

# ***Does Demand-Responsive Transport contribute to a more Equitable Transport System?***

*Finn Logister s1120933*

*Master Spatial Planning*

*Specialization Urban and Regional Mobility*

*Supervisor Radboud University: Ary Samsura*

*Internship: Provincie Noord-Brabant.*



Author name: *Finn Logister*

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Image on front page: DRT-stop in De Moer (own work).

## Abstract

Demand-Responsive Transport (DRT), a transport mode which dynamically reacts to the demand of travellers, is increasingly recognized as a viable solution to accessibility problems in areas with limited public transport (PT), thereby contributing to a more equitable transport system. This study builds on the frameworks by Martens, and Geurs and Van Wee, and therefore defines an equitable transport system as a system in which the perceived accessibility of its residents is high.

To investigate the impact of DRT on perceived accessibility, a mixed-methods approach was employed, consisting of a survey and semi-structured interviews with both inhabitants and experts. The survey and interviews with inhabitants were conducted in the municipality of Loon op Zand, Noord-Brabant, The Netherlands, location of a pilot for the DRT-system Bravoflex.

Findings of this research shows that DRT increases the perceived accessibility; however, this effect is very low, due to low recognition of the system among residents. The primary determinant of perceived accessibility is an individual's place of residence, with those living in areas with more extensive PT networks having a higher perceived accessibility.

DRT-systems are considered most valuable in place where no public transport is available, or outside of the operating hours of public transport. However, in areas where a PT-stop is available within cycling distance, it may be more effective, in terms of costs and environmental impact, to support infrastructure for travellers to park their bikes at a PT-stop rather than promote DRT.

The low recognition of DRT among residents in the study area suggests that its impact on perceived accessibility could be enhanced through greater public awareness. To increase the public awareness and use of DRT, several strategies can be implemented: the booking process must be seamless, and DRT-services should be fully integrated into public transport travel planners.

Since DRT-systems are particularly beneficial in low-demand areas, user numbers are an insufficient indicator to measure its success. Instead, the value of Demand-Responsive Transport lies in providing a crucial transport option for individuals with limited accessibility, thereby contributing to a more equitable transport system.

## Abstract (Dutch)

Flexvervoer, een transport modus die dynamisch reageert op de vraag van reizigers, wordt steeds meer erkend als een oplossing voor bereikbaarheidsproblemen in gebieden met beperkt openbaar vervoer, waardoor het bijdraagt aan een rechtvaardig vervoersysteem. Dit onderzoek bouwt voort op eerder onderzoek van Martens en Geurs en Van Wee, en definieert een rechtvaardig vervoerssysteem als een systeem waar de ervaren bereikbaarheid van haar bewoners hoog is.

Om de invloed van flexvervoer op de ervaren bereikbaarheid te onderzoeken zijn meerdere methoden toegepast; een enquête en semigestructureerd interviews met zowel bewoners als experts. De enquête en de interviews met bewoners vonden plaats in de gemeente Loon op Zand, locatie van een pilot van de flexibele vervoersdienst Bravoflex.

Dit onderzoek toont aan dat flexvervoer de ervaren bereikbaarheid verbetert; deze invloed is echter zeer klein, door de lage bekendheid van het systeem onder bewoners. De meest bepalende factor voor ervaren bereikbaarheid is de woonplaats van een individu, waarbij degenen die in gebieden met uitgebreidere OV-netwerken wonen een hogere ervaren bereikbaarheid hebben.

Flexvervoer wordt gezien als meest waardevol in plaatsen waar geen OV beschikbaar is, of buiten de rijtijden van het reguliere OV. In gebieden waar een bushalte op fietsafstand ligt, kan het qua kosten en impact op het milieu gunstiger om te zorgen voor infrastructuur om de fiets te parkeren bij een OV-halte in plaats van flexvervoer te promoten.

De geringe bekendheid van flexvervoer onder de bewoners in het onderzoeksgebied suggereert dat de impact ervan op de ervaren bereikbaarheid groter zou kunnen zijn wanneer het bekender wordt. Om de bekendheid en het gebruik van flexvervoer te vergroten, kunnen verschillende strategieën worden toegepast: het boekingsproces moet eenvoudig zijn en flexvervoer worden geïntegreerd in reisplanners voor het OV.

Flexvervoer heeft de meeste toegevoegde waarde in gebieden met een lage vervoersvraag, waardoor het aantal gebruikers niet de juiste indicator is om het succes ervan te meten. In plaats daarvan ligt de waarde van flexvervoer in het bieden van een cruciale vervoersoptie voor personen met een beperkte bereikbaarheid, waardoor een rechtvaardiger vervoersysteem wordt bevorderd.

## Preface

This thesis marks the end of my Master Spatial Planning at the Radboud University. During my time at this university, I have learned a lot about the field of spatial planning, my specialization Urban and Regional mobility, and myself personally. I learned a lot about the working field by participating in the dual mode, which gave myself the opportunity to write this thesis at the province of Noord-Brabant. This not only allowed me to learn a lot about the effects of Demand-Responsive Transport (DRT), but also to learn how these systems are designed in real life, and which considerations were made by my colleagues.

I want to thank all the people who have helped me during the writing process of my thesis; I will point out a few. First, all my colleagues at the province of Noord-Brabant, and specifically my supervisor Jan Geurts. Second, I want to thank my supervisor from the Radboud University, Dr. Samsura, for his clear feedback. Next to this, I want to thank all the other people with whom I have discussed the research: colleagues, fellow students, or others. A special mention goes out to two fellow students; Anya Vasilenka and Imola Peters, with whom I did repeatedly discuss this thesis. I also want to thank all the participants of this research; the respondents of the survey and the interviewees, being an inhabitant of the municipality of Loon op Zand or an expert.

I hope this thesis will be an interesting read.

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# Chapter 1: Introduction

## 1.1 Contextual Background

Transport systems are an essential part of a society, allowing humans to exercise their rights as citizens. Principle 20 of the European Pillar of Social Rights (EPSR) states that 'everyone has the right to access essential services of good quality including energy, transport, financial services and digital communications. Support to access such services should be available for those in need' (Dorantes & Murauskaite-Bull, 2023, p. 3861). However, this principle is not universally realized. Studies indicate that low-income and other population groups are particularly vulnerable to transport issues, which may hinder them in taking part in socioeconomic activities, reduce their chances to progress, hinder their well-being, and lead to poverty or social exclusion (Dorantes & Murauskaite-Bull, 2023).

When individuals lack adequate access to jobs, goods, services and other essential activities, a lack of adequate transport resources can contribute significantly to social exclusion and feelings of social isolation (Lucas, 2019). These transport inequalities are highly correlated with social disadvantages, meaning that some social groups are more at risk of Transport Related Social Exclusion and the health-related externalities of transport systems than others (Lucas, 2019).

In the Netherlands, transport costs pose a significant challenge for a significant amount of residents. Approximately ten percent of the Dutch population struggles with high transport costs, which have risen more than inflation (Kennisinstituut voor Mobiliteitsbeleid [KiM], 2024). Between 1 and 5,5 per cent of the Dutch people scrap trips to save money (KiM, 2024). Despite these costs, car use and ownership remain high, possibly due to policy and planning decisions that favour private cars over public transport (PT) (KiM, 2024). For many locations, PT is not considered a viable alternative to private cars due to limited accessibility or significantly longer travel times. Work locations often lack good connections to PT, forcing employees to rely on cars to reach their workplaces (Bastiaanssen & Breedijk, 2024). High car ownership rates may also be influenced by a pro-car attitude prevalent in the population, leading to pro-car policies by politicians seeking to cater to their electorate.

The transport challenges people face vary depending on the area type. In the province of Noord-Brabant in the Netherlands, cities have a high population density (the municipality of Eindhoven having the highest with 2,769 inhabitants per km<sup>2</sup>), but there are also areas which have a low population density (the municipality of Baarle-Nassau has the lowest, with 93 inhabitants per km<sup>2</sup>) (Provincie Noord-Brabant, 2018b; Centraal Bureau voor de Statistiek [CBS], n.d.-a). The demand for transport is lower in the latter areas.

The province of Noord-Brabant recognizes Mobility as a Service (MaaS) as a solution to changing transport demand, where ownership is becoming less popular while subscriptions are becoming more common (Provincie Noord-Brabant, 2018a). The province identifies three forms of (public) transport: direct transport (traditional PT from hub to hub), flexible and shared transport. A form of flexible transport is Demand Responsive Transport (DRT), which does not have fixed routes or timings (Sörensen, Bossert, Jokinen, & Schlüter, 2021). The province of Noord-Brabant is introducing its own variant of DRT with Bravoflex, aimed at connecting people living in areas with limited public transport to 'hubs'; places where frequent PT is available. From these hubs, the passenger can travel further using the regular PT-network (Bravo, n.d.-a).

While the discussed existing research highlights the challenges for mobility in the Netherlands, such as increasing car dependency and limited access to public transportation in certain areas, there remains a gap in understanding the underlying factors contributing to these trends.

## 1.2 Research Problem

Transport planning refers to the processes of decision-making shaping the future of transport systems at local, regional, national and international scales. Every decision-making process inevitably involves choices. Because of these choices, the outcomes of transport planning will always favour certain concerns over others, certain investments over others, certain transport modes over others, certain areas over others, etc. and therefore certain people over others. Transport planning is thus a normative activity which raises equity concerns (Martens, 2021).

There is no general agreement on how to relate to equity considerations within the context of transport planning. The traditional approach views transport planning as ‘the field of government intervention that aims to ensure effective and efficient movement’ (Martens, 2021, p.3). A well-functioning transport system for road, PT and bicycles is typically equated with a congestion-free system (Martens, 2021). Transport planning has slowly broadened its horizon to account more systematically for other impacts of transport investments, most notably environmental impacts and traffic safety implications, leading to better road design and sometimes to more attention to more sustainable modes of transport, such as walking and cycling (Martens, 2021). This requires an understanding of the distribution of each cost and benefit over different population groups (Martens, 2021). To evaluate this, a normative judgement about what is an equitable distribution is required (Martens, 2021).

### **Accessibility**

The extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s) (Geurs & Van Wee, 2004, p. 128). See Section 2.1 for a more elaborate explanation.

Beyond a transport system in itself that can cause inequities, it is often assumed that changing land use will change the behaviour of its users. An example of this is the assumption that a reduction in travel distance will lead to an increase in the use of public and nonmotorized forms of transport, because an individual’s priority is not to minimize travel costs, but to maximise utility (Maat, Van Wee, & Stead, 2005). However, steering this behavioural change has been difficult to achieve (Mölenberg, Panter, Burdorf, & Van Lenthe, 2019). Travel behaviour can also be affected by new mobility technologies. An example of this is the potential of the e-bike for commuting trips from home to work (and vice versa) (Wiersma, 2020). Other examples of new mobility technologies are autonomous vehicles, robotic delivery, shared mobility, micro-mobility, ride-hailing, Mobility as a Service (MaaS) and others (Lucas, 2019; Palm, Farber, Shalaby, & Young, 2020). Optimists believe that new mobility technologies will allow people that are currently not able to own or drive their own vehicles to get access to benefits of these technologies. Conversely, pessimists predict an increased concentration of transport wealth amongst the already privileged and (partial) lock-out of the people and places who cannot access these services because of their unaffordability or non-operability within certain spatial contexts, for example sparsely populated and remote areas (Lucas, 2019). More research is needed to understand the exact impacts of these technologies and policies on disadvantaged and marginalized groups (Lucas, 2019; Caggiani, Colovic, & Ottomanelli, 2020).

Demand Responsive Transport (DRT) is an example of a new mobility technology; it has the potential to help address the problems of an ageing society, divergence in economic developments between rural and urban regions, and the environmental impact of motorised individual transport (Sørensen et al., 2021). DRT could offer a solution for places and/or times with low transport demand, where regular bus lines are often not efficient (Häme, 2013). There are multiple variants of DRT: door-to-door services and systems with predefined stops, fixed or flexible routes, some services you have to book further in advance than others, systems could use an app to book a seat or not, etc. (Coutinho et al., 2020). An integrated system where DRT is integrated in the existing PT-network, where the DRT-system serves as a feeder to existing PT, is yet to be implemented (and thus researched) in real life (Sørensen et al. 2021).

Until now, most of the studies on accessibility issues tend to focus on urban settings, while peri-urban and peripheral areas receive less attention (Blandin, Vecchio, Hurtubia, & Aitken, 2023). In the latter areas, car dependency is often more prominent, resulting in a higher amount of transport poverty (Blandin et al., 2023). While car dependency is concerning from environmental, externalities and climate change standpoints, the consequences are strengthened for those who are forced to use a car, who have to bear costs that may lead to debt or a lower quality of life when they can spend less on other dimensions of life (Blandin et al., 2023). The interplay of environmental and social concerns requires adopting an intersectional approach, focusing on providing affordable and convenient transportation alternatives as well as opportunities and services in their neighbourhoods, especially for those at risk of transport poverty (Blandin et al., 2023).

DRT-systems have already been researched a lot, mostly on simulations to evaluate whether such a system would be economically and environmentally sustainable, such as the research by Mortazavi, Ghasri, and Ray (2024). The exact features of DRT-systems are unique for each individual system and evolving, due to policy decisions and technological advances. In research that has been conducted by Sørensen, et al. (2021), it is recommended to create a DRT-system that is connected to the public transport system, where the DRT serves as feeder to the regular PT system, offering a solution to the so-called *last-mile* problem. This is the approach of the province of Noord-Brabant create with its DRT-system (Bravo, n.d.-a), explained in Section 1.1.

Despite growing interest in DRT as a solution for low-demand areas as explained above, relatively little attention has been given to how users (of the transport system, thus not only DRT), perceive the system. From an equity perspective, this is a critical omission. As Martens (2021) argues, equitable transport is not only about physical availability but also about whether people experience real and usable access. Perceived accessibility, which (among other factors) is shaped by awareness, familiarity, and subjective judgments by individuals, is therefore key to understanding how DRT affects people's ability to access their travel demand. This thesis will address this gap by examining whether and how the perception of DRT influences perceived accessibility, offering a user-centred perspective on transport equity.

### 1.3 Research Objective and Question:

This thesis aims to explore the relationship between Demand-Responsive Transport (DRT) and the equitability of transport systems by observing the perceived accessibility of inhabitants. To achieve this, this research will develop a conceptual framework focused on the equitability of transport systems as perceived by inhabitants.

To gain this understanding, it is necessary to research which factors make DRT attractive for inhabitants and identify which spatial contexts and population groups benefit most from DRT. This leads to the following sub-questions:

*How does Demand-Responsive Transport affect the Perceived Accessibility of Inhabitants?*

*In what Spatial Contexts is Demand-Responsive Transport considered beneficial?*

*Which Population Groups consider Demand-Responsive Transport a useful Transport Mode?*

*What factors are important to make Demand-Responsive Transport attractive?*

These sub-questions together lead to the answer of the following main research question:

*How does Demand-Responsive Transport affect the Equitability of a Transport System?*

## 1.4 Relevance

### 1.4.1 Societal Relevance

As discussed in Section 1.2, an equitable transport system provides benefits for society, allowing people to participate in more activities and reduce transport poverty. For a long time, Dutch transport policy has focussed on combatting congestion, and increasing the efficiency of the system, instead of increasing accessibility (Bastiaanssen & Breedijk, 2022). In the Netherlands, there are vast differences between accessibility between different transport mode users; car users enjoy good accessibility, while people who have to rely on PT face lower accessibility, especially when living in more rural areas, city outskirts or in suburban cores (*kernen* in Dutch) (Bastiaanssen & Breedijk, 2022). This means that people living in these areas have access to less facilities and jobs (Bastiaanssen & Breedijk, 2022). Adding to the lower accessibility in these areas, during off-peak hours (especially in the evening) and the weekend, accessibility when using public transport decreases even more because of lower frequencies of service (Bastiaanssen & Breedijk, 2022).

Between 2012 and 2022, the availability of PT has decreased in the Netherlands, leading to worse accessibility to jobs and facilities in rural and suburban areas (Bastiaanssen & Breedijk, 2024). In the same time period, the accessibility of car users has increased, which means that the inequalities in accessibility between car and PT users have grown (Bastiaanssen & Breedijk, 2024). The bicycle also contributes to accessibility, but the accessibility of regional facilities by using this mode is often limited (Bastiaanssen & Breedijk, 2024). The difference between accessibility by car or other modes is the highest for people with a lower education level. Jobs for people with lower education levels are increasingly located in places which have good accessibility by car, and less for (the combination of) PT and by bike. This means that car ownership for these people has increasingly become a prerequisite for access to work (Bastiaanssen & Breedijk, 2024). The higher the education level, the lower the differences between accessibility by car or PT. But still, these differences are significant for people with a medium or high education level (Bastiaanssen & Breedijk, 2024).

In its most recent government programme, the Dutch government states that it is important for small villages to keep their existing bus connections. To achieve this, it considers the potential of combinations of shared mobility, paratransit and Demand-Responsive Transport (Rijksoverheid, 2024). Like the national government, the province of Noord-Brabant also highlights equity in its vision on (public) mobility (Provincie Noord-Brabant, 2018a). In this vision, the province states that public mobility ("*gedeelde mobiliteit*" in Dutch) should be accessible to everyone, and that (social) safety is important. It also aims to guarantee an affordable base level for transport (Provincie Noord-Brabant, 2018a). The province also acknowledges trends in transport demand, where modes other than the traditional busses and trains are gaining traction, and ownership is less self-evident, while an integrated system (Mobility as a Service or MaaS) including shared and flexible transport systems is becoming the norm (Provincie Noord-Brabant, 2018a). These systems could offer an alternative travel option for people living in small villages where traditional bus lines increasingly disappear when there are not enough travellers (Mobiliteit, 2024).

## 1.4.2 Scientific Relevance

As discussed in the societal relevance, realizing the potential to reduce car use and promotes the adoption of different transport modes not only requires infrastructural investments but also efforts to achieve behavioural change. This can include addressing (perceived) barriers to adopting alternative modes, such as concerns about safety, convenience, and familiarity, but also promoting the benefits of sustainable transport for health, environmental sustainability, and cost-effectiveness (Wiersma, 2020). As highlighted in the research gap (Section 1.2), it is uncertain how new transport technologies will affect transport-related social exclusion. Current transportation research often lacks a subjective perspective that considers accessibility and related social outcomes, such as social exclusion (Lättman, Olsson, & Friman, 2016).

This thesis significantly contributes to the scientific discourse by delving into the multifaceted challenge of promoting behavioural change to reduce car dependency and encourage alternative modes of transportation particularly in regions such as Noord-Brabant. Traditional transport planning has predominantly focused on infrastructure development, and studies on accessibility have mainly focused on 'objective' and often aggregate measurements, based on variables such as the total number of opportunities and average observed travel times (Blandin et al., 2023).

Recent research highlights the critical role of behavioural factors in shaping travel choices and promoting sustainable mobility (Wiersma, 2020). However, methods that calculate accessibility fail to capture the perceptions of humans, resulting in discrepancies between these perceptions and the calculated measures (Pot, Van Wee, & Tillema, 2021). This may be (among others) because of the following reasons; the parameters measuring 'objective' accessibility do not represent the needs of the population group (Curl, 2018). Secondly, and more commonly explained is that individuals do not have a complete understanding of their potential accessibility, for example because of a lack of information about a transport service (Curl, 2018). A measurement that captures the influence of this human perception is perceived accessibility. This concept encompasses the choices that happen on an individual level (Lättman, Olsson, et al., 2016).

Extensive research has been conducted separately on both equity and new mobility technologies, such as a DRT-system. We have already discussed the research of Martens (2021) on equity in transport planning. Various other authors have studied equity and connected it to transport; research has been conducted on the effects of high-speed railway lines on equity (Cascetta, Cartenì, Henke, & Pagliara, 2020), others have set normative standards for sufficient accessibility (Van Der Veen, Annema, Martens, & Van Arem, 2020), and others have formed evaluate frameworks to evaluate transportation equity (Litmann, 2024).

An example on research studying DRT is the study of Coutinho et al. (2020), which investigates the effects of a DRT-system in low(er)-density areas in the municipality of Amsterdam. Research on the relationship between new mobility technologies, and especially DRT and equity has not been conducted at the time of this research. Previously conducted research on DRT mainly focusses on urban areas, while research on peri-urban and rural areas has been limited. One could perhaps expect different outcomes in these areas types, since peri-urban and rural areas have different characteristics. Rural areas consistently experience demographic changes mainly driven by the asymmetric distribution of economic activities between rural and urban areas. However, the implementation of PT-services in low-density regions is complex because these regions can differ a lot to each other depending on the different needs of their dwellers and other pre-existing

conditions related to their specific context (Porru, Misso, Pani, & Repetto, 2020). Due to these specific contexts, certain mobility forms could be successful in certain contexts but not in others.

There are multiple types of Demand-Responsive Transport (DRT) systems. The province of Noord-Brabant is aiming to integrate their DRT-system (Bravoflex) with the already existing public transport (Bravo, n.d.-a), which is a rare approach (Sörensen et al., 2021). The effects of a DRT-system that is integrated with existing public transport have not been extensively researched.

Research on the relationship between new mobility technologies, such as DRT, and equity has been missing. By investigating the complexities of behavioural change within the context of transport planning, this thesis aims to advance the understanding of the determinants of travel behaviour and identify effective strategies for promoting sustainable mobility. Using knowledge from transportation science, psychology, and spatial planning, this study aims to develop evidence-based interventions and policy recommendations to incentivize sustainable travel behaviours and reduce car reliance, resulting in more resilient and equitable transportation systems.

# Chapter 2: Theoretical Framework

## 2.1 Equity in Transport Planning

As discussed in the introduction, equity should be an important component in transport planning and increasingly has been taken into account in the design of transport systems (Martens, 2021). This research adopts the description of equity as stated by Martens (2021), who argues that there are three dimensions which together make up the equitability of a transport system: *distribution*, *recognition* and *representation*. While this study focuses primarily on distribution, the concepts of recognition and representation are briefly explained below.

In the perspective of *recognition*, equity is considered the goal of transport planning, and seeks to put transport planning on par with other major domains of government intervention, such as health care, education and housing (Martens, 2021). Recognition is about recognizing that there are differences between people. Due to these differences, people have different needs (Jones, 2006). This should lead to politics of difference, recognizing the unique identity of individuals and groups. A society might recognise a group by acknowledging and providing for its distinct identity in its law or public arrangements (Jones, 2006). For transport policy, this implies the question whether it acknowledges and serves the interests of different individuals and/or groups (according to these people, not the policy-makers) (Jones, 2006).

*Representation* refers to the degree of involvement of people in decision-making (Martens, 2021). It closely aligns with the concept of participation, which can range from minimal involvement, such as manipulation or therapy aimed at ‘educating’ participants, to full citizen control, where residents have complete authority over policymaking (Arnstein, 2019). Representation is a core principle of modern democracies, such as the Netherlands, where citizens elect representatives to act on their behalf in decision-making bodies, ranging from the EU-parlement to the municipal council (Hayes & Hibbing, 2016).

This research will focus on the impact of Demand-Responsive Transport (DRT) on *distribution*, since this dimension has the biggest impact on an equitable transport system (Martens, 2021). Recognition and representation have received little attention in transport literature, making it difficult to research how DRT affects these dimensions. Adding to this, the concept of distribution at least partly includes recognition, because of the focus of this research on perceived accessibility, which as discussed in Section 1.4.2, encompasses the travel options that are considered an option by an individual. The concept of perceived accessibility will be further explored in Section 2.2.2.

Equity adds a dimension to the analyses conducted within transport planning; it requires an understanding of the *distribution* of benefits and burdens over different population groups. Taking equity seriously necessitates a detailed analysis of which population groups benefit and which lose out in a given intervention. When determining whether the expected distribution of impacts is fair, a normative judgment is needed, which thus requires an explicit equity yardstick. Equity, even if understood as an impact, thus adds a layer of complexity to the traditional approach to transport planning (Martens, 2021). Because of the fact that perceived accessibility encompasses the human and individual component of decision-making for transport choices, it is suitable indicator for an equitable transport system, and will be used as such in this research.

## 2.2 Distribution

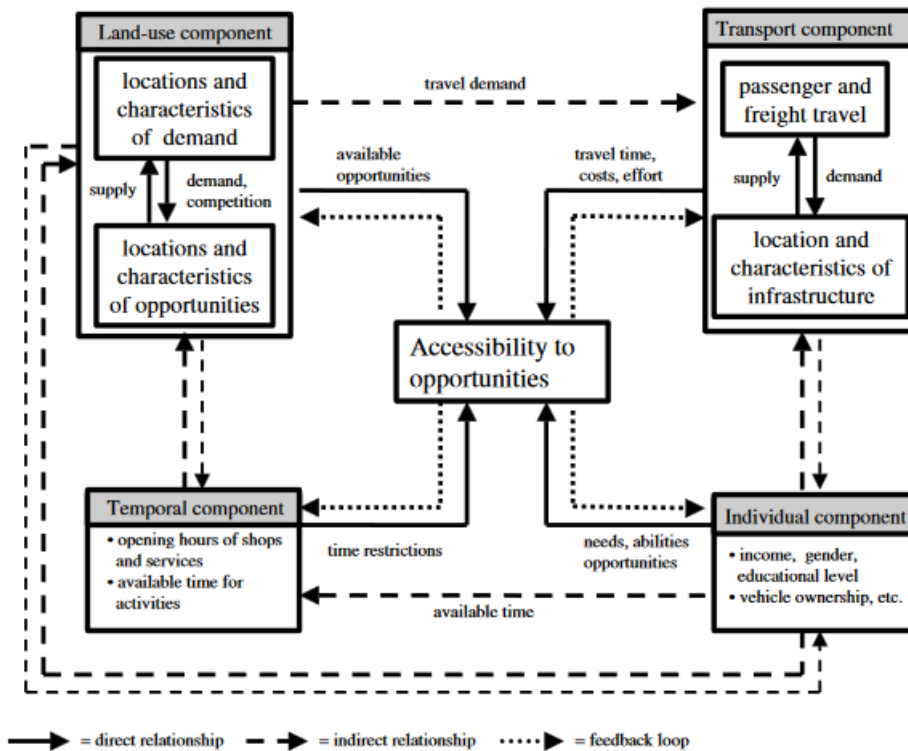
### 2.2.1 Accessibility

The terms mobility and accessibility are often used to evaluate the distribution of transport systems. *Mobility* refers to the potential for movement, the ability to get from one place to another (Handy, 2002). This is usually measured by actual movement, measuring either the numbers of trips made or the total kilometres travelled. This is not necessarily an accurate measure. First, potential movement can exceed actual movement; for example, when individuals choose to drive less than they could. Second, increases in actual movement can result in decreases of potential movement, for example when this leads to congestion (Handy, 2002).

Increasingly, transport planning has shifted its focus to *Accessibility* instead (Handy, 2020). This is not solely about how far a person is able to travel. This study adopts the definition of Geurs and Van Wee (2004) who define accessibility as '*the extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s)*'.

Because of the fact that accessibility is not solely determined by the distance one can cover, it is possible to have high accessibility but poor mobility at the same time and/or place. An example of this is a neighbourhood that suffers from severe congestion, but its residents still experience high accessibility because they live within a short distance of their desired destinations (Handy, 2002). Accessibility is more difficult to measure than mobility, since it requires more complex calculations about the availability of destinations and their attractiveness (Handy, 2020).

Figure 1: Relationships between components of accessibility (Geurs & Van Wee, 2004).



In Figure 1, Geurs and Van Wee (2004) break down the factors that affect accessibility.

The *land-use* component represents the amount, quality and spatial distribution of opportunities at a destination (jobs, shops, health, social and recreational facilities, etc.), and the demand for these opportunities at origin locations (e.g. where inhabitants live). The confrontation of supply of and demand for opportunities may result in competition for activities with restricted capacity, in for example job and school vacancies and hospital beds (Geurs & Van Wee, 2004).

The *transportation* (transport) component describes the characteristics of the transport system, expressed as the disutility for an individual to cover the distance between an origin and a destination using a specific transport mode. Thus includes travel time (including waiting and parking), costs (fixed and variable) and effort (including reliability, level of comfort, accident risk, etc.). Supply of transportation includes its location and characteristics (e.g. maximum travel speed, number of lanes, public transport timetables, travel costs). Demand relates to both passenger and freight travel (Geurs & Van Wee, 2004).

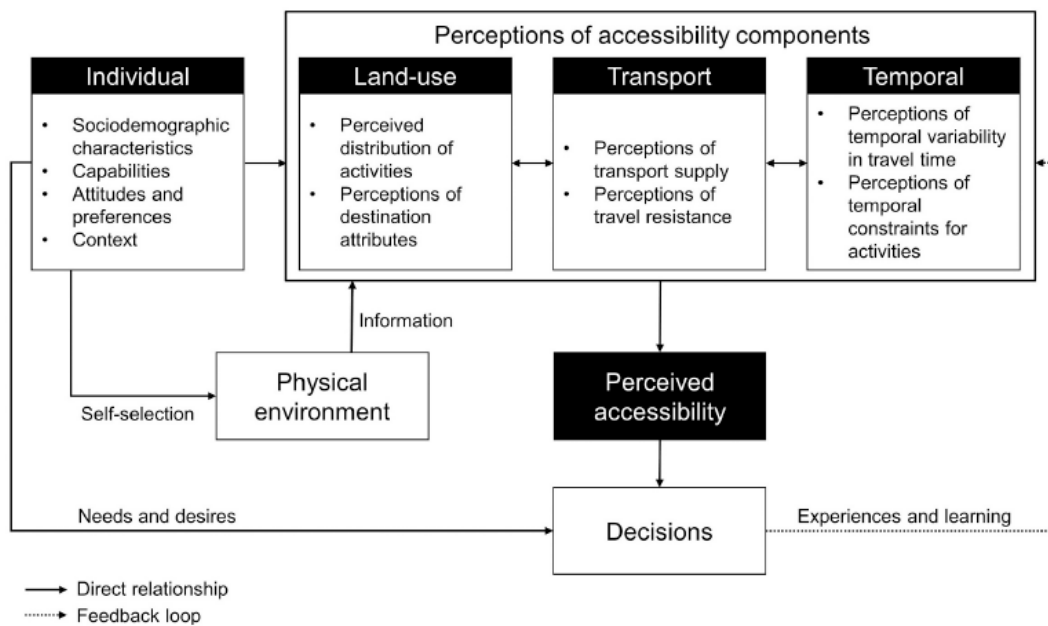
The *temporal* component reflects time-related constraints: the availability of opportunities at different times of the day, and the time available for individuals to participate in certain activities, for example work or recreational activities (Geurs & Van Wee, 2004).

The *individual* component refers to the needs (depending on age, income, educational level, household situation, etc.), abilities (depending on someone's physical condition, availability of travel modes, etc.) and opportunities (depending on someone's income, travel budget, educational level, etc.) of individuals. These characteristics affects someone's level of access to transport modes (being able to drive and having access to a car) and spatially distributed opportunities (someone does have the skills or education to qualify for jobs near their residential area), and may strongly influence the total aggregate accessibility result (Geurs & Van Wee, 2004).

## 2.2.2 Perceived Accessibility

Usually, accessibility is evaluated using calculated indicators based on spatial data. However, the relationship between the land-use and transport systems and potential individual behaviour is mediated by how individuals perceive their environment (Pot et al., 2021). Previous studies have shown a low level of agreement between perceived and objective accessibility measures (Scheepers et al., 2016). Each individual has its own ‘mental map’ of what is within reach and which locations are suitable for activities. This mental map shapes decisions regarding spatial behaviour (Pot, Van Wee, & Tillema, 2021). In other words; there may be travel options available that a potential traveller is unaware or does not consider suitable.

Figure 2: A model of perceived accessibility (Pot, Van Wee, & Tillema, 2021)



In Figure 2, Pot, Van Wee and Tillema (2021) explain the components that influence perceived accessibility, expanding the factors of (measured) accessibility explained by Geurs and Van Wee (2004), discussed in Section 2.1. The *land-use* component refers to an individual’s spatial knowledge. What does someone know about the facilities that are present in its living area and do they consider these as sufficient? Additionally, some destinations hold greater importance for certain individuals than others. The land-use component is also influenced by *self-selection*: people choose to live in places that align with their own travel needs. For instance, in a small village where most residents own a car, demand for PT may be low. A reverse relationship could also be true; *car ownership* may be high because PT options are lacking. Adding to this, characteristics of the transport system and accessibility may not be the dominant decision factors when someone chooses a place to live. Moreover, people will rarely have perfect information on accessibility before choosing a new residential location, which could lead to an unanticipated mismatch between preferences and the actual accessibility situation. Finally, the accessibility situation may change over time, as well as someone’s preferences, for example due to life events, such as getting a child or getting an injury (Pot et al., 2021).

The *transport* component concerns an individual's knowledge of available transport options. Are they aware of the different transport modes available in their area? Which factors influence a decision of person to (not) travel with a certain transport mode? These could be costs, comfort, safety and convenience (Pot et al., 2021).

The *temporal* component relates to how individuals estimate the travel times. It could be that one overestimates the travel time to a certain destination, and because of this perceives this destination as unreachable. Additionally, the perceived frequency of transport and the perceived opening hours of a location influence perceived accessibility (Pot et al., 2021).

These components thus all make up perceived accessibility, which influences someone's travel decisions. In addition to perceived accessibility, travel decisions are also influenced by *individual characteristics*, which as the name suggests vary for each individual. These include *sociodemographic statistics*; someone is too young to drive a car, or has a very low income, limiting their transport choices (Pot et al., 2021; Van Wee, 2022). Another component of the individual characteristics are personal *capabilities*, which influence how people gather and process information. Some people are more skilled at interpreting maps or using digital travel planners (Pot et al., 2021). Another component is *attitudes and preferences*; individuals may have personal preferences for specific activities or travel modes, regardless of their socio-demographic background (Pot et al., 2021). Personal attitudes towards transport modes and which activity patterns are perceived feasible by someone are also partly shaped by the geographical and/or social *context* and someone's position within this. This context influences which travel modes are considered normal to use in a community, or whether a social environment provides information about the use of certain transport modes (Van Wee, 2022). Individual characteristics also interact with each other. For instance, capabilities may be affected by socio-demographic statistics, such as someone who is too young to be able to be allowed to drive (Van Wee, 2022).

## 2.3 Demand-Responsive Transport

This research aims to study the influence of Demand-Responsive Transport on the equitability of a transport system. To do this, it is necessary to define the characteristics of this transport mode. Demand-Responsive Transport (DRT) is often referred to as a flexible form of PT, positioned between conventional bus services and taxi services (Häme, 2013). It features flexible routing and scheduling, responding dynamically to transportation demand (Häme, 2013). Typically, the customers of a DRT-service are required to request and book their trips in advance by placing trip requests, providing information on the origin and destination of the trip, as well as their desired pick-up and/or drop-off time (Häme, 2013). Unlike taxi services, the travel fare usually is charged per passenger (Dytckov, Lorig, Holmgren, Davidsson, & Persson, 2021).

There are multiple types of DRT-systems, some with an economic aim, while others aim to achieve social benefits (Ryley, Stanley, Enoch, Zanni, & Quddus, 2014). DRT-services are often fully or partially funded by local authorities to provide socially necessary transport. Typically DRT-services are used to provide transportation in areas and/or times with low transportation demand, where a regular bus service might not be as efficient (Häme, 2013). Such a system has the goal to reduce car dependency while increasing accessibility of public services and PT efficiency (Sörensen et al., 2021).

DRT can serve as a first- and last-mile connector for areas where PT is not available, which can be especially helpful for people who cannot walk far, such as the elderly or the physically impaired (Dytckov et al., 2022). Additionally, DRT-systems have the potential to reduce CO<sub>2</sub> emissions compared to PT in areas with low demand and can serve as a social service, but when demand increases, traditional bus or train services are more efficient (Dytckov, Persson, Lorig, & Davidsson, 2022).

### *User Factors*

In order to actually be used, a DRT-system should be accepted by the public (Sörensen et al., 2021). When the public awareness increases, the system is perceived as a suitable travel option by residents, increasing their perceived accessibility (Pot et al., 2021), as discussed in Section 2.2.2.

Several key features which vary for different DRT-systems influence its public acceptance and usage. Some systems pick up and drop off passengers at designated stops, while other offer a door-to-door service where a passenger can freely choose its origin and destination (Pettersson, 2019).

DRT systems can also vary in their function within the transport network: some DRT-systems are implemented to replace conventional PT, while others serve as a feeder to the existing PT-system (Sörensen et al., 2021). An example of a DRT-system replacing conventional PT is Mokumflex, which replaced regular bus lines in low-density areas in the municipality of Amsterdam (Coutinho et al., 2020). Cost decreased, although this was mainly due to the big decrease in ridership to less than 28% of the previous level (Coutinho et al., 2020). The research failed to measure why 72% of the travellers previously using the bus lines chose not to use the DRT-system (Coutinho et al., 2020). This smaller amount of travellers were satisfied with the service, perhaps due to the fact that the DRT-rides were free.

This refers to pricing, which differs across DRT-systems; some apply fixed pricing, while other systems have a dynamic approach, applying different prices during peak-hours, discounts for elderly, and/or different prices for different types of services (for example stop-to-stop or door-to-

door) (Pettersson, 2019). Pricing has an impact on financing, which is a key issue for operating DRT-systems across the world. Examples of this is are the *Kutsuplus* DRT-system operating in Helsinki, Finland, *RideKC* In Kansas City, USA, and *Breng flex* in Nijmegen, Arnhem and Molenhoek, the Netherlands, which were all discontinued due to their high costs (Pettersson, 2019).

Coutinho et al. (2020) state that the drop in the number of passengers in their research is possibly linked to the large time-frame of 15 minutes around the desired departure time, that required customers to organize their schedules for a 30 minute basis, and the necessity of interacting with a system, instead of simply showing up at the stop. This refers to another factor that influences the usage of a DRT-system, and differs for each system; booking restrictions. An example of this is indeed how long in advance you have to book a ride (Sörensen et al., 2021). Some DRT-systems allow a passenger to book a ride within a few minutes, while others require a user to book their ride a certain time in advance, such as an hour or a day (Pettersson, 2019).

Another feature that differs between DRT-systems is the booking system. Typically, an app is used for to book a DRT-ride, but other methods are also offered by different DRT-systems, such as a website, SMS, or making a phone call. In some cases, DRT services are integrated into digital public transport planners, making them easier to discover and use (Pettersson, 2019). An example of the effect of the booking system is the DRT-system *Brengflex*, in the Netherlands, which ran as a pilot between 2016 and 2019, after which it was discontinued (Trandsdev Nederland, n.d.). Research by Jittrapirom, Van Neerven, Martens, Trampe, and Meurs (2019) shows that *Brengflex* was often less convenient to use for residents than already existing travel options, and, for elderly people, the unfamiliarity of smartphones and apps were a barrier to use the system.

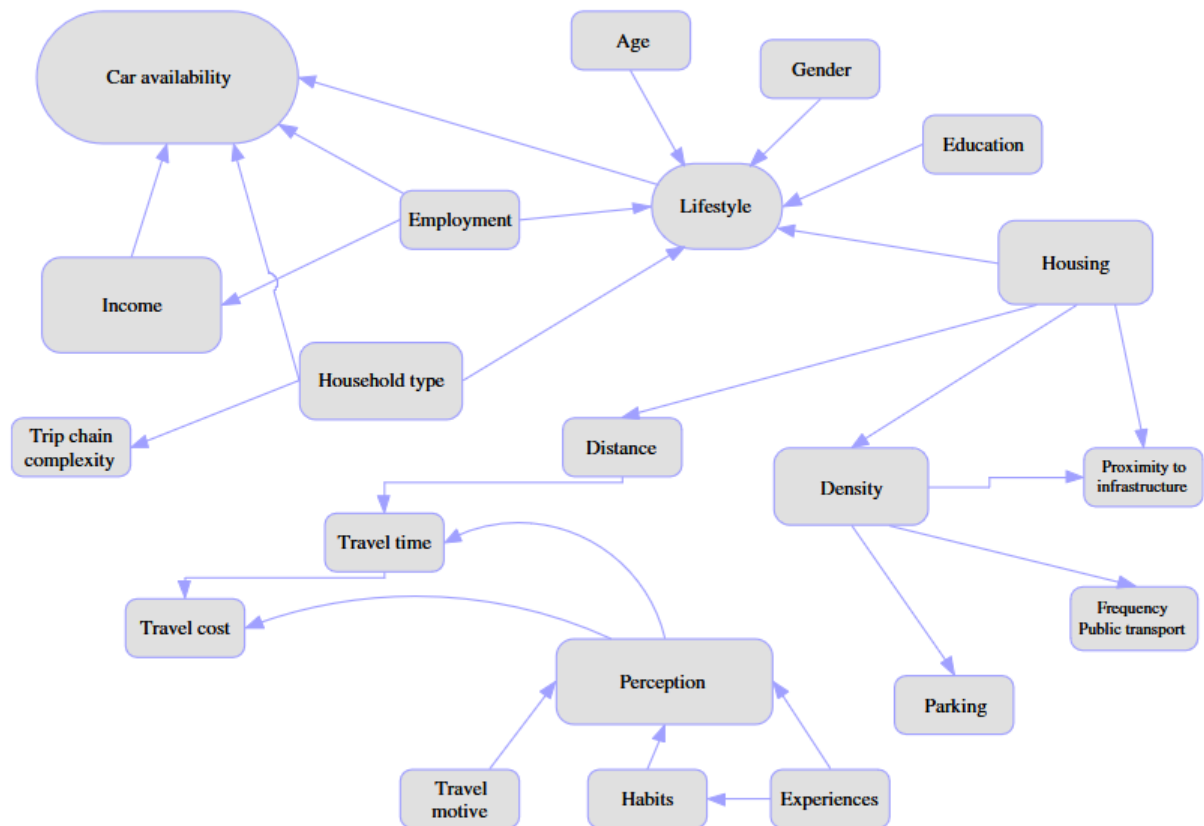
## 2.4 Demand-Responsive Transport and Equity

A DRT-system influences the distribution of transport in the area in which it is deployed. DRT is often used as a solution to serve low-density areas where regular PT is not financially feasible. As discussed previously, DRT can replace non-profitable PT-lines, or it can be added to serve areas which were not served by regular PT before (Coutinho et al., 2020). Additionally, DRT can be used as a solution for temporal gaps in service, for example during weekends, holidays, or evenings, when regular PT-supply is often reduced (Sörensen et al., 2021).

When DRT is added to the already existing PT-network, it provides new travel options, increasing the accessibility of people, for example those who do not own a car (Sörensen et al., 2021). DRT can solve the so-called first-/last-mile problem by providing a connecting link to the regular PT-network, e.g. busses or trains, increasing someone's access to jobs (Sörensen et al., 2021).

To understand whether DRT-system can offer a solution to the first-/last-mile problem, people's motivations behind travel mode choices need to be understood. A multitude of factors constitute the traveller's choice for a certain transport mode (Stam, Van Oort, Van Strijp-Harms, Van Der Spek, & Hoogendoorn, 2021), displayed in Figure 3. All these factors influence someone's travel mode choice to a larger or smaller extent and have mutual relationships (De Witte, Hollevoet, Dobruszkes, Hubert, & Macharis, 2013). Given the complexity of these interdependencies, this research does not consider all influencing factors:

Figure 3: Visualisation of model choice determinant interdependencies (De Witte, Hollevoet, Dobruszkes, Hubert, & Macharis, 2013)



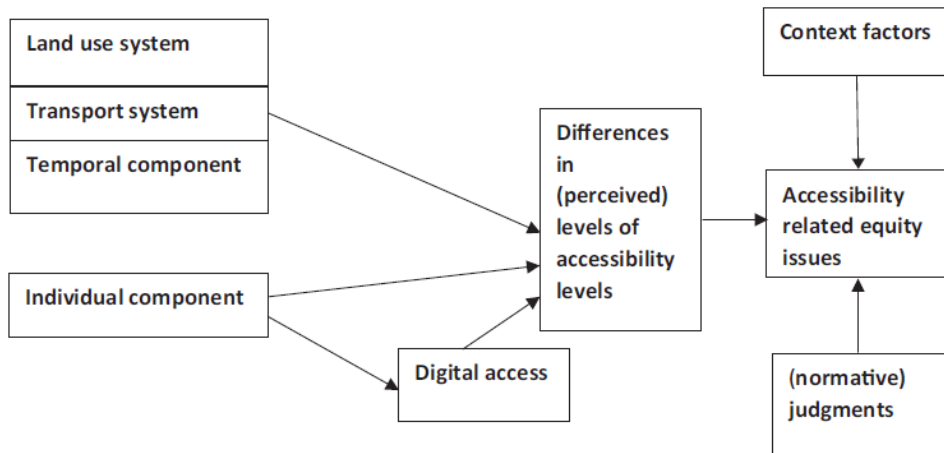
For home-connected trips, residents of the Netherlands mainly use their bicycles or a bus, for example to travel to a train station, as this is faster and sometimes more comfortable than walking (Van Kuijk, De Almeida Correia, Van Oort, & Van Arem, 2022 ; Stam et al., 2021). For activity-related trips, this is more problematic since these cannot be easily covered by private vehicles. In such cases, shared transport modes or DRT could offer a solution when there is no bus line available and it is too far to cycle (Van Kuijk et al., 2022).

### 2.4.1 Normative Judgments

In Section 2.1, distribution and the related goal of accessibility were discussed. The equity perspective shines a new light on this goal: it is no longer sufficient to assess transport interventions, such as the introduction of DRT, on whether they improve accessibility in general. It also becomes important to assess how a certain measure affects the accessibility of different population groups (Martens, 2021). This requires normative statements about ‘sufficient’ levels of accessibility. There are multiple views what this exactly entails (Van Wee, 2022). Some argue that it only matters which persons have ‘too low’ accessibility levels, while others follow an egalitarian view, arguing that differences in accessibility are a problem in themselves (Van Wee, 2022).

According to Martens (2017), sufficient accessibility refers to a level of accessibility below which people experience a lack of opportunities. Low levels of accessibility could be caused by insufficient transport network design, or a suboptimal distribution of land use and corresponding activities ((Van Der Veen et al., 2020). To determine sufficient levels of accessibility, normative threshold values are required, which look at the possible travel options, thus not to actual or predicted travel behaviour, for different population groups (Van Der Veen et al., 2020). Additionally, it is important how people perceive their accessibility, as individuals with low perceived accessibility are more likely to choose car travel over PT (Blandin et al., 2023).

Figure 4: A conceptual model for Accessibility and Equity (Van Wee, 2022).



What exactly is sufficient accessibility is subject to normative judgments. This component is included in the model by Van Wee (2022), explaining the relationship between (perceived) accessibility and equity in Figure 4, expanding the model of Geurs and Van Wee (2004). In this model, the individual component influences the level of (perceived) accessibility and *digital access*. This represents the possibility of replacing physical destinations with a digital alternative. Examples of this are working/ learning from home and online shopping (Van Wee, 2022). However, digital access falls outside the scope of this research.

### Evaluating DRT-systems

To evaluate the success of a DRT-system, a multitude of indicators can be used. Often the number of passengers or the financial results are used to evaluate the success of the system (Pettersson, 2019). Other evaluation methods include added/saved vehicle miles/kilometres travelled (per vehicle), number of trips and vehicle occupancy rates (Baier, Sørensen, & Schlüter, 2024).

Another indicator that can be used to measure the success of a DRT-system is to compare its costs to alternative modes. In the case of substitution of an existing bus line, the costs and subsidies of both services should be compared to determine whether DRT is a more efficient option (Papanikolaou, Basbas, Mintsis, & Taxiltaris, 2017).

The criteria for a DRT-service to be considered successful depend on the planner's initial expectations and objectives (Papanikolaou et al., 2017). These objectives can be categorized into *political*, *service-related*, *environmental*, and *financial* goals (Baier et al., 2024). However, financial goals often conflict with the other three; from a purely financial perspective, not providing any service often would often be the most effective option. Nevertheless, this approach overlooks the positive societal impacts of DRT, such as improved accessibility and reduced social exclusion, which can caters to political, service-related and/or environmental goals (Baier et al.,

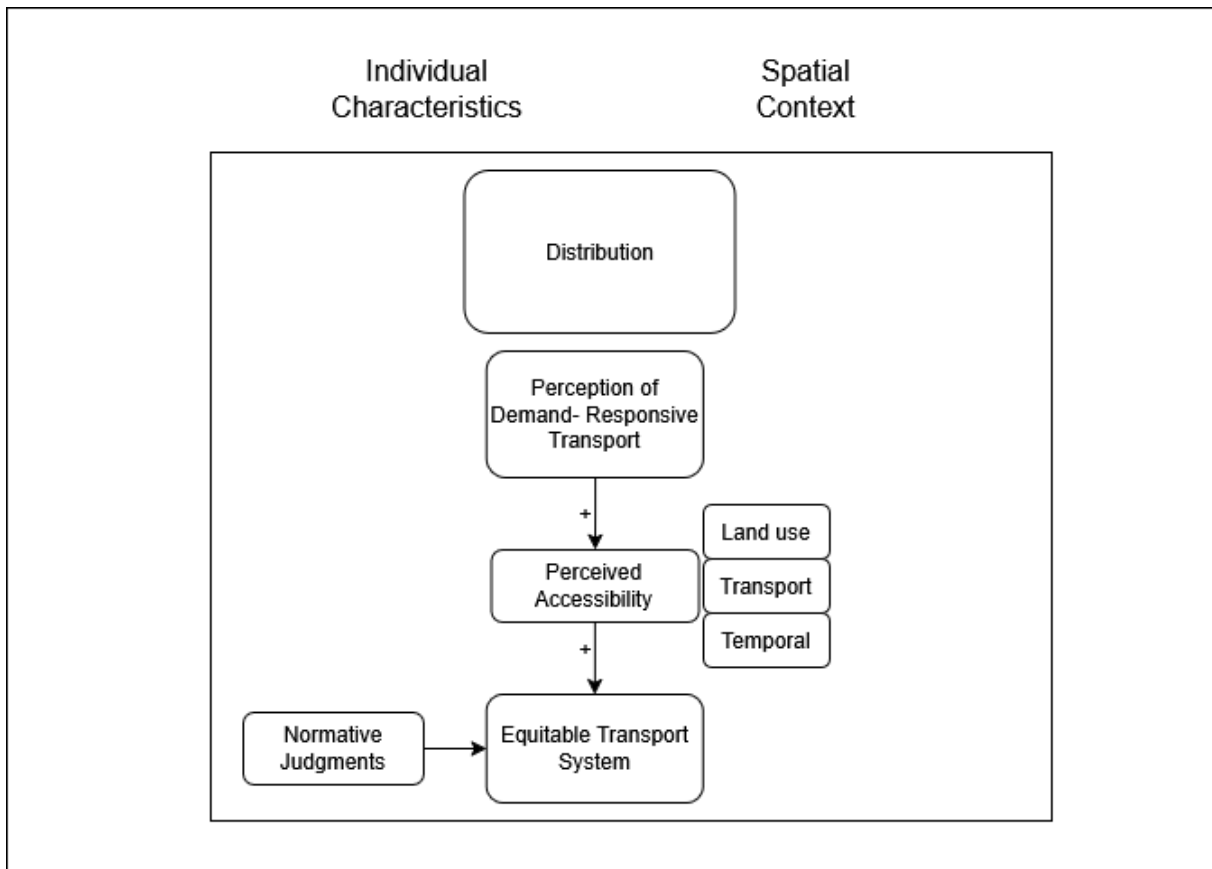
2024). Goals can be of multiple types: accessibility can be included in a service-related goals, but can also have a political component. Therefore, a weighting of each goal is needed to give priorities to the goals that are considered most important and consider several subordinate goals at once (Baier et al., 2024).

To consider these effects in the evaluation of DRT-systems, assessment methodologies which consider the effects on equity can be applied. One example of this is the Multi-Criteria Analysis (MCA), which also weighs its effects on accessibility, social exclusion etc. (Papanikolaou et al., 2017).

Another evaluation method is the framework developed by Alonso-González, Liu, Cats, Van Oort, and Hoogendoorn (2018). The goal of a DRT-system is generally not to substitute active travel modes (walking or cycling) or PT. To check whether a DRT-system competes with these travel modes, this framework suggest to evaluate the performance of the system and related changes in accessibility by researching whether the distances of DRT-rides compete with these travel modes. The lower the percentage of trips that is within a walking or cycling distance, the less DRT competes with these travel modes. When a DRT-system aims to serve as a complementary mode to PT, the percentage of trips by DRT that are used a connection to and from a PT-ride should be higher (Alonso-González et al., 2018).

## 2.5 Conceptual Framework

Figure 5: Conceptual Framework



This study states that perceived accessibility is a key indicator of whether a transport system is perceived as equitable by its users. Building on the work of Martens (2021), the analysis recognises that equity is not only about spatial coverage or service provision but also about whether people perceive that they have meaningful access to the destinations and opportunities they value. Adopting the widely used definition of Geurs and Van Wee (2004) and Pot et al. (2021), perceived accessibility is observed through three core components: land use, transport system, and temporal availability. These components correspond to what destinations are perceived as reachable, by what means, and at what times. As explained in Sections 2.2 and 2.3, this structure allows this study to research both the role of the physical environment (the location of activities and services) and the subjective evaluation of how well the transport system supports accessibility across time and space. Each individual variable is explained more elaborately in the Section 2.6, which outlines the operationalisation of the conceptual framework.

The central hypothesis of this thesis is that the perception of Demand-Responsive Transport (DRT) has a positive influence on perceived accessibility. When residents are aware of the possibility of traveling using DRT and evaluate it positively, DRT may enhance perceived accessibility, particularly in areas where there is a limited supply of conventional PT. The framework incorporates spatial context and individual characteristics as control variables to account for variation in both perceived accessibility and DRT-perception across diverse social and geographic settings.

## 2.6 Operationalisation of the Conceptual framework

The operationalisation of the conceptual framework, displayed in Figure 5 starts with the *Perception of Demand-Responsive Transport (DRT)*. This framework serves as a foundation to investigate the relationship between the *perception of DRT*, *perceived accessibility* and an *equitable transport system*. This study examines how the *perception of DRT* influences *perceived accessibility*.

To analyse these relationships, it is crucial to consider the key components of perceived accessibility, as discussed in Section 2.2: land use, transport, temporal, and individual factors.

- The *Land Use* component is about the perception of the amount, quality and spatial distribution of opportunities at a destination and the demand for these opportunities at origin locations (Geurs & Van Wee, 2004).
- The *Transport* component describes the transport system; included are perceptions about the amount of time (travel, waiting and parking), costs (fixed and variable) and effort (including reliability, level of comfort, accident risk, etc.) (Geurs & Van Wee, 2004).
- The *Temporal* component reflects perceptions about temporal constraints: the availability of opportunities at different times of the day, and the time available for individuals to participate in certain activities, for example work or recreational activities (Geurs & Van Wee, 2004).

Together with the individual characteristics, which serves as a control variable, these factors shape perceived accessibility. Whether this accessibility is considered sufficient, and whether the transport system can be deemed *equitable*, is subject to *Normative Judgments* (Geurs & Van Wee, 2004). This research defines an improvement of the equitability of the transport system as an increase of the perceived accessibility among residents.

This leads to following hypothesis: *The perception of DRT positively affects perceived accessibility.*

Two overarching factors influence all the previously discussed variables and thus serve as control variables in this research:

1. *Individual Characteristics* reflect the needs (depending on age, income, educational level, household situation, etc.), abilities (depending on someone's physical condition, availability of travel modes, etc.) and opportunities (depending on someone's income, travel budget, educational level, etc.) of individuals (Geurs & Van Wee, 2004). Thus, the individual characteristics influence both the perception of DRT and perceived accessibility.
2. The *Spatial Context* affects the perceptions and actions of humans and thus both their perception of DRT and their perceived accessibility.

In addition to researching the effect of DRT on perceived accessibility, this research also studied the reverse relationship: what factors that shape the perception of DRT? In this case, DRT is the dependent variable while the factors of place of living, age group, most-used transport mode, and the temporal, transport and land use components of perceived accessibility are the independent variables.

Based on this, the second hypothesis is formulated: *Perceived accessibility positively affects the perception of DRT.*

The effect of normative judgements (a topic explored in Section 2.4.1) on an equitable transport system will not be evaluated through statistical analysis using the survey. Instead, normative judgements will be researched by conducting (expert) interviews, a method that will be elaborated upon in Chapter 3. These interviewees will share their view on whether the researched DRT-system leads to an increase in the equitability of the transport system.

## Chapter 3: Methodology

The development of the methodology for this research will be described using the Research Onion, which ‘peels off’ the structure of choosing the methodology to answer a certain research question (Saunders & Tosey, 2013). This starts with determining the research philosophy, followed by the choice for research methods (research design), and finally, the research strategy explains how this data is collected (Saunders & Tosey, 2013).

### 3.1 Research philosophy

A research philosophy that aligns well with the topic of equity in this study is *post-positivism*. This philosophy states that while an objective reality exists, it can only be understood imperfectly through observation and interpretation within the framework of specific theories (Guba & Lincoln, 1994). Although post-positivism seeks to explore phenomena scientifically, it acknowledges that there is no absolute truth to be found (Panhwar, Ansari, & Shah, 2017). It emphasizes the importance of developing a thorough understanding by employing multiple perspectives and methodological approaches (Panhwar et al., 2017). This view supports the research design of this study, which applies structured quantitative analyses to test hypotheses (as discussed in Section 2.6) and examine the relationships between the perception of Demand-Responsive Transport (DRT) and perceived accessibility. This research also uses the qualitative method of interviews to validate the findings of the survey, in line with post-positivism, which encourages the use of a variety of research methods to reduce the influence of researcher bias (Panhwar et al., 2017).

In addition, this research also draws upon *critical realism*. This research philosophy suggests that while reality is initially experienced through the senses, it is interpreted subjectively by the mind (Saunders & Tosey, 2013). Similar to post-positivism, critical realism recognizes the existence of a single reality, but also highlights the limitations of human mind and the inherent complexity of social phenomena (Guba & Lincoln, 1994). It emphasises the need to examine both observable experiences and the underlying structures and mechanisms that shape them (Saunders & Tosey, 2013). Although critical realism is often associated with qualitative research, it is equally applicable to quantitative studies on perceived accessibility. This concept is inherently shaped by a complex interplay of social, cultural, political, and economic factors making it well-suited to this philosophical approach that values depth and context (Guba & Lincoln, 1994).

To research the complex topic of perceived accessibility, two or three (depending on someone’s viewpoint) research methods are used: a survey among residents in the research area, which, although this data is quantitative in nature, provides an insight in the perception of these residents. Although the survey provides a structured, quantitative way to measure the perceptions, a methodology that suits post-positivism, this research does not consider its outcomes as purely objective. This is in line with both post-positivism and critical realism, since both of these research philosophies state that to understand quantitative results, a theoretical understanding is required (Mingers, 2005; Panhwar et al., 2017). To enrich this study with more qualitative depth, two types of interviews are used; first, interviews with inhabitants of the research area, to explain the viewpoints of the survey respondents further and gain a deeper understanding into the mechanism influencing the relations between DRT and perceived accessibility. Second, experts interviews are conducted, where policy makers and mobility experts can explain the results of the survey and interviews with inhabitants, and explain the choices (they) made in the design of DRT-systems and its relation to foster a more equitable transport system.

### 3.1.2 Research Design

When aiming to research the topic of equity, it is necessary to understand people's experiences and gain a sense of context, as discussed in the theoretical framework. Given this complexity, mixed methods research is a suitable method to research the effects of DRT-systems on equity, which in this research is operationalised as perceived accessibility. This means that both quantitative and qualitative research methods are used (Saunders & Tosey, 2013). This research uses two (or three, depending on the perspective) methods; first, a survey, and second, two types of interviews; regular and expert interviews. The next section will explain why these methods are suitable for conducting this research.

#### *Survey*

The first research method used in this research is the survey. Conducting a survey allows the researcher to collect a considerable body of data on a large number of subjects, making it a highly efficient approach to research (Van Thiel, 2014). Surveys can gather both factual information and data on people's opinions or attitudes towards a certain subject (Van Thiel, 2014), which is particularly relevant for this study, as it investigates *perceived* accessibility and the equitability of the transport system, both of which are inherently subjective and subject to people's perceptions. Since the required data for this research is collected from individuals, its nature is subjective.

Results of a survey can be generalized back to the population (Glasow, 2005). A survey is especially suitable for deductive research (Van Thiel, 2014), such as this study, since it aims to test theories about (perceived) accessibility, and how these apply to an area where Demand-Responsive Transport is present.

#### *Interviews (Regular and Expert)*

To complement the results of the survey with a qualitative insight, interviews are conducted. Interviews build a holistic snapshot, analyse words and report detailed views of informants. They also enable interviewees to express their own thoughts and feelings using their own voice (Alshenqeeti, 2014). Interviews are an excellent method to gain information about places, events, opinions and experiences, which vary between people with different attributes (Dunn, 2021). They are well-suited to research complex topics, such as equity and perceived accessibility, behaviour and/or motivations (Dunn, 2021). Interviews can be used to fill knowledge gaps that other methods, such as the survey in this research, possibly leave (Dunn, 2021). They can also be used to verify or counter claims about *the* public opinion (Dunn, 2021).

In this research, two types of interviews are conducted; regular and expert interviews. Expert interviews require additional explanation.

Expert interviews offer an effective means to quickly obtain good results (Bogner, Littig, & Menz, 2009). Who is identified as expert depends on the researcher's judgement. However, this definition remains insufficient since it does not provide the researcher with criteria to distinguish between experts and non-experts (Meuser & Nagel, 2009). The term 'expert' might end up being used inflationary and finally anybody might be seen as an expert –at least as 'expert of her or his own life'. Following this line the expert interview would no longer be distinguishable from other techniques of interviewing (Meuser & Nagel, 2009). An individual is addressed as an expert because the researcher assumes that it has knowledge, which it may not necessarily possess alone, but is not accessible to anybody in the field of action under study (Meuser & Nagel, 2009). It is difficult to standardize a model for all expert interviews, for multiple reasons. First, due to the discussed definition of an expert, which varies for every research (Bogner & Menz, 2009). Second,

conversations with experts create a unique social situation that is prone to interference; this does not invalidate basic principles of how interviews should be conducted, but it limits the range of strict methodological guidelines that can be applied (Bogner & Menz, 2009). Thirdly, one cannot stipulate that expert interviews should be carried out in a certain way. Interviewers will always have their own particular interest in the subject under investigation, and their own concrete question to which they are seeking an answer; this inevitably leads to flexibility in the use of this instrument of enquiry (Bogner & Menz, 2009).

Expert help to explain the results that are obtained from the previous discussed survey and interviews with residents. Additionally, they can explain the factors that are important in the design of a DRT-system and why certain choices are made in this process.

## 3.2 Research Strategy

### 3.2.1 Data Requirements

This study collects cross-sectional data. This is mostly because of recourse constraints in terms of time. Measurements of one point in time will yield enough data to analyse to effect of the perception of DRT on perceived accessibility and an equitable transport system.

#### *Survey Questions*

The questions used in the survey were inspired by the sources discussed in the theoretical framework. In Appendix 1, the full questionnaire can be found (both the Dutch and English version). The questions are an operationalisation of the conceptual framework, as outlined in Table 1.

*Table 1: Operationalisation Survey Questions*

<i>Concept</i>	<i>Dimension</i>	<i>Indicators</i>	<i>Question</i>	<i>Type of Data</i>
<b>Perception of DRT</b> <i>(independent variables)</i>	<b>Awareness</b>	Recognition	Have you ever heard of Bravoflex?	Likert
	<b>Attitude</b>	<i>Willingness to use Bravoflex.</i>	How often would you use Bravoflex?	Likert
		<i>Perceived impact on Public Transport use.</i>	Bravoflex would encourage me to use public transport more often.	Likert
		<i>Perceived impact of Bravoflex on independence.</i>	Bravoflex could make me less dependent on others to travel.	Likert
<b>Perceived accessibility</b> <i>(dependent variable)</i>	<b>Land use system</b>	Perceived accessibility of activities.	It is <u>possible</u> to reach the activities I prefer using public transport and Bravoflex.	Likert

		Perceived spatial proximity of essential destinations.	The locations I need to travel to are close to my home.	Likert
		Satisfaction with local PT and DRT service coverage.	I am satisfied with the level of public transport that I can reach from my home.	Likert
	<b>Transport system</b>	Perceived ability to maintain lifestyle using only PT and DRT.	If public transport and Bravoflex were my only mode of travel, I would be able to continue living the way I want.	Likert
		Perceived alignment of PT and DRT services with personal transport needs.	Public transport suits my travel needs well.	Likert
		Perceived ease of access to daily destinations using PT and DRT.	It is <u>easy</u> to reach my daily activities using public transport and Bravoflex.	Likert
		<i>Perceived barriers to use PT and DRT.</i>	I experience barriers that make me use public transport less or not at all.	Likert
	<b>Temporal</b>	Perceived temporal availability of transport	Access to my preferred activities is satisfying with public transport and Bravoflex	Likert
		Perceived frequency of DRT and PT.	The frequency of busses is satisfying in my area.	Likert
		Perceived service times of PT and DRT.	I am satisfied with service times of busses in my area.	Likert
<b>Control variables</b>		Age	What is your age?	Ordinal
		Spatial Context	In what town do you live?	Nominal
		Most-used travel mode	With which mode of transport do you travel the most kilometres?	Nominal
		Public transport use	How often do you travel by public transport?	Likert

		Car ownership	Does your household own a car?	Nominal (binary)
		Income	What is your monthly income?	Ordinal
		Working status	What is your working status?	Nominal

The first two questions of the survey determine the survey eligibility of a respondent: they must be at least 18 years old and live in the municipality of Loon op Zand. The first question asks about the age of the respondent; if it selects 'under 18', the survey automatically closes. The remaining options corresponding to the age categories used by the Centraal Bureau voor de Statistiek (Central Bureau of Statistics of the Netherlands, CBS) for its population data (CBS, 2024). The second question asks about the spatial context of the respondent, to be more precise; in which town it lives: Kaatsheuvel, Loon op Zand, De Moer or the final option; it does not live in the municipality of Loon op Zand. When a respondent chooses this the last option, the survey automatically closes.

The survey questions are primarily closed, occasionally an answer option is added where a respondent can write his own response. For the majority of the questions, a so-called Likert scale is used. This consists of a number of items (statements or propositions) the same subject; for each item, the respondent has to indicate to what extent they agree with the statement. The scores of the respondent are subsequently added up, and divided by the number of questions. This results in a score between 1 and 5. A high total score usually means that the respondent also scores relatively high on the central subject of study (Van Thiel, 2014).

First, following the conceptual framework, some questions were asked to measure the perception of DRT, the independent variable in this research. This is divided between the dimensions of the awareness and attitudes. In this research, the DRT-system is the Bravoflex system, which is running in the municipality of Loon op Zand, the research area. A more detailed explanation on specific DRT-system Bravoflex is included in Section 3.2.2.

First, without any explanation beforehand, the respondent is asked whether it is aware and/or has used the system (occasionally). This question is not included in the Likert-score for the perception of DRT. After this, an explanation about the specific Bravoflex-system was included; both a short videoclip and a written explanation, which the respondent was able to read back before answering three questions about their perception towards the DRT-system (Table 1). To research the subjective effect on social exclusion, discussed in Section 1.4, respondents are asked whether the DRT-system would help them to travel more independently. Respondents are also asked whether the Bravoflex system would encourage them to use PT more often. Additionally, respondents are asked whether they experience barriers to use the DRT-system, inspired by the research of Ramos, Vicente, Passos, Costa, and Reis (2019), which discusses barriers for using public transport related to the perceptions of inhabitants.

The dependent variable of this research is perceived accessibility. In the operationalization, this concept is divided into three dimensions following Geurs and Van der Wee (2004). The individual component/characteristics is included in the control variables.

The first component of perceived accessibility is the land use system, which measures the perceived accessibility of activities. Following research by Blandin et al. (2023), respondents are asked whether the locations they need to visit are close to their home. For the second component, the transport system, questions are asked to measure the perceived transport supply. For the third component, the temporal, questions were asked to measure the perceived temporal availability of transport.

Certain survey questions measure the perceived accessibility of residents. These are inspired by the Perceived Accessibility Scale (PAC), developed by Lättman, Olsson, and Friman (2016). This scale can be used to determine the traveller's (or possible travellers) opinion of their accessibility, or for directing interventions aimed at improving accessibility to where they are most needed according to the individuals (Lättman, Olsson, et al., 2016). This scale consists of four items, based on the four components that make up perceived accessibility according to Van Wee (2022), discussed in Section 2.2.2:

- *It is easy to do daily activities with X* (individual component)
- *If X was my only mode of travel I would be able to continue living the way I want* (transport component).
- *It is possible to do the activities I prefer with X* (land-use component).
- *Access to my preferred activities is satisfying with X* (temporal component).

In this research, X is public transport. In the survey, the DRT-system of Bravoflex is considered as a part of public transport. This is included in the explanation of the questions to the respondents (see the survey questions in Appendix 1).

Beyond researching the effect of DRT on perceived accessibility, this research also aims to research the reverse relationship: the factors that influence the perception of DRT. In this case, DRT is the dependent variable while the factors of place of living, age group, most-used transport mode, and the temporal, transport and land use components of perceived accessibility are the independent variables.

### *Regular Interview Questions*

The interviews conducted for this research have a semi-structured nature. This is more flexible than a structured interview, as it allows depth to be achieved by providing the opportunity on the part of the interviewer to probe and expand the interviewee's responses. Next to this, it enables a respondent's feelings to be heard (Dunn, 2021). When undertaking such interviews, a basic checklist allows for in-depth probing while permitting the interviewer to keep the interview within the parameters traced out by the aim of the study (Alshenqeeti, 2014).

The interviews operationalise concepts of the conceptual framework in Section 2.5. The full interview guide (in Dutch, in which the interviews were conducted, and the English translation) is included in Appendix 2. The interview questions are inspired by the sources mentioned in the theoretical framework, and especially the operationalisation of perceived accessibility by Pot, Van Wee, and Tillema (2021). First, the *socio-demographic characteristics* and *capabilities* of the interviewees are discussed, such as their age and ability to drive a car, cycle and walk. Later, *spatial capabilities* of the interviewee are researched, by asking them whether they are aware of the PT-options in their living area. Interviewees are also asked about their *attitudes and preferences*, by asking themselves about their regular travel patterns, their opinion on the facilities in their living area and the travel options in their area. These questions are also part of the *land use, transport, and temporal* component of perceived accessibility. Following this,

questions are asked about the DRT-system Bravoflex, including their likelihood of using the system and the features they consider important.

Finally, the interviews discuss the *normative judgments* of the interviewees. As discussed in Section 2.4 of the Theoretical Framework, what exactly is sufficient accessibility and whether there is an accessibility problem is subject to normative judgments (Van Wee, 2022). The interviewees are asked whether they think it is important to have a form of PT in their village, not only regarding their individual interests but also for community benefit. Following this, the interviewees are asked whether every village (“*kern*” in Dutch) should have a public transport option, which is a policy objective of the province of Noord-Brabant. Next to this, the respondents are asked whether they are in favour of a minimum level of PT and whether they would be willing to pay more in order for this to be implemented, via higher ticket prices or taxes.

### *Expert Interview Questions*

Similar to the regular interviews, the expert interviews have a semi-structured nature. The questions are tailored to the specific expertise of the expert, and they are asked to speak about the normative standpoints of the organisation they work for about (perceived) accessibility. The interviewees were presented with some results of the survey and interviews with residents, and are asked to react and (if they can) explain these, using their expertise. The full interview guides of the expert interviews can be found in Appendix 3 (both the original Dutch and the English translation).

## 3.2.2 Data Collection

### *The Researched DRT-system*

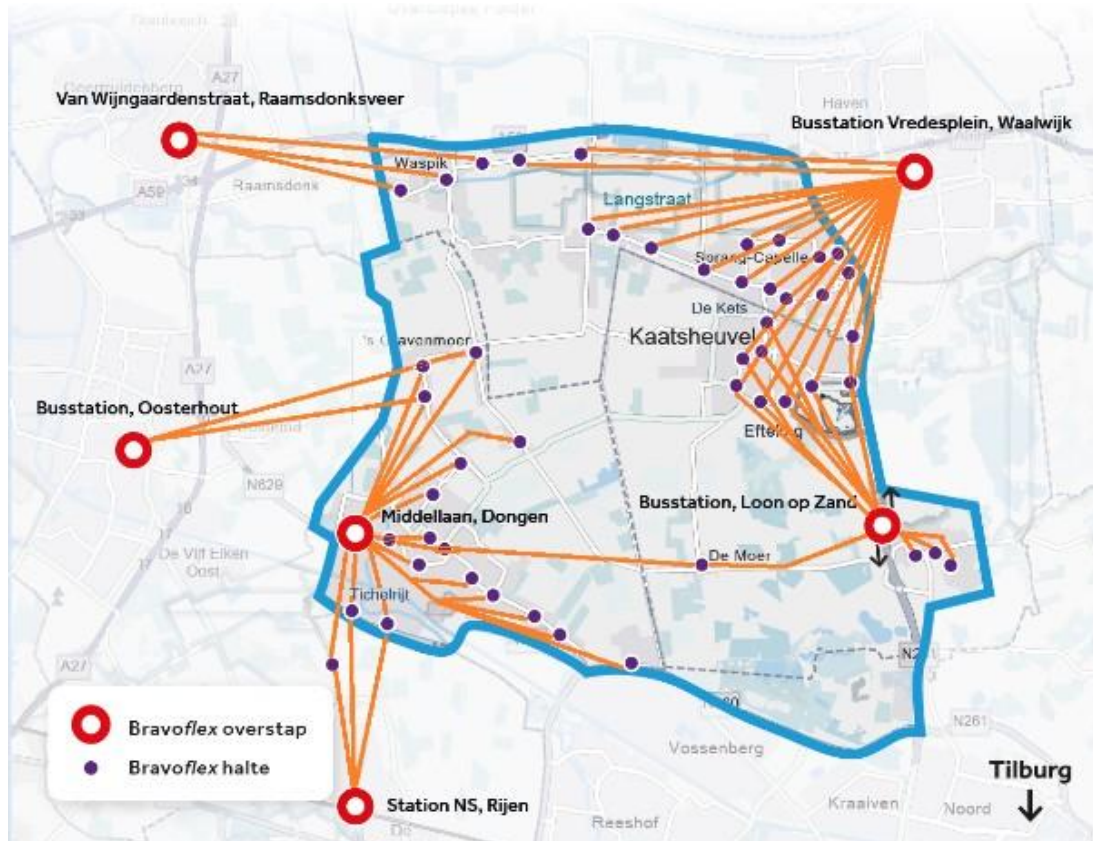
DRT is part of the overall mobility strategy of the province (Provincie Noord-Brabant, 2018a). The province aims to offer PT that complements the demands of the inhabitants: it uses three types of transports to achieve this; direct, DRT and together (“*direct, flex en samen*”). In places and at times with high demand highly frequent PT is offered (‘direct’). At places and/or times with less demand, solutions that differ from busses with fixed schedules are offered, such as the DRT-system Bravoflex or flexible bus lines for students (‘flex’). Next to this, shared mobility and neighbourhood busses, which are run by volunteers (‘together/*samen*’), are an important component of the mobility system. Finally, the role of cycling is also considered as important by the province for the first or last mile (Provincie Noord-Brabant, 2018a). The province aims to create an integrated transport system where the traveller can choose their travel mode according to their specific needs. Travellers should easily understand the different travel options and be able to book and pay for these easily. For this to be achieved, a transition is needed to Mobility as a Service (MaaS) (Provincie Noord-Brabant, 2018a).

The DRT-system that is researched in this study is Bravoflex in Dutch province of Noord-Brabant. This system aims to complement regular PT in areas where it not present (during the whole day) (Bravo, n.d.-a). Bravoflex is a stop-to-hub (or hub-to-stop) system; a traveller books a ride (at least one hour beforehand) from a stop to a hub where frequent PT is available, or vice versa (Bravo, n.d.-c). The aim of the system is to offer a connection to the PT-network from places where is not enough demand for regular PT. The stops can already be included in the regular PT-network, but are not served at all times (for example: the bus lines stops riding in the evening and/or during the weekend). The stops can also be specific DRT-stops, where previously no PT was available (Bravo, n.d.-c). Bravoflex will be introduced in the whole province of Noord-Brabant, starting in the region of West-Brabant, where it is available from start of the 2025 (Bravo, n.d.-a). In 2026, the system will be available in the whole province (Bravo, n.d.-a).

## Research Area

This research takes place in the municipality of Loon op Zand, in the province of Noord-Brabant, the Netherlands. Together with (parts of) two neighbouring municipalities, Dongen and Waalwijk, it serves as a pilot location for the DRT-system Bravoflex (Bravo, n.d.-b, as shown in Figure 6. This makes it a suitable location to research the impact of a DRT-system on the perceived accessibility of its inhabitants.

Figure 6: The Pilot area of Bravoflex Midden-Brabant (Bravo, n.d.-b)



Loon op Zand has a population of 23,850 inhabitants across 10,400 households (CBS, 2024). It is made up by three villages with different characteristics: Kaatsheuvel, Loon op Zand and De Moer (Gemeente Loon op Zand, n.d.). Kaatsheuvel has the most households: 7,370, divided between Kaatsheuvel-West (4,545 households) and Kaatsheuvel-Oost (2,825 households), Loon op Zand has 2,725 households, and De Moer 310 (CBS, 2024).

The research area is diverse: outside of industrial areas, the residential neighbourhoods of Kaatsheuvel and Loon op Zand have a high population density which is considered urban according to the measures of the CBS (n.d.-b), with more than 5,000 inhabitants per square kilometre (CBS, 2024). The town of De Moer has a very low, non-urban population density (CBS, n.d.-b) with 112 inhabitants per square kilometre (CBS, 2024).

The bus lines 136, 231, 300, 301, 674 drive through Kaatsheuvel (Provincie Noord-Brabant, n.d.), which thus is served quite well. Lines 136, 300 and 301 also drive through or at the edge of the town of Loon op Zand (Provincie Noord-Brabant, n.d.). De Moer is an exception: until recently, there was no public transport available in this town. This has changed with the Bravoflex pilot; since then, a stop from where you can travel with Bravoflex has been added (Bravo, n.d.-b).

### Survey Sampling Design

To participate in the survey, two requirements apply: the respondent has to live in the research area, which is the municipality Loon op Zand, and had to have an age of 18 years or older. The survey is made in Qualtrics, which is a web-based tool to take surveys (Radboud Universiteit, n.d.-b).

The survey got distributed via multiple channels. First, flyers got delivered at the houses of residents. The flyer, added in Appendix 4 includes an explanation of the topic of this research and a QR-code and link to the survey. In total, 500 flyers were distributed in the municipality, according to the population sizes of the three towns. This also led to two verbal responses, where the respondents provided their answers orally, while the researcher filled them in on his own device.

Second, the survey was promoted via social media. Facebook-post were shared within two groups, one for inhabitants of Kaatsheuvel and one for inhabitants of the town Loon op Zand. The municipality of Loon op Zand posted a message on their Facebook page sharing the survey (Gemeente Loon op Zand, 2024). This post was also shared by Moers Belang, which is a Facebook page about the village of De Moer. Additionally, the survey was shared by the weekly local newspaper De Duinkoerier as displayed in Figure 7 (Logister, 2024), which is distributed freely to all the inhabitants of the municipality, except for those who expressed that they do not want it via a sticker on their door (Weekblad De Duinkoerier, n.d.).

The survey was open to responses from the 14<sup>th</sup> of November until the 29<sup>th</sup> of December, 2024.

### Regular Interviews Sampling Design

The interviews had the same participation requirements as the survey; the interviewee has to be an inhabitant of the municipality of Loon op Zand and must be at least 18 years old. Interviewees were recruited while being informed about the survey; in the flyer recruiting inhabitants to participate in the survey (Appendix 4), a request to participate in an interview was included. Additionally, in the final question of the survey, respondents were asked if they were interested in giving an interview. If a respondent was interested, they could leave their email address in order to be contacted by the researcher. Then, in correspondence with the respondent, a date and location for the interview were chosen. This resulted in four conducted interviews between the 11<sup>th</sup> and the 17<sup>th</sup> of December, 2024. Three interviews took place at the interviewee's home, one was conducted online. The interviews were transcribed by the researcher.

Figure 7: The survey shared in De Duinkoerier (Logister, 2024).

#### Onderzoek naar openbaar vervoer Loon op Zand

Woon je in Loon op Zand, Kaatsheuvel of De Moer? Ik ben Finn Logister, student planologie aan de Radboud Universiteit in Nijmegen. Voor mijn afstudeeronderzoek bij de provincie Noord-Brabant onderzoek ik hoe tevreden inwoners zijn over het openbaar vervoer in onze gemeente.

Het invullen van de enquête duurt slechts 5 minuten en is volledig anoniem. Of je nu wel of geen gebruik maakt van het openbaar vervoer, jouw mening telt. Er zijn twee voorwaarden: je woont in de gemeente Loon op Zand en bent 18 jaar of ouder.

Je kunt de enquête invullen via de QR-code of via de link [tinyurl.com/OV-LOZ-2024](https://tinyurl.com/OV-LOZ-2024). Kun je de enquête ook doorsturen naar vrienden, familie of buren? Hoe meer reacties, hoe betrouwbaarder het onderzoek.

Daarnaast zoek ik inwoners die hun ervaringen willen delen in een kort interview van 20 tot 30 minuten. Heb je interesse of vragen? Stuur me een e-mail via [flogister@brabant.nl](mailto:flogister@brabant.nl).

Dank je wel voor je hulp!



Radboud Universiteit



### *Expert Interviews Sampling Design*

As discussed in Section 3.1.2, there are no standard measurements for someone to be considered an expert. The requirement that this research lies down is that the expert has to have experience working in transport planning and/or the design of DRT-systems. This led to four interviewees from the following organisations: one transport planner working at the province of Noord-Brabant, two persons (in a duo-interview) working at the travellers association of Brabant (*Reizigersoverleg Brabant*), which advocates for the needs of travellers of Brabant (Reizigersoverleg Brabant, n.d.), and one person who is working as a transport planner for the province of Noord-Holland, and most relevant for this thesis, was the chair of the national network of Demand-Responsive Transport (*Landelijk Netwerk Flexvervoer*). This network is part of the partnership of DOVA, which shares knowledge and collaborates on topics related to PT. All twelve provinces of The Netherlands, and the transport regions of Amsterdam, The Hague and Groningen-Drenthe, are represented (DOVA, n.d.). In this thematic group, these organisations discuss their progress and lesson about DRT-systems.

### 3.2.3 data Analysis

#### *Survey*

The survey will be analysed quantitatively. To do this, the software of SPSS is used. This software is suited to process and analyse large amounts of data with a diverse range of statistical tests (Radboud Universiteit, n.d.-a). The statistical analysis of this research consists of three steps.

First, a reliability check was carried out to assess the internal consistency of survey items measuring each key concept. This involved computing Cronbach's alpha for the grouped indicators of Perceived Accessibility (based on its three dimensions) and Perception of DRT (based on recognition and attitude), discussed in Section 3.2.1. This test determines whether these different indicators are reliable and can be meaningfully combined into a single composite variables for conducting further analysis. Second, a descriptive analysis was conducted to provide insight into the place of living, transport mode choice and the awareness of the DRT-system Bravoflex among respondents.

Third, a regression analysis was performed to test the hypothesised relationship between the perception of DRT as the independent variable and perceived accessibility as the dependent variable. To be precise, a one-way ANOVA (Analysis of Variance) test was conducted, which tells whether a dependent variable changes according to the level of independent variables (Van Thiel, 2014). The null hypotheses ( $H_0$ ) states is no difference among group means. The alternative hypothesis ( $H_a$ ) states that at least one group differs significantly from the overall mean of the dependent variable. If more than two groups are analysed such as in this research, or several variables are included in the analysis, such as in this research, variance analysis is to be preferred over the t-test (Van Thiel, 2014). For this research, this means that a multiple linear regression was conducted to examine whether and to what extent DRT perception predicts perceived accessibility while controlling for factors such as income, age, car ownership, and spatial context. This statistical analysis directly addresses the main research question and enables the interpretation of the strength and direction of the relationship between the independent and dependent variables.

#### *Interviews*

The (expert) interviews are transcribed by the researcher. Both the interviews with inhabitants as well as the expert interviews are used to validate the results of the survey.

### 3.3 Reliability and Validity

This research adheres to the Dutch code of conduct for scientific practice (*'Nederlandse Code Wetenschapsbeoefening'*), drawn up by the association of Dutch universities (VSNU), of which the Radboud University is a member. This code of conduct has six main principles; honesty and diligence, reliability, verifiability, impartiality, independence and responsibility (VSNU, 2014). This research is reliable, in the sense that it could be replicated, because the methodology is transparent. The survey and interview questions are made public, while the supervisor of the researcher can access the responses to the survey and read the interview's transcripts. Furthermore, the statistical tests used to analyse the results of the survey are made public.

The first questions of the survey were designed to ensure the validity of the responses. To verify that the respondents were indeed 18 years or older and inhabitants of the municipality of Loon op Zand, they were asked to indicate their age and the town they lived in. If they stated that they were younger than 18 or did not live in the municipality, the survey automatically closed. As discussed in Section 3.2.2, the interviewees were recruited by their expressed interest at the end of the survey. This ensured that each respondent was over 18 years old and lived in the municipality of Loon op Zand, as they would not have been able to proceed to this question otherwise. For the expert interviews, it was certain that the interviewees worked for the organization they claimed to be part of, due to professional contact during the researcher's internship at the Province of Noord-Brabant.

In this study, multiple research methods are used in order to check each other's results. This is applied in the following way: the survey is the main research method in this research, while the (expert) interviews are mainly used to check the results of the survey, which increases the validity and reliability of this research. In addition, because of the two different types of interviews that are conducted, the views of both the residents of the research area and the policy makers/experts are included in the research findings, further increasing the validity of this research.

### 3.4 Ethics

All the research data is be uploaded to Research Information Services for Students (RIS for Students) (Radboud University, n.d.-b). In principle, this data material is exclusively for the archive and may also contain confidential material. Using this data material for other purposes is only allowed when the Master's student has granted his or her consent and within the framework regarding agreements made concerning the confidentiality of the respondents (Radboud University, n.d.-b). The next paragraphs will, for each research method, explain how this research prevents risks for participants.

#### *Survey*

To protect the identity of the respondents of the survey and the interviews with residents, the answers of one individual respondent can only be accessed by the researcher (Radboud University, n.d.-a). At the start of the distribution of the survey, no question was asked whether the respondent agreed that their data, excluding data that could track them back, would be used for this research. This was an oversight, and therefore, a consent question was added as the first question in the survey (Appendix 1). However, previous responses were still included in this research, for several reasons. First, no questions were asked that could personally identify individual respondents. Additionally, the flyer used to recruit respondents (Appendix 4) for the

survey provided information about the aims of the survey and included the email address of the researcher, allowing early respondents to reach out with any questions regarding the research or the data collection and storage. Furthermore, in the beginning of the survey, respondents were asked about their age. When they indicated that they were younger than 18 years old, the survey automatically closed. Individual answers by respondents can be accessed by the researcher and can be accessed in the RIS for students, where the raw survey data is uploaded to.

### *Interviews with Inhabitants*

When approaching potential interviewees living in the municipality of Loon op Zand, they were informed about the subject of the research and its aims. Also, information was provided on the length of the interview, which was around 20-30 minutes, and about the storage of their data. The interviewees were asked permission for the recording of the audio of the interview via the interviewer's smartphone. After this, a consent form (Appendix 5) was signed by the interviewee. After their permission, the interviews started, ensuring a comfortable atmosphere for the interviewees, which is an important condition for conducting interviews (Dunn, 2021). In addition, the interviewer would make notes to remember non-verbal data, like gestures and body language. The interviewees were informed they could reject to answer a question, and that they could stop the interview at any time. Later, the finished interviews were transcribed by the researcher. The interviewees received the researcher's email address so they could reach out with questions after the interviews had taken place.

To not harm the interviewees, their identity is not disclosed. Instead, the interviewees themselves chose a pseudonym to which they will be referred in the research. The interviews are confidential and anonymous. The real names of the interviewees are not included in the transcripts, and they can only be accessed by the researcher (and is archived in the RIS for students, as stated before). The transcripts are not included as an Appendix of this study, the only place to access them is the RIS for students.

### *Expert Interviews*

The procedure for the expert interviews is the same as for the regular interviews (they were informed about the research aims, data storage, and signed the consent form), but with one difference. The identity of the interviewee is not revealed, but instead of referring to a pseudonym, the interviewees are referred to the organisation they work for, and their job title. To reduce the risk of identification of expert interviewees, the version of this thesis shared externally will refer to expert interviewees only by their organization, deleting the job titles. One expert interviewee gave verbal consent to use the recording in this research.

# Chapter 4: Results

This chapter presents the findings of the research on the influence of Demand-Responsive Transport on an equitable transport system. The chapter is organized as follows: First, the results of the survey are presented, starting with reliability tests to ensure that the survey questions accurately capture the concepts outlined in the theoretical framework. Following this, descriptive statistics are provided, offering an overview of respondents' demographics and their primary transport modes, highlighting key patterns and distributions within the data. Finally, regression models are introduced to measure the influence of the perception on DRT on perceived accessibility and how different factors influence people's perception on DRT.

In the next section, the survey results are interpreted. The effect of DRT on perceived accessibility is explored and population groups and spatial contexts that benefit most from DRT are identified. Findings from the interviews with inhabitants and experts provide context for these interpretations. The chapter concludes with a discussion on the normative statements from these interviews, evaluating the indicators that can be used to measure the success of DRT systems, the impact of DRT on perceived accessibility, and what constitutes a sufficient level of accessibility.

## 4.1 Survey Results

The survey yielded 203 valid responses that can be analysed. Only responses that filled in all the survey questions, are considered as valid. An exception is the last question of the survey, which asks the respondents if they are interested in giving an interview. When this question was left unanswered, the previous questions were considered valid. This means that this research has an analysis of 203 data units.

### 4.1.1 Reliability Test

To check whether the questions capture the concepts described in the theoretical framework, a reliability test is performed. the Cronbach alpha of these is measured. All the following figures in this chapter where retrieved using the software of SPSS.

Figure 8: Cronbach Alpha for DRT

Reliability Statistics		Item-Total Statistics			
Cronbach's Alpha	N of Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
,693	3				
		4,38	1,989	,627	,434
		4,17	2,160	,454	,699
		5,12	3,055	,510	,640

The Cronbach Alpha of the independent variable DRT (Figure 8) yields a reliable concept.

Following this, the Cronbach Alpha of the dependent variables are measured.

The Cronbach Alpha for the land use component of perceived accessibility (Figure 9) yields a weak internal consistency.

Figure 9: Cronbach Alpha Land Use

Reliability Statistics		Item-Total Statistics			
Cronbach's Alpha	N of Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
,432	3				
		5,64	2,915	,306	,262
		6,27	3,268	,159	,513
		6,07	2,461	,332	,193

The Cronbach Alpha for the temporal component of perceived accessibility (Figure 10) yields a high internal consistency.

Figure 10: Cronbach Alpha Temporal

Reliability Statistics		Item-Total Statistics			
Cronbach's Alpha	N of Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
,799	3				
		5,23	3,988	,571	,801
		5,44	3,624	,662	,707
		5,26	3,738	,703	,666

For the transport component of perceived accessibility, the Cronbach Alpha (Figure 11) also yields a high internal consistency.

Figure 11: Cronbach Alpha Transport

Reliability Statistics		Item-Total Statistics			
Cronbach's Alpha	N of Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
,799	4				
		7,2857	7,621	,579	,767
		7,2956	7,506	,757	,684
		7,1429	7,796	,617	,747
		7,2266	8,047	,517	,797

Since land use, transport, and temporal factors collectively form the dependent variable ‘perceived accessibility’, a combined Cronbach’s Alpha was calculated. The result (Figure 12) yields a very high internal consistency.

Figure 12: Cronbach Alpha perceived accessibility.

Reliability Statistics		Item-Total Statistics			
Cronbach's Alpha	N of Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
,871	10				
		24,3005	46,013	,591	,859
		24,3103	45,047	,784	,844
		24,1576	44,777	,738	,846
		24,2414	47,224	,521	,864
		23,3103	48,809	,500	,865
		23,9458	51,893	,259	,883
		23,7438	46,786	,557	,861
		23,8719	44,984	,747	,846
		24,1429	46,717	,590	,858
		23,9606	46,692	,640	,855

Since the Cronbach alpha of both perceived accessibility and DRT are high, it can be concluded that the survey questions measure what they intend to in relation to the research questions.

### 4.1.2 Descriptive Statistics

The next two figures show in which town within the municipality Loon op Zand the respondents of the survey live (Figure 13). Interestingly, the majority of the respondents live in Loon op Zand, while Kaatsheuvel has more inhabitants (16,000 compared to 6,000, see Section 3.2.2.) (CBS, 2024). The survey was distributed according to the population, this discrepancy is unexpected.

Figure 13: Place of living of the survey respondents.

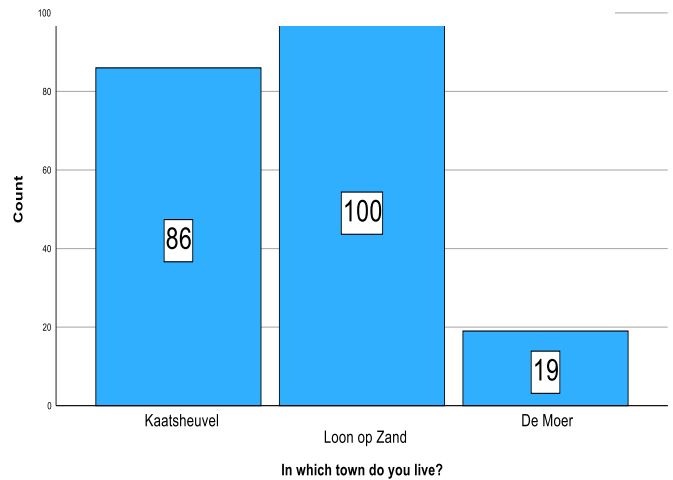


Figure 14 displays the main transport mode of the respondents. The majority of the respondents uses the car as main transport mode, followed by the (e)bike and PT. For the regression analysis in the next section, car as driver and car as a passenger are combined into a single category: car user.

Figure 14: Main transport mode of the respondents

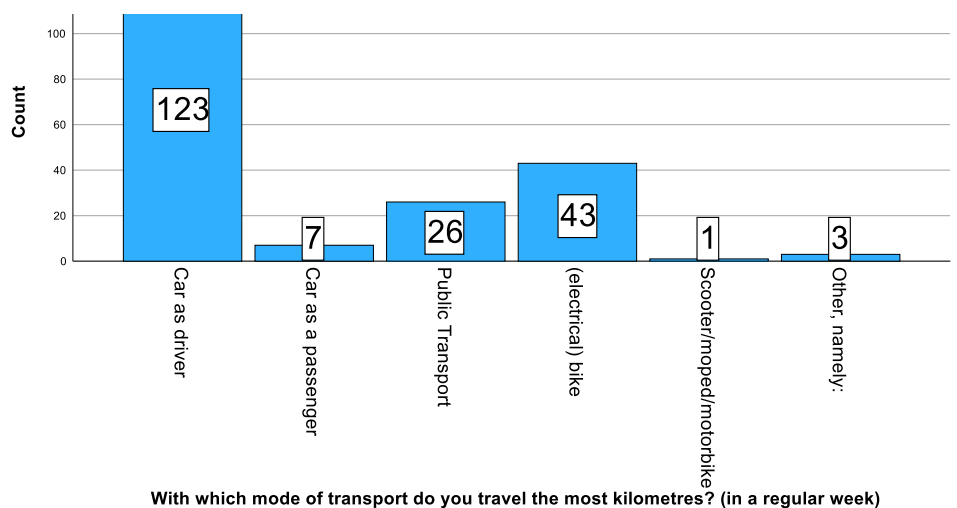
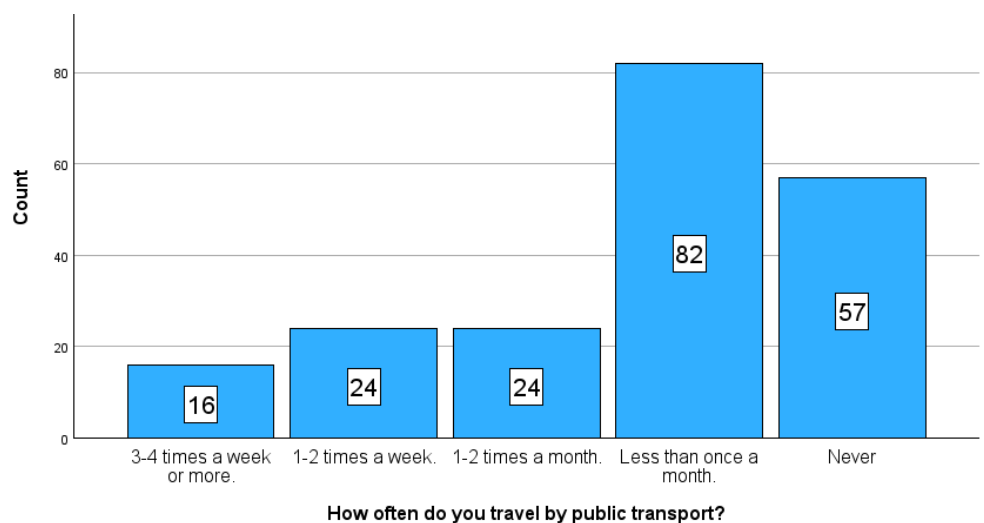


Figure 15 displays the usage of PT among the respondents.

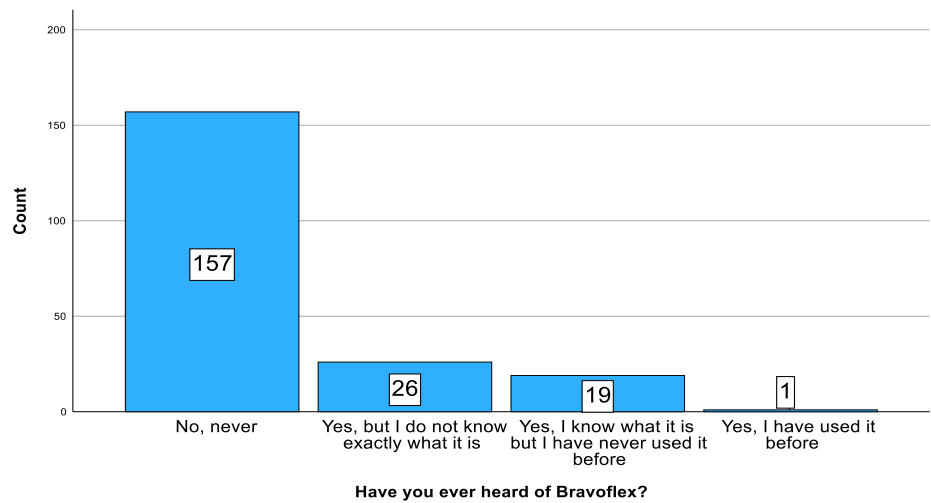
Figure 15: Public transport usage among the respondents.

The answers of the respondents on their main transport mode and usage of public transport are in line with the average Dutch population (CBS, 2025).



When seeing the answers of the questions about the DRT-system Bravoflex, it is striking that the majority of the respondents are not aware of the system, and only one respondent has used the system (Figure 16). No respondent used the system regularly, which was the remaining answer option for this question.

Figure 16: Awareness of the Bravoflex-system of the respondents



#### 4.1.3 Regression Analysis

To test the first hypothesis discussed in Section 2.6: *The perception of DRT positively affects perceived accessibility*, the variables which were discussed in Sections 3.2.1 and 4.1.1, a regression analysis was conducted. The dependent variable is thus perceived accessibility, a Likert score between 0 and 5, while the independent variables are DRT and the control variables (which can be considered part of the individual component of perceived accessibility, as discussed in Section 2.2 and 2.5), which are also measured in a Likert score. The survey question about the recognition of the particular Bravoflex DRT-system (Figure 16) is not included in this Likert-score, as operationalised in Table 1 in section 2.6. As can be seen in the list of survey questions (Appendix 1), before the questions about the respondents' perception of DRT, an explanation of the Bravoflex-system (both a short clip and a text) was given, so that respondent could adequately answer these questions, even without previous experience with the DRT-system. With the help of these questions, comments can be made on the respondents' perception of DRT, even considering the low awareness of the system prior to answering this survey. The control variables used in this regression analysis are age, place of living and most used transport mode. The perception of DRT is measured as a Likert score between 0 and 5, while the control variables are measured as dummy variables, with one answer option which serves a reference category. For the control variable age, the age category between 18 and 25 years old serves as reference category, for place of living the town of De Moer is used, and for the most used transport mode the private car is used (driver and passenger were added together). This results in the following regression model, displayed in Figure 17 and Table 2:

Figure 17: Regression model for perceived accessibility

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,451 <sup>a</sup>	,203	,166	,68752

a. Predictors: (Constant), Scooter, PT, Young\_Adult, DRT, Loon\_Op\_Zand, Bike, Old, Kaatsheuvel, Adult

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23,288	9	2,588	5,474	<,001 <sup>b</sup>
	Residual	91,229	193	,473		
	Total	114,517	202			

a. Dependent Variable: Perceived\_Accessibility  
 b. Predictors: (Constant), Scooter, PT, Young\_Adult, DRT, Loon\_Op\_Zand, Bike, Old, Kaatsheuvel, Adult

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,083	,304		6,849	<,001
	DRT	,129	,069	,123	1,878	,062
	Kaatsheuvel	,667	,179	,437	3,719	<,001
	Loon_Op_Zand	,365	,174	,243	2,093	,038
	65+	-,437	,212	-,249	-2,066	,040
	45-65	-,261	,203	-,169	-1,288	,199
	25-45	-,243	,204	-,147	-1,189	,236
	PT	,490	,163	,218	2,999	,003
	Bike	,339	,125	,185	2,707	,007
	Scooter	-,347	,699	-,032	-,496	,620

a. Dependent Variable: Perceived\_Accessibility

Table 2: The impact of variables on Perceived Accessibility

Variable	Standardized coefficients Beta
Perception towards DRT	0.123*
Inhabitant of Kaatsheuvel	0.437***
Inhabitant of Loon op Zand	0,243**
Age is 65 years or older	-0,249**
Age between 45 and 65	-0,169
Age between 25 and 45	-0,147
Uses public transport as their main travel mode	0,218**
Uses an (e)bike as their main travel mode	0,185*
Uses a scooter as their main travel mode	-0,032

Note: \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01

The regression model in Figure 17 shows that the proposed model is significant since the p-value is lower than 0,05, with its sig. that is lower than 0,001. The R square is 0,203, meaning that the proposed model explains 20,3 percent of the variation in perceived accessibility.

To show the direction and strength of the effects from the different variables the standardized coefficients beta is calculated (Figure 17). The regression model shows that a positive perception of DRT has a small positive effect on the perceived accessibility of the respondents. The hypothesis *The perception of DRT positively affects perceived accessibility* cannot be rejected based on this data.

Respondents living in Kaatsheuvel or Loon op Zand on average have a higher perceived accessibility than residents of De Moer. Whether or not someone is an inhabitant of Kaatsheuvel is the most significant variable in the regression model, and it also has the highest effect out off all the variables included in the regression model. This tells that residents of De Moer have the lowest perceived accessibility of the three cores.

The older respondents of the survey, the lower their perceived accessibility. This means that persons between 18 and 25 have the highest perceived accessibility. Respondents who use PT or a bike as their main travel mode have higher perceived accessibility than people which use a car as their main travel mode. Only one respondent who answered that a scooter/motor bike/moped is their most used travel mode (Figure 14), so this could be the reason why this variable is far from significant and has a high standard error compared to the other variables in both regression models (Figure 17 and 18).

To research which factors influence the perceptions toward DRT-systems, and research the hypothesis introduced in Section 2.6: *perceived accessibility positively affects the perception of DRT*, another regression analysis is conducted. The three components of perceived accessibility (transport, temporal, land use) and control variables are used in this, although for the land use component, the questions are analysed separately, due to low validity (see Section 4.1.1). Figure 18 and Table 3 show limited clear results. It does not provide sufficient statistical evidence to reject the null hypothesis (that perceived accessibility has no effect on the perception of DRT) at the 5% significance level (since  $p = 0.078$ ). However, the data shows a potential relationship that may warrant further investigation in future research. The most significant variable is once again place of living, which was included as a control variable, with residents of Loon op Zand and De Moer having a slightly more positive perception towards the DRT-system than inhabitants of Kaatsheuvel. The only significant variable in this model is the high income group (who answered that their income was between 4500 and 6000 euros), while other income groups did not show significant differences in their perception towards DRT.

Figure 18: Regression model for perception towards DRT

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,308 <sup>a</sup>	,095	,038	,70768

a. Predictors: (Constant), Transport, 45-65, Loon\_Op\_Zand, Scooter, Bike, The locations I need to travel to are close to my home., PT, It is possible to reach the activities I prefer using public transport., 65+, Temporal, Kaatsheuvel, 25-45

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9,990	12	,832	1,662	,078 <sup>b</sup>
	Residual	95,155	190	,501		
	Total	105,145	202			

- a. Dependent Variable: DRT
- b. Predictors: (Constant), Transport, 45-65, Loon\_Op\_Zand, Scooter, Bike, The locations I need to travel to are close to my home., PT, It is possible to reach the activities I prefer using public transport., 65+, Temporal, Kaatsheuvel, 25-45

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,903	,333		5,713	<,001
	Kaatsheuvel	-,390	,188	-,267	-2,074	,039
	Loon_Op_Zand	-,144	,182	-,100	-,790	,431
	65+	,064	,225	,038	,285	,776
	45-65	-,129	,211	-,087	-,612	,541
	25-45	-,037	,214	-,023	-,174	,862
	PT	-,052	,177	-,024	-,294	,769
	Bike	,025	,133	,014	,186	,853
	Scooter	,780	,733	,076	1,063	,289
	The locations I need to travel to are close to my home.	,086	,050	,129	1,737	,084
	It is possible to reach the activities I prefer using public transport.	,138	,058	,197	2,385	,018
	Temporal	,026	,086	,033	,302	,763
	Transport	-,049	,094	-,061	-,520	,604

a. Dependent Variable: DRT

Table 3: The impact of variables on the perception towards DRT

Variable	Standardized coefficients Beta
<b>Inhabitant of Kaatsheuvel</b>	-0,267**
<b>Inhabitant of Loon op Zand</b>	-0,1
<b>Age is 65 years or older</b>	0,038
<b>Age between 45 and 65</b>	-0,087
<b>Age between 25 and 45</b>	-0,023
<b>Uses public transport as their main travel mode</b>	-0,024
<b>Uses an (e)bike as their main travel mode</b>	0,014
<b>Uses a scooter as their main travel mode</b>	0
<b>The locations I need to travel to are close to my home</b>	0,129*
<b>It is possible to reach the activities I prefer using public transport</b>	0,197**
<b>Temporal</b>	0,033
<b>Transport</b>	-0,061

Note: \* p<0.1, \*\* p<0.05 and \*\*\* p<0.01

## 4.2 Discussion

This section discusses the main results of the quantitative analysis presented in Section 4.1. The aim is to interpret and contextualise the identified statistical relationships between the perception of DRT and perceived accessibility, with the support of qualitative insights from the conducted (expert) interviews and relevant academic literature. By combining these sources of evidence, the discussion aims to triangulate the results and provide a more comprehensive understanding of how DRT-systems are perceived.

The discussion is divided into three parts. The first part (The Effect of DRT on Perceived Accessibility) reviews the main regression results and explores the extent to which awareness and the perception of DRT influence how people perceive their accessibility. The second part (For who is a DRT system particularly useful?) considers spatial and socio-demographic differences in responses, and, drawing on analyses on subgroups and interviews with both residents and experts, reflects on who benefits most from such a system. The final part (Normative Judgments) steps back to reflect critically on the wider policy implications, addressing questions of equity, last-mile connectivity, and the role of DRT in fostering a more equitable transport system.

### *The Effect of DRT on Perceived Accessibility*

The results of this research indicate that it is difficult to precisely measure the effects of Demand-Responsive Transport on perceived accessibility. The regression analysis revealed a weak and statistically low significant relationship between the perception of DRT and perceived accessibility (Section 4.1.3). Additionally, together with the control variables only 20,3% of the variation of perceived accessibility is explained. This finding must be interpreted with caution. As shown in the descriptive analysis (Section 4.1.2), the vast majority of respondents were unaware of the Bravoflex system, and even less had travelled using the system before (Figure 16). Although this question is not included in the analysis of perceived accessibility (explained in Section 3.2.1), a short videoclip and explanation perhaps is not sufficient for respondents to really understand the potential benefits that a DRT-system could offer them. This low level of awareness could limit the ability of the survey to detect a meaningful effect of DRT perception on perceived accessibility, because the independent variable is not fully developed in the minds of most respondents. It could be that in a few years, when the DRT-system is more prominently present in the researched municipality and the whole province of Noord-Brabant, and the knowledge about Bravoflex increases, its effect on perceived accessibility may grow.

The important role of awareness of the system is consistent with earlier research. Ramos et al. (2019) emphasised that a major challenge for PT-systems is not only technical or operational, but cultural and perceptual: users often lack awareness, trust, or familiarity with PT-systems, especially in regions dominated by car use. Following this point, as discussed in Section 2.2.2, travellers' decisions are shaped by 'mental maps'; internal representations of transport options that do not always reflect objective availability (Pot et al., 2021). When a resident is not aware of the DRT-system available to them, it is not integrated in their mental map, and therefore excluded from their perceived accessibility.

Interviews with residents support this interpretation. All four participants expressed unfamiliarity with Bravoflex, similar to the majority of the survey respondents' (Section 4.1.2, Figure 16). This finding suggests that DRT is not yet normalised or integrated into daily travel considerations, even among residents who may benefit from it most. Still, after an explanation of the system, most interviewees believed it could improve accessibility in low-PT areas:

*“I do think that it is a good initiative. You run transport when there is demand, so that you do not have empty buses, which is also expensive. And perhaps this will also make tickets a bit cheaper, if it is used a lot. Supply and demand will match better, I think.”<sup>1</sup>*

*Hans, interviewee 4*

Furthermore, the thesis adopts a user-centred perspective on transport equity, drawing from Martens (2021), arguing equitable transport system is defined in terms of perceived accessibility, not only spatial or economic provision. From this perspective, the finding that the perception of DRT currently has a limited effect on perceived accessibility does not imply that DRT is ineffective; rather, it highlights the need to make DRT visible, accessible, and trusted by a wider range of users before it can contribute meaningfully to accessibility outcomes. Raising awareness by providing targeted communication and simplifying booking processes could help transform DRT from a marginal, unfamiliar concept for residents into a viable transport option included in users’ travel decision-making. This again supports the notion of Pot et al. (2021) discusses in Section 2.2.2, that perceived accessibility is not only about transport infrastructure or service coverage, but also whether users feel confident and to use a certain mode.

In short, the weak statistical relationship between the perception of DRT and perceived accessibility in this research, is best understood as a reflection of current limitations in the system awareness among its potential users, and not as a dismissal of the relationship between the two. The potential for DRT to improve perceived accessibility remains, but only if it becomes recognised, trusted, and embedded in the everyday mobility practices of the communities it is designed to serve.

#### *For who is a DRT-system particularly useful?*

When considering the interviews with inhabitants and experts, the Bravoflex DRT-system is not helpful to the majority of the population of the research area, since they already have access to frequent PT. This is also reflected in the survey results, which show that respondents living in areas with higher public transport availability report higher levels of perceived accessibility. While this finding may seem self-evident, it highlights the fact that DRT is unlikely to significantly improve perceived accessibility in areas that are well-served in terms of traditional PT. Rather than replacing traditional PT, DRT should be seen as a complementary solution that fills specific gaps in PT-service, for example in low-density areas where regular bus lines are unavailable or limited. This perspective aligns with Alonso-González et al. (2018), who argue that DRT systems are most effective in contexts where traditional PT is not viable.

For individuals who live within walking or cycling distance of a bus stop which are served by busses throughout the whole day, the particular DRT-system Bravoflex offers little to no added value. Instead, it is beneficial to people who live in areas where previously, no PT-stop was available within a walking distance. This is also the main goal of the province of Noord-Brabant of this system, as stated in its mobility vision (Provincie Noord-Brabant, 2018a) and it also in the interview:

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<sup>1</sup> *“Ik denk wel dat het een goed initiatief is. Dat je ook vervoer laat rijden op het moment dat er ook vraag naar is, dus dat je niet lege bussen hebt, hè, wat toch ook duur is. En ja, wellicht dat hiermee ook de kaartjes wat goedkoper worden, als er veel gebruik van gemaakt wordt. Vraag en aanbod sluit beter aan, denk ik zo.”*

*“One of those promises is that we will make public mobility available in more places. With Bravoflex, we can also introduce a DRT-stop, in areas where there was previously no public transport at all. De Moer in your research area is a good example of that.”<sup>2</sup>*

*Programme leader mobility province Noord-Brabant*

This especially could benefit people who cannot cycle far and for whom the bus stop is too far away to walk to. This is reflected in the differences in perceived accessibility of the respondents living in the three towns in the municipality of the research area. Inhabitants of the town where only a DRT stop but no regular bus service (De Moer) is available have the lowest perceived accessibility.

Next to areas where currently there is no regular public transport available, it can also be beneficial for people who rely on a bus lines which does not ride during the whole day. Many bus lines ceases to ride in the weekend or during the evening hours, since ridership is too low during these times. Examples of such lines are neighbourhood busses (*“buurtbussen”*), around 60 of which ride in Brabant in 2025, which rely on volunteers and often drive through neighbourhoods and villages where highly frequent busses are not available (Bravo, n.d.-d). With the introduction of the DRT-system Bravoflex, people living in these areas still have access to PT outside standard operating hours. According to the province these areas benefit the most from the introduction of the DRT-system, next to places where there previously no PT available:

*“And at times when buses stop running DRT could also be a solution.”<sup>3</sup>*

*Programme leader mobility province Noord-Brabant*

DRT-systems can also help to mitigate the impacts of the changes in the routing of bus lines, as stated by the travellers association. Bus lines routes increasingly are moved to the edge of villages/neighbourhoods, to speed up the routing and to offer a better alternative to a private car due to the shorter travel time than a bus that drives through the centre of villages. This so-called ‘stretching’ of the bus lines benefits most travellers, since the most important factor for the modal choice of a traveller is the relative travel time compared to alternative transport modes (KiM, 2020). Stretching bus lines speeds up its routing, decreasing the travel time, making PT a more attractive alternative to other modes, such as the private car (Stewart & El-Geneidy, 2015). At the same, operating costs of PT go down (Van Der Bijl & Van Oort, 2024). The stretching of bus lines increases the walking distance to a stop, and most people are willing to walk a larger distance to stop where the bus line is faster (Van Der Bijl & Van Oort, 2024), or they use their bike, which is the most-used transport mode for a first-mile in the Netherlands (De Witte et al., 2013), previously discussed in Section 2.4. However, larger distances to PT stops disproportionately affect people with reduced mobility; people in wheelchairs, people who are injured or in poor health; people with heavy loads to carry; and people with small children (Stewart & El-Geneidy, 2015):

*“during my studies I did notice that in PT there is a lot of stretching now in terms of lines. (...) That is very good to get the choice-traveller to use PT, because your travel time is much more competitive with the car. But the people who get hit by this are, for example, the people who are*

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<sup>2</sup> *“Eén van die beloftes is dat wij gedeelde mobiliteit beschikbaar maken op meer plaatsen. Met Bravoflex kunnen wij ook een halte neerzetten, een flexhalte in gebieden waar voorheen dus helemaal niets aan openbaar vervoer was. De Moer in het gebied waar jij je enquête gedaan hebt is daar een mooi voorbeeld van.”*

<sup>3</sup> *“En tijdstippen waarop bussen niet meer rijden. Dan kan flex ook nog wel een oplossing zijn.”*

*not going to cycle to a stop on the edge of the village. I think precisely the people who can't do that; you lose them, because those bus lines disappear”<sup>4</sup>*

*Advisor Travellers Interests Oost-Brabant at the Travellers Association Brabant*

DRT could serve as a solution for this group, since these stops are closer to the resident, reducing walking distances.

In line with the notion of the changing bus line routing, the survey shows that perceived accessibility decreases the older the respondents get. This could be because of the reduced mobility when people get older, while younger people are more willing to cycle to a PT-stop where highly frequent PT is available. This also could be valid for people with disabilities, who are not able to walk or cycle as far as healthy people (Dytckov et al., 2022), as discussed in Section 2.3. This came to the forefront in an interview with a resident of Kaatsheuvel, whose daughter has a disability:

*“I think all the busses arrive and depart at the Efteling. With her (her daughter with a disability) , that's at least a 15-minute, 20-minute walk and there is a stop a bit closer too, which still is 15 minutes (walking) with her. She doesn't walk that fast.”<sup>5</sup>*

*Maria, interviewee 2*

But just starting a DRT-system to combat the impacts of the changing bus routes will not be sufficient. The system is complicated according to the interviewees, both the residents and the experts. In order for a DRT-system to be used, it has to be simple in the eyes of the (potential) user:

*“Often there is a good public transport alternative available, but people do not know about it, or perhaps find it inconvenient? They do not know where to find it because it is fragmented”<sup>6</sup>*

*Former Chair national network for Demand-Responsive Transport (DOVA)*

An important factor which was stated by almost all interviewees (both residents and experts) to increase the visibility and ease of use of the DRT-system is the integration of the system into (Public) Transport travel planners. Even residents who rarely travel using PT still use a travel planner for their incidental trips and answer positively on the question when:

*“Yes, it (Bravoflex) is part of Public Transport. I very much think so. I do really like that PT (travel) app, because everything you need to know is included in it.”<sup>7</sup>*

The integration of Bravoflex into (public) transport planners is also of high importance as stated by programme leader mobility of the province of Noord-Brabant in the expert interview. The ultimate goal the province works towards is a MaaS-app, where you can easily book and pay multiple modes of transport, including trains, busses, shared mobility and also DRT-rides.

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<sup>4</sup> *“Tijdens mijn studie is het mij opgevallen dat in het ov er heel veel gestrekt wordt qua lijnen. (...) Dat is heel goed om de keuze-reiziger in het ov te krijgen, want je reistijd concurreert veel meer met de auto. Maar de mensen die daar raakt zijn bijvoorbeeld de mensen die niet naar een halte aan de rand van het dorp gaan fietsen. Ik vind juist de mensen die dat niet kunnen; die raak je kwijt, want die buslijnen verdwijnen.”*

<sup>5</sup> *“bij de Efteling komen volgens mij alle bussen. Met haar is dat zeker een kwartier, twintig minuten lopen en dan hebben we iets dichterbij (huis) ook een halte, dat is ook gewoon een kwartier met haar. Ze loopt niet zo snel.”*

<sup>6</sup> *“Vaak is er wel een goed OV alternatief, maar weten de mensen niet, vinden ze het lastig? Weten dus niet waar ze het moeten zoeken omdat het versnipperd is.”*

<sup>7</sup> *“Ja, het is een onderdeel van het OV. Dat denk ik zeer zeker. Ik vind die OV-app wel heel goed, want eigenlijk alles wat je moet weten, staat erin.”*

The youngest survey respondents (18-25 years old) report the highest perceived accessibility, likely because many of these are students who benefit from free PT subscriptions in the Netherlands, leading to more frequent PT usage (Versteijlen, Van Wee, & Wals, 2021), increasing their perceived accessibility.

The survey results show that people who use public transport or their bicycle as their main transport mode have a higher perceived accessibility than people using a car, with people who use PT as their main travel mode having the highest perceived accessibility. This discrepancy might be due to the fact that most questions assessing perceived accessibility focused on public transport. However, car users might be just as satisfied, if not more, with their accessibility compared to those who use PT as their main transport mode.

In addition to DRT, it could be useful to also consider alternative solutions to (perceived) accessibility problems. Interviewee Piet, living in the town of De Moer (with only a DRT-stop and no other PT options) highlighted the strong social networks within the village, and the initiative of AutoMaatje by the Dutch automobile association ANWB which is used by inhabitants of the town, where volunteers drive people with limited mobility to their destination (ANWB, n.d.). This aligns with the model of Van Wee (2022), discussed in Section 2.2.2, which emphasizes the importance of social context for solving accessibility problems. Similar findings in the research by Meijering and Weitkamp (2024) in rural and suburban areas in the north of The Netherlands, concludes this as well. Older adults displayed creativity and agency that helped them to maintain their everyday mobilities and compensated for their physical and cognitive impairments, such as a group in a small town that organises rides to the hospital or leisure activities for people who cannot travel independently (Meijering & Weitkamp, 2024).

### *Normative Judgments*

To evaluate the success of a DRT-system, the number of passengers that use the service and/or the financial results are commonly used criteria (Pettersson, 2019). The financial results are considered important by the programme leader mobility of the province of Noord-Brabant, since the DRT-systems costs public resources in tax-payer money, and therefore the civil servants have to justify this spending to their governors, which are elected politicians:

*“We need to justify to the Provincial Council what we are doing with our resources. The same is valid for municipalities, which in turn have to explain their municipal council what they are doing with their resources.”<sup>8</sup>*

*Programme leader mobility province Noord-Brabant*

However, beyond financial considerations, the impacts of DRT on equity and accessibility are also crucial. As discussed in Section 2.4, it is important to assess how a certain measure affects the accessibility of different population groups (Martens, 2021). Bravoflex could benefit particular population groups, as stated by the province of Noord-Brabant and the travel association:

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<sup>8</sup> *“Wij moeten kunnen verantwoorden naar de Provinciale Staten wat wij met onze middelen doen. En hetzelfde geldt voor gemeenten die weer moeten verantwoorden naar hun gemeenteraad wat zij met hun middelen doen.”*

*“Yes, I think that is because of how it (Bravoflex) is set up; You go from stop to a hub. That will probably be a cycling distance for some people. So I think you do get rid of the people who are well fit to cycle, but the people who can't, will use Bravoflex faster.”<sup>9</sup>*

*Advisor Travellers Interests Oost-Brabant Travellers Association Brabant*

The province prefers that people cycle to these hubs (discussed in the expert interview), following the so-called STOMP principle (Goudappel, n.d.), a planning principle widely used by transport planners in The Netherlands. STOMP is a ranking that determines which transport mode needs to get priority in a planning process. The ranking is *Stappen* (stepping, refers to walking), *Trappen* (kicking, refers to cycling), *OV* (PT), *MaaS* (which includes DRT), and lastly, the private car (Goudappel, n.d.).

Ultimately, defining “sufficient” accessibility requires normative judgments. As discussed in Section 2.4, there are multiple views regarding what this exactly entails (Van Wee, 2022). The travel association defines sufficient accessibility the following way:

*“Even in less inhabited places with fewer passengers, there should be a direct connection to frequent public transport.”<sup>10</sup>*

*Advisor Travellers Interests Oost-Brabant Travellers Association Brabant*

The residents which were interviewed, all stated that it is important that every village has access to PT, while the access to destinations was rarely discussed. Adding to this, residents, and also the travellers association, focussed a lot on bus lines that do not drive through residential areas, or lines that have disappeared completely. Residents thus generally are mobility-focused and a shift to accessibility-based thinking as Handy (2020) describes has not yet occurred.

The province of Noord-Brabant echoes the words of Handy (2020) in Section 2.2.1 on the shift from a focus on mobility to accessibility, and states that accessibility is a subjective term which is not easy to determine:

*“Accessibility is a feeling. It is a subjective thing, (...) The mobility world is actually a world that works using numbers and thinks about transport numbers, vehicle loss hours, etc. Ultimately it's (sufficient accessibility) about whether an individual, someone who lives/ works/ is present somewhere here in Brabant, feels that he/she/they can move around at the time they want to and in a way that suits them best.”<sup>11</sup>*

*Programme leader mobility province Noord-Brabant*

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<sup>9</sup> *“Ja, ik denk dat komt door hoe het is opgezet; je gaat van halte naar een hub. Dat zal voor sommige mensen waarschijnlijk fietsafstand zijn. Dus ik denk dat je de mensen die goed fit zijn wel aan de fiets kwijtraakt, maar de mensen die dat niet kunnen, sneller in Bravoflex krijgt.”*

<sup>10</sup> *“Dat ook op minder drukke plekken met minder reizigers, een directe aansluiting op OV zou moeten zijn, op frequent OV.”*

<sup>11</sup> *“Bereikbaarheid is een gevoel. Dat is een subjectief iets, (...) De mobiliteitswereld is eigenlijk een wereld die in cijfertjes werkt en denkt over, vervoersaantallen, voertuigverliesuren hebben we het over en dat soort zaken. Maar het gaat er uiteindelijk om of dat een individu, iemand die ergens hier in Brabant woont, werkt, leeft, aanwezig is, het gevoel heeft dat hij of zij of hen zich kan verplaatsen op het moment dat ze dat willen op een manier die ze eigenlijk het beste bij ze past.”*

# Chapter 5: Conclusion

## 5.1 Answering the Research Questions

To answer the main question of this research, *How Does Demand-Responsive Transport affect the Equitability of a Transport System?*, several sub-questions were introduced in Section 1.3.

The first sub-question is: *How does Demand-Responsive Transport affect the Perceived Accessibility of Inhabitants?* Based on this research it can be concluded that DRT has a small positive effect on the perceived accessibility of inhabitants, and that it has the largest effect in areas with limited public transport options. Although the effect of the perception of DRT on perceived accessibility is small, the strongest determinant is place of residence. People in areas with more frequent public transport naturally report higher perceived accessibility due to the greater availability of high-quality transport options. This in line the research of Bastiaanssen and Breedijk (2022) (among others) discussed in Chapter 1.4.1, which states there are vast differences in accessibility between area types in the Netherlands. However, DRT has a larger positive effect in areas with limited PT-services, helping to narrow the accessibility gap between well-served and underserved regions.

This finding relates to the next sub-question: *In what Spatial Contexts is Demand-Responsive Transport considered beneficial?* The answer to which is that DRT-systems are considered most beneficial in areas where PT is (sometimes) absent. In areas where there is already frequent PT available, DRT has little to no added value. This question coheres with the sub-question: *Which Population Groups consider Demand-Responsive Transport a useful Transport Mode?* The answer to which is that DRT has can potentially add value for people who are less mobile. For most of the (younger) population in the research area the DRT-system has little added value, since most bus stops are within an acceptable cycling distance. In order to encourage cycling to this bus stop as a first- and last-mile, adequate infrastructure to store bikes, with enough storage racks, must be available. Nevertheless, for people who do not cycle (as far), DRT-systems can offer a solution for this first/last-mile when their bus stop is not within walking distance of their homes according to the experts interviewed working for the province of Noord-Brabant and the Travellers' Association, discussed in Section 4.2. This confirms the statements of Sørensen et al (2021) and Dytckov et al. (2022), discussed in the theoretical framework, who argue that DRT can offer a solution to the first-/last-mile problem. DRT may also be useful in specific circumstances, such as when individuals temporarily lack access to a car or bicycle, prefer not to cycle or walk in the dark, or during adverse weather conditions. It is known that people cycle less in the dark, especially when there is no adequate lighting and safe bicycle paths (Uttley, Fotios, & Lovelace, 2020). This suggests that DRT can serve as an alternative when people do not feel comfortable to cycle.

The final sub-question: *What factors are important to make Demand-Responsive Transport attractive?* looks forward to the future. Since DRT is a relatively new transport mode and technologies keep evolving, there are several ways to improve the DRT-systems. A key success factor for DRT-systems is to ensure that they are perceived as a normal travel option by most residents, similar to conventional PT. To achieve this, its booking system needs to be seamless. Additionally, it is very important that the DRT-systems are integrated with travel apps for PT, allowing DRT to appear as a viable alternative when no conventional PT options are available.

The exact features of different DRT-systems differ a lot, and further research is needed to determine which factors are most important for travellers; such as the booking system, the reservation time that is needed (how short before you ride are you able to book it?), pricing, etc.

Using the answers of these sub-questions, the main question of this research can be answered: *How does Demand-Responsive Transport affect the Equitability of a Transport System?*

DRT certainly does contribute to a more equitable transport system. DRT-systems are designed to offer a travel solution for a limited amount of people, and not with the aim to serve a high amount of travellers like regular PT. However, for these specific groups, DRT can offer a big improvement for their (perceived) accessibility, since it adds an option to travel from and to areas where previously limited or no PT was available. This offers people an alternative to their private cars and offers people without a car an option to travel with PT, increasing their opportunities to engage in activities, visit facilities, and seek employment.

The introduction of DRT-systems has the potential to be a factor to combat car dependence in specific contexts. It introduces a form of PT in areas where it is not available (all the time); this will mean it will often take time to be considered as an option, since most people living in these areas are unfamiliar with PT and these areas are (perhaps due to the lack of PT) often car-centred. When the DRT-system is catered well to the demands of the specific population it will serve, the familiarity and use of the system will gradually increase, and people will at least consider it as a travel option. Not everyone owns a car; it is fair and just to at least offer these people a suitable travel option, enabling them to lead more independent lives and participate fully in society.

The effect of DRT on perceived accessibility is strongest in areas with limited public transport options, helping to reduce disparities between regions with different PT availability and therefore contributing to a more equitable transport system.

## 5.2 Contribution to further Development of Theories

Policy makers interviewed for this study supported Martens' (2017) definition of sufficient accessibility as a level below which people experience a lack of opportunities (see Section 2.4). However, both policy maker and residents tend to adopt a more mobility-focused perspective rather than an accessibility-focused one, prioritizing the availability of PT over access to opportunities.

As discussed in Sections 4.2 and 5.1, the most significant factor influencing perceived accessibility in this research is the place of residence. This highlights the spatial context as the primary determinant of perceived accessibility. This validates the research of Porru et al. (2020) in Section 1.4.2, and Van Wee (2022), discussed in Section 2.2.2, who emphasize the importance of spatial context and conclude that certain mobility solutions could be successful in certain contexts but not in others. Additionally, this outcome reinforces the concept of self-selection, as discussed in Section 2.2.2: people choose their place of residence based on their mobility needs (Pot et al., 2021). People who own a car do not rely on good accessibility by PT, since they can reach most of their desired locations with their car. However, because of the survey's focus on perceived accessibility in relation to PT, car users may have reported a lower level of perceived accessibility, a limitation of this research that will be further discussed in Section 5.4.

Personal capabilities did not significantly influence perceptions of DRT in this research, likely due to the residents' overall low familiarity with the system. Once again, this aligns with the concept of self-selection by Pot et al. (2021), discussed in Section 2.2.2: people have little demand for PT in a certain area, and because of this they have little demand for DRT as well. However, this relationship could also have a reverse nature: Low PT-usage leads to low familiarity with PT and,

consequently, with DRT; further reducing the likelihood of its adoption. This may be particularly relevant for system like Bravoflex, which aims to serve as a connection to the PT network. This research suggests an ambiguous relationship between users of PT and the perception towards DRT (see Section 4.1.3). Future research should examine whether frequent PT users have a more positive perception of DRT and whether this perception varies across different types of DRT systems.

This research confirms the notion that DRT-systems can enhance transportation equity. Although the recognition of the researched DRT-system is low among the population of this research, DRT still has a small positive effect on perceived accessibility, supporting the theory of Sørensen et al. (2021), discussed in Section 2.4. A crucial next step in expanding knowledge on DRT's impact is to examine whether increased public awareness leads to higher perceived accessibility and usage of DRT. As discussed in Section 4.2, the role of social networks in increasing public awareness of transport systems can be important. The knowledge about this is still limited, and requires further exploration.

Beyond improving perceived accessibility in general, a DRT-system can also cater to specific population groups and/or areas. In this research, the DRT-system serves as a travel option for people unable to cycle long distances to a bus stop. Without the DRT-system, these people would have had limited PT options, and would instead rely on private vehicles or assistance from others.

This finding confirms the arguments made by Dytckov, Persson, Lorig, and Davidsson (2022) in Section 2.3, and Sørensen, Bossert, Jokinen, and Schlüter (2021) in Section 2.4, that DRT can serve as a first-/last-mile connector for areas where the availability of PT is limited, and that it can be particularly beneficial for people who cannot walk far, such as the elderly or physically impaired people. The assessment framework for DRT-systems by Alonso-González, Liu, Cats, Van Oort, and Hoogendoorn (2018), discussed in Section 2.4.1, fails to capture that not all individuals are able to walk or cycle as far. To improve this framework, it should be developed further to be able to evaluate at an individual level whether DRT-trips substitute walking or cycling trips, considering individual variations in walking and cycling capabilities. This could strengthen the definition of sufficient accessibility by Martens (2017), by better accounting for individual needs and capabilities.

In conclusion, future research should focus on developing accessibility measures that integrate both objective and perceived accessibility factors. Furthermore, as DRT aims to enhance transport equity, further investigation is needed into how different population groups perceive DRT and in what ways they can benefit from it.

### 5.3 Recommendations for Praxis

This research has several implications for transport planning. DRT can positively influence perceived accessibility, particularly in areas with limited availability of PT. However, in this study, the effect was relatively small, likely due to residents' low familiarity with the DRT-system, as it is still in a pilot phase.

In this research, the perceived accessibility is highest in the areas with extensive PT service. In areas with limited PT, perceived accessibility is lower, but the residents' perception towards DRT is more positive, as it provides an additional travel option. In areas where PT is unavailable within walking or cycling distance (this could also be in the evenings or during the weekend when some bus lines stop running), DRT adds value to the transport system. However, in areas where a bus stop is available within cycling distance, it may be more effective in terms of costs and environmental impact to support infrastructure for travellers to park their bikes rather than promote DRT. Nonetheless, in such cases DRT can act as a 'safety net' for individuals who are not able to cycle as far, or during adverse weather conditions where people might otherwise opt to use their private car. To encourage usage among potential DRT-users, the system must be widely recognized as a viable travel option. This requires increasing public awareness, and ensuring ease of use. A crucial step in this regard is the integration of DRT-systems in travel planners.

The province of Noord-Brabant has not yet established specific criteria to measure the success of the DRT-system Bravoflex. In Section 2.3, multiple evaluation methods to measure the success of DRT-system were discussed. The Multi-Criteria Analysis (MCA), discussed in Section 2.4.1 appears to be a suitable evaluation method, since it assesses the role of DRT within the PT-network and its increased on (perceived) accessibility, which is the aim of the Bravoflex DRT-system. To conduct a MCA, the province should first define clear objectives this for the system. One potential metric is the availability of PT in terms of walking distance to a PT- or DRT-stop, and the number of people that gain access to a stop within walking distance due to the introduction of the DRT-system (at different times of the day and week). Additionally, aspects of the assessment framework by Alonso-González, Liu, Cats, Van Oort, and Hoogendoorn (2018), discussed in Sections 2.4.1 and 5.2, can be used to measure the percentage of DRT-rides that serves as a connection to and from PT. When the goal of the DRT-system is to improve the access to PT, this percentage should be relatively high.

In addition to evaluating DRT performance in isolation, it is important to situate it within the broader discussion of first-/last-mile connectivity. DRT should be viewed as one of several possible methods, alongside for example cycling infrastructure, pedestrian accessibility, and micro-mobility options that can offer a solution to this problem. As emphasised earlier in this study (see for example Section 2.4), DRT is most effective as a complementary solution in low-demand areas where conventional PT may not be viable. In areas where cycling is already a strong first-mile solution, DRT may serve more effectively as a safety net, especially for individuals with limited mobility or for incidental use. For DRT to reach its full potential, it should be normalised as part of an cohesive transport system and not treated as a niche or emergency service. This not only includes the integration of DRT into transport planners but also more extensive public communication about its role and benefits within the wider transport network.

Finally, beyond specific evaluations for DRT-systems, it is essential to assess the overall equitability of the entire transport system, rather than evaluating the DRT-system in isolation. A meaningful metric in this context is the number of individuals experiencing transport poverty, with reductions in this figure indicating effective policy implementation.

## 5.4 Limitations of the Study

Like any research, this study has its limitations. This research on perceived accessibility is focussed around DRT and PT, which leads to the limitation that people who use PT often reported relatively higher perceived accessibility, as discussed in Section 4.2. However, private cars offer a high level (perceived) accessibility and could be used as a baseline to which PT and DRT strive towards.

This study has chosen to research the effect of DRT-systems on perceived accessibility, rather than measured/objective accessibility. Future research could explore these aspects separately by investigating how DRT influences measured accessibility and identifying the factors that enhance the attractiveness of DRT-systems. This research provides a foundation for further exploration of the importance of different factors that make a DRT-systems attractive; including the system type (stop-to-hub, door-to-door, door-to-hub, etc.), integration with travel planners in a MaaS-app, booking time, infrastructure at stops and cycle and/or walking routes to these stops.

Since DRT is a rapidly evolving mode of transport, findings from this study, conducted in a pilot area, may differ from results obtained after full-scale implementation across Noord-Brabant. Additionally, this research was conducted in a particular research area with its unique characteristics, and would perhaps give different results when conducted in a different area, even within Noord-Brabant. Given that place of residence is the primary predictor of perceived accessibility in this study, future research should focus on areas most likely to benefit from DRT systems. Further research should also examine specific population groups that face accessibility challenges to determine whether DRT can effectively address their needs and how these systems can be tailored to better serve this specific group.

Moreover, it is essential to research whether DRT is the most effective solution for the problems of the target population, or whether alternative solutions are more effective. As discussed in Chapter 4, areas with limited PT options often have strong social networks and communities who come up with creative solutions to combat accessibility problems. Future research could explore whether and how these social networks can be used to promote the recognition of DRT and usage among residents.

Ultimately, introducing a DRT-system should not be an objective in itself; it should add value to the transport system and improve the quality of life of its users.

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## Appendix 1: Survey Questions

Q1 Deze vragenlijst maakt onderdeel uit van een masterscriptie aan de Radboud Universiteit. Het onderzoek gaat over de tevredenheid over het Openbaar Vervoer in de gemeente Loon op Zand. Een geanonimiseerde versie van de verzamelde gegevens zal worden gedeeld met mijn supervisor en de Radboud Universiteit. Mocht u vragen hebben over dit onderzoek, kunt u contact opnemen met [flogister@brabant.nl](mailto:flogister@brabant.nl)

Q1 This questionnaire is part of a master's thesis at Radboud University. The research is about satisfaction with Public Transport in the municipality of Loon op Zand. An anonymised version of the collected data will be shared with my supervisor and the Radboud University. If you have any questions about this research, please contact [flogister@brabant.nl](mailto:flogister@brabant.nl)

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Q2 Ik ga ermee akkoord dat gegevens die voor dit onderzoek zijn verzameld, worden gepubliceerd of beschikbaar worden gesteld op voorwaarde dat er geen identificerende informatie wordt gebruikt.

- Ja
- Nee

Q2 I agree that research data gathered for this study may be published or made available provided my name or other identifying information is not used.

- Yes
- No

Q3 Deze enquête gaat over het openbaar vervoer (OV) in de gemeente Loon op Zand. Ten eerste volgen twee vragen om te kijken of u in aanmerking komt om te mogen deelnemen.

Q3 This survey is about public transport in the municipality of Loon op Zand. First, two questions follow to check if you are eligible to participate.

Q4 Wat is uw leeftijd?

- 0-17 jaar
- 18-25 jaar
- 25-45 jaar
- 46-65 jaar
- 65 jaar en ouder

Q4 What is your age?

- 0-17 years
  - 18-25 years
  - 25-45 years
  - 45-65 years
  - 65 years and older
-

Q5 In welke kern woont u?

- Kaatsheuvel
- Loon op Zand
- De Moer
- Ik woon niet in de gemeente Loon op Zand.

Q5 In which town do you live?

- Kaatsheuvel
- Loon op Zand
- De Moer
- I do not live in the municipality of Loon op Zand

**Displayed if:** I do not live in the municipality of Loon op Zand

Q6 Aangezien u niet in de gemeente Loon op Zand woont komt u niet in aanmerking deze enquête in te vullen. Bedankt voor uw interesse. Wanneer u vragen heeft over dit onderzoek kunt u mij een e-mail sturen naar [flogister@brabant.nl](mailto:flogister@brabant.nl).

Q6 As you do not live in the municipality of Loon op Zand, you are not eligible to complete the survey. Thank you for your interest. If you have any questions about this survey, please email me at [flogister@brabant.nl](mailto:flogister@brabant.nl).

**Displayed if:** 0-17 years

Q7 U bent te jong om deze vragenlijst in te vullen. Bedankt voor uw interesse. Wanneer u vragen heeft over dit onderzoek kunt u mij een e-mail sturen naar [flogister@brabant.nl](mailto:flogister@brabant.nl).

Q7 You are too young to complete this questionnaire. Thank you for your interest. If you have any questions about this survey, please email me at [flogister@brabant.nl](mailto:flogister@brabant.nl).

Q8 Met welk vervoersmiddel reist u de meeste kilometers (in een normale week)?

- Auto als passagier
- Auto als bestuurder
- OV
- (elektrische) fiets
- Scooter/ brommer/ motor
- Anders, namelijk: \_\_\_\_\_

Q8 With which mode of transport do you travel the most kilometres? (in a regular week)

- Car as a passenger
  - Car as driver
  - Public Transport
  - (electrical) bike
  - Scooter/moped/motorbike
  - Other, namely: \_\_\_\_\_
- 

Q9 Ik ben afhankelijk van anderen (familie, bekenden) om mijn bestemmingen te bereiken.

- Nooit
- Soms
- Regelmatig
- Vaak
- Altijd

Q9 I depend on others to reach my desired activities.

- Never
  - Sometimes
  - Regularly
  - Often
  - Always
- 

Q10 Hoe vaak reist u met het OV?

- 3-4 keer per week of meer.
- 1-2 keer per week.
- 1-2 keer per maand.
- Minder dan 1 keer per maand.
- Nooit.

Q10 How often do you travel by public transport?

- 3-4 times a week or more.
  - 1-2 times a week.
  - 1-2 times a month.
  - Less than once a month.
  - Never
-

Q11 Ik ervaar drempels waardoor ik minder of geen gebruik maak van OV.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q11 I experience barriers that make me use public transport less or not at all.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- 

Q13 Heeft u al eens van Bravoflex gehoord?

- Nee, nog nooit.
- Ja, maar ik weet niet precies wat het is.
- Ja, ik weet wat het is maar ik heb het nog nooit gebruikt.
- Ja, ik heb het al eens gebruikt.
- Ja, ik gebruik het regelmatig.

Q13 Have you ever heard of Bravoflex?

- No, never
  - Yes, but I do not know exactly what it is
  - Yes, I know what it is but I have never used it before
  - Yes, I have used it before
  - Yes, I use it regularly
- 

Q14 Bekijk optioneel de video (het duurt even voordat deze is geladen) en lees de uitleg (scrol hiervoor naar onder). Met Bravoflex reis je alle dagen van de week én in de avonden. Dus ook wanneer er geen lijnbus is! Bravoflex brengt je van deze halte naar een OV-overstaphalte, waar je overstapt op het normale OV. En Bravoflex brengt je ook weer terug natuurlijk! Reserveren doe je minimaal één uur van tevoren via de app of telefoon.

**Hoe werkt het** Bravoflex heeft géén vaste route of dienstregeling. Je reserveert via de app of telefonisch en bepaalt zelf hoe laat en bij welke halte je wilt aankomen of vertrekken. Reserveer minimaal één uur van tevoren. - kies jouw opstaphalte en bestemming. In de app zie je direct naar welke OV-overstaphaltes je kunt reizen, en andersom. - Kies zelf jouw aankomst- of vertrektijd. - Geef het aantal reizigers door. - Betaal je rit direct met iDeal in de app of met je pinpas bij de chauffeur. De Bravoflex-vervoersservice is natuurlijk rolstoeltoegankelijk.

**Tarief** Vanaf 2025 kost een rit met Bravoflex **2 euro**. Wanneer er voor jouw reis óók een lijnbus beschikbaar is, kost een rit **5 euro**. *\*Let op: De studentenkaart, de OV-chipkaart, abonnementen, Voor Elkaar Pas en leeftijds korting zijn niet geldig.*

**Reistijden** Maandag t/m zaterdag van 07.00 uur tot 24.00 uur Zondag en  
feestdagen van 08.00 uur tot 24.00 uur

Q14 With Bravoflex you travel every day of the week and in the evenings. Even when there is no scheduled bus! Bravoflex takes you from this stop to a public transport hub, from which you can travel further using regular public transport. Bravoflex will also take you back home, of course! Reservations should be made at least one hour in advance via the app or by calling.

**How it works** Bravoflex has no fixed route or timetable. You book a ride using the app or by making a call and decide what time and at which stop you want to arrive or depart. Book at least one hour in advance. - Choose your pick-up stop and destination. The app immediately shows you which public transport stops you can travel to and vice versa Choose your arrival or departure time. Enter the number of travellers. Pay

your ride directly with iDeal in the app or with your debit card at the driver. The *Bravoflex* transport service of course is wheelchair-accessible.

**Pricing** From 2025 onwards, a ride with Bravoflex costs 2 euros. If a regular line bus is also available for your journey, a ride costs 5 euros. *\*Please note: The student card, OV-chipcard, season tickets, Voor Elkaar Pas and age discount are not valid.*

**Travel times.** Monday to Saturday from 07.00 to 24:00. Sunday and public holidays from 08.00 to 24.00 hours

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Q15 Bravoflex stimuleert mij om vaker gebruik te maken van het OV.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q15 Bravoflex would encourage me to use public transport more often.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
-

Q16 Bravoflex kan ervoor zorgen dat ik minder afhankelijk ben van anderen om te reizen.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q16 Bravoflex could make me less dependent on others to travel.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- 

Q17 Ik zal Bravoflex ... gebruiken

- Helemaal niet gebruiken
- Misschien een keer proberen
- Af en toe gebruiken
- Regelmatig gebruiken
- (bijna) dagelijks gebruiken

Q17 How often would you use Bravoflex?

- Never
  - I will maybe try it one time
  - Occasionally
  - Regularly
  - Multiple times a week
- 

Q18 Welke drempels ervaart u om Bravoflex (meer) te gebruiken? (meerdere antwoorden mogelijk)

- Ik heb geen behoefte om het te gebruiken.
- Het is te duur.
- Ik weet niet hoe Bravoflex werkt.
- De Bravoflex-halte ligt te ver van mijn huis of bestemming.
- Ik denk niet dat ik op tijd op mijn bestemming aankom.
- Het is niet flexibel genoeg (ik moet een uur van te voren boeken).
- Ik ervaar geen drempels.
- Anders, namelijk \_\_\_\_\_

Q18 What barriers discourage you to use Bravoflex?

- I don't feel the need to use it
  - it is too expensive
  - I do not know how Bravoflex works
  - De Bravoflex-stop is located too far from my home or destination
  - I do not think I will arrive at my destination on time
  - It is not flexible enough (I have to book one hour in advance).
  - I do not experience any barriers to use Bravoflex
  - Others, namely: \_\_\_\_\_
- 

Q19 Beschouw voor de rest van de vragenlijst Bravoflex als een onderdeel van het OV.

Q19 For the rest of the questionnaire, consider Bravoflex as part of public transport.

---

Q20 Met het OV is het mogelijk om mijn gewenste bestemmingen te bereiken.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q20 It is possible to reach the activities I prefer using public transport.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly agree
- 

Q21 Het is makkelijk om mijn gewenste bestemmingen te bereiken met het OV.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q21 It is easy to reach my daily activities using public transport.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly agree
-

Q22 Over het algemeen ben ik tevreden over de bereikbaarheid tot mijn bestemmingen met het OV.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q22 Access to my preferred activities is satisfying with public transport.

- Strongly disagree
  - disagree
  - Neutral
  - Agree
  - Strongly agree
- 

Q23 Wanneer het OV mijn enige reisoctie zou zijn, kan ik blijven doen wat ik nu doe.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q23 If public transport was my only mode of travel, I would be able to continue living the way I want.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly agree
- 

Q24 Beschouw voor de rest van de vragenlijst Bravoflex als een onderdeel van het OV.

Q24 For the rest of the questionnaire, consider Bravoflex as part of public transport.

---

Q25 Over het algemeen ben ik tevreden over de bereikbaarheid van mijn bestemmingen met het OV.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q25 Access to my preferred activities is satisfying using public transport.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- 

Q26 Ik ben tevreden over de frequentie van het OV in mijn omgeving (hoe vaak het beschikbaar is per uur).

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q26 The frequency of public transport is satisfying in my area (how many times per hour it is available).

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
-

Q27 Ik ben tevreden met de bedieningstijden van het OV in mijn omgeving (op welke dagen en tot hoe laat het rijdt).

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q27 I am satisfied with service times of public transport (on which days and till what time they run) in my area.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- 

Q28 Het OV sluit goed aan bij mijn reisbehoefte.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q28 Public transport suits my travel needs well.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- 

Q29 Beschouw voor de rest van de vragenlijst Bravoflex als een onderdeel van het OV.

Q29 For the rest of the questionnaire, consider Bravoflex as part of public transport.

---

Q30 De bestemmingen waar ik naartoe moet zijn over het algemeen dichtbij huis.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q30 The locations I need to travel to are close to my home.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- 

Q31 Ik ben tevreden over het OV dat ik vanuit mijn huis kan bereiken.

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer eens

Q31 I am satisfied with the level of public transport that I can reach from my home.

- Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
-

Q32 Is uw huishouden in het bezit van een auto?

- Nee
- Ja

Q32 Does your household own a car?

- No
  - Yes
- 

Q33 Wat is uw werkstatus?

- Ik werk voltijd
- Ik werk deeltijd
- Ik ben zzp'er
- Ik ben gepensioneerd
- Ik ben student
- Ik ben werkloos/ op zoek naar werk
- Anders

Q33 What is your employment status?

- I work fulltime
  - I work parttime
  - I am self-employed
  - I am retired
  - I am a student
  - I am unemployed/ looking for work
  - Other
- 

Q34 Wat is het maandelijkse inkomen van uw huishouden?

- Minder dan 1500 euro
- Tussen 1500 en 2500 euro
- Tussen 2500 en 4000 euro
- Tussen 4000 en 6000 euro
- Meer dan 6000 euro
- Wil ik niet zeggen/ weet ik niet

Q34 What is your household's monthly income?

- Less than 1500 euros
  - Between 1500 and 2500 euros
  - Between 2500 and 4000 euros
  - Between 4000 and 6000 euros
  - More than 6000 euros
  - I do not want to tell/ I do not know
- 

Q35 Voor mijn onderzoek wil ik graag bewoners interviewen. Heeft u interesse om vragen over dit onderwerp te beantwoorden? Dit duurt 20-30 minuten. Laat dan hieronder uw e-mailadres achter, zodat ik contact met u kan opnemen.

- Ik heb interesse en dit is mijn e-mailadres: \_\_\_\_\_
- Ik heb geen interesse om een interview te geven.

Q35 For my research, I would like to interview residents. Are you interested in answering questions on this topic? This takes 20-30 minutes. If so, please leave your e-mail address below so that I can contact you.

- I am interested and this is my e-mail address:  
\_\_\_\_\_
  - I am not interested in giving an interview
- 

Q36 Hartelijk bedankt voor het invullen van de enquête. Uw antwoorden worden meegenomen in mijn onderzoek over de invloed van flexvervoer op de ervaren bereikbaarheid van bewoners. Mocht u nog

vragen hebben over het onderzoek of geïnteresseerd in de resultaten kunt u mij een e-mail sturen naar [flogister@brabant.nl](mailto:flogister@brabant.nl)

Q36 Thank you very much for completing the survey. Your responses will feed into my research on the impact of demand-responsive transport on residents' perceived accessibility. If you have any further questions about the survey or are interested in the results please email me at [flogister@brabant.nl](mailto:flogister@brabant.nl) .

## Appendix 2: Regular Interview Guide

*Dutch*

Onderwerp	Vraag/tekst
Introduction/ individual	<p>de interviewer stelt zich kort voor</p> <p>Paar korte introductievragen: - Suggestie: Hoelang woont u al in deze buurt?</p> <p>Het interview zal ongeveer 30 minuten duren. Het is vertrouwelijk en anoniem. Wanneer u het interview wil beëindigen of een vraag niet wilt beantwoorden respecteer ik dat. Deze data zal worden gedeeld met anderen, zonder persoonlijke informatie waarmee u geïdentificeerd kan worden. U mag een pseudoniem kiezen waarnaar ik kan verwijzen in de resultaten.</p> <p>Mag het geluid van het interview worden opgenomen? Hierdoor kan ik makkelijker mijn aandacht bij het interview houden zonder de hele tijd te hoeven typen.</p> <p>Het interview zal gaan over uw eigen vervoerspatronen en het openbaar vervoer in Loon op Zand (en het nieuwe Bravoflex-systeem dat de provincie gaat uitrollen, dit zal ik later verder uitleggen.)</p> <p>Heeft u zelf nog vragen of opmerkingen over het onderwerp of het interview voorafgaand?</p> <p><b>Dan zal ik bij deze de geluidsofname aanzetten.</b></p>
<b>Individual: socio- demographic characteristics, capabilities</b>	Ten eerste wil ik u vragen om u kort voor te stellen. (Leeftijd, werkstatus, thuissituatie: partner of alleenstaand, hoeveel mensen in het huishouden?)
<b>Land use/ transport</b>	<p>Hoe ziet uw gemiddelde week eruit? Waar gaat u naartoe? Bent u tevreden over de voorzieningen in uw omgeving?</p> <p>Welke vervoersmiddelen gebruikt u en voor welke doeleinden? Hoe bereikt u uw gewenste activiteiten? (boodschappen, winkelen, horeca, hobby's, bezoek familie en/of vrienden, bezoeken ziekenhuis/apotheek, cultuur)</p> <p>Hoe lang bent u onderweg om deze activiteiten te bereiken? Welk vervoersmiddel gebruikt u om deze activiteiten te bereiken? Zijn deze voorzieningen op loop- of fietsafstand?</p>
<b>Transport/ temporal</b>	<p><b>Zijn er situaties waarin u zich beperkt voelt in uw mobiliteit?</b></p> <p>Of bent u wel eens afhankelijk van anderen om ergens te komen? Heeft dit te maken met de voor u beschikbare vervoersmiddelen?</p>

	Heeft u bepaalde uitdagingen ervaren bij het reizen in uw omgeving? (beperkte verbindingen, wachttijden, gebrek aan flexibiliteit, slecht (verlichte) fietspaden)
<b>Capabilities</b>	<b>Bent u op de hoogte van het OV wat beschikbaar is in uw omgeving?</b> (lijnenkaart)
<b>(Public) transport</b>	<p>Wat is uw mening over het openbaar vervoer in dit gebied? Reist u wel eens met het Openbaar Vervoer? Zo ja, met welk doeleinde? (te ingewikkeld, halte ligt te ver weg, betrouwbaarheid, reistijd, flexibiliteit, te lage frequentie, rijtijden, geen behoefte) Zo nee, waarom niet? Zou u vaker gebruik willen maken van het OV wanneer het beter zou aansluiten op uw behoeften?</p> <p>Wanneer u zou zijn aangewezen op het OV (en de fiets), zou u dan kunnen blijven doen wat u nu doet?</p>
<b>Bravoflex (DRT)</b>	<p><b>Heeft u al eens van Bravoflex gehoord?</b> Zo ja, verder vragen... Wat weet u er al van?</p> <p>Heeft u er wel eens gebruik van gemaakt?</p> <p>Zo nee, <b>Video</b></p> <p>Ik zal de <b>Opname hervatten</b></p> <p>Met Bravoflex reis je alle dagen van de week én in de avonduren. Dus ook wanneer er geen lijnbus is! Bravoflex brengt je van deze halte naar een OV-overstaphalte, waar je overstapt op het normale OV. En Bravoflex brengt je ook weer terug natuurlijk! Reserveren doe je minimaal één uur van tevoren via de app of telefoon.</p> <p><b>Hoe werkt het</b> Bravoflex heeft géén vaste route of dienstregeling. Je reserveert via de app of telefonisch en bepaalt zelf hoe laat en bij welke halte je wilt aankomen of vertrekken. Reserveer minimaal één uur van tevoren.</p> <ul style="list-style-type: none"> <li>- kies jouw opstaphalte en bestemming. In de app zie je direct naar welke OV-overstaphaltes je kunt reizen, en andersom.</li> <li>- Kies zelf jouw aankomst- of vertrektijd.</li> <li>- Geef het aantal reizigers door.</li> <li>- Betaal je rit direct met iDeal in de app of met je pinpas bij de chauffeur.</li> </ul> <p>De Bravoflex-vervoersservice is natuurlijk rolstoeltoegankelijk.</p> <p><b>Tarief</b> Vanaf 2025 kost een rit met Bravoflex <b>2 euro</b>. Wanneer er voor jouw reis óók een lijnbus beschikbaar is, kost een rit <b>5 euro</b>.</p> <p><i>*Let op: De studentenkaart, de OV-chipkaart, abonnementen, Voor Elkaar Pas en leeftijds korting zijn niet geldig.</i></p> <p><b>Reistijden</b></p> <ul style="list-style-type: none"> <li>• Maandag t/m zaterdag van 07.00 uur tot 24.00 uur</li> </ul>

	<ul style="list-style-type: none"> <li>• Zondag en feestdagen van 08.00 uur tot 24.00 uur</li> </ul> <p><b>en kaart van pilotgebied.</b> Wat denkt u hiervan? Wat voor vragen roept dit bij u op?</p>
<b>Relation with other concepts</b>	<p><b>Zou dit een verbetering opleveren?</b> Voor wie/waar zou het (wel) een goede reisoctie zijn?</p> <p>Zou u het (wel eens) gebruiken? Waarom wel/niet? (te ingewikkeld, Bravoflex-halte ligt te ver weg, betrouwbaarheid, flexibiliteit met boeken, geen behoefte) Wat voor bedrag zou u hieraan uitgeven? Zijn de tarieven vanaf januari (2 euro als er geen lijnbussen beschikbaar zijn en 5 euro wanneer dit wel zo is) acceptabel voor u?</p> <p><b>Zou dit systeem u stimuleren om vaker gebruik te maken van het OV? Waaraan moet het systeem voor u nog meer aan u voldoen om het te gaan gebruiken?</b> Voldoet het huidige boekstelsel aan uw wensen of zou dit anders moeten werken? Is het belangrijk voor u dat Bravoflex in de reisplanners is opgenomen?</p> <p>Vindt u een Bravoflex een vorm van OV?</p>
<b>Normative judgments</b>	<p><b>Vindt u dat het transportsysteem (dus niet alleen het OV) van voldoende kwaliteit is voor iedereen in de buurt, ongeacht hun leeftijd, mobiliteit of inkomen?</b> (buurt, kosten, beperkingen) Waarom (niet)? Wat zou er moeten veranderen om dit te verbeteren?</p> <p>Vindt u het belangrijk dat er OV/ een bus beschikbaar is in uw dorp/woonplaats? (eerst voor zichzelf en in het algemeen) Vindt u dat er in iedere kern een vorm van OV zou moeten zijn? Is dit een taak van de overheid/provincie?</p> <p><b>Bent u voor een minimumniveau van OV?</b> Bent u bereid om hiervoor meer te betalen? In de vorm van hogere ticketprijzen of belastingen.</p>
<b>Conclusion</b>	<p>Ik wil nog even een aantal vragen behandelen waar we nog niet aan toe gekomen zijn (<b>checklist</b>).</p> <p>Dit was mijn laatste vraag. Wilt u nog iets toevoegen?</p> <p>Dan wil ik u bedanken voor uw medewerking en <b>stop ik de geluidsopname</b>.</p>

Topic	Question/ Text
Introduction/ individual	<p>the interviewer briefly introduces himself</p> <p>A couple of short introductory questions: - Suggestion: How long have you lived in this neighbourhood?</p> <p>The interview will last about 30 minutes. It is confidential and anonymous. If you want to end the interview or do not want to answer a question I respect that. This data, without any personal information that could identify me, may be shared with others. You can choose a pseudonym to which I can refer to in the results.</p> <p>Can the audio of the interview be recorded? This makes it easier for me to keep my attention on the interview without typing all the time.</p> <p>The interview will be about your own transport patterns and public transport in Loon op Zand (and the new Bravoflex system that the province is going to roll out, I will explain this in more detail later).</p> <p>Do you have any questions or comments before starting the interview?</p> <p><b>If so, I will hereby start the audio recording</b></p>
<b>Individual: socio- demographic characteristics, capabilities</b>	<p>First, I would like to ask you to introduce yourself briefly. (Age, work status, home situation: partner or single, how many people in the household?)</p> <p>Do you have a driving licence? Does your household own one/ multiple cars? Is a car available all day? Who in your household uses it the most? Can you walk and cycle well?</p>
<b>Land use/ transport</b>	<p>What means of transport do you use and for what purposes? How do you reach your desired activities? (shopping, shopping, catering, hobbies, visiting family and/or friends, hospital/pharmacy visits, culture) How long do you travel to reach these activities? What means of transport do you use to reach these activities? Are these facilities located at a bike/walking distance?</p>
<b>Transport/ temporal</b>	<p>Are there situations in which you feel limited in your mobility? Are there situations where you dependent on others to travel to your desired locations? Is this because of the transport modes that are available to you? Have you experienced any particular challenges when travelling in your area (limited connections, waiting times, lack of flexibility)?</p>
<b>Capabilities</b>	<p>Are you aware of the public transport that is available in your area?</p>
<b>Public transport</b>	<p>What is your opinion of public transport in this area? Do you ever travel by public transport? If yes, for what purpose? If not, why not? (too complicated, stop is too far away, reliability, travel time, flexibility, frequency, ride times, no demand) Suggestions:</p>

	<p>If you were to rely on public transport (and cycling), would you be able to continue doing what you do now?</p>
<b>Bravoflex (DRT)</b>	<p>Have you heard of Bravoflex?  If yes, further questions...  What do you already know about it?  Have you ever used it?</p> <p>If not, explanation. With short film and map of pilot area.</p>
<b>Relations with other concepts</b>	<p>What do you think of this?  Does it improve your accessibility?  Would you (ever) use it? Why yes/no? (Too complicated, stop is too far away, reliability, flexibility in booking, no demand)  How much would you be willing to pay for this service?  Are the current fares (€2 when no regular busses are available and €5 when there are) acceptable to you?</p> <p>Would this system stimulate you to use PT more often?  What more does the system need to meet for you to start using it?  Does the current booking system meet your demands or should it be different?  Is it important to you that Bravoflex is included in travel planners?</p> <p>Do you consider Bravoflex as PT?  For whom would it be a good travel option?</p>
<b>Normative judgments</b>	<p>Do you feel that the transport system (thus not only PT) is accessible to everyone in your community, regardless of their age, mobility, or income? (neighbourhoods, costs, disabilities) Why (not)? What needs to change in order to improve this?</p> <p>Do you think it is important that public transport/ a bus is available in your village/ place of residence? (first for yourself and in general)  Do you think there should be some form of public transport in every core?  Is this a task of the government/province?  Are you in favour of a minimum level of OV?  Are you willing to pay more for this? In the form of higher ticket prices or taxes.</p>
<b>Conclusion</b>	<p>This was my last question. Do you want to add anything to this interview?</p> <p>Thank you for your participation and I will add the audio recording.</p>

## Appendix 3: Expert Interviews Guides

### Appendix 3.1 Interview Guide Travel association

#### Dutch

Het interview zal ongeveer 30 minuten duren.

Voor de resultaten zal ik verwijzen naar uw functietitel en uw organisatie. Wanneer u het interview wil beëindigen of een vraag niet wilt beantwoorden respecteer ik dat.

Mag het geluid van het interview worden opgenomen? Hierdoor kan ik makkelijker mijn aandacht bij het interview houden zonder de hele tijd te hoeven typen.

Deze vragen zijn het vervolg op de enquête die ik gehouden heb onder bewoners van de gemeente Loon op Zand, waar een pilot van Bravoflex wordt gehouden. Deze hebben 203 bewoners ingevuld. Hier zal ik tijdens ons gesprek ook een paar keer naar verwijzen.

#### Dan start ik de audio-opname.

Onderwerp	Vraag
<b>Introduction and Context</b>	Wat is uw functie binnen het ROB?
	Welke rol speelt het ROB het behartigen van de belangen van reizigers in het algemeen en met betrekking tot systemen zoals Bravoflex?
	Bent u betrokken geweest bij overleg of heeft u feedback gegeven tijdens de ontwikkelings- of proeffase van Bravoflex?
<b>Normative Judgments</b>	Vindt u dat het huidige mobiliteitssysteem in Noord-Brabant voldoende kwaliteit biedt voor alle inwoners, met name in gebieden met beperkt openbaar vervoer?
	Hoe definieert u "voldoende bereikbaarheid," en hoe wordt dit toegepast in beleid en praktijk? Is dat een bepaalde reistijd naar voorzieningen, banen binnen zoveel minuten...
	Wat zijn de belangrijkste mobiliteitsuitdagingen voor reizigers in de provincie?
<b>Use of PT</b>	Uit mijn enquête blijkt dat veel inwoners van Loon op Zand ontevreden zijn over het openbaar vervoer, en dat twee derde het slechts één keer per maand of minder gebruikt. Wat denkt u dat de oorzaken hiervan zijn?
	De meerderheid van de respondenten geeft aan dat het OV niet goed aansluit bij hun reisbehoeften. Ook geeft de meerderheid aan dat het wel mogelijk is voor hen met het OV te reizen, maar niet gemakkelijk. Wat is hier de oorzaak van volgens u?
	Denkt u dat flexvervoer de bereikbaarheid van inwoners kan vergroten?
	Wat is de toegevoegde waarde van Bravoflex?
<b>Individual</b>	Voor welke typen reizigers kan flexvervoer van toegevoegde waarde zijn? <ul style="list-style-type: none"><li>- <i>bijvoorbeeld bestaande gebruikers van openbaar vervoer, personen met een handicap, ouderen, mensen zonder toegang tot een auto, incidentele gebruikers (bijv. recreatieve reizen, bij slecht weer of 's avonds), en/of forenzen?</i></li><li>- <i>Kan flexvervoer inwoners aanmoedigen om het openbaar vervoer te gebruiken als alternatief voor de auto?</i></li></ul>

<b>Transport system</b>	Welke feedback hebben uw leden gedeeld over hun ervaringen met Bravoflex (pilots)? Zijn er terugkerende thema's, zoals tevredenheid over het boekingsproces, reistijden of betrouwbaarheid?
<b>DRT</b>	Uit mijn enquête blijkt dat een groot deel van respondenten geen behoefte heeft aan Bravoflex, of het onpraktisch vinden vanwege bijvoorbeeld extra overstappen. Wat is uw reactie op deze bevindingen?
	Veel respondenten geven aan Bravoflex niet te kennen en weinig interesse te hebben in het gebruik ervan. Wat denkt u dat hiervan de oorzaak is? Hoe kan de bekendheid en aantrekkelijkheid van Bravoflex worden verbeterd? Zijn er bepaalde manieren/ plekken waar bekendheid aan flexvervoer kan worden gegeven?
	In mijn enquête geeft ongeveer 25% van de respondenten aan dat Bravoflex hun onafhankelijkheid kan verbeteren, en 15% zegt dat het hen kan stimuleren het OV vaker te gebruiken. Hoe interpreteert u deze cijfers?
	Is Bravoflex gemakkelijk te gebruiken en toegankelijk voor alle soorten reizigers, vooral voor mensen met beperkte digitale vaardigheden of mobiliteitsproblemen?
	Wat zijn volgens u de belangrijkste factoren om een systeem voor flexvervoer aantrekkelijk te maken voor gebruikers?
<b>Normative judgments/ perceived accessibility</b>	Wanneer is Bravoflex volgens het ROB een succes?
	Welke criteria zijn volgens u het meest geschikt om het succes van flexvervoer te evalueren? Bijvoorbeeld hand van het aantal gebruikers, verminderd autogebruik ervaren bereikbaarheid, of andere indicatoren?
<b>Transport system</b>	Welke verbeteringen zijn nodig om de aantrekkelijkheid van flexvervoer in de toekomst te verbeteren? Zouden zaken zoals een reisplanner of kortingen op basis van leeftijd/inkomen het systeem aantrekkelijker maken?
	Zijn er zaken die landelijk geregeld moeten worden om flexvervoer verder te ontwikkelen?
<b>Research Question</b>	De hoofdvraag van mijn onderzoek is: Draagt flexvervoer (in dit geval Bravoflex) positief bij aan de ervaren bereikbaarheid? Denkt u dat dit het geval kan zijn?
	Uit mijn enquête blijkt dat dit niet het geval is (in de pilot). Wat moet er gebeuren om dit wel het geval te laten zijn in de toekomst?
<b>Final</b>	Zijn er aanvullende opmerkingen of inzichten die u wilt delen?

### English

The interview will last about 30 minutes.

I will refer to your job title and your organisation for the results. If you wish to end the interview or not answer a question I respect that.

Can the audio of the interview be recorded? This will make it easier for me to keep my attention on the interview without typing all the time.

These questions are the follow-up to the survey I conducted among residents of the municipality of Loon op Zand, where a pilot of Bravoflex is being held. These were completed by 203 residents. I will also refer to this a few times during our interview.

<b>Topic</b>	<b>Question/ Text</b>
<b>Introduction and context</b>	<p>What is your function in the travel association?</p> <p>What role does your association play in advocating for traveller needs in general and regarding systems such as Bravoflex?</p> <p>Have you been involved in consultations or provided feedback during the development or pilot phases of Bravoflex?</p>
<b>Normative judgments</b>	<p>Do you think the current mobility system is of sufficient quality for all inhabitants of the province of Noord-Brabant?</p> <p>Wat does the travel association consider a sufficient level of accessibility?</p>
<b>Transport</b>	<p>What are the key mobility challenges faced by travellers in the province?</p> <p>My survey shows that most respondents are not satisfied with PT, and 2/3<sup>rd</sup> of the respondents use it once a month or less. Why do you think is the case?</p> <p>The majority of respondents indicate that public transport does not suit their travel needs well. The majority also indicate that while it is possible for them to travel by public transport, it is not easy. What do you think is the cause of this?</p>
<b>Transport/ perceived accessibility</b>	<p>Will Bravoflex improve the accessibility of inhabitants?</p> <p>What is the added value of Bravoflex?</p>
<b>Individual</b>	<p>For which will the Bravoflex system offer the highest added value?</p> <ul style="list-style-type: none"> <li>○ <i>Is it focussed on people that already use PT or does it want to attract new users? Which of these groups will use it more you think?</i></li> <li>○ <i>Other examples: individuals with disabilities, the elderly, people without access to cars, occasional users (e.g., recreational trips, in bad weather or during evenings), and/or commuters.</i></li> <li>○ <i>Should it be one of the goals of Bravoflex to encourage people to use public transport as an alternative to private cars?</i></li> </ul>
<b>Transport system</b>	<p>What feedback have your members shared about their experiences with Bravoflex (pilots)? Are there any recurring themes, such as satisfaction with the booking process, travel times or reliability?</p>
<b>DRT</b>	<p>The most cited barrier to use Bravoflex is that he/she has no demand to use it. One of the other barriers that is cited frequently is that it adds another interchange. What do you think of these remarks?</p>
	<p>Many respondents said they did not know Bravoflex and had little interest in using it. What do you think is the reason for this? How can the awareness and attractiveness of Bravoflex be improved? Are there particular ways/places where awareness of flex transport can be raised?</p> <p>In my survey, about 25% of respondents said Bravoflex could improve their independence, and 15% said it could encourage them to use public transport more often. How do you interpret these figures?</p>

	<p>Is Bravoflex easy to use and accessible to all types of travellers, especially those with limited digital skills or mobility problems?</p> <p>What do you think are the key factors in making a DRT-system attractive to users?</p>
<b>Normative judgments/ perceived accessibility</b>	<p>When is Bravoflex considered a success according to the travel association?</p>
	<p>What criteria are most suited to evaluate the success of Bravoflex? <i>Is success measured by the number of users, reduced car usage, or other indicators (e.g., perceived accessibility)?</i></p>
<b>Land use system</b>	<p>What lessons have been learned from the ongoing pilots?</p> <ul style="list-style-type: none"> <li>○ <i>My survey showed that many people are not aware of Bravoflex. Why do you think this the case and how can this be improved?</i></li> <li>○ <i>In the survey is around 25% of people think that Bravoflex can improve their independence. Around 15% says that it will stimulate them to use PT more often. What do you think of these numbers?</i></li> </ul>
<b>Transport system</b>	<p>What factors make a DRT-system attractive?</p> <ul style="list-style-type: none"> <li>○ <i>How have these been incorporated into the system?</i></li> <li>○ <i>How does Bravoflex compare to DRT-systems in other provinces or countries? Why have these specific features been chosen?</i></li> <li>○ <i>Have best practices or lessons been adopted from elsewhere?</i></li> </ul> <p>What improvements are needed to enhance the attractiveness of Bravoflex in the future?</p> <ul style="list-style-type: none"> <li>○ <i>For example, would features like a travel planner or discounts based on age/income make the system more appealing?</i></li> </ul>
<b>Research Question</b>	<p>The main question of my research is: Does DRT (in this case Bravoflex) contribute positively to perceived accessibility? Do you think this could be the case?</p>
	<p>My survey shows that this is not the case (in the pilot). What needs to happen for this to be the case in the future?</p>
<b>Final</b>	<p>Are there any additional comments or insights you would like to share?</p>

## Appendix 3.2 Interview guide Province of Noord-Brabant

### *Dutch*

Het interview zal ongeveer 30 minuten duren.

Voor de resultaten zal ik verwijzen naar uw functietitel en uw organisatie. Wanneer u het interview wil beëindigen of een vraag niet wilt beantwoorden respecteer ik dat.

Deze vragen zijn het vervolg op de enquête die ik gehouden heb onder bewoners van de gemeente Loon op Zand, waar een pilot van Bravoflex wordt gehouden. Deze hebben 203 bewoners ingevuld. Hier zal ik tijdens ons gesprek ook een paar keer naar verwijzen.

Mag het geluid van het interview worden opgenomen? Hierdoor kan ik makkelijker mijn aandacht bij het interview houden zonder de hele tijd te hoeven typen.

### **Dan start ik bij deze de audio-opname**

<b>Topic</b>	<b>vraag</b>
<b>Introduction and context</b>	Wat is uw functie binnen de provincie Noord-Brabant en hoe bent u betrokken bij mobiliteitsprojecten zoals Bravoflex?
	Hoeveel kennis heeft u over flexvervoer, en specifiek over het Bravoflex-systeem?
<b>Normative Judgments</b>	Vindt u dat het huidige mobiliteitssysteem in Noord-Brabant voldoende kwaliteit biedt voor alle inwoners, met name in gebieden met beperkt openbaar vervoer?
	Hoe definieert de provincie "voldoende bereikbaarheid," en hoe wordt dit toegepast in beleid en praktijk? Is dat een bepaalde reistijd naar voorzieningen, banen binnen zoveel minuten...
	Uit mijn enquête blijkt dat veel inwoners van Loon op Zand ontevreden zijn over het openbaar vervoer, en dat twee derde het slechts één keer per maand of minder gebruikt. Wat denkt u dat de oorzaken hiervan zijn?
	De meerderheid van de respondenten geeft aan dat het OV niet goed aansluit bij hun reisbehoeften. Ook geeft de meerderheid aan dat het wel mogelijk is voor hen met het OV te reizen, maar niet gemakkelijk. Wat is hier de oorzaak van volgens u?
<b>DRT</b>	Waarom heeft de provincie het Bravoflex-systeem geïntroduceerd, en welke specifieke behoeften probeert het te vervullen?
	Wat zijn de belangrijkste doelen van Bravoflex binnen de bredere mobiliteitsstrategie van de provincie?
	Wat is volgens u de toegevoegde waarde van Bravoflex?
	Voor welke type gebieden (bijvoorbeeld stedelijke, landelijke, of specifieke locaties zoals industrieterreinen)? Wie zijn de beoogde gebruikers van Bravoflex? bestaande OV-reizigers of nieuwe gebruikers? Bevolkingsgroepen: ouderen, mensen zonder auto, of incidentele reizigers)? Tijdstippen: avond en weekend

	Is een van de doelstellingen van Bravoflex om mensen te stimuleren minder (vaak) afhankelijk te laten zijn van de auto? wat ook één van de doelen is van de provincie. Zo ja, op welke manieren probeert het Bravoflex dit te bereiken?
<b>Perceived Accessibility</b>	Denkt u dat Bravoflex de ervaren bereikbaarheid van voorzieningen zoals werk, winkels, en gezondheidszorg in de regio kan verbeteren?
<b>Transport system</b>	Uit mijn enquête blijkt dat een groot deel van respondenten geen behoefte heeft aan Bravoflex, of het onpraktisch vinden vanwege bijvoorbeeld extra overstappen. Wat is uw reactie op deze bevindingen?
	Veel respondenten geven aan Bravoflex niet te kennen en weinig interesse te hebben in het gebruik ervan. Wat denkt u dat hiervan de oorzaak is? Hoe kan de bekendheid en aantrekkelijkheid van Bravoflex worden verbeterd? In mijn enquête geeft ongeveer 25% van de respondenten aan dat Bravoflex hun onafhankelijkheid kan verbeteren, en 15% zegt dat het hen kan stimuleren het OV vaker te gebruiken. Hoe interpreteert u deze cijfers?
<b>DRT</b>	Welke verbeteringen zijn volgens u nodig om Bravoflex in de toekomst aantrekkelijker te maken? Zouden functies zoals een geïntegreerde reisplanner of kortingen op basis van leeftijd of inkomen hierbij helpen?
	Welke lessen heeft de provincie geleerd van eerdere pilots met Bravoflex, en hoe zijn deze verwerkt in het huidige systeem?
	Zijn er best practices of geleerde lessen van andere regio's of landen die zijn toegepast op Bravoflex?
<b>Normative Judgments</b>	Wanneer is Bravoflex volgens de provincie een succes?
<b>Research Question</b>	De hoofdvraag van mijn onderzoek is: Draagt Bravoflex positief bij aan de ervaren bereikbaarheid? Denkt u dat dit het geval kan zijn?
	Uit mijn enquête blijkt dat dit nog niet het geval (in de pilot). Wat moet er gebeuren om dit wel het geval te laten zijn in de toekomst?
	Zijn er aanvullende opmerkingen of inzichten die u wilt delen over Bravoflex en de rol ervan in het mobiliteitssysteem van Noord-Brabant?

### *English*

The interview will last about 30 minutes.

I will refer to your job title and your organisation for the results. If you wish to end the interview or not answer a question I respect that.

Can the audio of the interview be recorded? This will make it easier for me to keep my attention on the interview without typing all the time.

These questions are the follow-up to the survey I conducted among residents of the municipality of Loon op Zand, where a pilot of Bravoflex is being held. These were completed by 203 residents. I will also refer to this a few times during our interview.

Topic	Question/ Text
<b>Introduction and context</b>	What is your function within the province of Noord-Brabant and how are you involved in projects such as Bravoflex?
	How much do you know about DRT-systems and specifically Bravoflex?
<b>Normative judgments</b>	Do you think the current mobility system is of sufficient quality for all inhabitants of the province of Noord-Brabant?
	How does the province define 'sufficient accessibility,' and how is it applied in policy and practice? Is that a certain travel time to facilities, jobs within so many minutes...
<b>Transport</b>	My survey shows that many Loon op Zand residents are dissatisfied with public transport, with two-thirds using it only once a month or less. What do you think are the reasons for this?
	The majority of respondents indicate that public transport does not suit their travel needs well. Also, the majority indicate that while it is possible for them to travel by public transport, it is not easy. What do you think is the cause of this?
<b>DRT</b>	Why is the Bravoflex system being introduced by the province, and what specific needs is it aiming to address?
	What are the primary goals of the Bravoflex system within the broader mobility strategy of the province?
	What value does Bravoflex add?
	Which types of areas is Bravoflex targeted at? (urban, rural, industrial sites)
<b>Individual/ DRT</b>	<p>Who are the target travellers for the Bravoflex system?</p> <ul style="list-style-type: none"> <li>○ <i>Is it focussed on people that already use PT or does it want to attract new users? Which of these groups will use it more you think?</i></li> <li>○ <i>Other examples: individuals with disabilities, the elderly, people without access to cars, occasional users (e.g., recreational trips, in bad weather or during evenings), and/or commuters.</i> <ol style="list-style-type: none"> <li>1. <i>Is one of the goals of Bravoflex to encourage people to use public transport as an alternative to private cars?</i></li> </ol> </li> </ul>
<b>Perceived accessibility</b>	Do you think Bravoflex can improve the perceived accessibility of facilities such as work, shopping, and healthcare in the region?
<b>Transport system/ DRT</b>	The most cited barrier to use Bravoflex is that he/she has no demand to use it. One of the other barriers that is cited frequently is that it adds another interchange. What do you think of these remarks?
<b>Transport</b>	My survey showed that many people are not aware of Bravoflex and little people are planning to use it. Why do you think this the case and how can this be improved?
	In the survey is around 25% of people think that Bravoflex can improve their independence. Around 15% says that it will stimulate them to use PT more often. What do you think of these numbers?
<b>DRT</b>	What improvements are needed to enhance the attractiveness of Bravoflex in the future?

	<ul style="list-style-type: none"> <li>○ <i>For example, would features like a travel planner or discounts based on age/income make the system more appealing?</i></li> </ul>
	What lessons has the province learned from previous pilots with Bravoflex, and how have these been incorporated into the current system?
	Are there any best practices or lessons learned from other regions or countries that have been applied to Bravoflex?
<b>Normative judgments/ DRT</b>	When is Bravoflex considered as a success by the province?
	What criteria are used to evaluate the success of Bravoflex? <i>Is success measured by the number of users, reduced car usage, or other indicators (e.g., perceived accessibility)?</i>
<b>Research Question</b>	The main question of my research is: Does Bravoflex contribute positively to perceived accessibility? Do you think this could be the case?
	Uit mijn enquête blijkt dat dit nog niet het geval (in de pilot). Wat moet er gebeuren om dit wel het geval te laten zijn in de toekomst?
	Do you want to add anything to this interview?

## Appendix 3.3 Interview Guide DOVA

### Dutch

Het interview zal ongeveer 30 minuten duren.

Voor de resultaten zal ik verwijzen naar uw functietitel en uw organisatie. Wanneer u het interview wil beëindigen of een vraag niet wilt beantwoorden respecteer ik dat.

Mag het geluid van het interview worden opgenomen? Hierdoor kan ik makkelijker mijn aandacht bij het interview houden zonder de hele tijd te hoeven typen.

Deze vragen zijn het vervolg op de enquête die ik gehouden heb onder bewoners van de gemeente Loon op Zand, waar een pilot van Bravoflex wordt gehouden. Deze hebben 203 bewoners ingevuld. Hier zal ik tijdens ons gesprek ook een paar keer naar verwijzen.

Onderwerp	Vraag
<b>Introduction and Context</b>	Wat is uw functie binnen de provincie Noord-Holland en het landelijk netwerk flexvervoer?
	Hoeveel kennis heeft u van flexvervoer?
<b>Normative Judgments</b>	Vindt u dat het huidige mobiliteitssysteem in Nederland voldoende kwaliteit biedt voor alle inwoners, met name in gebieden met beperkt openbaar vervoer?
	Hoe definieert u "voldoende bereikbaarheid," en hoe wordt dit toegepast in beleid en praktijk? Is dat een bepaalde reistijd naar voorzieningen, banen binnen zoveel minuten...
<b>Use of PT</b>	Uit mijn enquête blijkt dat veel inwoners van Loon op Zand ontevreden zijn over het openbaar vervoer, en dat twee derde het slechts één keer per maand of minder gebruikt. Wat denkt u dat de oorzaken hiervan zijn?
	De meerderheid van de respondenten geeft aan dat het OV niet goed aansluit bij hun reisbehoeften. Ook geeft de meerderheid aan dat het wel mogelijk is voor hen met het OV te reizen, maar niet gemakkelijk. Wat is hier de oorzaak van volgens u?
	Denkt u dat flexvervoer de bereikbaarheid van inwoners kan vergroten?
	Wat is de toegevoegde waarde van flexvervoer?
<b>Transport system</b>	Wat zijn de belangrijkste verschillen tussen de verschillende vormen van flexvervoer binnen Nederland? En waarom verschillen deze factoren?
<b>Context</b>	Zijn er verschillen in de doelen die flexvervoer vervult in verschillende regio's?
<b>Individual</b>	Voor welke typen reizigers kan flexvervoer van toegevoegde waarde zijn? <ul style="list-style-type: none"> <li>- <i>bijvoorbeeld bestaande gebruikers van openbaar vervoer, personen met een handicap, ouderen, mensen zonder toegang tot een auto, incidentele gebruikers (bijv. recreatieve reizen, bij slecht weer of 's avonds), en/of forenzen?</i></li> <li>- <i>Kan flexvervoer inwoners aanmoedigen om het openbaar vervoer te gebruiken als alternatief voor de auto?</i></li> </ul>
<b>Transport</b>	Uit mijn enquête blijkt dat een groot deel van respondenten geen behoefte heeft aan Bravoflex, of het onpraktisch vinden vanwege bijvoorbeeld extra overstappen. Wat is uw reactie op deze bevindingen?

	<p>Veel respondenten geven aan Bravoflex niet te kennen en weinig interesse te hebben in het gebruik ervan. Wat denkt u dat hiervan de oorzaak is? Hoe kan de bekendheid en aantrekkelijkheid van Bravoflex worden verbeterd? Zijn er bepaalde manieren/ plekken waar bekendheid aan flexvervoer kan worden gegeven?</p> <p>In mijn enquête geeft ongeveer 25% van de respondenten aan dat Bravoflex hun onafhankelijkheid kan verbeteren, en 15% zegt dat het hen kan stimuleren het OV vaker te gebruiken. Hoe interpreteert u deze cijfers?</p> <p>Wat zijn volgens u de belangrijkste factoren om een systeem voor flexvervoer aantrekkelijk te maken voor gebruikers?</p>
<b>Normative judgments/ perceived accessibility</b>	Welke criteria zijn volgens u het meest geschikt om het succes van flexvervoer te evalueren? Bijvoorbeeld hand van het aantal gebruikers, verminderd autogebruik ervaren bereikbaarheid, of andere indicatoren?
<b>Transport system</b>	<p>Waarom zijn sommige varianten van flexvervoer meer of minder succesvol dan andere? Welke lessen kunnen hieruit getrokken worden</p> <p>Welke verbeteringen zijn nodig om de aantrekkelijkheid van flexvervoer in de toekomst te verbeteren? Zouden zaken zoals een reisplanner of kortingen op basis van leeftijd/inkomen het systeem aantrekkelijker maken?</p> <p>Zijn er zaken die landelijk geregeld moeten worden om flexvervoer verder te ontwikkelen?</p>
<b>Research Question</b>	<p>De hoofdvraag van mijn onderzoek is: Draagt flexvervoer (in dit geval Bravoflex) positief bij aan de ervaren bereikbaarheid? Denkt u dat dit het geval kan zijn?</p> <p>Uit mijn enquête blijkt dat dit niet het geval is (in de pilot). Wat moet er gebeuren om dit wel het geval te laten zijn in de toekomst?</p>
<b>Final</b>	Zijn er aanvullende opmerkingen of inzichten die u wilt delen?

### English

The interview will last about 30 minutes.

I will refer to your job title and your organisation for the results. If you wish to end the interview or not answer a question I respect that.

Can the audio of the interview be recorded? This will make it easier for me to keep my attention on the interview without typing all the time.

These questions are the follow-up to the survey I conducted among residents of the municipality of Loon op Zand, where a pilot of Bravoflex is being held. These were completed by 203 residents. I will also refer to this a few times during our interview.

<b>Topic</b>	<b>Question</b>
<b>Introduction and context</b>	What is your function within the province of Noord-Holland and the nationwide flex transport network? How much do you know about DRT-systems?
<b>Normative Judgments</b>	Do you think the current mobility system in the Netherlands provides sufficient quality for all residents, especially in areas with limited public transport? How do you define 'sufficient accessibility,' and how is it applied in policy and practice? Is that a certain travel time to facilities, jobs within so many minutes...
<b>Use of PT</b>	My survey shows that many Loon op Zand residents are dissatisfied with public transport, with two-thirds using it only once a month or less. What do you think are the reasons for this? The majority of respondents indicate that public transport does not suit their travel needs well. Also, the majority indicate that while it is possible for them to travel by public transport, it is not easy. What do you think is the cause of this?
<b>Effect of DRT-systems on perceived accessibility</b>	Do you think that DRT-systems can improve the accessibility of inhabitants? What value does DRT add?
<b>Transport system</b>	What are the main differences between the different DRT-systems within The Netherlands? And why do these factor differ? Are there differences in the goals that DRT-systems fulfil in different areas?
<b>Context</b>	Which types of areas do you think DRT-systems are suitable for? Urban rural industrial areas...
<b>Individual</b>	For which types of travellers do you think DRT-systems are usable for? <ul style="list-style-type: none"> <li>- <i>Does it focus on existing public transport users, individuals with disabilities, the elderly, people without access to a car, occasional users (e.g., recreational trips, in bad weather or during evenings), and/or commuters?</i></li> <li>- <i>Can it encourage inhabitants to use PT as an alternative to private cars?</i></li> </ul>
<b>Transport system</b>	My survey shows that a large proportion of respondents do not need Bravoflex, or find it impractical because of extra transfers, for example. What is your response to these findings? Many respondents said they did not know Bravoflex and had little interest in using it. What do you think is the reason for this? How can the awareness and attractiveness of Bravoflex be improved? Are there particular ways/places where awareness about DRT can be raised? In my survey, about 25% of respondents answered that Bravoflex could improve their independence, and 15% said it could encourage them to use PT more often. How do you interpret these numbers? What do you think are the key factors in making a DRT-system attractive to users?
<b>Normative judgments/</b>	What criteria do you think are best suited to evaluate the success of DRT-systems?

<b>perceived accessibility</b>	- <i>Is success measured by the number of users, reduced car usage, or other indicators (e.g., perceived accessibility)?</i>
<b>Transport system</b>	Why are some variations of DRT-systems more or less successful than others?
<b>Land use system</b>	What lessons can be learnt from already existing DRT-systems?
<b>Transport system</b>	What factors make a DRT-system attractive? What improvements are needed to improve the attractiveness of DRT-systems in the future? - <i>For example, would features like a travel planner or discounts based on age/income make the system more appealing?</i>
	Are there things that need to be regulated nationwide to further develop DRT-systems?
<b>Research Question</b>	The main question of my research is: Does DRT (in this case Bravoflex) contribute positively to perceived accessibility? Do you think this could be the case?
	My survey shows that this is not the case (in the pilot). What needs to happen for this to be the case in the future?
<b>Final</b>	Are there any additional comments or insights you would like to share?

## Appendix 4: Flyer Survey

Beste inwoner van Loon op Zand, Kaatsheuvel  
of De Moer,

Mijn naam is Finn Logister, student planologie  
aan de Radboud Universiteit in Nijmegen. Om  
af te studeren loop ik stage bij de provincie  
Noord-Brabant, waar ik onderzoek doe naar  
de tevredenheid over het openbaar vervoer in  
de gemeente Loon op Zand.

Voor dit onderzoek wil ik u vragen om mijn enquête in te vullen. Dit duurt  
ongeveer 5 minuten en is volledig anoniem. De enquête is zowel bedoeld  
voor mensen die al bekend zijn met het openbaar vervoer, als voor mensen  
die dat niet zijn. Er zijn twee voorwaarden om hem te mogen invullen: u woont  
in de gemeente Loon op Zand en u bent 18 jaar of ouder.

Om betrouwbare resultaten te krijgen, heb ik een groot aantal ingevulde  
enquêtes nodig. **Kunt u mij helpen door de enquête in te vullen, en deze  
verder te verspreiden onder bekenden?**

U kunt de enquête vinden via de QR-code of  
via de link die onderaan deze brief staat.

Verder ben ik voor dit onderzoek op zoek  
naar bewoners die ik kan interviewen over  
dit onderwerp. Dit zal 20-30 minuten duren.  
Wanneer u hier interesse in heeft, kunt u mij  
een e-mail sturen naar  
[flogister@brabant.nl](mailto:flogister@brabant.nl), zodat ik contact met  
u kan opnemen. Dit e-mailadres kunt u  
ook gebruiken wanneer u vragen heeft over  
dit onderzoek.

Bij voorbaat dank!

Met vriendelijke groet,  
Finn Logister

Link naar de vragenlijst: [tinyurl.com/OV-LOZ-2024](https://tinyurl.com/OV-LOZ-2024)



**Radboud Universiteit**



# Appendix 5: Consent Form Regular Interviews

## Toestemmingsverklaring

Ik ben geïnformeerd over het doel van het onderzoek.

Ik heb vragen kunnen stellen over het onderzoek.

Ik neem vrijwillig deel aan het onderzoek.

Ik begrijp dat ik op elk moment tijdens het onderzoek kan stoppen als ik dat wil.

Ik begrijp waarvoor de gegevens gebruikt zullen worden.

Ik ga akkoord met deelname aan het onderzoek zoals beschreven in het informatiedocument.

Daarnaast geef ik toestemming voor:

Ja	Nee	
		- Het maken van audio-opnames.
		- Het intern opslaan van audio-opnames voor een periode van 10 jaar om wetenschappelijke integriteit te waarborgen.
		- Het gebruik van de (niet-persoonlijke) gegevens uit de audio-opnames voor dit onderzoek.
		- Het delen van deze identificeerbare opnames met de onderzoeksbegeleider, dr. Ir. Ary Samsura.

Naam van deelnemer:

Datum:

Handtekening:

Naam onderzoeker:

Datum:

Handtekening:

# Informatiedocument

*Draagt vraagafhankelijk vervoer bij aan een rechtvaardiger transport systeem?*

## Inleiding

Hierbij vraag ik u om deel te nemen aan een wetenschappelijk onderzoek van de Radboud Universiteit. Meedoen is vrijwillig. Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u in deze brief uitleg over wat het onderzoek inhoudt. Lees deze informatie rustig door en vraag de onderzoeker om uitleg als u vragen heeft. De contactgegevens vindt u onderaan de brief.

## Beschrijving en doel van het onderzoek

Het onderzoek gaat over de (mogelijke) invloed van het flexibele vervoerssysteem Bravoflex op een rechtvaardiger transport systeem. Dit wil in het kort zeggen dat iedereen zijn gewenste activiteiten goed kan bereiken. Hiervoor is als onderzoeksgebied de gemeente Loon op Zand gekozen, aangezien hier een pilot van Bravoflex plaatsvindt. Het doel van dit onderzoek is meer te weten te komen over hoe een flexibel vervoerssysteem hieraan kan bijdragen, en welke factoren hierbij belangrijk zijn.

## Door wie wordt het onderzoek uitgevoerd?

Dit onderzoek wordt uitgevoerd door Finn Logister, masterstudent Spatial Planning (Planologie) aan de Radboud Universiteit. Voor deze scriptie wordt hij begeleidt door Dr. Ary Samsura.

## Wat houdt deelname aan het onderzoek in?

In dit onderzoek geeft u een interview van 20-30 minuten waarin ik dieper inga op de vragen die u heeft ingevuld in de vragenlijst. Onderwerpen die voorbij zullen komen zijn uw huidige vervoerspatronen, de voorzieningen en Openbaar Vervoer in uw buurt, en Bravoflex. Er wordt een geluidsopname gemaakt van het interview, welke door de onderzoek wordt beluisterd en getranscribeerd (uitgetypt). Het interview zal plaatsvinden op een locatie naar keuze van u.

## Risico's en ongemakken

In dit onderzoek worden vragen gesteld over uw persoonlijke vervoersgewoonten en Bravoflex. Als u bepaalde vragen liever niet wilt beantwoorden, staat het u vrij deze over te slaan. Het interview zal worden opgenomen met uw toestemming, zodat we uw antwoorden nauwkeurig kunnen vastleggen. Mocht u zich op enig moment ongemakkelijk voelen of willen stoppen, dan kunt u dit aangeven en wordt het interview direct beëindigd.

## Vrijwilligheid

U doet vrijwillig mee aan dit onderzoek. Daarom kunt u op elk moment tijdens het onderzoek uw deelname stopzetten en uw toestemming intrekken. U hoeft niet aan te geven waarom u stopt. Het afzien van deelname of het voortijdig stoppen heeft geen nadelige gevolgen voor u.

## Welke gegevens worden verzameld en hoe wordt hiermee omgegaan?

De audio-opnames worden verwijderd zodra het interviewtranscript klaar is. Dit transcript worden geanonimiseerd, wat betekent dat het zo goed als onmogelijk is om gegevens naar u te herleiden. Uw eigen naam wordt vervangen door een pseudoniem. Alle andere informatie die naar u als individu leidt worden verwijderd in de onderzoeksgegevens (zoals contactgegevens of andere genoemde individuen) en vervangen door X.

De onderzoeker zal alleen werken met deze geanonimiseerde gegevens, die ook gebruikt kunnen worden voor wetenschappelijke artikelen en presentaties. De geanonimiseerde gegevens worden niet gebruikt voor andere onderzoeken, tenzij u hier expliciet toestemming voor geeft.

### **Toestemmingsverklaring**

Als u wilt deelnemen aan dit onderzoek, vragen we u een toestemmingsformulier te ondertekenen. Uw schriftelijke toestemming geeft aan dat u de informatie heeft begrepen en akkoord gaat met deelname aan het onderzoek.

### **Heeft u vragen over het onderzoek?**

Als u meer wilt weten over het onderzoek of de opslag van de onderzoeksgegevens, neem dan contact op met de onderzoeker of zijn begeleider.

#### *Onderzoeker*

Naam: Finn Logister

Titel: Bachelor of Science

E-mailadres: [f.logister@brabant.nl](mailto:f.logister@brabant.nl)

#### *Begeleider*

Naam: Ary Samsura

Titel: Doctor Ingenieur

E-mailadres: [ary.samsura@ru.nl](mailto:ary.samsura@ru.nl)

# Appendix 6: Consent Form Expert Interviews

## Toestemmingsverklaring

Ik ben geïnformeerd over het doel van het onderzoek.  
Ik heb vragen kunnen stellen over het onderzoek.  
Ik neem vrijwillig deel aan het onderzoek.  
Ik begrijp dat ik op elk moment tijdens het onderzoek kan stoppen als ik dat wil.  
Ik begrijp waarvoor de gegevens gebruikt zullen worden.  
Ik ga akkoord met deelname aan het onderzoek zoals beschreven in het informatiedocument.

Daarnaast geef ik toestemming voor:

Ja	Nee	
		- Het maken van audio-opnames.
		- Het intern opslaan van audio-opnames voor een periode van 10 jaar om wetenschappelijke integriteit te waarborgen.
		- Het gebruik van de (niet-persoonlijke) gegevens uit de audio-opnames voor dit onderzoek.
		- Het delen van deze identificeerbare opnames met de onderzoeksbegeleider, dr. Ir. Ary Samsura.

Naam van deelnemer:

Datum:

Handtekening:

Naam onderzoeker:

Datum:

Handtekening:

## **Informatiedocument**

*Draagt vraagafhankelijk vervoer bij aan een rechtvaardiger transport systeem?*

### **Inleiding**

Hierbij vraag ik u om deel te nemen aan een wetenschappelijk onderzoek van de Radboud Universiteit. Meedoen is vrijwillig. Voordat u beslist of u wilt meedoen aan dit onderzoek, krijgt u in deze brief uitleg over wat het onderzoek inhoudt. Lees deze informatie rustig door en vraag de onderzoeker om uitleg als u vragen heeft. De contactgegevens vindt u onderaan de brief.

### **Beschrijving en doel van het onderzoek**

Het onderzoek gaat over de (mogelijke) invloed van het flexibele vervoerssysteem Bravoflex op een rechtvaardiger transport systeem. Dit wil in het kort zeggen dat iedereen zijn gewenste activiteiten goed kan bereiken. Het doel van dit onderzoek is meer te weten te komen over hoe een flexibel vervoerssysteem hieraan kan bijdragen, en welke factoren hierbij belangrijk zijn.

### **Door wie wordt het onderzoek uitgevoerd?**

Dit onderzoek wordt uitgevoerd door Finn Logister, masterstudent Spatial Planning (Planologie) aan de Radboud Universiteit. Voor deze scriptie wordt hij begeleidt door Dr. Ary Samsura.

### **Wat houdt deelname aan het onderzoek in?**

In dit onderzoek geeft u een interview van 20-30 minuten waarin gereageerd wordt op de uitkomsten van de vragenlijst die aan de bewoners van Loon op Zand is ingevuld. Er wordt een geluidsopname gemaakt van het interview, welke door de onderzoeker wordt beluisterd en getranscribeerd (uitgetypt). Het interview zal plaatsvinden op een locatie naar keuze van u. Eventueel kan het interview online worden afgenomen.

### **Risico's en ongemakken**

In dit onderzoek worden vragen gesteld over Bravoflex en het Openbaar Vervoer. Als u bepaalde vragen liever niet wilt beantwoorden, staat het u vrij deze over te slaan. Het interview zal worden opgenomen met uw toestemming, zodat de onderzoeker uw antwoorden nauwkeurig kan vastleggen. Mocht u zich op enig moment ongemakkelijk voelen of willen stoppen, dan kunt u dit aangeven en wordt het interview direct beëindigd.

### **Vrijwilligheid**

U doet vrijwillig mee aan dit onderzoek. Daarom kunt u op elk moment tijdens het onderzoek uw deelname stopzetten en uw toestemming intrekken. U hoeft niet aan te geven waarom u stopt. Het afzien van deelname of het voortijdig stoppen heeft geen nadelige gevolgen voor u.

### **Welke gegevens worden verzameld en hoe wordt hiermee omgegaan?**

De audio-opnames worden getranscribeerd. Dit transcript wordt geanonimiseerd, wat betekent dat het zo goed als onmogelijk is om gegevens naar u te herleiden. Uw eigen naam wordt vervangen door uw functietitel binnen uw organisatie. Alle andere informatie die naar u als individu leidt worden verwijderd in de onderzoeksgegevens (zoals contactgegevens of andere genoemde individuen) en vervangen door X. ' Het transcript en de MP3-opname zal hierna voor 10 jaar bewaard worden in het digitale scriptie-archief van de Radboud Universiteit (RIS for students), om de wetenschappelijke integriteit te waarborgen. De onderzoeker zal alleen werken met deze geanonimiseerde gegevens, die ook gebruikt kunnen worden voor wetenschappelijke artikelen en presentaties. De geanonimiseerde gegevens worden niet gebruikt voor andere onderzoeken, tenzij u hier expliciet toestemming voor geeft.

### **Toestemmingsverklaring**

Als u wilt deelnemen aan dit onderzoek, vragen we u een toestemmingsformulier te ondertekenen. Uw schriftelijke toestemming geeft aan dat u de informatie heeft begrepen en akkoord gaat met deelname aan het onderzoek.

### **Heeft u vragen over het onderzoek?**

Als u meer wilt weten over het onderzoek of de opslag van de onderzoeksgegevens, neem dan contact op met de onderzoeker of zijn begeleider.

#### *Onderzoeker*

Naam: Finn Logister

Titel: Bachelor of Science

E-mailadres: [f.logister@brabant.nl](mailto:f.logister@brabant.nl)

#### *Begeleider*

Naam: Ary Samsura

Titel: Doctor Ingenieur

E-mailadres: [ary.samsura@ru.nl](mailto:ary.samsura@ru.nl)