	19	Mixed
Amsterdam - Enkhuizen	13 + 2 ³	Residential
Alkmaar - Den Helder	7	Destination

Table 4.2: The eight corridors in North Holland, as outlined by Provincie Noord-Holland & Vereniging Deltametropool (2013).

Notes:

¹ The number of stations in this table adds up to 111+2. The discrepancy with the number of transit nodes in the North Holland 2040 vision (64) can be explained as follows: several stations are part of multiple corridors, while some other stations are not part of any corridor.

² Because seven out of twelve stations on this corridor are not located in North Holland province, this corridor was not analysed to the same extent as the other corridors. Therefore, it was not assigned a type.

³ The Amsterdam - Enkhuizen corridor comprises thirteen train stations and two bus stations. The other corridors consist of train stations only.

In order to work towards such a strategy, the Deltametropool organisation mapped all transit nodes in the province and evaluated them in order to determine their potential for TOD-related improvements. The criteria used for this evaluation were generally in parallel with the theories of the 5 Ds (Cervero & Kockelman, 1997; Cervero & Murakami, 2008): for example, the population and building density, node accessibility, and diversity of the surroundings were assessed. This way, the organisation could compose a ranking of transit nodes, with the nodes of the highest potential coming out on top.

The existing nodes and their surroundings were ranked based on position in the bicycle and footway network, position in the transit network, position in the road network, proximity to inhabitants, workers, and visitors, intensity of use, and diversity of use. This way the 'environment' of the node could be determined, ranging from 'world city' to 'village' (Provincie Noord-Holland & Vereniging Deltametropool, 2013), enabling approaches specific to the node, while still being streamlined and synchronised.

Besides the nodes themselves, each corridor is approached differently as well. For example, there are more urban and more rural corridors. Some corridors serve special locations like airports or areas especially popular with tourists. Some corridors are busy routes all day, while others are disproportionately busier in rush hours. This effect is even more dramatic when a corridor has a big city or transit station on one end, while the other end is more rural: in the morning the trains going towards the city are packed, while the ones going the other way are virtually empty. In the afternoon, this effect is, of course, reversed. These differences mean not just the separate stations, but also the corridors require specific attention and tailored policies. For this reason, the province has divided the eight corridors into four categories: residential, destination, and mixed (see table 4.2). The residential corridors have a clear 'rush hour direction'. The province describes the ideal corridor as one that has a healthy mix between living and working across the entire corridor. This mix would ensure a balance in travel directions in rush hours, while well-spread-out amenities attract visitors in off-peak hours.

It is most probably impossible to transform all corridors into a perfect ideal corridor. This is why the province gives a general idea of possible plans for each corridor type. In residential corridors, the ease of transfer between car or bike to train should be as effortless as possible. Schools, shops, and other amenities are ideally located near transit nodes. For destination corridors, connections to other public transport can be improved, while areas close to transit nodes could be diversified, for example by transforming disused office buildings into apartments. This diversification argument can also be made for mixed corridors: some stations might be residential-heavy while others are primarily destinations. A mixed corridor is therefore not necessarily an ideal one.

One of the criticisms of the strategy is the idea that there is little consensus on the local level: even if there is a very fledged-out regional strategy, as this is, the local municipalities might not agree on it. Municipalities should be able to strive for a common goal of the region, rather than for maximising economic development on their own soil (Tan et al., 2013). A regional strategy cannot serve every municipality in the best possible way and concessions have to be made. The detailed ranking of separate nodes, as seen in the strategy (Provincie Noord-Holland & Vereniging Deltametropool, 2013), can be helpful in objectively determining their value and development potential.

5 Analysis

In this chapter, the researched material (consisting of conducted interviews and literature reviews) will be analysed and compared, and the results of this process will be presented as well. The research objectives and research questions, as outlined in chapter 1, form the basis for this analysis. To support the analysis, the theories and ideas introduced in the theoretical framework (chapter 2) will be used as reference material.

5.1 Characterising the approaches

The first section of this analysis focuses on the characteristics of the approaches taken in the researched cases, highlighting the similarities and differences between them. Where possible, the interviewees' opinions on the approaches will be taken into account, as well as the studied literature.

5.1.1 Organisation and coordination

The provinces of Groningen and Drenthe and the city of Groningen have outsourced all matters related to public transport to a separate organisation: the Ov-bureau Groningen-Drenthe. The idea is that this bundling of forces yields better results than when the three organisations would develop their public transport policies separately (Interview I). For the Hub strategy, the bureau has appointed a programme manager, whose task is to kickstart the programme, organise the visual marketing of the hub locations, and inform the involved municipalities' traffic and transport councils of the programme's latest developments. Feedback from these councils is collected by the programme manager and passed down to the Hub team (Interview D).

In the case of the node development in North Holland, the dialogues between several levels of government and other involved organisations and stakeholders were usually organised by the province itself. The "corridor dialogue" process used for the Kennemerlijn is an exception to this; an external agency was involved to lead the dialogue meetings (Arcadis, 2016). In a thorough evaluation of the Zaancorridor project (Arcadis, 2016), which served as a pilot project for the corridor programme, it was noted that the Zaancorridor project was characterised by a relatively top-down approach, while the Kennemerlijn project was organised in a bottom-up way. The report does not necessarily prefer one over the other but acknowledges it depends on the goals and the sense of urgency. If this sense of urgency is there within the involved municipalities, a bottom-up procedure is preferable for successful cooperation. In Interview J, it was mentioned that with the top-down approach of the Zaancorridor project, some municipalities lacked a sense of urgency and wondered what exactly the problem was and why they had to cooperate. This shows participative, supportive actors, one of the critical success factors as written by Thomas & Bertolini (2014), are an

important part of a successful TOD strategy planning phase, as well as the necessity of proper intergovernmental cooperation, as discussed in section 2.2.3.

5.1.2 Involved actors

Some actors have a direct stake, while others have a more indirect involvement but are still expected to cooperate. From the interviews, it became clear that in some cases it was difficult to get all actors on the same page, especially when there was a difference in involvement (Interview A, Interview F, Interview J). These differences may include, for example, the number of transit nodes managed by an individual municipality, if any at all, or the number of bus lines servicing a transit hub, and their frequency. These discrepancies prompted the interviewee in North Holland to say that he sometimes wished some processes were overseen by a more impartial entity than the municipalities themselves, especially when it came to the distribution of financing (Interview J).

In both Groningen/Drenthe and North Holland, the involvement of the governmental manager of railways ProRail and the national train operator NS was mentioned. It was noted that it is NS who eventually decides the service frequency and timetables. ProRail manages the railway capacity and decides on the split between passenger and goods transport, for example. Besides, NS usually owns the station buildings and their surroundings. It is therefore important to keep them involved in the process. Because they are large organisations, this can be a difficult task and in some cases, it can take years for certain proposals to get through (to) them. If a municipality is planning any kind of change to the station area, it is wise to let these organisations know well ahead of time. (Interview A, Interview F).

Both studied cases have made it a point to involve many stakeholders and have done some form of consultation with lower-level involved parties, including local residents and organisations. However, there were differences in terms of how much freedom and initiative was left to local municipalities.

5.1.3 Pilot projects

A shared characteristic of both the Hub strategy and the node development in North Holland is the use of pilot projects. In a pilot project, the projected changes devised by the programme are put in place in one or a limited number of locations, so that the potential real-life effects can be seen and evaluated without the costs, efforts and commitment of implementing the entire programme. Pilot projects offer the opportunity to draw lessons and, if necessary, adjust the plans for the rest of the programme.

As stated in the theoretical framework (section 2.4.1), Bertolini (2013) and Geurs & Klinkenberg (2014) actually recommend governments to try things out and utilise pilot projects as a means to which aspects of the programme can or cannot work in practice. While

the pilot projects in Groningen and Drenthe were more trial-and-error based and were preceded by less thorough research and deliberation than the Zaancorridor pilot in North Holland, all parties reflect on using pilot projects positively (Interview A, Interview B1, Interview B2, Interview C, Interview J).

5.1.4 Transferability: lessons from elsewhere

As explored in the theoretical framework, learning from applications of transit oriented development elsewhere can be beneficial to any programme. Interviewees of both the Hub strategy in Groningen and Drenthe and the transit node development programme in Noord-Holland have visited other locations in the Netherlands to learn lessons or to gather inspiration. While these visits were described as valuable, it was also noted that a large takeaway was that every location is different and requires its own tailored approach (Interview B2, Interview J).

While the transit node strategy in North Holland concerns train stations in cities, suburbs and larger towns, and therefore with potential for actual dense development near them, the Hub strategy in Groningen and Drenthe concerns, for a large part, bus stations in relatively rural villages. This means that for example "Density" and "Diversity" (two of the 3 Ds from the theory by Cervero & Kockelman (1997)) can often not be fully achieved in Groningen and Drenthe unless these Ds are already present (on for example Groningen's main station). While this does not invalidate the Hub programme as a TOD strategy, it does make clear that not all typical TOD properties are universally applicable or transferable. These findings are in accordance with the findings from Thomas et al. (2018) on the transferability of TOD strategies, especially in the Netherlands.

5.1.5 Financing

In both Groningen/Drenthe and North Holland, the financing of the programmes was a matter of discussion, especially regarding the financial burden put on individual municipalities. From the start, it was clear that the financial cost would be shared between the province and municipalities, but as the plans were developed and stakeholder meetings were held, a discussion arose about who would be financially responsible for specific aspects of the programmes. All interviewees stated these discussions are normal and to be expected. They are a natural and regular occurrence whenever a shared project between multiple levels of government is a matter of discussion.

For the Hub strategy in Groningen and Drenthe, the starting point for the province was the fact that public transit to a certain hub location would be guaranteed (and therefore financed) for a certain number of years. For main bus lines between towns and cities, this is 20 years, while for local lines between villages and towns, this is generally 10 years (Provincies Groningen en Drenthe, 2020). In return, most investments on or near the site of the hub locations themselves, are expected to be financed by the local municipalities the hub is

located in. Shared amenities which benefit from coordination at a higher level, such as water taps and bicycle lockers, are generally financed by the provinces. A subset of investments is done by the province, but the ownership and maintenance are subsequently transferred to the municipality.

In North Holland, the financial burden is shared between the province and municipalities in a similar way. In the interview, it was noted here that the political climate plays a role as well, and the willingness to invest money in public transit-related areas is often a political decision. This introduces another level of uncertainty in terms of financing for the programme. This is in line with critical TOD success factors 4 and 5 by Thomas & Bertolini (2014).

In both locations, while there was a general understanding that the financial burden was to be shared, in the interviews it became clear that on the municipalities' side, there was a certain amount of uncertainty and lack of clarity on the financial side of the programme. Some municipalities already had a reconstruction planned (and therefore made financial reservations) for a station area and were therefore happy to incorporate the programme ideas. Other municipalities, which did not have such plans, were often questioning what was "in it" for them and doubted whether their own investment would yield enough return in the future (Interview J).

In summary, it can be said that while there is a general understanding that the financial burden is split between the provinces and municipalities. However, the specifics of this are nearly always an expected, but not always welcome matter of discussion. Not every municipality is able or willing to put in the same amount, nor does every municipality feel like they are all getting an equal piece of the eventual benefits of the programme, further complicating the question of financing.

5.2 Evolution over time

Several years have passed since the strategies in question were developed and the first interviews of this thesis have been conducted. This section explores the current state of the cases researched and summarises the reflections and evaluations conducted by the involved provinces. It also outlines the current strategies and assesses to which extent they differ from the programme goals and specifics as outlined in chapter 4 of this document.

5.2.1 Monitoring and evaluation

In general, it can be said that the province of North Holland is more thorough in its evaluations, much like its research leading up to the development of its strategy was of notable substance, especially in comparison with the Hub strategy in Groningen and Drenthe.

The province of North Holland intends to monitor its transit node strategy every year. These evaluations are publicly accessible. In its most recent Monitor (Provincie Noord-Holland, 2022), it notes the above-average number of residential projects which have been realised near transit nodes, with enough planning capacity to take this development further. The number of workplaces, offices in particular, has also risen near transit nodes, more so than in other places. This would indicate a positive effect of their transit node development strategy. Less positive is the significant rise in car ownership across the province. This is attributed to the Covid-19 pandemic in 2020 and 2021, in which many people avoided using public transport. The rise in car ownership was much less significant near transit nodes, although this cannot be fully attributed to the transit node strategy: transit nodes are often located in inner cities, in which car ownership is much less common to begin with.

In a follow-up interview at the province of Drenthe (Interview B2), it was noted that some developments were slower than expected. It was noted that the specifics of the programme were gaining traction with traffic engineers, but took more time than expected to land with people less familiar with matters related to traffic and transportation.

5.2.2 Current strategies and developments

As discussed in the previous sections, both cases have been subject to evaluation. In 2019, the province of North Holland redefined its transit node strategy into three main focus points (Provincie Noord-Holland, 2019). The redefined strategy differs from the originally devised one in several ways. Firstly, they intend to optimise the "chain commute" experience by offering a wide range of possible travel options at transit nodes, with a comfortable way of transferring between modes. Secondly, the intention is to make better use of the space provided by transit node areas by stimulating development and amenities within the node. Finally, the transit node area should be a safe, comfortable and future-proof place, which can be achieved by, for example, focusing on urban green and climate adaptation.

A relatively recent development in mobility is Mobility as a Service (MaaS). This term pertains to convenient and tailored mobility systems which are accessible through a single interface, resulting in an integrated viewing and payment experience (Jittrapirom et al., 2017). The Hub strategy in Groningen and Drenthe plays into this development by offering services such as shared cars, bicycle lockers, and e-bike chargers at some of their hub locations. A website has been created to list all hubs and their respective facilities in an

organised way. In one of their evaluating presentations (Provincies Groningen en Drenthe, 2020) the provinces state that "no MaaS system can exist without hubs." While bold, this statement signifies their commitment to the programme and to integrating MaaS services into it.

Several local and provincial governments, consisting of the province of Zeeland and the municipalities of Amsterdam, The Hague, Eindhoven, Rotterdam and Utrecht, overseen by the Dutch Ministry of Infrastructure and Water Management, have devised their own hub system with a single shared identity, similar to the programme in Groningen and Drenthe (Ministerie van Infrastructuur en Waterstaat et al. 2022). These hubs are intended to be a location for shared mobility, such as bicycles and cars. They are intended to be positioned near transit locations, much like the hubs in Groningen and Drenthe.

In general, in both cases, the provinces remain committed to their respective TOD programmes. They have continually evaluated the programmes and have adapted their goals and specifics if deemed necessary. Despite a decline in public transport usage as a result of the Covid-19 pandemic, evaluations have generally been mildly positive and plans have, as of yet, not been drastically scaled back or abandoned. In several areas throughout the country, an adaptation of the "hub" concept has gained traction, which is a sign the ideas, as well as the MaaS concept discussed previously, are potentially becoming a general trend in the Netherlands and could be an important focus point for transit oriented development programmes in the future.

6 Conclusion

This final chapter aims to summarise and draw conclusions from the explanations and analyses in the previous chapters, in order to answer the research questions introduced in section 1.4.

6.1 Discussion

As discovered in the theoretical framework, transit oriented development strategies are often complex in nature, especially in the Netherlands, a decentralised country with several involved layers of government, where there is an emphasis on consensus-seeking. As provinces are usually responsible for regional public transit in the Netherlands, it can be difficult to get all municipalities on the same page.

As gathered from the interviews, bottom-up and top-down approaches exist to achieve understanding and cooperation with all stakeholders. If all involved municipalities know what they can gain from the strategy, or if there is a sense of urgency, a bottom-up approach works best. If not, a top-down approach is the preferable option, although it can be difficult to get certain municipalities on board. In this case, extra effort has to be taken to get these actors on the same page.

In order to manage stakeholder relations, governments can appoint an external representative who is responsible for informing representatives of local municipalities about the plans, as well as managing stakeholder meetings. It is important to know which stakeholders are involved and to inform them at the appropriate time. This is especially true for organisations such as NS and ProRail, which several interviewed actors described as bureaucratic, often needing several years to process and implement requested changes.

As Bertolini (2013) and Geurs & Klinkenberg (2014) described, pilot projects can be a successful way to preliminarily gauge a strategy's effects in practice. Interviewed actors confirmed that notion and reflected positively on using pilots. They require relatively little investment, which lowers the barrier to actually putting the plans into practice in a relatively early stage of the strategy planning process. Pilot projects allow plans, or parts thereof, to be dynamically adapted if necessary, or to pick the most successful variant of an idea.

While getting inspiration from other transit oriented development strategies elsewhere in the country or the world does not do any harm, it more often than not does not present much chance of transferability (Thomas et al., 2018). This became clear in the researched cases as well; even though they are situated in the same country, the transferability between relatively urbanised and relatively rural areas is low.

In complex intergovernmental planning programmes, such as transit oriented development strategies, discussions about the financial burden of the planned changes are to be expected. The researched cases are no exception in this, as this topic surfaced in multiple conducted interviews. However, it is important to set up financing guidelines in the early stages. In order to get local governments on board, certain allowances can be made, for example, the higher government can pay certain upfront costs while subsequent maintenance is the responsibility of the lower government. It is also advisable to, where relevant and possible, combine the plans with certain improvements a local government might already have planned, such as a station building renovation. Despite all this, the influence of the political climate and the willingness of the current (local, regional, or national) government to invest in certain strategies will always remain a relatively unpredictable uncertainty.

While external factors such as a pandemic and personnel shortages have influenced the world of public transportation in many ways, especially in the Netherlands, transit oriented development remains a topic governments are interested in and the original strategies of the researched cases are still largely intact and recent policy documents show that the involved actors remain committed to meeting their goals and improving and optimising public transit nodes. However, new transit trends have emerged over the years, one example being Mobility as a Service (MaaS) (Jittrapirom et al., 2017). As shown in recent policy documents relating to both researched cases, the strategies have been adapted to cater for developments like this one, signifying the need for policymakers to stay on top of new developments and monitor and adapt their strategies where necessary.

In conclusion, there is not one single strategy to recommend for transit oriented development in the Netherlands. Since the transferability of TOD strategies is relatively low, context is an important factor. Efforts should be made to get and keep all stakeholders on the same page, involving them early in the process where possible, with a clear understanding of how the strategy is financed. During the process, an eye should be kept on external factors: changes in mobility trends, for example, should be incorporated into the strategy where possible and necessary.

6.2 Recommendations for future research

Views on developments relating to public transportation are subject to constant change. This has always been true due to ever-changing political climates and travel and living preferences. In recent years, however, changes have been more rapid and unexpected, as was the case with the Covid-19 pandemic changing how much and by which method people travel, majorly affecting the financial viability of public transportation. In the Netherlands, personnel shortages have recently been plaguing the public transportation sector, in some cases leading to fewer or less reliable travel options. As of today, it is still an unanswered question how many of these changes, if any, will have long-term or even permanent effects. I would recommend future research to focus on both the effects of the Covid-19 pandemic and

the personnel shortages and its effects on public transit usage and the implications for TOD programmes.

As stated in section 5.2.2, Mobility as a Service is a potential trend which is closely related to transit oriented development, as transit nodes are presumably a logical location for shared mobility facilities. Further research on this subject and its implications on general public transport usage, as well as what this means for TOD strategies, would be recommended.

6.3 Reflection

As already stated in the acknowledgement (section 1.1), writing this thesis was a challenging, yet rewarding task. Research started in the second half of 2017 and the last words were put on paper in March of 2023. While this period was substantially longer than initially projected, it also provided an opportunity for a longitudinal approach to certain aspects. The aspect of how views on transit oriented development have changed over the years, as well as a reflection on the state of the researched case studies, became a valuable part of this thesis. However, this prolonged research period also allowed for the introduction of potential external variables, a major pandemic being an example. The effects of this are not fully understood yet and therefore it is possible they are not fully reflected in this thesis.

The amount of conducted interviews and researched literature gives the confidence that the documentation on the studied cases is extensive and complete enough to do proper analysis and draw conclusions. However, the number of cases researched is limited, and even between these two cases, many differences can be found, making a direct comparison, while possible, not infallible. The findings of this thesis should be judged critically when applying them to other transit oriented development strategies in the Netherlands, especially if these strategies have key differences when compared to the cases focused on in this thesis.

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Appendix I: Form for informed consent

Thank you for participating in this research regarding the process of creating a transit oriented development strategy. The interview itself and its results will be processed as confidentially as possible and will only be used in the master's thesis of the interviewer.

Contact: Bas Hankamp, BSc
 University of Groningen
 b.hankamp@student.rug.nl
 <phone number>

By signing this form, I, the interviewee, acknowledge that:

- I voluntarily take part in this interview and research and I can withdraw at any time with no reason given;
- I have taken note of and understand the level of confidentiality of this interview and its results;
- I understand this interview will be recorded and that this recording will only be used to aid in processing the interview;
- If necessary, I can request for certain elements of the interview to not be used in the research;
- There is no further ambiguity to me regarding the goal of the research, this interview, and the processing of the results;
- I have been given a copy of this form.

Date:

Interviewee's name:

Signature:

Researcher's name:

Signature:

Bas Hankamp

Appendix II: interview details

The following is a list of the conducted interviews, as described in section 3.2.1, along with their locations and dates. The first round of (nine) interviews was between the 19th of November and the 24th of December, 2017. The last two interviews took place on the 16th and the 25th of April, 2019.

Interview A with Kor de Boer (Zuidhorn municipality) took place in Zuidhorn on Monday the 4th of December, 2017.

Interview B1 with Martin Courtz (Drenthe province) took place in Assen on Friday the 17th of November, 2017. Interview B2 was in Assen as well, on Tuesday the 16th of April, 2019.

Interview C with Hindrik de Haan (Groningen province) took place in Groningen on Thursday the 30th of November, 2017.

Interview D with Frans Hamstra (Drietachtig BV) took place in Assen on Wednesday the 29th of November, 2017.

Interview E with Menno Oedekerk (Groningen municipality) took place in Groningen on Tuesday the 28th of November, 2017.

Interview F with Peter Sijbolts (Bedum municipality) took place in Bedum on Friday the 8th of December, 2017.

Interview G with Theo Vlaming (Leek municipality) took place in Leek on Friday the 22nd of December, 2017.

Interview H with Johann Vogel (Delfzijl municipality) took place in Delfzijl on Wednesday the 20th of December, 2017.

Interview I with Hans Werner (Ov-bureau Groningen-Drenthe) took place in Assen on Tuesday the 21st of November, 2017.

Interview J with Paul Chorus (North Holland province) took place in Haarlem on Thursday the 25th of April, 2019.

In the table below, one can find the codes used to analyse the conducted interviews.

Code	Description
Case description	What does the strategy consist of; what are the (literal) plans?
Characteristics of approaches	What are the specific characteristics of the approach(es) used?
Financing	How is the programme financed; how is the financial burden divided between involved actors?
General interest in TOD	How much interest is there for TOD and how has it changed over the years?
Implications/consequences of approaches	Which effects have the taken approaches had in practice?
Involved actors	Which actors are involved in the strategy and how are they organised?
Lessons learnt / advice	Which lessons have already been learnt and what advice can be given for future strategies?
Pilot projects	Which pilot projects have been used and which ideas were tested using them?