

Urban densification in the Merwedekanaalzone

Sustainable in many ways, but also socially?

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Abstract

Cities worldwide continue to grow in population, and for decades urban sprawl has been the answer. However, the limits of urban sprawl are being reached, and instead it is becoming more and more dense in cities. With urban densification, cities focus on sustainable urban development. Urban densification forces policymakers to use space in a sustainable way, but what does this mean for social sustainability? In the scientific debate on the relationship between urban densification and social sustainability, it is emphasized that this relationship is strongly context dependent. This thesis presents the context of the Merwedekanaalzone in Utrecht when it comes to the relationship between urban densification and social sustainability.

Like many other cities, the Dutch city of Utrecht is focusing on urban densification in order to meet the housing demand with the increasingly scarce space. The Merwedekanaalzone is one of the areas being densified, where 10,000 homes are being built with unprecedented density by European standards. The project demonstrates sustainability in the field of mobility and the environment, but what about the social sustainability of the developments in the Merwedekanaalzone? Building on existing literature, this research shows through surveys and additional interviews with stakeholders that diverse housing is crucial for optimal social sustainability in the Merwedekanaalzone. Besides explaining the main challenges for achieving social sustainability through urban densification, suggestions for possible follow-up research are mentioned in this thesis.

Keywords: social sustainability, urban densification, sense of community, social equity, compact city.

Acknowledgements

This thesis is the end product of the master Spatial Planning, which I am doing at the University of Utrecht. The past six months were therefore my last months as a student. I look back on a great time, and I am proud to present this thesis as final piece.

During the thesis process I have learned at least as much as the past study years combined. You are mostly on your own, which makes it a real challenge. Yet I never felt that I was alone while doing my research. This is primarily due to my supervisor from Utrecht University, Dr. Abigail Friendly. Even during stays abroad or holidays I could ask her for advice. This always resulted in a quick response with specific and extensive feedback, which allowed me to continue my work. In addition, I have always experienced the online meetings that we had once in a while as very pleasant.

The most important role in my research is fulfilled by the local residents who have made the effort to complete my survey. I would especially like to thank the local residents who left their email address for an interview. They were all great conversations and it has provided me with essential insights. Then I would like to thank the project developer for taking time for an interview. Considering the important role that project developers play in urban densification in the Merwedekanaalzone, this perspective was indispensable. This also applies to the municipality of Utrecht, which I would like to thank. It took a while before an appointment could be arranged, but in the end everyone was very helpful.

While writing my thesis, I benefited a lot from coffee breaks with my housemates, which always gave me new energy. I especially want to thank Evalien and her coffee machine. Then I am fortunate that my father, Bart, has been working in the field of spatial planning for many years and has provided me with valuable advice for which I would like to thank him. My cousin has also made a valuable contribution by helping me with writing and language related matters, thanks a lot Maarten. Finally, I would like to thank my girlfriend Maaike, because of your support I will soon be able to keep you company in the working life!

Thank you all, and enjoy reading.

Ruben Humblet Utrecht, The Netherlands 5 August 2022

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1. Introduction

1.1 Problem definition

The share of the world population living in urban areas continues to increase. In 2010 this was 50% of the total population, but it is predicted that 70% of the world's population will live in urban areas by 2050 (United Nations [UN], 2013). The worldwide population growth can also be seen in the Netherlands. In the period 2016-2017, the population of the country increased by 100.000 inhabitants, the biggest increase ever measured over a period of 15 years (Capital Value, 2018). This trend requires a sustainable and compact way of urban development, as a countermovement to the urban sprawl concept, which has been acclaimed for decades (Haaland & Konijnendijk van den Bosch, 2015). An alternative, sustainable way of urban planning was already considered at the beginning of this century, since the concept of urban sprawl would have a bad influence on the health and physical condition of citizens (Ewing et al., 2003). Urban sprawl can be seen as expanding urban areas and is characterized by low-density housing, segregated land-use, car-oriented planning and a lack of public transport facilities (Johnson, 2001). Problems related to urban sprawl are sacrificing precious (green) land, losing biodiversity and increasing social inequalities (Power, 2001). It is thus recognized that the negative effects of urban sprawl need to be countered with a different approach in urban planning.

The Dutch city of Utrecht is aware of the demand for a new form of urban development. To deal with the demand for housing and the increasing population, Utrecht is focussing on creating a dense but sustainable city (Gemeente Utrecht, 2021). This approach focuses on sustainable mobility and an environmentally friendly way of urban development. However, the high prices of the newly developed houses seems to exclude a large part of the demanders (RTV Utrecht, 2020). In addition, residents of the city fear that urban densification will lead to an impersonal, overcrowded city (Venderbosch, 2021). Urban densification may be the solution to the housing shortage and the growing population, but little research has been done on the social consequences of this (Burton; 2003; Bibby et al., 2021; Pont et al., 2020). This thesis will investigate the relation between urban densification and social sustainability, with the Utrecht neighbourhood Merwedekanaalzone as case study. The main research question is formulated as follows:

To what extent does urban densification contributes to social sustainability in the Merwedekanaalzone, Utrecht?

To answer this research question in the most fitting manner, 3 sub-questions will help to formulate the eventual conclusions:

- 1. In what way is urban densification related to social sustainability?
- 2. What are the most important indicators of social sustainability related to urban densification in the Merwedekanaalzone?
- 3. How can social sustainability in the Merwedekanaalzone be improved through urban densification?

1.2 Social relevance

The housing shortage in the Netherlands is a problem that has been recognized for years. Particularly in the large cities, such as Utrecht, the demand for housing remains high and purchase prices are rising to unprecedented heights (Central Bureau of Statistics [CBS], 2022; Pararius, 2022). The most recent Spatial Strategy published by the municipality of Utrecht focuses on themes such as a green environment, housing, mobility and employment opportunities (Gemeente Utrecht, 2021). in order to address all these themes, the municipality will focus on densification in the coming years. Large-scale projects in, for example, the Beurskwartier or the Merwedekanaalzone must respond to the housing shortage in a sustainable way. That sounds like a noble aim, but the proportion of housing that is actually affordable for the low and middle incomes in Utrecht appears to be substandard in these new projects (De Utrechtse Internet Courant [DUIC], 2020). This raises the question of whether the housing shortage is actually being tackled with these new construction projects, or whether it only offers opportunities for wealthy buyers and tenants on the housing market. The sustainability goals, space for greenery and the creation of a healthy living environment have all been incorporated into the lucrative projects. But if this is indeed only accessible to the elite, it is also the only group that is able to take advantage of these location benefits. As a result, there appears to be social exclusion, which is contrary to the values of the just city.

1.3 Scientific relevance

Previous research into the consequences of densification mainly focuses on the consequences for the environment. Research into the social consequences of densification, such as change in sense of community or accessibility of facilities, is much more scarce. Despite that the concept of densification has been regarded as the preeminent approach to urbanization since the early 1990s (Pont et al., 2020). A comprehensive literature review found that most scientific papers were written on the effects of urban densification on 'transport' (41%). That is, the use of certain means of transport or, for example, safety in traffic. Off all the studies done on the effects of urban densification, only 12% focused on the social effects (Pont et al., 2020). Burton (2000) states that social justice aspects have been relatively underexposed in previous research, because these are more difficult to measure than environmental consequences. At the same time, Burton's (2000) research is regarded as the leading example of a large-scale investigation into the link between urban densification and social inequality (Bibby et al., 2021). After Burton's criticism, several studies have been conducted into the link between the spatial strategy of cities and the accessibility of the housing market (Cavicchia, 2021; Dale & Newman, 2009; Rérat, 2012). However, this was not always about urban densification specifically, and they were often integral studies that compared several cities instead of one specific case study. This study, which focuses on the city of Utrecht, takes a closer look at one example that could be useful for comparable cities in the Netherlands.

2. Theoretical framework

Based on existing theories about urban densification and social sustainability, this chapter outlines a theoretical framework on which the rest of this research is based. First, the concept of urban densification is explained in more detail, after which the link with social sustainability is discussed. This chapter concludes with the conceptual framework, which serves as a foundation for the executive side of this research.

2.1 The concept of densification

The growth of human population requires an increase in the volume of buildings and urban areas, which is an inherent part of development (Pelczynski & Tomkowicz, 2019). Since the 1960s, this growth has manifested itself in the form of urban sprawl. Not only in rapidly urbanization continents like Asia and Africa, but urban sprawl is considered as a worldwide problem (Zhao, 2011). A problem, since many studies done in the end of 20th century already have shown that urban sprawl is hindering cities in sustainable development (Johnson, 2001). But also more recent studies argue that urban sprawl has a negative impact (Pelczynski & Tomkowicz, 2019). An example of such negative effect is the consumption of (highly productive agricultural) land, that results in less open space and longer distances between urban areas and green recreational areas. Another disadvantage of urban sprawl is that it maintains or even strengthens the dependency on car use, that has multiple negative effects like longer commuting times and distances, climate change emissions, noise and air pollution (Pelczynski & Tomkowicz, 2019).

In order to counter this increasing urban sprawl, urban densification is considered as alternative. Urban density means an increase in either population, buildings, and or activities in the urban environment (Westerink et al., 2013). These factors can develop independently of each other. For example, it is not by definition the case that densification of housing, i.e. an increasing number of houses on the same plot of land, will lead to an increase in the population on that same plot of land. This is determined by the size of households and the living space per capita (Haase et al., 2013). However, it differs per case exactly how the concept of urban density is interpreted, this depends on the context (Raman, 2010). Although the concept of densification is not clearly defined and depending on the context, in planning it generally stands for land that is used more intensively than before (Dembski et al., 2020). In that specific context, the location is a key factor. That the location is indeed an important factor is emphasized by the assumption that densification is only applied in inner cities. This is a misconception, the concept is also increasingly used in suburbia (Dembski et al., 2020).

Besides the distinction between inner cities and suburbs, for example, a different definition can be given to densification even within the same region (Churchman, 1999). It depends on how density is measured, whether it is residential density or population density, and what purpose is to be achieved with it. The difference in definition can also be explained on the basis of the different cultural, social, historical and administrative backgrounds that may differ per country or per region (Churchman, 1999). This once again illustrates the importance of location and context when it comes to defining and interpreting the concept of densification or density. In addition to the various factors that can be subject to densification (population, buildings, activities) and the importance of location and context, a distinction can be made between hard and soft densification (Touati-Morel, 2015). Hard densification stands for large-scale urban development, while soft densification includes small interventions in the spatial environment that ultimately contribute to the entire whole. There is also a difference in the resistance of current residents.

Soft densification interventions mainly take place in an existing built environment, which can lead to resistance from residents (Touati-Morel, 2015). Hard densification mainly takes place on areas of land where nothing has yet been built, which lowers the risk of local resistance. However, this raises the question of the extent to which there is then densification or expansion of the built environment, in the case of hard densification (Touati-Morel, 2015).

2.2 Densification in the Netherlands

Since the 1960s and 1970s, various Dutch policy documents have referred to densification, or a comparable form of it. The ideas of 'clustered dispersal' and 'growth centres' were discussed in the Second (1966) and Third (1973) National Policy Document on Spatial Planning (Nabielek, 2011). The densification strategies were introduced in the Netherlands out of necessity, since the country is one of the most dense populated in Europe. Therefore, spatial development should take place in a deliberately way in order to preserve open and green space between urban settlements (Broitman & Koomen, 2015). This was, and is, especially a challenge in the western, most dense part of the Netherlands where the Randstad area is located (Faludi & Van der Valk, 1994). Densification therefore seemed to be the only way to deal with the scarce space in the Netherlands in combination with the population growth that certainly took place at the beginning of this century. However, criticism on the Dutch densification policy soon arose (Nabielek, 2011). According to research bureau Ecorys, Dutch cities were already reaching their densification limit at the beginning of this century (2005). According to them, complexity in ownership, legal procedures and increasing costs caused impediment to further urban densification in the Netherlands (Ecorys, 2005). Besides, the sustainability of densification strategies was questioned The compact city would lead to congestion, and would increase the local pollution (Nabielek, 2011).

Despite the limits that seem to apply to urban densification in the Netherlands, Dutch city centres have become increasingly popular in recent years and this is leading to urban densification (Broitman & Koomen, 2015). In particular, highly educated dual earners without children move to the city centres and are willing to pay a lot for housing in prime locations (Broitman & Koomen, 2015). Besides that having children in urban densified areas is not encouraged because of the many high-rise buildings (Ahfeldt & Pietrostefani, 2017), an urban densified area is also often experienced as child-unfriendly Kyttä et al., 2013). This explains why urban densified areas are largely populated by highly educated dual earners without children.

2.3 Densification in the city of Utrecht

The Dutch city of Utrecht has been subject to urban sprawl development in recent decades. The new developed Leidsche Rijn neighbourhood and the suburb Nieuwegein were developed along major motorways and provided with train or light-rail connections to the adjacent urban centre of Utrecht (Buitelaar & Leinfelder, 2019). With good public transport facilities, Utrecht seems to distinguish itself from the typical urban sprawl problem of car dependency. Despite the public transport facilities, a neighbourhood like Leidsche Rijn is a good example of a so-called Vinex neighbourhood that is designed for car use. Despite the development of various neighbourhoods and the expansion of suburbs, the housing market in Utrecht is still under great pressure. The municipality of Utrecht predicts a population of 410.000 in 2030, an increase of 70.000 compared to 2016 (Gemeente Utrecht, 2016). To facilitate this predicted growth, Utrecht is committed to sustainable and healthy growth, from within the city (Gemeente Utrecht, 2016). In order to realize this sustainable and healthy growth, Utrecht commits to the so-called '10-minute city'. The idea of a 10-minute city is that you can reach certain amenities within 10 minutes from your home. It concerns essential facilities such as work, education, and a place to do groceries (Gemeente Utrecht, 2021).

Besides the very essential amenities, other amenities such as sports, theatre and green space for relaxation should also be accessible to the inhabitants of Utrecht within 10 minutes. In order to grow sustainably and healthily, and thus achieve a 10 minute city, but at the same time respond to the predicted increase in population, Utrecht is focusing on urban densification. Urban densification takes place at specific locations throughout the city, which are designated as urbanization node (Gemeente Utrecht, 2021).

The designated urbanization nodes are located outside the historic center of Utrecht, in order to keep and preserve as much of it intact as possible. Two examples of such urbanization nodes are the station area and the Merwedekanaalzone (Gemeente Utrecht, 2021). The station area is already an important junction, but in addition to a transport function, it must also be made liveable and habitable. The use of several functions in the same area fits in with the local policy of the municipality of Utrecht, in which mixed land use plays an important role. In the Merwedekanaalzone, there is already a certain amount of mixed land use, since there is housing, business and catering industry located (Gemeente Utrecht, 2021). The municipality of Utrecht has designated the Merwedekanaalzone as a densification location, where 10,000 new homes will be developed. This makes the Merwedekanaalzone a suitable case study location, which will be discussed in more detail in section 3.2.

2.4 The compact city

The concept of densification applied on the urban environment, led to the concept of the compact or dense city. In contrast with the concept of urban sprawl, the compact city stands for high-density housing, mixed land-use, a proper public transport network and promotion of cycling and walking (Burton, 2000). However, like the concept of densification, it is difficult to precisely define and establish the compact city. Burgess (2002) states that the main purpose of the compact city is often to achieve sustainable urban development, but this is not necessarily the only purpose. Economic, social, cultural and political reasons could underpin, and ultimately benefit from, the compact city (Burgess, 2002). As with the concept of densification (Dembski et al., 2020; Raman, 2010), the application and interpretation of the compact city concept depends on the location and context. The scale level for example, determines in what way the 'principal spatial point' of compactization is assumed, according to Burgess (2002). Is it about the entire urban region, or the metropolitan area? Or on neighbourhood level, in suburbs or the inner city? In addition, there is also discussion about the applicability, whether this should be done on existing buildings or completely new ones (Burgess, 2002). This context and location dependence explains why it is so difficult to give a precise definition of the compact city. Despite the importance of context and circumstances, Burgess (2002) comes up with the following definition of the compact city approach:

"To increase built area and residential population densities; to intensify urban economic, social and cultural activities and to manipulate urban size, form and structure and settlement systems in pursuit of the environmental, social and global sustainability benefits derived from the concentration of urban functions."

This definition covers aspects mentioned by Burton (2000), such as high-density housing. However, Burgess mentions different forms of sustainability benefits, to be precise environmental, social and economic benefits. The importance of these three pillars is endorsed by Burgess (2002), Dempsey & Jenks (2010) and Jenks and Jones (2010). The scholars agree that an ideal compact city must be socially balanced, function optimally economically and focus on preserving the environment. Although there are also demonstrable negative effects of the compact city, like overcrowding and lower living quality (Haaland & Konijnendijk van den Bosch, 2015), many urban planners and policymakers seem to have agreed that it is more beneficial for an urban area to densify than to allow urban sprawl (Naess, 2001).

This opinion is mainly based on the environmental advantages that densification entails, like effective land use, a forced decrease in car use, which automatically provides more stimulation for cycling and walking, and the protection of non-urban area around cities (Westerink et al., 2013; Burton, 2000; Skrede & Berg, 2019).

In contrast to the benefits for the environment, there is something that, according to Burton (2000), was an underexposed theme in research into the compact city at the beginning of this century. Burton questions social equity in the compact city. It is confirmed that, if the compact city does indeed represent a sustainable form of living, it will not be accessible to every layer of the population (Burgess, 2002). After all, priority will always be given to survival, before looking at the sustainable aspect of this. For lower incomes, it is therefore impossible, or at least more difficult, to spend money on a sustainable way of living. If densification does indeed result in a compact city that focuses on sustainable living, will this also be accompanied by an unattainable price tag for low and middle incomes? The social sustainability pillar of the compact city, which according to Burton is therefore underexposed, is particularly relevant for this research in relation to the compact city. The next section will further discuss the social sustainability of a compact city.

2.5 Social sustainability and the compact city

Social sustainability is a process for creating sustainable, successful places that promote wellbeing, by understanding what people need from the places in which they live and work (Woodcraft, 2015). Together with environmental and economic sustainability, social sustainability is part of sustainable urban development (Burton, 2000; Burgess, 2002; Dempsey & Jenks, 2010; Jenks & Jones, 2010). Sustainable urban development can be considered as one of the main goals of a compact city approach, a result of densification In the previous section it was argued that the willingness of residents to participate in this densification depends on the possibility to benefit from the positive effects that occur with densification. Furthermore, the willingness of local residents to allow densification in their neighbourhood depends on local standards that differ per country or continent. In most European cities, neighbourhoods are already densified when there are more than 100 homes per hectare. This is in stark contrast to Asian countries such as India and China, where there are at least 600 homes per hectare in various cities at neighbourhood level (Dempsey, 2010). So a compact city approach, focusing on 150 homes per hectare for example, could be considered as a relatively high density in European cities, while in certain neighbourhoods in Asian cities it would suddenly create a lot of space compared to the current situation. This shows again that the location and context determine how the compact city approach is interpreted and applied, as emerged in the previous section 2.4.

Although social sustainability is central to this research, there is often overlap with environmental and economic sustainability. The willingness of residents to participate in the densification process is an example of this overlap between environmental, social, and economic sustainability, because the residents form a social factor that is influenced by economic and environmental arguments. In practice, however, it is not the case that applying densification/the compact city approach by definition leads to sustainable (social) development. Raman (2010) proposes four reasons for this. Firstly, densification in itself is a vague concept, which is interpreted and applied differently per scale level. In addition, densification can be seen as an umbrella term for several underlying factors such as mixed land use, green space and sustainable transport. In order for the densification process to succeed it is important that the right balance is found between mixed land use, green space and sustainable transport (Bibri et al., 2020).

Secondly, Raman states that a densification strategy is not the right way to generate sustainable development in every context. This is illustrated by the example given earlier in this chapter, where the willingness of residents is cited to indicate that this is strongly location-specific. In African and Asian cities in particular, urban densification is already such that it does not seem to be the solution for sustainable urban development. This is in contrast to American and European cities, where there are opportunities for densification and where efforts are made to counter urban sprawl (Raman, 2010).

This ties in with the third argument, which emphasizes that the willingness to live in a densified environment depends on social and cultural factors. Lastly, there is always the difference between the design and the perception of the final densification strategy. A densification strategy either concerns the densification of the population, buildings, or activities, which are regarded as the elements of which a densification strategy can consist (Westerink et al., 2013). The densification process will affect accessibility and social relations and the way in which this will be done is difficult to predict. Besides the critical comments that can be made about the link between densification and sustainable development, it is also questionable what exactly is meant by social sustainable development specifically. For example, Burton (2000) considers things like affordable housing and accessibility to green space to be social aspects, while things like housing and green space could also be seen as an economic and environmental issue respectively. With regard to consequences of the compact city approach on social sustainability, Burton (2000) mentions three things that are negatively influenced by the densification of housing:

- Less domestic living space
- Lack of affordable housing
- Increased crime levels

It should be noted that Burton's research, which is highly regarded and often cited, is now over 20 years old. Despite this, she is cited, because her work is considered to be so relevant that it has added value for this research.

An aspect not mentioned by Burton, but regarded as important by other scholars, is the role of subjective well-being in relation to social sustainability (Cloutier & Pfeiffer, 2015; Mouratidis, 2019). Subjective well-being is often measured at neighbourhood level, but has only recently been linked to the built environment in research. For easier measurement, subjective well-being can be divided into three aspects. First, one's current emotional feelings, second, satisfaction with life in general so far, and third, the meaning and purpose of one's life (Mouratidis, 2019). When viewed in a broader perspective, the concept of subjective well-being could also be described as "happiness" (Cloutier & Pfeiffer, 2015). Happiness is considered an indicator of social sustainability, in particular the connectedness with the neighbourhood plays an important role. Higher density in a neighbourhood may lead to more social interactions, which can lead to more connectedness (Cloutier & Pfeiffer, 2015) and thus contribute to social sustainability. As one of the main pillars of the compact city, social sustainability can be divided into two dimensions: social equity and sustainability of community (Bramley et al., 2009). Jenks and Jones (2010) also discuss two aspects of social sustainability. They mention social equity as well, the second factor in their view is the quality of life. That social equity is an important part of social sustainability is endorsed by Hofstad (2012). In addition to social equity, he emphasizes that social justice, social inclusion, social capital, and social cohesion form the basis of the concept of social sustainability. First, the widely supported social equity aspect will be discussed in the next section.

2.6 Social equity as part of social sustainability

The compact city idea should in principle be conducive to social sustainability, which is largely shaped by social equity. Social equity includes access to public facilities, such as public transport, shops, schools and health centres. In addition to public facilities, social equity also advocates job opportunities and access to affordable housing (Bramley et al., 2009). Social equity is a wide term, and can therefore be used and interpreted in different ways. Burton (2003) uses existing literature to distinguish actors that are part of social equity or social justice, which are considered the same term in her research.

According to the existing literature, these actors would be positively or negatively influenced by the compact city concept. In this, Burton distinguishes between statements for which it is known that there is research that shows conflicting results, and statements for which no conflicting results were known at the time (2003). The following propositions are the positive result of a compact city approach (Burton, 2003):

- Better access to facilities (positive effect)
- More space and possibilities for pedestrians and cyclists (positive effect)
- Lower levels of social segregation (positive effect)

Other, more recent work argues that social equity should not be seen as an end in itself in urban densification, but rather is a consequence of better access to facilities and variety of housing in both type and prices which should result in affordable housing for all (Bibri et al., 2020). In addition, reduced social segregation is a demonstrable consequence of the compact city, which also contributes to social equity (Bibri et al., 2020; Burton, 2000).

A remark should be made, however. One of the biggest challenges for the compact city in relation to social equity is to let both current residents (before applying the compact city approach) and new residents benefit from the positive effects that come with densifying the neighbourhood (Daneshpour & Shakibamanesh, 2011). This does not only concern positive effects such as social facilities, and factors that cannot be determined exclusively with the built environment, such as inclusiveness, cohesion and safety. These social factors can be influenced by the built environment, but local governments struggle in the institutionalisation of planning practices capable of advancing these social goals (Hofstad, 2012). Social mobility can indeed increase through a compact city approach, which ensures that different social groups come into contact with each other and ultimately has a positive effect on segregation. However, this effect can be negated when urban densification manifests itself in the delivery of only high-quality housing in popular places, resulting in high house prices. This contributes to social segregation (Ahfeldt & Pietrostefani, 2017). Concluding this section, various aspects of social equity in relation to the compact city approach have been discussed. Better access to facilities is a widely supported positive effect, but that social segregation is reduced by the compact city approach is questioned.

An important role herein is reserved for the local authorities, who must pay particular attention to rent prices, because that seems to be an important factor in reducing or increasing social segregation. High-density areas in European cities have long been characterized by low incomes and poor living conditions, because it is cheaper to live than places with a garden and where a car is required, such as in suburbs (Westerink et al., 2013). However, this trend has changed and now densification in central-areas benefits the developers and landlords, but disables the lower and middle incomes in finding affordable housing (Cavicchia, 2021). In that sense, urban densification encourages social-economic inequality and makes the compact city only attractive to high-incomes who can afford to live in city centres (Rérat, 2012).

This inequality is caused by the densification process that allows cities to convert or demolish relative old but payable housing, and develop more expensive housing instead (Debrunner, Hengstermann & Gerber, 2020). Because it changes the housing segment, this process is accompanied by social exclusion and inequality. The relationship between rents and social segregation is an example of a factor that can be influenced directly, which is related to a factor that cannot be influenced directly, such as segregation, cohesion, etc. These kinds of social phenomena can partly be influenced by the built environment, but in practice they prove difficult to control and predict (Hofstad, 2012). It is therefore important that the adjustments that are made in the built environment to propagate the compact city ideal, are done as efficiently as possible because the built environment can be directly influenced by local authorities.

2.7 Sustainability of community as part of social sustainability

As argued in the previous section, social equity has a demonstrable connection with social sustainability which is endorsed by several scholars (Bramley et al., 2009; Hofstad, 2012; Jenks & Jones, 2010). Social equity could be considered as the first overarching dimension of social sustainability. The second overarching dimension of social sustainability mentioned in the literature is the sustainability of community (Bramley & Power, 2009; Bramley et al., 2009; Dempsey et al., 2011). Whilst social equity matters may be considered political and policy steerable, issues related to community sustainability are less so (Bramley & Power, 2009). Sustainability of community stands for the ability of the local community to sustain itself through social interaction between residents and thereby to function at an acceptable level (Dempsey et al., 2011). Compared to social equity, sustainability of community can be regarded as a vaguer concept that is determined by subjective factors. For example, the aim is to have a community function in an acceptable manner, but what does acceptable mean here? The degree of acceptable remains vague and must be defined per spatial plan.

While community sustainability is a more vague concept than social equity, Bramley and Power (2009) argue that it is the responsibility of the government to ensure community sustainability, while academic writers should address the phenomenon of community sustainability more in literature. Two important areas of community sustainability that have been extensively researched are social cohesion and social capital (Bramley & Power, 2009). As Hofstad (2012) argues, social cohesion and capital can be partly influenced by the built environment, but it remains difficult to predict how a spatial change, such as urban densification, influences social cohesion and capital.

Overall, the debate on community sustainability is characterized by vagueness. Nonetheless, when broken down into specific indicators that can be related to social capital and cohesion, community sustainability becomes more concrete and measurable. Bramley et al. (2009) distinguish the following aspects as the most important components of sustainability of community:

- Interaction with other residents/social networks
- Participation in collective community activities
- Pride/sense of place
- Residential stability (versus turnover)
- Security (lack of crime and disorder)

That the above points form the basis of the concept of sustainability of community is largely endorsed by Dempsey et al. (2011). The authors do, however, have a fair comment on the definition of the term, because how is "community" defined? In theory, community often overlaps with neighbourhood, which can therefore be taken as the same term (Dempsey et al., 2011).

The sustainability aspect in itself is too broad to be defined or measurable. However, the context of urban communities can make sustainability measurable by factors, as Bramley et al. (2009) did. The sense of community is determined by individual behaviour, such as activity within the community, that depends on the extent to which a resident feels connected to the neighbourhood (Turcu, 2013; Bramley et al., 2009).

This connection with the neighbourhood is related to the extent to which there is interaction with local residents, the first point mentioned by Bramley et al. (2009). The interaction with others also contributes to the extent to which a resident is proud of the neighbourhood in which the resident lives. The fourth element mentioned as a component of sustainability of community is residential stability. This factor again depends on the extent to which a resident feels connected to the neighbourhood. Social cohesion is seen as the most important reason for staying or leaving a neighbourhood (Bramley et al., 2009). In addition, it is important for a community that residents stay there for a longer period of time, because this contributes to social sustainability in general (Dempsey et al., 2011).

When it comes to staying in a neighbourhood for longer, the type of home ownership has an influence. Tenants may be less willing to invest socially in the neighbourhood they live in, as this is often seen as a temporary residence. In contrast, owning a house promotes the will to invest socially in the neighbourhood (DiPasquale & Glaeser, 1999). That residents stay in a neighbourhood for a relatively short time symbolizes little affinity and bond with the neighbourhood, which is an indicator of low sustainability of community (Dempsey et al., 2011).

The last indicator that is mentioned by Bramley et al. (2009) as most important component for sustainability of community, is security or safety. The feeling of safety is considered very important by residents when it comes to the sustainability of their community (Turcu, 2013). The sense of safety seems to be more important than, for example, living in a mixed-income community while both factors can play a role in the social sustainability of a community or neighbourhood (Turcu, 2013).

Nevertheless, the distinction that residents make can be explained because the sense of security is directly linked to their personal experience, while a (non-)mixed income neighbourhood is more likely to have indirect consequences in terms of general social sustainability. It may be argued that all five indicators mentioned by Bramley et al. (2009) for measuring community sustainability have in common that the indicators depend to some extent on social networks. The social network of a resident, and to what extent the resident is willing to invest in this network, ultimately determines the extent to which the resident feels connected to the community (Bramley & Power, 2009).

Various findings from earlier studies illustrate that the sense of community is inextricably linked to the degree of urban densification. People are more likely to meet one other on the street in higher density regions than in lower density areas, Alternative ideas suggest that people in higher-density societies disengage from social engagement and incur stress (Bramley & Power, 2009). These seemingly opposing viewpoints could indicate nonlinear interactions but also emphasize that the relationship between the built environment and sustainability or community differs per case and strongly depends on the context (Bramley & Power, 2009; Bramley et al., 2009; Dempsey et al., 2011).

2.8 Measuring social sustainability in the urban context

At the beginning of the 21st century, research into social facets of the compact city focused in particular on the relationship between social equity and the compact city (Burgess, 2002; Burton, 2003; Burton, 2000). More recent research, building on the work of Burgess and Burton, argues that social equity can be considered as part of social sustainability (Bramley et al., 2009; Hofstad, 2012; Jenks & Jones, 2010).

In addition to social equity, there is another factor that contributes to social sustainability: community of sustainability. According to Woodcraft (2015), measuring social sustainability is most accurate when social sustainability is divided into 3 elements, namely:

- Amenities and infrastructure
- Social and cultural life
- Voice and influence

The first element, amenities and infrastructure, refers to the built environment of the neighbourhood. The presence or absence of certain facilities and infrastructure can have an impact on social sustainability. Social and cultural life, the second element, concerns the experience of residents. How the residents experience their social and cultural life may be related to the built environment. Therefore, residents will also be asked about their perception of the built environment for example, so that possible links can be examined. It is interesting, for example, to look at a respondent who indicates that he feels little social connection with the neighbourhood. Could this be related to a lack of certain facilities? The third and final element, voice and influence, illustrates the will and ability of residents to influence future development in the neighbourhood by participating in the decision-making process.

Among the three elements that can measure social sustainability to a certain extent, there are indicators for each element. Woodcraft (2015) selected indicators based on previous research into social experiences done by the UK government and work by Dempsey et al. (2011). The three elements plus the indicators form a framework, which is visualized in figure 1. However, it should be noted that this framework was developed for a residential developer in the United Kingdom. As a result, some factors that could influence social sustainability have been disregarded. For example, factors such as access to education and employment are not included in the framework, because they are beyond the control of the residential developer that commissioned Woodcraft's research (2015). However, indicators that could measure social equity or justice have also not been taken into account by Woodcraft. Again, the argument is used that social equity and justice cannot be influenced by a housing developer. It seems logical that matters such as education and employment are beyond the control of a housing developer, but this is doubtful in the case of social equity and justice. Apart from the few facets not included in Woodcraft's model, it is considered complete enough to use the indicators for this thesis. In addition, other literature will be used to establish the indicators and the conceptual model.

Larimian and Sadeghi (2021) concur that measuring sustainability is an underexposed theme in the literature. Larimian and Sadeghi used the existing literature in their research to determine the best way to measure social sustainability. Unlike Woodcraft's research, which focuses on the perspective of a housing developer, Larimian and Sadeghi focus exclusively on the gap in the literature. Based on the literature, the following seven indicators are distinguished to measure social sustainability: social interaction, safety and security, social equity, social participation, neighbourhood satisfaction, sense of place and housing satisfaction (Larimian & Sadeghi, 2021). Although these seven aspects specify the concept of social sustainability to a certain extent, aspects like social equity and sense of place for example remains vague and difficult to measure.

In order to clarify the seven aspects mentioned by Larimian and Sadeghi, an accompanying statement is drawn up for each indicator in table 1, with which the indicator can be measured. These indicators will be used in the remainder of this study, which will be further explained in the method chapter 3.

Factor of social sustainability	Indicator per factor
Social interaction	I know the first names of my next door neighbours
Safety and security	I feel safe to walk alone in the neighbourhood after dark
Social equity	Access to essential facilities (supermarket, healthcare, bank)
Social participation	We have a strong and active community in our neighbourhood
Neighbourhood satisfaction	This neighbourhood is a good place to live in
Sense of place	Living in this neighbourhood gives me a sense of community
Housing satisfaction	Housing in my neighbourhood is affordable

Table 1: Indicators of social sustainability explained per factor (Larimian & Sadeghi, 2021).



Figure 1: Indicators of social sustainability (Woodcraft, 2015).

2.9 Conceptual framework

In order to draw up a conceptual model for this research, first a comparison will be made between the framework of Woodcraft (2015) and the indicators used by Larimian and Sadeghi (2021). Despite the fact that the Woodcraft framework does not consider the social equity aspect, the framework is still relevant. Social sustainability is not only based on social equity, but also on sustainability of community. Therefore, it makes no sense to completely write off Woodcraft's framework due to the lack of factors that measure social equity. There is a lot of overlap between the Woodcraft framework and the indicators used by Larimian and Sadeghi. Although the Woodcraft framework lacks the indicator "social equity", it does address the infrastructure aspect. However, it is debatable whether infrastructure falls under social sustainability or, for example, environmental sustainability. Infrastructure is therefore not reflected in the indicators used by Larimian and Sadeghi. In order to set up a conceptual model for this thesis, in addition to the existing literature, the indicators used by Larimian and Sadeghi are used. The Woodcraft framework serves as confirmation, but cannot be regarded as guiding. The Woodcraft framework cannot serve as a basis because it has been drawn up partly from a scientific, but also from a commercial point of view. This is in contrast to the research of Larimian and Sadeghi and this thesis, that are both written from a scientific and social relevance. The full conceptual model is visible on the next page in figure 2.

The conceptual model summarises the theoretical framework that is discussed in the last chapter in simple terms. Urban densification, which is the focus for this research, is the result of a general population growth and migration to the city. The urban densification has led to the compact city approach. The compact city approach has sustainable, urban development as its main purpose. Three aspects are important to achieve sustainable urban development. Namely environmental, social and economic sustainability. This thesis focuses on social sustainability. Social sustainability consists of two overarching factors, namely social equity and sustainability of community. In order to measure social sustainability, there are seven concrete indicators that can be used and which arise from the two pillars of social equity and sustainability of community. In the next chapter, where the methodology of the research is explained, the indicators from the conceptual model will be further explained.



Figure 2: Conceptual model (source: author).

3. Research Methodology

This chapter will first describe the case study design. It will then be explained which research method has been chosen and why this is the most appropriate method. Finally, the research area and the research population will be explained.

3.1 Case study design

The relationship between urban densification and social sustainability can best be investigated at neighbourhood level. Conducting research at the neighbourhood scale is a common approach to studies focusing on the built environment (Mouratidis, 2018). A neighbourhood is a geographical area that connects the micro level of a home to the macro level of a city or region. Since its inception, the urban planning profession has placed a strong emphasis on neighbourhood-level planning, thereby creating the impetus for doing research in that field. Because social sustainability in relation to urban densification can be seen as a socio-spatial issue, it is not desirable to investigate this on a macro scale, as the interpretations of socio-spatial issues can already differ greatly at the micro level (Woodcraft, 2012). In addition, a study at city or regional level is too large-scale, while research at the neighbourhood level allows comparisons to be made within the same geographical or cultural scale (Mouratidis, 2018). After determining the research scale, it was decided to conduct a single case study. A single case study is suitable when a subjective phenomenon is measured, because many contextual factors have to be taken into account to define the concept to be researched (Starman, 2013). Social sustainability is a subjective phenomenon that is measured in this research, which is why a case study is appropriate. In addition, case studies do not require large numbers of research units or a minimum number of variables (Starman, 2013). This research is not large-scale, because it concerns a master's thesis with limited research possibilities and time. The use of a case study carries no additional risks of bias compared to other methods of inquiry. On the contrary, history suggests that the case study approach favours the falsification of pre-existing assumptions over the verification of them (Flyvbjerg, 2006). It should be noted that the aim of the research is not to generalize. In that sense, the results of the research strongly depend on the context of in this case in the Merwedekanaalzone neighbourhood and the city of Utrecht, or on a larger scale the Netherlands as a country. This is why the results can at most serve as a reference for other neighbourhoods in the city of Utrecht, but the consequences of urban densification can differ greatly within a country which makes generalizing on a larger scale undesirable (Churchman, 1999; Raman, 2010).

3.2 Research area

In order to be able to answer the research question, some requirements have been set for the case study and the research area. Where it was already established in the previous section 3.1 that the study could best be done at neighbourhood level, secondly, there must be urban densification in the area to be researched. In addition, it is important that the researcher can regularly visit the site, so preference was given to a neighbourhood in the vicinity of Utrecht. Ultimately, the Merwedekanaalzone met the requirements. The Merwedekanaalzone is a neighbourhood in the Zuidwest (Southwest) district of Utrecht, as visible in figure 3. In the Spatial Strategy Utrecht (2021), the Merwedekanaalzone is designated as an important new construction site in the city of Utrecht. An important difference with other neighbourhoods in Utrecht where a lot of densification will take place, such as the Beurskwartier near the Central Station, is that development has already taken place in the Merwedekanaalzone. Because some of the construction has already taken place in the Merwedekanaalzone, the case study can provide a valuable assessment of the current situation, rather than a measurement of the future situation. The advantages of conducting research at the scale level of a neighbourhood, in combination with the urban densification that is taking place, have resulted in the Merwedekanaalzone being chosen as a research location.



Figure 3: The location of the Merwedekanaalzone in relation to the city of Utrecht (Gemeente Utrecht, 2021).

As can be seen in figure 3, the Merwedekanaalzone consists of sub-area 4, 5 and 6. In sub-area 4 only residential complex Wilhelminawerf has already been developed, while Merwede 5 and 6 still have to be developed, except for the residential towers MAX and Lux et Pax. According to the municipality of Utrecht (2021), there are currently 1713 people living in the Merwedekanaalzone. Draugalis and Plaza (2009) state that this certain population size forms a small research population, and it is unrealistic to expect that as many as 20% of these residents will complete a survey. In addition, doubling the study population to 3000 people would require only 30 additional respondents for a desired sample size (Draugalis & Plaza, 2009). In order to increase the research population and thus the number of potential respondents, it was decided not only to distribute the survey among residents of the Merwedekanaalzone, but also among residents of adjacent neighbourhoods of Transwijk-Zuid and Dichterswijk. This resulted in 133 complete filled in surveys. These additional two neighbourhoods were not chosen randomly, but are the two closest neighbourhoods viewed from the Merwedekanaalzone. Certainly if it is taken into account that currently only a few residential complexes in the Merwedekanaalzone have been developed, it was logical to also ask the residents of Transwijk-Zuid and Dichterswijk for their opinion regarding social sustainability and urban densification in their neighbourhood. In addition, surrounding neighbourhoods may have to deal with the effects of urban densification taking place in another neighbourhood (Haaland & Konijnendijk van den Bosch, 2015).

Because it could be difficult for people to determine exactly in which neighbourhood they live, it was decided to use postal code areas to demarcate the location area. A postal code in the Netherlands consists of 4 numbers and 2 letters, this combination leads to a specific street. But if the 2 letters are omitted, it concerns a much larger area, so that the anonymity of the respondents is guaranteed (Koot, 2012). The geographical terms Wilhelminawerf, Merwede 5, Dichterswijk and Transwijk-Zuid will be mentioned frequently in the remainder of this thesis. In the sections below, the characteristics of each neighbourhood are briefly explained.

3.2.1 Dichterswijk, postal code area 3521

The Dichterswijk neighbourhood is located opposite the Merwedekanaalzone, as can be seen in figure 3. About 5,000 people live in the Dichterswijk. 57% live in an owner-occupied home, 31% percent rents in the private sector and the remaining 12% concerns social housing (AlleCijfers, 2022a). The Heycop new-build project is being developed in the Dichterswijk, which will eventually produce 333 private sector rental homes and 83 social rental homes (Gemeente Utrecht, 2022a). In the Dichterswijk neighbourhood there are plenty of facilities, such as a primary school, playgrounds and multiple restaurants.

3.2.2 Merwede 5, postal code area 3526

Merwede 5 forms the central part of the Merwedekanaalzone, as visible in figure 3. In this new urban district, 6,000 new homes are to be built, of which 30% social rent, 25% intermediate rent and purchase, and 45% free rent and purchase (Gemeente Utrecht, 2022b). Currently, 1000 people already live on the south side of Merwede 5, in the residential towers MAX and Lux et. Pax. These residential towers contain studios for one person only. Furthermore, Merwede 5 mainly contains empty warehouses and business premises, but also social meeting places such as VechtclubXL and Kanaal30. The development plans try to keep as much of the existing environment and functions intact as possible (Gemeente Utrecht, 2022b).

3.2.3 Transwijk-Zuid, postal code area 3526

The Transwijk-Zuid neighbourhood borders on the western side of the Merwedekanaalzone, as can be seen in figure 3. About 2700 people live in Transwijk-Zuid. When it comes to the housing division by type, 68% of the Transwijk-Zuid population live in social housing, 18% rent in the private sector and 14% live in an owner-occupied home (AlleCijfers, 2022b). In addition to the essential facilities in the area, Transwijk-Zuid also has a large city park, Park Transwijk.

3.2.4 Wilhelminawerf, postal code area 3527

The Wilhelminawerf is the first new-build project completed in the Merwedekanaalzone. In 2020, 167 apartments have been completed spread over 3 buildings, all in the free sector. Most apartments are suitable for two residents, although there are also apartments for single residents and two apartments for families. Apart from houses, no other facilities have yet been realized on the Wilhelminawerf. Work is being done on the development of a fourth building, which will accommodate commercial facilities such as a coffee shop and flexible workplaces (Gemeente Utrecht, 2022c). On the next page, figure 4 gives an impression of the Wilhelminawerf in its current state.



Figure 4: Residential complex the Wilhelminawerf (Gemeente Utrecht, 2022c).

3.3 Data collection methods

In addition to the knowledge about social sustainability and the compact city approach gathered on the basis of the theoretical framework, a mixed-methods approach is used in order to answer the main question of this thesis as adequately as possible. Quantitative research through online surveys is suitable for quickly finding respondents and disseminating them quickly. Moreover, online surveys can be used to search for a specific research population in a targeted manner (Van Selm & Jankowski, 2006). Given the time and limited resources for this research, conducting research through online surveys is appropriate. The use of online surveys allowed for quick and large scale distribution (Acharya et al., 2013). Compared to physical surveys, the time efficiency is a significant benefit. The ability to ask several questions on the same social sustainability topic through a survey, and then combine these questions to get a more reliable result than basing it on a single question is another benefit of an online survey in addition to its practical advantages (Bramley et al., 2009). Moreover, experiencing the built environment is something that differs from person to person (Dave, 2011). Secondary data cannot effectively reflect such variation. Furthermore, neighbourhood-level secondary data sources, including public reports or census data, are frequently unavailable (Larimian & Sadeghi, 2021). This makes conducting surveys specifically designed for urban densification and social sustainability an appropriate research method.

However, the factors social sustainability and urban densification to be measured are largely subjective. Ivankova and Creswell (2006) state that if the purpose of the study is to interpret quantitative findings that were discovered initially, qualitative data can be gathered after quantitative data by interviewing a limited number of participants, based on these quantitative findings. This approach is in line with this research, because in this way sufficient qualitative data can be collected with a limited number of interviews to give the quantitative data more meaning and to be able to explain it. Moreover, the surveys are only used to collect the opinion of local residents. In order to also take into account the perspective of other parties such as a municipality and project developer, conducting interviews is relevant and this also guarantees the objectivity of the total research (Croker, 2009).

3.3.1 Surveys

Following the choice to use online surveys as part of the mixed-methods approach, it was decided to distribute the surveys among residents of the Merwedekanaalzone and the two surrounding neighbourhoods Transwijk-Zuid and Dichterswijk.

The platform used for conducting the surveys was Qualtrics. The survey was delivered using a URL integrated within Utrecht University. An advantage of Qualtrics is that it is easy to choose another language for the questions in the survey. This means that the survey could written in English, but there was also a Dutch version to make it more accessible for Dutch-speaking respondents. In addition to the accessibility of the survey, it was also important that respondents had the opportunity to go back to previous questions during the survey to make possible adjustments. Furthermore, there should be the option for the respondent to temporarily stop taking the survey and then continue, or to stop permanently while completing the survey without any information being saved. Qualtrics offers all these possibilities, which made it a suitable choice as a platform for the surveys. Besides the ease of use for the respondent, it was also very easy for the researcher to work with Qualtrics, which confirmed the choice for the platform.

The survey consisted of two parts (see Appendix 3 for the full survey):

- 1) Personal characteristics:
 - Age
 - Postal code
 - Years in neighbourhood
 - Education level
 - Household type
- 2) Statements and questions about social sustainability in relation to the built environment:
 - Neighbourhood satisfaction
 - Safety and security
 - Social interaction and participation
 - Sense of place
 - Housing
 - Social equity
 - Atmosphere
 - Future and urban densification support

In the first part of the survey the respondent is asked about personal characteristics that could be relevant, such as age and the type of household in which the person lives. In addition, the respondent is asked for the postal code and type of household he or she lives in, so that it is possible to find out in a how and where the respondent lives without the respondent having to provide a complete address so that anonymity is guaranteed. In the second part of the survey, respondents are asked about how her or she experiences the built environment, and then is asked about aspects related to social sustainability. Each question in the survey has a direct link with the conceptual model and therefore also with the research questions. Appendix 3 contains two tables that show how the survey questions are linked to the research questions and conceptual model.

3.3.2 Interviews

In addition to the surveys, several interviews were conducted with various stakeholders in order to interpret the quantitative findings. At the end of the survey, the respondents were given the option to leave their email address so that they could be contacted for an interview. Several respondents did this and were subsequently approached for an interview. This resulted in 3 interviews with local residents. All interviews were conducted online because this makes the interviews more accessible and there was therefore a greater chance that the potential interviewees would agree. The 2 other important parties involved in the development in the Merwedekanaalzone are the municipality of Utrecht and the project developers, as executors of the plans. The municipality and various project developers were approached directly by mail. This resulted in one interview with an employee of a project developer, and one interview with a municipality employee which brings the total number of interviews to 5, see table 2 for the interview details.

Stakeholder	Date of interview	Interview method	Length of interview
Municipality of Utrecht	25-07-2022	Phone call	16:55
Project developer	24-06-2022	Video call	20:02
Local resident 1	23-06-2022	Phone call	12:14
Local resident 2	24-06-2022	Video call	12:24
Local resident 3	29-06-2022	Video call	19:25

Table 2:	Dates	and	times	of the	conducted	interviews
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The purpose of the interviews is to give the surveys more depth, and to allow other stakeholders, in addition to local residents, to give their opinion. In order to be able to use the interviews as usefully as possible, a semi-structured interview approach was chosen. A semi-structured interview approach is suitable because it is the middle ground between a fully structured approach, suitable for generating quantitative data, and a completely unstructured approach (DiCicco-Bloom & Crabtree, 2006). It is not the intention of this study to collect quantitative data by means of fully structured interviews. Instead, the interviews serve to supplement and interpret the quantitative data collected through the surveys. And despite the fact that a semi-structured interview method takes a relatively large amount of time and energy from the interviewer, it can be a valuable addition to data collected through surveys because open questions can be asked during an interview (Newcomer et al., 2015). Another advantage of semi-structured interviews is that as a researcher you can properly prepare the questions, but also give the interviewee the opportunity to express his opinion in his own words. This allows the researcher to work well prepared as a research without forcing the interviewee in a certain direction with the question (Cohen & Crabtree, 2006). A topic list is used for conducting semi-structured interviews (Cohen & Crabtree, 2006). The questions are asked on the basis of this topic list. The same topic list was used for each interview, but the questions were formulated differently depending on the interviewee. The complete topic list with associated questions per stakeholder can be found in Appendix 1.

The social sustainability factors of the conceptual model formed the base for the interviews with local residents. In the survey the respondents could indicate to what extent they agreed or disagreed with a statement, but there was no possibility to substantiate the answer. That is why open questions were used in the interviews, with which the respondents could indicate why they had a certain opinion. The respondents were also asked if they notice changes in their neighbourhood, what concrete changes have occurred in their opinion and whether they see these changes as a result of development in their own neighbourhood or in the Merwedekanaalzone. The respondents are also given the opportunity to indicate whether they are missing something in their neighbourhood, this can be something physical such as a facility or a subjective thing such as a social aspect.

3.4 Sampling

In order to collect the survey research data, various non-probability sampling methods were used. Only residents of postal code areas 3521, 3526 and 3527 were included in the study, which is why it was possible to work in a targeted manner. Some of the respondents were approached from the researcher's own network, which can be considered as a convenience sample (Acharya et al., 2013). These respondents from the researcher's network were approached directly, because the researcher already knew in advance that these people live in the correct postal code areas. The respondents from the researcher's network were also asked to distribute the survey in online neighbourhood groups, such as Next Door, Facebook and Whatsapp. This created a snowball effect, resulting in a snowball sample (Taherdoost, 2016). However, distributing the surveys via social media may exclude residents who do not use social media or are not in online groups, which is why it was also decided to distribute small flyers with a QR code that leads the residents to the survey. By partially distributing the online survey physically, potential respondents were not excluded because they do not use social media. However, these flyers were only distributed in residential complexes with many mailboxes together, so that many flyers could be distributed in a short time. However, care was taken to ensure an equal distribution of the number of flyers per postal code area, which resulted in 500 flyers per postal code area. Ultimately, 69 surveys were completed via the anonymous link, and 64 via the QR code. The survey could be completed in both Dutch and English.

Of the 133 participants, 14 (10.5%) chose the English version, the other 119 (89.5%) completed the survey in Dutch The data collection through the survey started on Monday, June 13, 2022, and ended 2 weeks later on Monday, June 27, 2022. At that time, 152 surveys had been completed. However, only the fully completed surveys are included in the analyses, which meant that 19 cases were removed. This left 133 valid cases that could be used in the data analysis process.

3.5 Data analysis

The collected data obtained with the surveys is statistical analysed with the help of the program SPSS. The first part of the analysis focuses on descriptive statistics, which shows how the personal characteristics of the respondents are distributed. For the representativeness of the sample drawn, it is essential to map out age distribution, household type, postal code area and also matters such as education level. These descriptive statistics can be found in section 4.1. In addition to descriptive statistics, several t-tests were performed to find out whether there are significant differences between the experience of social sustainability when it is linked to the opinion about urban densification. A ttest can be used to investigate whether two means that are distinguished from each other on a categorical variable, differ significantly from each other (De Vocht, 2017). The categorical variable on which the distinction is made was the negative or positive experience of urban densification. In order to determine whether a respondent has a positive or negative opinion about urban densification in his or her neighbourhood, various statements were presented with a Likert scale. Because a Likert scale with 7 options causes to many diversity in answers and a Likert scale with 3 options gives the respondent too little freedom of choice (Wakita et al., 2012), a Likert scale with 5 options was chosen. Furthermore, it is critical that the number of possibilities be odd, so that the respondent can choose a neutral answer in the middle. In order to finally be able to see whether there is a significant relationship between the experience of urban densification and the experience of social sustainability, several factors are tested against each other by means of a statistical analysis. In order to be able to use the collected data through the surveys to investigate whether there is a link between urban densification and social sustainability, a selection of propositions is made.

The 10 statements used to measure the extent to which the respondent experiences and expects urban densification are:

- I don't notice that many new homes are being built in my neighbourhood.
- I don't notice that many new homes are being built in adjacent neighbourhoods. -
- I don't notice that it is getting busier in my own neighbourhood because new homes are being built.
- I don't notice that it is getting busier in my own neighbourhood because new homes are being built in adjacent neighbourhoods.
- I don't notice from the bustle in my neighbourhood that new homes have been built in the Merwedekanaalzone.
- In the future, I don't expect to notice from the bustle that new homes have been built in the Merwedekanaalzone.
- I don't notice that amenities in my neighbourhood are coming under pressure due to the new homes in the Merwedekanaalzone.
- I don't expect amenities in my neighbourhood to come under pressure due to the new homes in the Merwedekanaalzone.
- I support the developments in the Merwedekanaalzone
- I support the development of new homes within the city borders of Utrecht -

First, the internal consistency of the propositions related to urban densification was tested. This was done to check whether the items chosen on theoretical grounds actually cover the construct to be measured, in this case urban densification (De Vocht, 2017). The outcome of the reliability test and the interpretation of the Cronbach's Alpha can be seen in tables 13 and 12, respectively.

Table 4: Reliability test	internal consistency.	Table 3: Interpretation Cronbach's Alpha (De Vocht 2017).			
Reliability S	tatistics	Alpha score	Answer		
, .		>0.9	Excellent internal consistency items		
Cronbach's		0.8 - 0.9	Good internal consistency items		
Alpha	N of Items	0.7 – 0.8	Sufficient internal consistency items		
866	10	0.6 – 0.7	Questionable internal consistency items		
		<-0.6	Insufficient internal consistency items		

Table 4: Reliability test internal consistency.

With a Cronbach's Alpha of 0.866 it can be stated that the internal consistency between the 10 items is good, and thus represent the urban densification construct well. In order to subsequently establish a link between the construct urban densification and social sustainability indicators, section 4.2 looks at the opinion of all respondents for each social sustainability indicator, after which it is examined for each indicator whether there exists a significant difference between respondents who experience urban densification negatively and respondents who experience it positively. This means that respondents with an average answer between 2.5 and 3.5, which indicates a neutral opinion, were not included in the comparison. 54 respondents belong to the group with a neutral opinion, they were included in the general analysis but not in the t-tests in which a possible significant difference was examined. The statistical analysis can be seen in section 4.2, the results are discussed in a broader perspective in chapter 5.

3.6 Research ethics

Regardless of the method of dissemination, it is important that ethical procedures are observed and that there is sufficient explanation about the research and what is done with the data being collected. In addition, there should also be an opportunity for the respondent to contact the researcher for further questions or information. In order to ensure the accessibility of contacting the researcher, it is emphasized both before and after completing the survey that you can always contact us with questions and comments. Before starting the survey, the respondent will see a brief explanation of the purpose of the research. In the short explanation it will also be emphasized that the collected data will be used exclusively for the master's thesis and that filling in the survey is completely anonymous. Before the survey begins, the respondent will be given the researcher's contact information so that the respondent has the opportunity to seek contact for any questions or comments before filling in the survey. Before completing the survey, it is also stated that the respondent can withdraw from the survey at any time. The short explanation containing the contact details, purpose of the survey, and emphasis on discretion will be presented to the respondent again after the survey. Apart from the importance of the transparency of the research, it is especially important when conducting the semistructured interviews that no attempt will be made to steer respondents' answers in a certain way so that the research can be done as objectively as possible (DiCicco-Bloom & Crabtree, 2006). In order to process the interviews properly, the interview will be recorded, with the permission of the interviewee, so that it can be transcribed afterwards. It is important that the recordings are handled with care and that they are removed after processing (DiCicco-Bloom & Crabtree, 2006).

4. Research Findings

This chapter includes an analysis of the data collected. First of all, the definitive dataset is determined. After that, the profile of the participants is explained on the basis of personal characteristics that have been surveyed. Results will then be examined for each question, after which possible links between the perception of urban densification and social sustainability are sought.

4.1 Profile of the participants

In terms of age, the youngest participant is 20 years old, and the oldest 84 years old. The average age of the participants is 38 years. The full distribution by age can be seen in figure 5.



Figure 5: Distribution of participants by age.

The age distribution is in line with the developments in Dutch city centres in recent years, in which highly educated dual earners without children move to urban densified areas (Broitman & Koomen, 2015). That this is also the case in the Merwedekanaalzone and the surrounding area is confirmed not only by the age distribution, but also by the type of household the respondents belong to. By far the largest part of the participants form a two-person household without children, namely 64.7%. The second share of participants lives alone, at 18.8%. The other 16.5% is filled by (one-parent) families (7.5%), joint households such as student houses (9.1%). Because these last two groups are relatively poorly represented in the group of participants, it was decided to combine the groups in a category 'other', visible in figure 6.





Because participants from different neighbourhoods participated in the survey, they were asked in which postal code area the participant lives. In this way it can be determined in which neighbourhood the participant lives, without this being at the expense of anonymity. The majority of the participants, namely 43.6%, live in postal code area 3521, which includes the Dichterswijk. 30.8% of the participants lives in postal code area 3526, the neighbourhoods of Transwijk-Zuid and the central and southern part of the Merwedekanaalzone itself are located here. The other 25.6% of the participants live in postal code area, flyers are only distributed at the Wilhelminawerf, in the northern part of the Merwedekanaalzone. A visual division by postal code is shown in figure 7.



Figure 7: Distribution of survey participants per postal code area.

The distribution of the participants per postal code area, is partly influenced by the distribution process of the surveys. An amount of 500 flyers with QR code were distributed per postal code area. Manual distribution of the surveys happened evenly, but online distribution of the survey is only controllable to a certain extent. The differences in distribution by postal code may have occurred due to a direct approach to participants, of whom the researcher knew that these persons lived in a valid postal code area. In addition, the researcher's network of acquaintances and friends was used, to distribute the survey in neighbourhood groups. This may have resulted in a skewed distribution between postal codes, but no percentage is negligible as the lowest is 25.6% (De Vocht, 2017).

In addition to the distribution by postal code, the number of years that a participant has lived in a neighbourhood is also important for the perception of social sustainability and urban densification. A participant who has lived in the neighbourhood for more than 6 years will have seen the neighbourhood transform. On the other hand, participants who have lived in the neighbourhood for a maximum of 2 years came to live in the neighbourhood during the densification process, so they do not know the neighbourhood without construction activity. The third and last category includes people who have lived in their neighbourhood for 3-5 years. When they came to live in their neighbourhood, the plans for the Merwedekanaalzone were already being developed, but the actual construction did not start until later. Looking at the data, there is not a single participant in postal code area 3527 who has lived in the area for more than 6 years. This can be explained by the area in which the survey was distributed. In postal code area 3527, targeted distribution has been done on the Wilhelminawerf.

The opinion of the residents in the Wilhelminawerf area is very important as it is one of the few projects in the Merwedekanaalzone that has already been completed. The Wilhelminawerf was completed at the beginning of 2021, which explains why a large part of the participants in postal code area 3527 have lived in their neighbourhood for 0 to 2 years. The Wilhelminawerf population is also the cause of the relatively large share (45%) of the participants in general who have lived in the same neighbourhood for a maximum of 2 years. The total distribution by number of years in the neighbourhood is visible in figure 7.



Figure 8: Distribution of participants by number of years in the neighbourhood.

In terms of education level, the participants form a homogeneous group. 6.9% of the participants, given their highest level of education, fall under the low-educated group, while the remaining 92.1% are highly educated, when the standards of the Central Bureau of Statistics are used (CBS, 2022). Due to the skewed distribution and the negligible share of the low-skilled, no distinction is made on the basis of education level in the statistical analyses later in this chapter. Like the distribution by type of household, the distribution by education level is in line with the claims of Broitman and Koomen (2015), who suggest that urban migration is particularly popular among highly educated dual earners.

4.2 Findings per social sustainability indicator

After the questions about personal characteristics, the respondents were presented with 32 statements. In the following sections, these statements are divided into social sustainability indicators based on the conceptual framework. A table will be used for each indicator, with corresponding legend shown in figure 9.

Answer	Mean	Interpretation	
Strongly disagree	1.0 - 2.5	Negative	
Disagree			
Neutral	2.5 - 3.5	Neutral	
Agree			
Strongly agree	3.5 - 5.0	Positive	

Figure 9: Legend results chapter.

Furthermore, in the remainder of this thesis no distinction will be made on the basis of postal code area, but the neighbourhoods located in the postal code area will be referred to by name. The distribution to neighbourhoods per postal code area can be seen in figure 10.

Postal code	Neighbourhoods
3521	Dichterswijk
3526	Transwijk-Zuid
3527	Wilhelminawerf

Figure 10: Postal code area with associated neighbourhoods.

Based on the experience of urban densification, as explained in section 3.5, a distinction has been made between respondents who experience urban densification negatively and respondents who experience urban densification positively. To investigate whether there is a significant difference between the two groups in the assessment of social sustainability, a t-test is used per social sustainability 31statement. In addition to the t-tests performed, this chapter consists of interpretations based on descriptive statistics, as well as the interviews conducted and existing literature. Quotes are used from the interviews, the full interviews can be found in appendix 2. The results of the t-tests are presented in tables per social sustainability indicator in the remainder of this chapter. The legend in figure 11 can be used for reading that tables.

Term	Interpretation
Mean	Average score statement. Range: 1 (strongly disagree) to 5 (strongly agree).
SD	Standard Deviation: average deviation of all observations from the arithmetic mean.
p-value	Exceedance probability: if p < 0.05, it can be stated with 95% certainty that the means differ significantly from each other.
p<0.05	Significant difference between the means, with 95% confidence
p>0.05	No significant difference between the means, with 95% confidence

Figure 11: Legend for reading the output of the t-tests.

4.2.1 Social interaction

Higher density in a neighbourhood may lead to more social interactions, which can lead to more connectedness (Cloutier & Pfeiffer, 2015) and thus contribute to social sustainability. The two interviewed residents who live at the Wilhelminawerf both indicate that they know their immediate neighbours well. In the complex there are two units per floor, so you only have one neighbour. The interviewed resident suggests in the quote below that social activities are organized by and for residents, but in practice this seems unpopular, admits the second local resident:

"Yes, I know the neighbours well, sometimes I speak to people here and there. But it's not that I know a lot of people, although things are organized by residents." Interview with local resident 1, Wilhelminawerf.

"Yes, when the first residents moved in, two activities were organized. However, after that it was quiet for a long time, and we recently had a barbecue where only 8 people came. And on a total population of 200, that is of course very limited. Normally I would have gone myself, but I had corona so couldn't be there."

Interview with local resident 3, Wilhelminawerf.

The two residents of the Wilhelminawerf both indicate that there is not much social interaction, apart from the immediate neighbours. The third interviewed local resident, who lives on a houseboat in the Merwede, indicates that she knows everyone by name and that the whole neighbourhood looks out for each other. By her neighbourhood she means Transwijk-Zuid, because that is where her houseboat is located. So there seems to be a difference between the existing environment adjacent to the Merwedekanaalzone and the developed area itself. This difference is also apparent in the survey results when looking at the statements related to social interaction shown in table 5.

	Transwijk-Zuid	Dichterswijk	Wilhelminawerf	Total mean
I have good contact with my neighbours	3.88	3.05	3.24	3.46
I regularly interact spontaneously with people	3.38	2.61	2.32	2.87

Table 5: Average scores of statements related to social interaction, per neighbourhood.

The data confirms the words of the residents of the Wilhelminawerf, who indicate that they do not have much social interaction with their neighbours. To determine whether urban densification plays a role in this, a t-test was performed, the results of which can be seen in table 6.

 Table 6: Mean, Standard Deviation and p-value for social interaction statements related to social interaction which display possible statistically significant differences between groups with a positive and negative attitude towards urban densification.

	Negative about urban densification		Positive about urban densification		
	Mean SD		Mean	SD	p-value
I have good contact with my neighbours	3.76	1.0	3.00	1.2	0.024
I regularly interact spontaneously with people	3.13	1.1	2.64	1.1	0.007

There is a significant difference between respondents who experience urban densification predominantly positively and respondents who experience urban densification mainly negatively, when social interaction is considered. Social interaction contributes to the sustainability of community (Dempsey et al., 2011). The interviews and survey data seem to indicate that residents of the Dichterswijk and Transwijk-Zuid neighbourhoods experience more social interaction, and may see urban densification as a possible threat to the strong social interaction in their neighbourhoods. Residents of the Wilhelminawerf indicate that they have less social interaction, and that could be a reason to support urban densification, in the hope that this will be accompanied by more social interaction, like Bramley et al. (2009) suggest.

4.2.2 Safety and security

"Well, the complex itself is of course still quite isolated from the rest of the buildings, but that will soon change. Moreover, you have the canal road close by, and there is always a lot of through traffic and a lot of people there. It is precisely that hectic pace and bustle that gives you a sense of security."

Interview with local resident 1, Wilhelminawerf.

Besides an indication of the feeling of safety, the quote from the Wilhelminawerf resident also gives a reason to support urban densification, because this will ensure that the residential complex is less isolated. The feeling of safety is considered very important by residents when it comes to the sustainability of their community (Turcu, 2013). Table 7 has been drawn up to determine whether there are differences per neighbourhood with regard to safety.

	Transwijk-Zuid	Dichterswijk	Wilhelminawerf	Total mean
I feel safe walking around my	4.59	4.20	4.41	4.42
neighbourhood during the day				
I feel safe when I walk through	4.34	3.80	3.76	4.03
my neighbourhood in the dark				
I am not worried about crime in	3.43	2.95	2.94	3.16
my neighbourhood				

Table 7: Degree of safety and security per statement, per neighbourhood.

On average, the surveyed residents feel safe in their neighbourhood, both during the day and at night. There is no appreciable difference between the different neighbourhoods. However, residents are more concerned about crime than they actually feel unsafe walking down the street. The feeling of safety on the street may be determined by the built environment (Hofstad, 2012), the interviewed project developer also agrees:

"Yes, you can, because at the building level you can already see blind corners that you enter and that no one can stand behind a cupboard around the corner. You can also make many interventions at the neighbourhood level. We then do that again as a collective with all developers, while we do that ourselves at the building level." Interview with project developer, Merwede 5.

During the urban densification process in the Merwedekanaalzone, the project developers collectively pay attention to safety at neighbourhood level. The fact that there are no major differences between the three neighbourhoods in terms of safety and security does not necessarily mean that this also applies to the proponents and opponents of urban densification. The results of the t-test are visible in table 8.

 Table 8: Mean, Standard Deviation and p-value for social interaction statements related to safety and security which display

 possible statistically significant differences between groups with a positive and negative attitude towards urban densification.

	Negative about urban densification		Positive about urban densification		
	Mean	SD	Mean	SD	p-value
I feel safe walking around my	4.51	0.6	4.27	0.6	0.197
neighbourhood during the day					
I feel safe when I walk through my	4.21	0.8	3.64	1.3	0.043
neighbourhood in the dark					
I am not worried about crime in my	3.26	1.1	2.91	1.3	0.320
neighbourhood					

Table 8 shows that respondents who are positive about urban densification, on average, feel significantly less safe on the street than residents who think negatively about urban densification. Nevertheless, the average score given by the respondents who feel less safe is still predominantly positive and safety does not currently appear to be a problem that could possibly be related to urban densification in the Merwedekanaalzone. The slight feeling of insecurity that can now be experienced at the Wilhelminawerf, for example, can still be attributed to the isolated location, but as the interviewed local resident indicates, this will change in the near future.

4.2.3 Social equity

"There is a commercial building that is being developed in our harbour. There will be a coffee shop there, because you kind of miss things like that in the area at the moment. If you want to grab a coffee somewhere, you go to the city center. And as far as a doctor or something like that is concerned, it's just well arranged, that's fine. And as far as educational facilities are concerned, that's a phase I'm not currently involved in." Interview with local resident 3, Wilhelminawerf.

The resident of the Wilhelminawerf indicates that there is currently no coffee shop or something similar in his neighbourhood. A catering facility is an example of a recreational facility. Social equity in relation to urban development is seen on the one hand as equal opportunities in access to facilities (Bibri et al., 2020; Bramley et al., 2009; Burton, 2000) and on the other hand as equal opportunities in the housing market (Burgess, 2002; Burton, 2003). Since housing and access to facilities are independent of each other an important factor when it comes to social sustainability, this section focuses on facilities and the indicator housing is discussed in section 4.7. The fact that the essential facilities, such as healthcare and supermarkets are easily accessible in their neighbourhood is confirmed by the two other local residents who were interviewed. However, three interviews that were conducted do not provide enough foundation for drawing conclusions. Table 9 shows how people think about access to facilities in each neighbourhood.

	Transwijk-Zuid	Dichterswijk	Wilhelminawerf	Total mean
I am satisfied with access to	3.83	4.03	4.00	3.96
essential facilities				
I am satisfied with access to	4.17	3.41	3.62	3.70
recreational facilities				
I am satisfied with access to	3.24	3.43	3.24	3.32
educational facilities				
I am satisfied with access to	4.56	4.26	3.44	4.14
public transport				

Table 9: Degree of satisfaction per facility statement, per neighbourhood.

The collected data in table 9 suggests that the surveyed residents in and around the Merwedekanaalzone are mostly satisfied with access to essential facilities. Most respondents had a neutral opinion about educational facilities, which can be explained by the high percentage of twoperson households without children. Residents of the Wilhelminawerf are on average less satisfied with access to public transport and recreational facilities. In the interviews conducted, the project developer and the municipality emphasize that mobility is one of the biggest challenges in the further development of the Merwedekanaalzone, because the focus is on a car-free neighbourhood with a lot of responsibility for public transport and sustainable mobility options. With the development of the central part of the Merwedekanaalzone, Merwede 5, these mobility options will be implemented. The residents of the Wilhelminawerf therefore seem dependent on the developments in Merwede 5, because only then can they benefit from the mobility options. At the same time, this could be another reason to support urban densification as a resident of the Wilhelminawerf, because their own prospects seem favourable. To investigate whether a link can indeed be made between supporting urban densification and access to facilities, a t-test was performed, the results of which are shown in table 10.

	Negative about urban densification		densification		
	Mean	SD	Mean	SD	p-value
I am satisfied with access to	3.87	0.8	4.27	0.6	0.126
essential facilities					
I am satisfied with access to	3.40	1.0	4.00	0.6	0.059
recreational facilities					
I am satisfied with access to	3.28	0.8	3.73	0.8	0.104
educational facilities					
I am satisfied with access to public	3.90	1.1	4.64	0.5	0.033
transport					

Table 10: Mean, Standard Deviation and p-value for social interaction statements related to facility access which display possible statistically significant differences between groups with a positive and negative attitude towards urban densification.

Table 10 shows that there is no significant difference between the two groups with regard to essential, educational and recreational facilities. With regard to facilities, it is important that both the new residents of the Merwedekanaalzone and the current residents of surrounding neighbourhoods can benefit from the new facilities that are being developed. That is a challenge for urban densification in general (Daneshpour & Shakibamanesh, 2011. The municipality of Utrecht indicates that the new facilities will mainly be additional, so that the surrounding neighbourhoods will also benefit from this:

"So in practice we looked very closely at what we can add in that district (Merwede 5) that will not compete with the shops in the Nova shopping center in Kanaleneiland or the shops on the Rijnlaan, but will be complementary instead." Interview with Municipality of Utrecht.

Sufficient attention therefore appears to be paid to access to facilities in the Merwede Canal Zone. Potentially, improved access to facilities is a positive effect of urban densification and contributes to social equity. Nevertheless, the residents of the Wilhelminawerf seem dependent on the developments in the adjacent Merwede 5 district, in order to ultimately have better access to public transport and recreational facilities. Until the completion of Merwede 5, the residents of the Wilhelminawerf may go out of necessity to the city center for recreational purposes.

4.2.4 Social participation

DiPasquale and Glaeser (1999) argue that there may be a difference between tenants and buyers regarding the will to invest socially in a neighbourhood. Since only rental homes have been completed in the Wilhelminawerf, there may therefore be a limited will to invest in the neighbourhood. Table 11 shows how social participation is experienced per neighbourhood. Table 12 can be used to determine whether the opinion of urban densification plays a role in social participation. The interviewed resident of the Merwede attributes the lack of neighbourhood commitment that the residents of the Wilhelminawerf are prepared to make, partly to the fact that only rental homes have been completed in the Wilhelminawerf:

At the other side of the channel, at the Wilhelminawerf, there are only rental properties. These people continue to live there less long, while I still know the 16-year-old children in my street as babies, and they are now looking after the children of the next generation. While tenants want to invest less in their neighbourhood, because they are often only there temporarily. So that's an example of, yes, where it's going to pinch."

Interview with local resident 2, Merwede.

	Transwijk-Zuid	Dichterswijk	Wilhelminawerf	Total mean
I am willing to work on a project	3.22	3.52	3.35	3.38
to improve the neighbourhood				
We form a strong and close-knit	2.29	3.02	2.21	2.59
community				

Table 11: Degree of social participation and community feeling, per neighbourhood.

 Table 12: Mean, Standard Deviation and p-value for social participation statements related to facility access which display possible statistically significant differences between groups with a positive and negative attitude towards urban densification.

	Negative about urban densification		Positive about urban densification		
	Mean	SD	Mean	SD	p-value
I am willing to work on a project to	3.63	0.8	2.82	1.0	0.005
improve the neighbourhood					
We form a strong and close-knit	2.84	1.1	2.00	0.6	0.019
community					

The claim of the local resident who lives on the Merwede is confirmed by the collected survey data and theory (DiPasquale & Glaeser, 1999). Respondents were presented with the statement: "I am willing to work on a project to improve the neighbourhood". The opinion of respondents who experience predominantly positive effects of urban densification on this statement is disagree on average. On the other hand, the group of respondents who experience negative effects of urban densification on average agree with this statement. The difference between the mean score of both groups is significant. This also applies to the second statement related to social participation, shown in table 12. The group of positivists about urban densification indicates that they do not form a strong community with the neighbourhood. The statement of the resident of the Merwede indicates that it may take years to develop this feeling. In addition, it is important that residents continue to live in the area for a longer period, which is more difficult to achieve with rental housing alone. Ultimately, social participation remains an important factor that can determine the social sustainability of a neighbourhood (Bramley et al., 2009). More owner-occupied homes will be completed in Merwede 5, which could benefit social participation in the Wilhelminawerf. Supporters of urban densification in the Wilhelminawerf seem aware of this.

4.2.5 Neighbourhood satisfaction

Jenks and Jones (2010) mention quality of life as the most important indicator of social sustainability in addition to social equity. The respondents who mainly experience negative effects of urban densification, rate the quality of life and neighbourhood satisfaction significantly higher on average than the respondents who mainly experience positive effects of urban densification, as visible in table 13.

	Negative about urban densification		Positive about urban densification		
	Mean	SD	Mean	SD	p-value
This neighbourhood is a good place to live	4.40	0.6	3.73	0.8	0.002
The quality of life in this neighbourhood is high	4.06	0.8	3.36	0.7	0.007
Living in this neighbourhood is good for my health	3.88	0.8	3.36	0.7	0.037

 Table 13: Mean, Standard Deviation and p-value for social participation statements related to neighbourhood satisfaction which

 display possible statistically significant differences between groups with a positive and negative attitude towards urban densification.

That the respondents who predominantly experience negative effects of urban densification rate the current quality of life and neighbourhood satisfaction relatively high, could be an explanation for the resistance towards urban densification. The fear of overcrowding and a reduction in the quality of life could be negative effects of urban densification and possibly a reason for local residents not to be in favour of this (Haaland & Konijnendijk van den Bosch, 2015). The fear of overcrowding has already become reality for the interviewed local resident from the Merwede. She illustrates the problem with the quote below:

"On the other side of the canal (Wilhelminawerf), there live children as well. They have hardly any room for playing there, so they come this way via the bridge. Fine of course, but we have a playground here that is run by volunteers. They can hardly handle the crowds now. So you should either recruit more volunteers or offer more play capacity." Interview with local resident 2, Merwede.

Despite that the interviewed local resident expresses her concerns about overcrowding, no neighbourhood is rated negatively on average when it comes to neighbourhood satisfaction, as can be seen in table 14.

	Transwijk-Zuid	Dichterswijk	Wilhelminawerf	Total mean
This neighbourhood is a good	3.71	4.48	4.03	4.13
place to live				
The quality of life in this	3.51	4.21	3.79	3.89
neighbourhood is high				
Living in this neighbourhood is	3.37	3.91	3.79	3.71
good for my health				

Table 14: Degree of neighbourhood satisfaction, per neighbourhood.

With regard to quality of life and neighbourhood satisfaction, there appear to be differences between the views of residents who already lived there before urban densification and the new residents of the neighbourhood, like Touati-Morel (2015) argues. Unlike the interviewed local resident who has been there for a long time, the two interviewed local residents who live at the Wilhelminawerf are looking forward to further urban densification in their neighbourhood and the rest of the Merwedekanaalzone. They expect that this will bring more liveliness to the neighbourhood, and that their quality of life will also improve:

"I don't really feel connected to the neighbourhood, but I do feel connected to the complex in which I live. This is because the neighbourhood is actually not finished yet, so that's why I don't feel much connection with it yet."

Interview with local resident 1, Wilhelminawerf.

"No, I don't feel connected to my neighbourhood. And that's because the complex where I live (the Wilhelminawerf) is the only complex that has already been completed, and is surrounded by empty and undeveloped land. But I am satisfied with my home." Interview with local resident 3, Wilhelminawerf.

It is too short-sighted to conclude on the basis of 3 interviews that the residents of the Wilhelminawerf support urban densification because this will improve their quality of life, and that the residents of surrounding neighbourhoods fear that urban densification will affect their quality of in a negative way. However, neighbourhood satisfaction plays a role in determining the social sustainability of a neighbourhood (Larimian & Sadeghi, 2021), and an improvement in neighbourhood satisfaction in the Wilhelminawerf seems to depend on the developments in the rest of the Merwedekanaalzone.

4.2.6 Housing satisfaction

Compared to the other indicators of social sustainability that the respondents were asked about through the survey, the respondents are less positive about the affordability of housing in their neighbourhood. The increasing demand and the additional high prices on the housing market in Utrecht (CBS, 2022; Pararius, 2022) were partly the reason for doing this research. Table 15 can be consulted to observe possible differences per neighbourhood.

	Transwijk-	Dichterswijk	Wilhelminawerf	Total
	Zuid			mean
Housing in my neighbourhood is	2.80	2.24	2.29	2.43
affordable				
I am satisfied with the size and	3.83	4.28	4.12	4.10
condition of my current home				

Table 15: Degree of housing satisfaction per neighbourhood.

The average score on the statement related to affordability of housing in Transwijk-Zuid is neutral, while he average score in the neighbourhoods of Dichterswijk and Wilhelminawerf is negative. This difference could be explained by the type of home where the survey was distributed. In the Wilhelminawerf and Dichterswijk, the survey was mainly distributed in new-build complexes, Wilhelminawerf and Heycop respectively. These residential complexes are not older than 3 years, and both contain only free sector rental properties. This while there are many older flats in Transwijk-Zuid, where the survey has been distributed. Some of the apartments in these flats fall under the social or medium rent, which means that the price is limited. Despite the fact that the respondents do not think that housing in their neighbourhood is affordable, they are generally satisfied with their home as can be seen in table 15.

The lack of affordable housing is a problem that can arise with urban densification as expensive new homes are developed in desirable places (Burton, 2000). In addition, the Merwedekanaalzone is also focusing on sustainable, environmentally friendly homes, resulting in higher house prices, which excludes lower incomes (Burgess, 2002). The statement of the interviewed local resident suggests that he thinks it is a lot of money, but he also realizes what kind of place he lives in and thus accepts the rent price. Two-income earners with a high level of education may find the rent high, but at least have the option to rent, while lower incomes do not have this option. This contributes to social segregation (Ahfeldt & Pietrostefani, 2017). The proponents of urban densification seem to have fewer problems with the price of housing, which could be because they are able to rent in that segment. Opponents of urban densification rate the affordability of housing less, and also seem to expect that urban densification will only lead to rising prices. Table 16 shows the differing opinions.

Table 16: Mean, Standard Deviation and p-value for social participation statements related to housing satisfaction which display possible statistically significant differences between groups with a positive and negative attitude towards urban densification.

	Negative about urban densification		Positive about urban densification		
	Mean	SD	Mean	SD	p-value
Housing in my neighbourhood is affordable	2.13	1.0	3.09	0.8	0.003
I am satisfied with the size and condition of my current home	4.24	0.7	3.27	1.1	0.000

An interviewed resident of the Wilhelminawerf confirms that he realizes that it is a lot of money when it comes to the rent prices, but that he is also aware of what he gets in return:

"Yes, as in the complex next to us, those are smaller apartments so they pay relatively much for what they get. But in our building the apartments are a lot bigger and we pay relatively a little bit more. Of course it remains a lot of money, but you also live near the center of Utrecht in a recently completed apartment."

Interview with local resident 1, Wilhelminawerf.

The responsibility for developing sufficient affordable housing lies with the local government (Debrunner et al., 2020). That this is also the case with the development of the Merwedekanaalzone is confirmed by the municipality of Utrecht:

"That is determined by the government, they have determined what percentage of social housing, middle segment, free rent and purchase must be realized. These are political considerations, we have agreed 35% social housing for the Merwedekanaalzone." **Interview with municipality of Utrecht.**

At the moment, the Wilhelminawerf is the only part of the new Merwedekanaalzone that has been developed, and the homes there are exclusively private rental sector homes. It is therefore too early to conclude that a lack of affordable housing will disrupt social sustainability in the Merwedekanaalzone, but it is an important point of attention.

4.2.7 Sense of place

The last indicator used to measure social sustainability in this study is sense of place or community. The sense of community is determined by individual behaviour, such as activity within the community, that depends on the extent to which a resident feels connected to the neighbourhood (Turcu, 2013; Bramley et al., 2009). This connection with the neighbourhood is related to the extent to which there is interaction with local residents. An interviewed local resident indicated that she is afraid that part of this interaction will disappear due to the urban densification in her neighbourhood:

"The big problem with urban densification is that you are going to build up the fringes of a city. So a place for loitering young people that does not bother anyone else is being built up, so that the young people move to the scarce public space. This also applies to start-ups or restaurants that use empty warehouses or buildings, all of this will disappear. This also removes a bit of the charm of the neighbourhood." Interview with local resident 2, Merwede.

For a strong sense of community it is important that residents stay there for a longer period of time, because this contributes to social sustainability in general (Dempsey et al., 2011). That is why the respondents were also asked to what extent they still see themselves living in the area in 10 years' time. The opinion on this is shown per neighbourhood in table 17, as is the extent to which the respondents experience a sense of community. Table 17 shows that the surveyed residents of the Wilhelminawerf, do not see themselves living in the neighbourhood for another 10 years. This is also confirmed by the interviewed local residents:

"No, this is really an intermediate stage. If you really start thinking about children and a family, this is not a sustainable situation. I also only know one child in our complex, and he lives with his mother."

Interview with local resident 3, Wilhelminawerf.

"Well, of course it is very urban, with few gardens and greenery. So I can imagine that at a certain point you think, okay, I have children, a quieter social life, that you then live a little further outside the city for more space."

Interview with local resident 1, Wilhelminawerf.

	Transwijk-	Dichterswijk	Wilhelminawerf	Total
	Zuid			mean
Living in this neighbourhood	2.51	3.52	2.71	3.00
gives me a sense of community				
I can see myself still living in this	2.15	3.26	2.41	2.70
neighbourhood in 10 years				

Table 17: Degree of sense of community per neighbourhood.

Table 18: Mean, Standard Deviation and p-value for social participation statements related to housing satisfaction which display possible statistically significant differences between groups with a positive and negative attitude towards urban densification.

	Negative about urban densification		Positive about urban densification		
	Mean	SD	Mean	SD	p-value
Living in this neighbourhood gives	3.31	1.0	2.36	0.8	0.004
me a sense of community					
I can see myself still living in this	3.63	1.2	4.36	0.5	0.057
neighbourhood in 10 years					

Table 18 shows that the proponents of urban densification in particular see themselves living in the same neighbourhood in 10 years' time. Based on the statements of the local residents, this would suggest that they are very satisfied with the neighbourhood, but that their current living situation is not sustainable for another 10 years. Only rental houses without a garden, such as in the Wilhelminawerf, are not sustainable when it comes to long-term living with a family, but also not when it comes to creating a strong sense of community. In contrast, owning a house promotes the will to invest socially in the neighbourhood (DiPasquale & Glaeser, 1999) and thus contribute to the sense of place. That residents stay in a neighbourhood for a relatively short time symbolizes little affinity and bond with the neighbourhood, which is an indicator of low sustainability of community (Dempsey et al., 2011). This again emphasizes that it is very important for social sustainability in a neighbourhood that there is a mix of rental and owner-occupied homes, with and without a garden, so that a diverse group of people can live there.

5. Discussion

In this chapter, the research results are linked to the research questions that have been formulated in advance. In addition, the research findings are placed in a broader scientific perspective, drawing on the already existing debate on urban densification and social sustainability. The limitations of this research will then be discussed, after which it will be concluded with recommendations for possible follow-up studies.

5.1 Social sustainability in the context of the Merwedekanaalzone

In the scientific debate on the relationship between urban densification and social sustainability, it is emphasized that this relationship is strongly context dependent (Bramley & Power, 2009; Bramley et al., 2009; Dembski et al., 2020; Dempsey et al., 2011; Raman, 2010). This thesis presents the context of the Merwedekanaalzone when it comes to the relationship between urban densification and social sustainability. Based on the literature, social sustainability is divided into two measurable factors: social equity and sustainability of community (Bramley et al., 2009; Hofstad, 2012; Jenks & Jones, 2010). The degree of social equity is primarily determined by access to essential facilities and housing (Bramley et al., 2009; Burton, 2003). As far as essential facilities are concerned, the residents of the Merwedekanaalzone and surrounding neighbourhoods are satisfied. When it comes to recreative facilities, the Wilhelminawerf lacks coffee shops or other facilities that invite local residents to recreate. The municipality of Utrecht indicates that there is room for a range of functions in the Merwedekanaalzone will not become a sleeping area of the city but that it will be lively instead. These are great plans, but until they are realised, the residents of the Wilhelminawerf will go to the city center for recreation, leaving an opportunity to stimulate social sustainability in their own neighbourhood.

The other social equity indicator besides access to facilities is housing. It is in line with the high house prices in general that residents of the Merwedekanaalzone and the surrounding area do not regard housing in their neighbourhood as affordable. A more important issue when it comes to housing in the Merwedekanaalzone, appears to be the lack of variation in housing types. The Wilhelminawerf consists exclusively of rental homes in the free rental sector, without a garden. That this only attracts one type of resident is clear from this study, where the majority of the respondents belong to a two-person household without children. The interviewed local residents also indicate that they experience little diversity in their neighbourhood. A missed opportunity, since reduced social segregation may be a consequence of urban densification which then also contributes to social equity (Bibri et al., 2020; Burton, 2000). This reduction of social segregation can take place provided there is sufficient diversity in the housing supply to accommodate different types of incomes, age groups and household compositions. However, reduction of social segregation can be negated when urban densification manifests itself in the delivery of only high-quality housing in popular places, resulting in high house prices. This contributes to social segregation (Ahfeldt & Pietrostefani, 2017). It is exactly that problem that currently seems to occur in the development of the Merwedekanaalzone. A problem that could have been prevented, because initially a mix of homes appeared to be delivered in the Wilhelminawerf:

"Of course there have been consultation moments with us residents, but nothing is subsequently done with that participation. For example, we as local residents were initially told that the Wilhelminawerf would largely consist of owner-occupied homes or apartments, which of course did not happen."

Interview with local resident 2, Merwede.

The quote from the local resident illustrates not only the false pretences presented to the residents of the area around the Wilhelminawerf, but also the importance attached to owner-occupied homes in the area. Tenants may be less willing to invest socially in the neighbourhood they live in, as this is often seen as a temporary residence. In contrast, owning a house promotes the will to invest socially in the neighbourhood (DiPasquale & Glaeser, 1999). That residents stay in a neighbourhood for a relatively short time symbolizes little affinity and bond with the neighbourhood, which is an indicator of low sustainability of community (Dempsey et al., 2011). The lack of owner-occupied homes in the Wilhelminawerf is therefore not only bad for diversity in the types of residents, but also when it comes to a mix between buyers and tenants. Therefore, the lack of affordable owner-occupied homes in the Wilhelminawerf not only creates a one-sided type of resident when it comes to income and household, but also contributes to sub-optimal social investment by residents.

The willingness to invest socially in the neighbourhood does not only depend on the type of home a person lives in. The social network of a resident ultimately determines to what extent the resident is willing to invest in this network, and the extent to which the resident feels connected to the community (Bramley & Power, 2009). The residents of the Wilhelminawerf indicate that they experience a less strong sense of community than the residents surveyed in the adjacent neighbourhood Dichterswijk. At the same time, the residents of the Wilhelminawerf indicate that they do not see themselves living in their neighbourhood for another 10 years, while the residents of the Dichterswijk consider this more likely. When it comes to a sense of community, the difference between rental homes and owner-occupied homes therefore seems to have a major influence in the Merwedekanaalzone. Renting ensures short-term thinking, less social investment and therefore a limited sense of community.

5.2 Urban densification to stimulate social sustainability in the Merwedekanaalzone

A lack of diversity in homes appears to limit both social equity and the sustainability of community in the Merwedekanaalzone. Local governments struggle in the institutionalisation of planning practices capable of advancing social goals like cohesion and diversity (Hofstad, 2012). However, local governments do have an influence on the type of housing that is delivered, if done wrong it is not surprising that they end up having trouble achieving social sustainability in a neighbourhood. The logical question for the project developer and the municipality of Utrecht is how they view the importance of diversity in homes.

"That variation is very important, because suppose you say: this area only houses villas, then it becomes a very monotonous neighbourhood where everyone comes home late at night and nobody is there during the day. And the fact that there is no one there during the day can be at the expense of safety in such a neighbourhood. While with a share of social housing in such a neighbourhood, you also give the children from such families the opportunity to grow up with more affluent children and thus have an example. But at the building level, a distinction will perhaps be made and one target group will be served, but if you look at the total picture for such an entire neighbourhood, a mix is very important." Interview with project developer Merwede 5.

Based on the above quote, it can be stated that the interviewed project developer seems to be aware of the importance of a diversity in types of housing. Then the question remains why this mix was not chosen in the Wilhelminawerf as was initially promised, but ultimately only rental homes were delivered. This question was put to the municipality of Utrecht. For the entire Merwedekanaalzone it has been agreed that 35% of the homes will be social housing. According to the municipality, the fact that only relatively more expensive homes have been completed in the Wilhelminawerf in the free rental sector is due to the lack of firm agreements:

"(...) the municipality also thought that the rents were too high. The point is that it was all agreed upon in the past. At the time, prices were not rising so exorbitant, and you also notice that as a municipality or government you have to look at agreements in a much more legal way. Because you see that if the agreements on the prices are not boarded up enough, a developer can say that they just index the prices. Then you end up in a not so pleasant discussion that even had to be settled in court."

Interview with municipality of Utrecht.

The lack of communication between the municipality and the project developer illustrates the issue outlined by Touati-Morel (2015), which examines the resistance of residents to spatial development in their neighbourhood. When plans for urban densification in a neighbourhood are developed, the resistance or support of local residents depends on transparency and the extent to which they can benefit from it themselves (Touati-Morel, 2015). When it comes to indicators of social sustainability, the fear of overcrowding and a reduction in the quality of life could be negative effects of urban densification and possibly a reason for local residents not to be in favour of this (Haaland & Konijnendijk van den Bosch, 2015). Besides, both the quantitative and qualitative data show that the difference in neighbourhood satisfaction can not only be explained by the opinion towards urban densification, but also depends on the extent to which the respondent directly benefits from the new homes in the Merwedekanaalzone. The interviewees who live at the Wilhelminawerf immediately benefit from the developments, because they have acquired a free market rental home in this way. The interviewed local resident who has lived in the area for a long time and does not directly benefit from the new homes, foresees crowding and a lack of bonding because she states that tenants only live there for a short time and are therefore not prepared to invest in the neighbourhood. However, this concerns the opinions of three interviewed residents, which clearly offers too little foundation for making certain assumptions for the entire population. Nevertheless, the interviews are substantiated by the survey data, since respondents who currently rate social sustainability indicators positively are more opposed to urban densification than residents who currently experience less social sustainability. This indicates a difference in the approach to urban densification: for one resident it is a threat to social sustainability, while the other resident expects that urban densification will only benefit social sustainability. That the view on urban densification can be related to living in the neighbourhood for a long or short period of time, as suggested by the interviewed local resident 2, may be the case. Because according to Daneshpour and Shakibamanesh (2011), the challenge of urban densification is to enable both new residents and current residents to benefit from the possible social benefits that arise. The municipality of Utrecht also wants to focus on this:

Because it is precisely because of those movements of people that it does not become an exclusive neighbourhood or anything like that. Primary schools will also be opened in the Merwedekanaalzone, for example, where children from the nearby Rivierenwijk can also attend. But the appearance of the houses is also very important, so that people will soon recognize in which house they live instead of all anonymous residential blocks. So realizing and incorporating sufficient public and green space is also a major challenge in the densification process."

Interview with municipality of Utrecht.

The fact that most facilities must be within walking distance is also in line with the 10-minute city that Utrecht wants to become (Gemeente Utrecht, 2016). Although the municipality emphasizes that it is the intention that not only the new residents of the Merwedekanaalzone will benefit from the facilities in their new neighbourhood, but that residents of surrounding neighbourhoods will also benefit here, the question is to what extent the neighbourhoods become mixed with each other when the aim is to reduce travel time as much as possible.

Besides, the municipality mentions a primary school as an example where the neighbourhoods will be mixed with each other. However, the majority of those surveyed in this study indicated that they have no need for educational facilities, simply because they do not have children. This highlights, again, the importance of a diverse neighbourhood when it comes to housing types and residents. When this is taken into account and appropriate facilities are realised, urban densification can certainly contribute to social sustainability in the Merwedekanaalzone. But in the current situation this is hardly the case.

5.3 Conclusion

The ongoing debate on the relationship between urban densification and social sustainability has formed the foundation for this research. Previous research into the consequences of densification mainly focuses on the consequences for the environment. Research into the social consequences of densification is scarcer. Before the specific case of the Merwedekanaalzone could be discussed, existing studies were used to determine which indicators for social sustainability may be influenced by urban densification. Subsequently, it was determined which of these social sustainability indicators are important in the Merwedekanaalzone. It appears that housing plays a decisive role in the social sustainability of the Merwedekanaalzone. Not so much the affordability, because the fact that the private sector rental homes are rented out for a relatively large fee fits in with the national trend and is accepted by tenants. The challenge with regard to urban densification lies in the variation of housing that seems essential for stimulating social sustainability in the Merwedekanaalzone. Variation in housing refers to a mix of social housing, mid-term rental housing, free rental housing and owner-occupied housing.

Diversity in types of housing not only ensures more diversity in types of residents, but also contributes to a sense of community, another important indicator of social sustainability in the Merwedekanaalzone. There is a stronger sense of community in the surrounding neighbourhoods of the Merwedekanaalzone, which means that the support for urban densification among local residents is limited. The fear of overpopulation and a lower quality of life seems justified when the current situation of the Merwedekanaalzone in terms of social sustainability is analysed. The current residents of the Merwedekanaalzone and the municipality of Utrecht hope that the further development of the Merwedekanaalzone will ultimately benefit social sustainability. In particular, the central part of the Merwedekanaalzone, sub-area 5, seems to bear a lot of responsibility for the entire environment. However, it is questionable whether a mix of facilities and homes in Merwede 5 is ultimately sufficient to improve social sustainability in the entire neighbourhood. The lack of diversity in homes and facilities on a smaller scale, such as at the Wilhelminawerf, seems to weigh more heavily than largescale compensation in, for example, Merwede 5. Besides, in view of the previous course of events regarding the Wilhelminawerf, it is justified to doubt the feasibility of the pre-established standards for social rental housing in Merwede 5. Because it was initially announced in the Wilhelminawerf that a large part of the apartments in the owner-occupied segment would be delivered, which ultimately did not happen due to a lack of firm agreements between the municipality of Utrecht and a project developer. Moreover, the adjacent Transwijk neighbourhood contains a relatively high percentage of social housing, which could give the project developers the opportunity to use this as an argument to deliver less social rent in Merwede 5 than agreed.

Ultimately, urban densification in the Merwedekanaalzone can contribute to social sustainability, provided sufficient attention is paid to the following aspects. Firstly, it is essential to create support among residents of surrounding neighbourhoods. This trust has been damaged by miscommunication about the development of the Wilhelminawerf, the municipality would do well to restore this trust by acting transparently and emphasizing which neighbourhood supporting initiatives are started by the municipality.

Secondly, it is important that the mix of housing is maintained and that clear agreements are made about it between the municipality en project developers. Moreover, it must be reconsidered whether a mix on a large-scale level is sufficient, or whether a mix should already exist at a complex such as the Wilhelminawerf. Finally, it must be made clear how local residents can benefit socially from urban densification developments in the Merwedekanaalzone. This not only contributes to creating support, but can ultimately lead to a stronger sense of community, which has proven to be essential for social sustainability in the Merwedekanaalzone.

5.4 Limitations

Although the selection of a single case study has made it possible to gain detailed insight into social sustainability in relation to urban densification, there are some limitations to this research method. The idea that the research results of a single case study can be generalized to a larger population should be rejected (Starman, 2013). That was not the aim of this research, but a multiple case study could have offered a solution in order to be able to make a comparison between different neighbourhoods where urban densification takes place. In carrying out the single case study, non-convenience sampling methods were used. Although this was the best way to conduct research for time and practical reasons, there are limitations to non-convenience sampling. The first being that bias and variability cannot be controlled or measured. Second, because of the non-convenience method it is not possible to generalize the results beyond the specific sample (Acharya et al., 2013).

In addition to the comments that can be made about the research and sampling method, there are also a number of limitations within the research conducted. In this study, only current home owners were questioned and no potential residents looking for a home in the research area. It is therefore difficult to determine to what extent home seekers are hindered by the degree of housing affordability in the Merwedekanaalzone and its surroundings, while the housing affordability is an important social sustainability indicator (Bibri et al., 2020; Bramley et al., 2009). In order to also question this group, making a second survey specifically for home seekers in the Merwedekanaalzone area would have been an option, but this was not chosen due to time reasons and the feasibility of the research.

A second limitation is the lack of distinction that could be made between tenants and buyers with regard to home ownership. This is partly an unavoidable problem, because the current homes in the Merwedekanaalzone (Wilhelminawerf and MAX buildings) consist exclusively of rent, so making a distinction is not applicable. However, respondents from the surrounding neighbourhoods of Dichterswijk, Transwijk-Zuid in Kanaleneiland could live in an owner-occupied home. That there is a difference between tenants and buyers with regard to the relationship between urban densification and social sustainability is not only apparent from this study, but is also suggested in the literature (DiPasquale & Glaeser, 1999). In order to be able to make a distinction in possible follow-up research, the question of whether someone rents or buys could be included in the survey. Thirdly, the Merwedekanaalzone is an area that is still under development, making it too early to draw definitive conclusions when looking at social sustainability. Nevertheless, the opinion of the current residents and those living in the vicinity of the Merwedekanaalzone on urban densification and social sustainability is presented in this research, which provides an insight into the current situation. In addition, this research provides a proper foundation for any follow-up research, so that a comparison can be made over time.

5.5 Recommendations

Based on the study results and limitations, some recommendations for further research can be made. For example, it would be relevant to conduct a comparable study in a few years' time, because the urban densification process in the Merwedekanaalzone will have progressed further by that time and the question is to what extent this has an impact on social sustainability. Within a few years it can also be concluded whether a mix of types of housing has been realized, and whether this has benefited social sustainability as foreseen in this study. The research could also be broadened when looking at types of sustainability. This research specifically focused on the relationship between urban densification and social sustainability, but there are also other aspects of sustainability that could be investigated in follow-up research.

In addition to social sustainability, the creation of sufficient public and green space is considered by all stakeholders as a major challenge in the urban densification of the Merwedekanaalzone. Green space accessibility could be considered as a matter of both environmental and social sustainability (Burton, 2000). This research focuses on social sustainability, and does not extensively discuss access to green space. During this research it became clear that environmental sustainability in particular is an important theme in urban densification. The importance of environmental sustainability may provide the impetus for a follow-up study that focuses on the relationship between urban densification and environmental sustainability, or an investigation into the relationship between social and environmental sustainability in the Merwedekanaalzone.

Furthermore, one of the outcomes of this research is that the diversity in housing may determine the extent to which urban densification contributes to social sustainability. Several studies have already been conducted into the relationship between urban policy and access to the housing market (Dale & Newman, 2009; Rérat, 2012), but a real focus on the relationship between an urban densification strategy and diversity of housing is not often made. Now that this research has shown the relevance of diversity of housing when it comes to social sustainability and urban densification, a possible follow-up study in a few years' time could focus on the link between housing types and social sustainability. The type of housing is seen as one indicator of social sustainability and therefore included in this research, but since other indicators are also included, a somewhat broader study remains without going into one indicator specifically.

Finally, this research mainly relied on quantitative data, supported by some interviews. In order to gain a better understanding of the different opinions and backgrounds, a more qualitatively oriented study is recommended. Many survey respondents left their email address in order to be approached for an interview. Due to the lack of response to an invitation and the time pressure, only three interviews with local residents were ultimately conducted, but the fact that many respondents wanted to give their opinion in the first instance does indicate a promising basis for more qualitative research into the effects of urban densification on social sustainability in the Merwedekanaalzone.

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Appendices

1. Interview topic list

	Way of questioning				
Торіс	Project developer/Municipality	Local resident			
Interviewee					
Introduction	Research ethics, permission to	Research ethics, permission to record			
	record the conversation etc.	the conversation etc.			
Introduction	Why it is important to have the	Why it is important to have the			
	interview? Brief explanation.	interview? Brief explanation.			
Position/role	What is your role in developing the	In which postal code area do you live,			
	Merwedekanaalzone?	and how long have you lived there?			
Neighbourhood diversity	How is it ensured that the	Do you feel that you live in a socially			
	Merwedekanaalzone becomes a	diverse neighbourhood, when you			
	socially diverse neighbourhood?	consider age and education level?			
Social equity	How is it guaranteed that there are	Are you satisfied with your living space,			
	equal opportunities for a home in	and the amount you pay for it?			
	the Merwedekanaalzone for every				
	income group?				
Housing & Facilities	How is it ensured that facilities in	Are you missing something			
	surrounding neighbourhoods do not	physical/social in your current living			
	overflow as a result of the new	situation?			
	construction in the MW-Zone?				
Housing & Facilities	How is it attempted to bind	Do you still see yourself living in this			
	residents to the heighbourhood for a	neighbournood in 10 years?			
Conce of community	longer period of time?	Do you fool connected to your			
Sense of community	How can the built environment be	Do you reel connected to your			
	sense of community is enhanced?				
Sonso of socurity	How can the built environment be	Do you over feel unsafe in your			
Sense of security	designed in such a way that the	peighbourhood and if so when and			
	sense of security is enhanced?	why?			
Urban densification	How can it be foreseen what the	What will change in your			
	effects will be on surrounding	neighbourhood when the MW-Zone is			
	neighbourhoods, since there are few	fully developed?			
	reference projects when you look at				
	density?				
Urban densification	What are the biggest challenges of	Do you support the densification policy			
	urban densification?	of the city of Utrecht?			
Closing	Explanation about processing	Explanation about processing			
-	interviews, offering to send the final	interviews, offering to send the final			
	version of thesis.	version of thesis.			

2. Elaborated interviews

The transcribed conversations are not a literal transcription. Smalltalk and other irrelevant parts have been omitted. Only the statements and questions relevant to the content or research that are ethically relevant are included in the concise transcript.

2.1 Interview with local resident 1, Wilhelminawerf

Researcher (R): *Thanks interviewee for time taken, ask if the interview may be recorded. Indicates that interview will last approximately 20 minutes, and the interviewee can stop or ask questions at any time. Then asks where the interviewee lives, does not need to be specifically named, but in any case the postal code area.*

Interviewee (I): *Indicates that the conditions have been understood and tells where he lives, namely at the Wilhelminawerf.*

R: *Continues with question 1*: "do you feel connected to the neighbourhood you live in, and why or why not?"

I: "I don't really feel connected to the neighbourhood, but I do feel connected to the complex in which I live. This is because the neighbourhood is actually not finished yet, so that's why I don't feel much connection with it yet."

R: "Understandable, so you talk to your neighbours a lot?"

I: "Yes, I know the neighbours well, sometimes I speak to people here and there. But it's not that I know a lot of people, although things are organized by residents."

R: "Okay, so what are residents' initiatives?"

I: "Neighbourhood drinks, barbecues, something pops up every now and then in the Whatsapp group."

R: "Alright, thank you. Well, it is obvious that a lot is being built in your neighbourhood and at some point new homes will of course be delivered in the rest of the Merwedekanaalzone. Do you expect a lot to change in your neighbourhood when these homes are ready?"

I: "I think it's not too bad, it will be a bit busier in the supermarket, for example, but I think it's only good and fun that there will be a little more liveliness."

R: "Clear, are you satisfied with access to facilities in your area?"

I: "Well, before that I lived in Kanaleneiland and my GP is still there, for example. In any case, I have the idea that in Utrecht it is good in terms of facilities and facilities, wherever you live."

R: "Sure, let's move on to something else. Do you support all those new construction projects in your area?"

I: Well, they have to build houses somewhere, right? And there's room for it, there was nothing here and it's a good location."

R: "And do you feel that these new-build projects attract a diverse range of tenants or buyers?"

I: "Not at all, it is really meant for the YUP (young urban professional) couples."

R: "Okay, that's what I thought. Your residential complex consists of 3 blocks. Suppose they build a 4th block, with only social housing. How would you like this?"

I: I'd be fine with it. Ultimately, you have to provide housing for every layer in society, whether you are highly or poorly educated. You also have to mix these different types of people, because I think this only benefits the general quality of life.

R: "That's a nice vision. Let's move on to affordability. Are you satisfied with what you pay, and the actual space you have?"

I: "Yes, as in the complex next to us, those are smaller apartments so they pay relatively much for what they get. But in our building the apartments are a lot bigger and we pay relatively only a little bit more. Of course it remains a lot of money, but you also live near the center of Utrecht in a recently completed apartment."

R: "Okay, and do you see yourself living in this neighbourhood in 10 years?"

I: Yes, actually, the only thing you're missing is a garden. Well look, you don't want to live here with a whole family, but it would work with one child."

R: "So you wouldn't leave because you've outgrown the area or don't feel at home anymore?"

I: "Well, of course it is very urban, with few gardens and greenery. So I can imagine that at a certain point you think, okay, I have children, a quieter social life, that you then live a little further outside the city for more space."

R: "Clear story. Then go on to the feeling of safety in your area. In the survey you also answered a question about this, but what exactly makes you feel safe or less safe in the neighbourhood?"

I: "Well, the complex itself is of course still quite isolated from the rest of the buildings, but that will soon change. Moreover, you have the canal road close by, and there is always a lot of through traffic and a lot of people there. It is precisely that hectic pace and bustle that gives you a sense of security."

R: "Yes, I understand. Thanks a lot" *Thanks the respondent for clear examples and time taken for the interview. Also asks if the interviewee wants to have the finished product and wishes her a nice day.*

2.2 Interview with local resident 2, Merwede

Researcher (R): *Thanks interviewee for time taken, ask if the interview may be recorded. Indicates that interview will last approximately 20 minutes, and the interviewee can stop or ask questions at any time. Then asks where the interviewee lives, does not need to be specifically named, but in any case the postal code area.*

Interviewee (I): *Agrees to interview recording, and shows with the camera where she lives. She explains that she lives on a houseboat in the canal, opposite the Wilhelminawerf.*

R: *Mentions how special it is that she lives on a houseboat, and can imagine that this gives her an opinion about the development in the Merwedekanaalzone. Then asks question 1: how long have you lived in the area?*

I: *Indicates that she has been living on the houseboat for 4 years now, but has also lived in a house in the same neighbourhood for 10 years before that. That is why she is very attached to the neighbourhood and did not want to move. Already indicates that she has several examples showing that the neighbourhood is subject to change.*

R: *Lets respondent know that the examples are of value and that they will certainly be returned to later in the interview. For now question 2: do you have a lot of contact with the neighbours, do you know them?*

I: *Indicates that she speaks to neighbours a lot and knows them well. "It's like a small village here." But also indicates that this is already changing, and that she can also give examples of this.*

R: *Asks the respondent to come up with such an example: what do you notice in your neighbourhood?*

I: "On the other side of the canal (Wilhelminawerf), there live children as well. They have hardly any room for playing there, so they come this way via the bridge. Fine of course, but we have a playground here that is run by volunteers. They can hardly handle the crowds now. So you should either recruit more volunteers or offer more play capacity."

R: *Indicates that it is indeed a valuable example, does she have another example?*

I: "Certainly, because the other side (Wilhelminawerf) are all rental properties. These people continue to live there less long, while I still know the 16-year-old children in my street as babies, and they are now looking after the children of the next generation. While tenants want to invest less in their neighbourhood, because they are often only there temporarily. So that's an example of, yes, where it's going to pinch."

R: "That is again a nice, concrete example. I notice you have a third example?"

I: "Yes, there is a dog walking area around here. Of course nobody follows the rules, so the dogs are not on a leash. But if significantly more dogs are added, without extra public space, then things will start to get tight again. Another example are the picnic tables here in the park, they are the people who live there with a small garden. Me and neighbours can just use those tables, that's all going well. But if there are all these extra people who think those tables are theirs, well, then what?

What if a table breaks? So these examples that I mention are the result of constant insertion, insertion, and more insertion."

R: "Do you also have contact with residents of the Wilhelminawerf?"

I: Certainly, and they complain a lot about, for example, the bicycle nuisance. Bicycle cellars have been developed for every building, but everyone puts their bicycle in public space because this saves effort. Now there is still a lot of space in the Wilhelminawerf compared to sub-area 5 (in the Merwedekanaalzone), which still has to be built."

R: "Thanks for the clear examples. You yourself mentioned sub-area 5, which by Dutch standards is going to be an unprecedented densified part of the city. Does the municipality communicate a lot to you as local residents?"

I: *Starts laughing* "No, you really need to get your foot in the door. Of course there have been consultation moments, but nothing is subsequently done with that participation. For example, we as local residents were initially told that the Wilhelminawerf would largely consist of owner-occupied homes or apartments, which of course did not happen."

R: "Clear story, I now want to talk about diversity in your neighbourhood. If you compare it to 5 years ago, has anything changed in terms of diversity?"

I: "5 years ago it was definitely more diverse. It has everything to do with house prices. With the current market, the 1930s homes in my neighbourhood, for example, are only affordable for highly educated people with 1 or 2 children."

R: "Then let's talk about urban densification in general. Do you think this is the solution to the housing shortage?"

I: "Is there even a housing shortage? There are still shrinking areas in the Netherlands. But it is a housing shortage caused by too much demand in the same place. I am supporting the idea of spreading people out, also to keep the shrinking areas alive. Because the big problem with urban densification is that you are going to build up the fringes of a city. So a place for loitering young people that does not bother anyone else is being built up, so that the young people move to the scarce public space. This also applies to start-ups or restaurants that use empty warehouses or buildings, all of this will disappear. This also removes a bit of the charm of the neighbourhood."

R: "Yes understandable. So the biggest problem is going to be the lack of space?."

I: "Yes I think so. People are going to miss it too, I have a spacious garden here myself, but all those apartments that are being developed and already are... Then you are in one of those little boxes..."

R: *Thanks the respondent for clear examples and time taken for the interview. Also asks if the interviewee wants to have the finished product and wishes her a nice day.*

2.3 Interview with local resident 3, Wilhelminawerf

Researcher (R): *Thanks interviewee for time taken, ask if the interview may be recorded. Indicates that interview will last approximately 20 minutes, and the interviewee can stop or ask questions at any time. Then asks where the interviewee lives, does not need to be specifically named, but in any case the postal code area.*

Interviewee (I): *Agrees to interview recording, And indicates that he cannot turn on the camera because he is standing under a bridge with his racing bike. He then says that he has been living at the Wilhelminawerf for a year now, and before that he lived in the Vogelenbuurt, so also in Utrecht.*

R: *Indicates that it's not a problem that the camera can't be used, and continues with question 2*: "Do you feel connected to your neighbourhood, and why or why not?"

I: "No, I don't feel connected to my neighbourhood. And that's because the complex where I live (the Wilhelminawerf) is the only complex that has already been completed, and is surrounded by empty and undeveloped land. But I am satisfied with my home."

R: "That is clear, and speaking of your complex, do you think there is a lot of diversity when you look at education level and age?"

I: "No, what I've seen is that it's mostly YUP (Young Urban Professionals), all early 30s, lots of couples..."

R: "Okay, and do you think it is a pity that there is not so much diversity in your complex?"

I: "Well, to be honest I don't really care about that. I don't think it is a pity, but I also don't think that putting similar people all together in one complex makes living there much more enjoyable or so."

R: "Okay, and suppose they develop a fourth residential block in the Wilhelminawerf, with exclusively social housing? How would you feel about that?"

I: "I don't really have a very strong premonition about that, because I've lived in neighbourhoods with a homeless shelter around the corner, or a lot of social housing, so it doesn't really matter to me."

R: "And do you think such a mix would lead to more social cohesion, if social housing were also added?"

I: "I am inclined to say that it would not contribute to more social cohesion."

R: "Okay, let's move on to the next topic. Are activities organized for and by residents in your complex?"

I: "Yes, when the first residents moved in, two activities were organized. However, after that it was quiet for a long time, and we recently had a barbecue where only 8 people came. And on a total population of 200, that is of course very limited. Normally I would have gone myself, but I had corona so couldn't be there."

R: "Clear story. With regard to development in your neighbourhood, do you expect that a lot will change in terms of social dynamics when new homes are completed in your neighbourhood?"

I: "I think that depends on what exactly is going to be developed. If, for example, there are also coffee shops or specialty shops, then I think it will be a cosy place where you can also meet people, etc. But if it is really exclusively housing, then I don't know whether it will really get more cosy because then you really have that anonymous of the city retains."

R: "Clear, that's a nice view. If we then take a look at the urban densification strategy that the municipality of Utrecht is implementing, do you support those development?"

I: "Yes, provided there is sufficient space for greenery. For relaxation and so that you can go outside for a while because otherwise you are really constantly in a concrete jungle. Anyway, I am in favour of going up in the air, after all there is a housing shortage."

R: "Yes, that there must be enough space for greenery is indeed an important condition for many people. OK, let's move on to the security aspect. Do you always feel safe in your neighbourhood?"

I: "Yes, I always feel safe when I walk through my neighbourhood. I don't really have a reason not to feel safe."

R: "Obviously, then I am curious if you are missing something in your current living situation. That can be something physical, such as a certain facility, or something social."

I: "Well, that's starting to happen now, we have a commercial building that is being developed in our harbour. There will be a coffee shop there, because you kind of miss things like that in the area at the moment. If you want to grab a coffee somewhere, you go to the city center."

R: "Yes, so that at some point you no longer have to go to the city center for recreational and social aspects, but have those kinds of facilities in your neighbourhood."

I: "Yes, that seems very nice indeed. And as far as a doctor or something like that is concerned, it's just well arranged, that's fine. And as far as educational facilities are concerned, that's a phase I'm not currently involved in."

R: "Speaking of that phase, do you see yourself still living in this neighbourhood in 10 years?"

I: "No, this is really an intermediate stage. If you really start thinking about children and a family, this is not a sustainable situation. I also only know one child in our complex, and he lives with his mother."

R: "That is indeed not much."

R: *Thanks the respondent for clear examples and time taken for the interview. Also asks if the interviewee wants to have the finished product and wishes her a nice day.*

2.4 Interview with project developer Merwede 5

Researcher (R): *Thanks interviewee for time taken, ask if the interview may be recorded. Indicates that interview will last approximately 20 minutes, and the interviewee can stop or ask questions at any time. Also asks whether the interviewee can briefly explain what exactly his role is in the development of the Merwedekanaalzone.*

Interviewee (I): * Agrees, and indicates that he would like to see the quotes used before the end product is handed in, because sometimes things can be misinterpreted, for example. Then indicates that the developer manages approximately 20% of the land in area Merwede 5 (central part of the Merwedekanaalzone). In 2017/2018, the land owners in the Merwedekanaalzone started selling the land to the project developers. Initially, the focus was mainly on the development of the entire Merwede 5 area, and since approximately 2020, the development of buildings in that area has also been specifically looked at. This is then done on the basis of the preconditions set by the municipality.*

R: "Okay, clear, and if I have understood correctly, there are already several project developers involved in Merwede 5, instead of one developer taking on everything?"

I: "Yes, in the end it was decided that each developer has their own piece of land, but because there are such high ambitions, the forces also have to be joined. Especially when you look at energy and mobility, you cannot do this on your own, it has to be done on a larger scale. This also applies, for example, to facilities such as a school or a parking standard that must be met. These are things that have to be arranged overarching."

R: "Alright, and if you look at the diversity in housing types, how important do you think that diversity is for a neighbourhood?"

I: "That variation is very important, because suppose you say: this area only houses villas, then it becomes a very monotonous neighbourhood where everyone comes home late at night and nobody is there during the day. And the fact that there is no one there during the day can be at the expense of safety in such a neighbourhood. While with a share of social housing in such a neighbourhood, you also give the children from such families the opportunity to grow up with more affluent children and thus have an example. But at the building level, a distinction will perhaps be made and one target group will be served, but if you look at the total picture for such an entire neighbourhood, a mix is very important."

R: "Clear story, and if we look at urban densification in general, because the Merwede Canal zone is unprecedentedly densified by Dutch standards, what do you think are the biggest challenges?"

I: "I think the quality of the public green space because you get a very urban environment when you make many buildings very high and close together, so how do you get that green feeling incorporated? Furthermore, mobility and the appearance of the plinths (view at street level) and the challenge in terms of sustainability are there."

R: "That sustainability is precisely something that can also be achieved with urban densification, right?"

I: "That's just how you look at it. In terms of generating green energy, it is easier to have more space, such as in Leidsche Rijn, where you have large roofs per household that you can fill with solar panels. That space is much more scarce in the Merwede. On the other hand, in terms of building materials, it is a lot more sustainable to develop in the Merwede than in Leidsche Rijn, because you need much less material per unit."

R: "And also in terms of ultimate consumption, the Merwede should become a sustainable district. Because if I'm not mistaken, many homes are delivered without a parking space?"

I: "Yes, the parking standard is indeed a lot lower than in Leidsche Rijn, for example. There will be a lot of use of sustainable mobility options, which makes me think that it is indeed a very sustainable plan in the end."

R: "But can you also filter on potential residents? With the current market you could almost say that you can only come and live there without a car, then you will still have enough interested parties left, I think."

I: "That's quite a tricky issue for us as developers. Because then you will miss a large part of the target group. Because if you deliver more expensive houses without a parking space, then of course a lot of people will drop out. So that is the risk we take, it is really the question whether this will work yes or no."

R: "OK, let's move on to the security aspect. How can you positively influence residents' sense of safety with the built environment?"

I: "Yes, you can, because at the building level you can already see blind corners that you enter and that no one can stand behind a cupboard around the corner. You can also make many interventions at the neighbourhood level. We then do that again as a collective with all developers, while we do that ourselves at the building level."

R: *Indicates that the respondent has provided a lot of useful information, and that all questions have been answered. Thanks the respondent for clear examples and time taken for the interview. Also asks if the interviewee wants to have the finished product and wishes her a nice day.*

2.5 Interview with municipality of Utrecht

Researcher (R): *Thanks interviewee for time taken, ask if the interview may be recorded. Indicates that interview will last approximately 20 minutes, and the interviewee can stop or ask questions at any time. Also asks whether the interviewee can briefly explain what exactly his role is in the development of the Merwedekanaalzone.*

Interviewee (I): *Agrees to record the conversation. Tells that he has been working in Spatial Planning for 25 years, and until last year he worked on the developments in the Merwedekanaalzone for 5 years. There, as senior project leader, he managed the team and was responsible for the environmental vision and the environmental impact assessment.*

R: "Thanks for the explanation. I have already spoken to local residents and a project developer already. They both think that a variety of housing types is essential for social cohesion. How is it determined what kind of housing will eventually be developed?

I: "That is determined by the government, they have determined what percentage of social housing, middle segment, free rent and purchase must be realized. These are political considerations, we have agreed 35% social housing for the Merwedekanaalzone."

R: "And how is that arranged in the Wilhelminawerf, for example? I've also been there and talked to local residents, but if I'm right, only homes in the free rental sector have been completed."

I: "That's right, and of course there was quite a lot of commotion about that, because the municipality also thought that the rents were too high. The point is that it was all agreed upon in the past. At the time, prices were not rising so exorbitant, and you also notice that as a municipality or government you have to look at agreements in a much more legal way. Because you see that if the agreements on the prices are not boarded up enough, a developer can say that they index and they can just do that. Then you end up in a not so pleasant discussion that even had to be settled in court."

R: I also spoke with a resident of a houseboat in the Merwede. She is afraid that urban densification will come at the expense of local initiatives that can arise in the fringes of the city, such as Kanaal30 and VechtclubXL. How is it ensured that there is room within the developments for such projects?

I: Yes, if I had a crystal ball I could answer that, but what you see is that artists and the like always manage to find a place. So it is partly up to the people themselves, but if you look at stimulating creativity, we do play a role. Because Kanaal30 was created through collaboration between the municipality and market parties. The VechtclubXL has also ended up in the Merwedekanaalzone at the initiative of the municipality. However, such initiatives are always available with a temporary permit, because it often concerns buildings that need to be refurbished or therefore disappear in the long term for new developments. Because if you wanted to realize something like this in a new building, suddenly much higher rents are involved and things like that.

R: "Interesting to hear the background of those initiatives, because I didn't know that the municipality partly set up Kanaal30 and the VechtclubXL."

I: "Yes, and it is also true that we as a municipality have hired an architect to look at okay, what are culturally valuable buildings that we can preserve in the developments? They are not all the most exciting buildings at the moment, but there are a number of interesting ones such as the bicycle depot for example. There will now be a kind of new market hall, as they have in Rotterdam, but in Utrecht."

I: "With this I want to indicate that we want all kinds of functions in the area, such as creativity, living and working, a square with cafes so that it is not a sleeping area of the city but that it will be really lively. However, it will be difficult if everything is new construction to subsidize such initiatives, because it is no longer possible to rely on a temporary permit. Because if you support one initiative, the other will say why don't we get anything?"

R: All right, then I'll move on to my next question. Is the intention for the Merwedekanaalzone to become a self-sufficient area, or is there really a focus on mixing with surrounding neighbourhoods such as Transwijk-Zuid and Dichterswijk?

I: "Yes, it is really the intention that it becomes a so-called "and-and" situation. In Merwede 5, for example, we are focusing on a car-free neighbourhood, in which we mainly encourage walking, cycling and public transport. It is the intention that many facilities are within walking distance. At the same time, this is a good example of policy that no longer ties in well with urban densification, because large shopping centres are becoming less and less successful. So to prevent vacancy, as much as possible is bundled around these shopping centres."

I: "So in practice we looked very closely at what we can add in that district (Merwede 5) that will not compete with the shops in the Nova shopping center in Kanaleneiland or the shops on the Rijnlaan, but will be complementary instead."

R: Clear story. And is the mobility aspect the biggest challenge in terms of urban densification in your view?

I: "Among other things, yes. Because it is precisely because of those movements of people that it does not become an exclusive neighbourhood or anything like that. Primary schools will also be opened in the Merwedekanaalzone, for example, where children from the nearby Rivierenwijk can also attend. But the appearance of the houses is also very important, so that people will soon recognize in which house they live instead of all anonymous residential blocks. So realizing and incorporating sufficient public and green space is also a major challenge in the densification process."

R: *Indicates that the respondent has provided a lot of useful information, and that all questions have been answered. Thanks the respondent for clear examples and time taken for the interview. Also asks if the interviewee wants to have the finished product and wishes him a nice day.*

3. Survey

First, the tables show how the questions from the survey relate to the research questions and factors from the conceptual model. This is followed by the complete survey.

3.1 Survey questions in relation to the research questions and conceptual model

Research question	Associated questions/statements survey			
How does urban densification affect social sustainability?	All statements/questions			
How can social sustainability be measured in an urban context?	All statements/questions			
To what extent is there urban densification in the Merwedekanaalzone?	9.1 to 9.9			

Factors conceptual model	Associated questions/statements survey			
Personal factors	1.1 to 5.1			
Social interaction	6.8 to 6.9			
Safety and security	6.5 to 6.7			
Social equity	7.1 to 7.3			
Social participation	6.10 to 6.11			
Neighbourhood satisfaction	6.1 to 6.4			
Housing satisfaction	7.4 to 7.6			
Sense of place	8.1 to 8.7			

3.2 Complete survey

Introduction text

Dear reader,

My name is Ruben Humblet, and I am a master student of spatial planning at Utrecht University. For my thesis I am researching urban densification in the Merwedekanaalzone, Utrecht. I would like to ask you to participate in this research. You can complete this survey if you live in Utrecht and your postal code starts with the numbers 3521, 3526 or 3527. Filling in the survey takes approximately 5 minutes and is on an anonymous basis. Participation in this study is voluntary. You can stop the research at any time, without giving a reason and without adverse consequences.

Background of the research

The research focuses on the relationship between urban densification and social sustainability in the Merwedekanaalzone. The municipality of Utrecht expects 410,000 people to live in Utrecht by 2030, which means an increase of 50,000 people compared to the current situation. In order to accommodate all these people, the municipality is focusing on urban densification in various areas, such as the Merwedekanaalzone.

If you have any questions or comments about the research, please contact me at email. If you have any questions or comments about privacy and data protection, please contact the data protection officer at email.

Researcher/student Ruben Humblet r.humblet@students.uu.nl

Data Protection Officer privacy@uu.nl

To start the survey, please click on the box below.

Kind regards,

Ruben Humblet

What is your age?

.....

Question 2

What are the 4 digits of your postal code?

- o **3521**
- o **3526**
- o **3527**

Question 3

How many years have you lived in your current neighbourhood?

- \circ 0-2 years
- o 3-5 years
- o 6 years or more

Question 4

What is your highest completed education?

- o Primary education
- o VMBO
- o HAVO
- o VWO
- o MBO
- University of applied science- bachelor
- o University-bachelor
- o University-master
- o University- PhD

Question 5

What is the composition of your household?

- o Living alone
- A two-person household without children (that live at home)
- Single-parent family, youngest child under 12 years of age living at home
- Single-parent family, youngest child above 12 years of age living at home
- Family, youngest child under 12 years of age living at home
- Family, youngest child above 12 years of age living at home
- o Joint household, max. 2 roommates
- Joint household, more than 2 roommates
- o Otherwise, namely:

The following statements are about how you experience social sustainability in your neighbourhood.

	Totally disagree	Disagree	Neutral	Agree	Totally agree
This neighbourhood is a good place to live.					
The quality of life in this neighbourhood is high.					
Living in this neighbourhood is good for my mental and physical health.					
I can see myself still living in this neighbourhood in 10 years.					
I feel safe walking around my neighbourhood during the day.					
I feel safe when I walk through my neighbourhood in the dark.					
I am not worried about crime in my neighbourhood.					
I have good contact with my neighbours.					
I regularly interact spontaneously on the street with someone from my neighbourhood.					
I am willing to work with others on a project to improve the neighbourhood.					
We have a strong and close-knit community in our neighbourhood.					

The following statements are about the facilities and housing in your neighbourhood

	Totally disagree	Disagree	Neutral	Agree	Totally agree
I am satisfied with access to essential facilities in my neighbourhood (supermarket, health center, bank, etc.).					
I am satisfied with access to recreational facilities in my neighbourhood (park, sports facilities, playground, etc.).					
I am satisfied with access to educational facilities in my neighbourhood (preschool, primary, secondary).					
I am satisfied with access to public transport in my area.					
Housing in my neighbourhood is affordable.					
I am satisfied with the size and condition of my current home.					

Question 8

The following statements are about urban densification in Utrecht

	Totally disagree	Disagree	Neutral	Agree	Totally agree
I don't notice that many new homes are being built in my neighbourhood.					
I don't notice that many new homes are being built in adjacent neighbourhoods.					
I don't notice that it is getting busier in my own neighbourhood because new homes are being built.					
I don't notice that it is getting busier in my own neighbourhood because new homes are being built in adjacent neighbourhoods.					
I notice that the atmosphere in my neighbourhood is improving because new homes are being built.					
I notice that the atmosphere in my own neighbourhood is improving because new homes are being built in adjacent neighbourhoods.					
I don't support the development of new homes within the city borders of Utrecht.					

The following statements are about the development in the Merwedekanaalzone. 6000 new homes are being built here. Some of the homes have already been completed. First you will be asked about your current experience, followed by a question about your expectations.

	Totally disagree	Disagree	Neutral	Agree	Totally agree
I don't notice from the bustle in my neighbourhood that new homes have been built in the Merwedekanaalzone					
In the future, I don't expect to notice from the bustle that new homes have been built in the Merwedekanaalzone					
I don't notice that amenities in my neighbourhood are coming under pressure due to the new homes in the Merwedekanaalzone					
I don't expect amenities in my neighbourhood to come under pressure due to the new homes in the Merwedekanaalzone					
I notice that the atmosphere in my neighbourhood is changing in a positive way due to the new homes in the Merwedekanaalzone					
I expect that the atmosphere in my neighbourhood will change in a positive way due to the new homes in the Merwedekanaalzone.					
I don't support the development in the Merwedekanaalzone					

Question 10 (optional)

In addition to the data collected through this survey, several interviews will be conducted. If you want to make yourself available for this, you can leave your email address here.

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Question 11 (optional)

Thank you for your time and completing this survey. Filling out this survey has helped me a lot. If you have any questions or comments, or if you would like to be kept informed, please email r.humblet@students.uu.nl.

Kind regards,

Ruben Humblet