Tiny House, Big Life:

Opportunities and Challenges of Tiny House Communities in the Netherlands

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Abstract

The housing sector contributes to climate change as the construction of houses requires raw materials, energy, and emits greenhouse gases. Furthermore, the Netherlands has been dealing with a housing crisis for years with a shortage of houses and increasing prices. The sector is viewed as unsustainable and Tiny House Communities could pose as an alternative, sustainable housing model. Residents of a Tiny House Community live in a Tiny House and form a community that focuses on environmental, economic, and social well-being. Tiny Houses are small dwellings limited to 50m2 and designed for optimal spatial use and economic and environmental sustainability. The tiny lifestyle subverts consumerism and is focused on quality of life and an environmental ethic. Using Arup's SPeAR® framework, this study aimed to gain insight into the contribution of Tiny House Communities to sustainability in the Netherlands, trying to research the opportunities and challenges that come with this housing model. Interviews were conducted with Tiny House Community residents, municipal representatives, and interest groups. Results suggested that Tiny House Communities indeed contribute to sustainability in the Netherlands as they positively impact the lives of residents and broader society. Environmental opportunities are due to the limited energy and material consumption of Tiny Houses and the limited consumption pattern of residents. Economic opportunities are due to the affordability of Tiny Houses and the creation of a sharing economy in the Tiny House Community. The added value of Tiny House Communities shows in the social opportunities. Residents enjoy living with and support of like-minded people as they can reinforce each other's sustainable behaviors. Other opportunities like more freedom, a simplified lifestyle, and living close to nature, all contribute to life satisfaction. The broader society enjoys opportunities regarding the creation of a hotspot and win-win situations. Nevertheless, Tiny House Community residents experience challenges regarding policy and regulations, neighborhood concerns, and financing options.

Keywords

Tiny House; Tiny House Community; Sufficiency; Sustainability; the Netherlands; SPeAR®

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List of Abbreviations

BBL	Besluit Bouwwerken Leefomgeving
GHG	Greenhouse gases
LEED	Leadership in Energy and Environmental Design
LENSES	Living Environments in Natural, Social, and Economic Systems
SPeAR®	Sustainable Project Appraisal Routine
TH	Tiny House
THC	Tiny House Community
TWL	Tiny Wonen Limburg

1. Introduction

The world population is expected to grow to 9.7 billion people by 2050 of which two-thirds will be living in urban areas (The World Bank, 2022; United Nations, 2022). In the Netherlands, about 75% of its 18 million inhabitants live in an urban area, one of Europe's highest percentages (Planbureau voor de Leefomgeving, n.d.). Urbanization increases pressure on the living environment and public health, which has damaging consequences for inhabitants (Tollin et al., 2016). Therefore, the New Urban Agenda and the Paris Agreement acknowledge the key role of urban areas in the sustainability transition (Tollin et al., 2016; United Nations, n.d.). Sustainability is built upon three pillars: environmental, economic, and social (Baker, 2016). Housing is a cornerstone of this sustainable transformation as it is a cross-cutting issue with an impact on all pillars (Cohen, 2021). Urbanization has created a need for housing for all while simultaneously guaranteeing environmental, economic, and social stability.

The housing sector has a significant environmental impact. First, the construction of houses requires raw materials, energy, and emits greenhouse gases (GHG) (Giesekam et al., 2014; Harris et al., 2023). In the Netherlands, the construction sector is accountable for about 35% of total energy consumption (Bergsma & Bijleveld, 2014). Energy-induced GHG cause air pollution, contributing to 3 million premature deaths in urban areas worldwide (International Energy Agency, 2017). Material consumption has a severe impact as it requires raw materials and contributes to GHG emissions. The steel industry and its production, of which about one-fourth is used in construction, is accountable for about 25% of CO_2 emissions worldwide (Koenraadt & Smit, 2021). Construction waste accounts for 35% of total waste in the Netherlands with 15% ending up in landfills (Bergsma & Bijleveld, 2014). Once houses are finished, households consume energy to heat and illuminate the space and require materials to furnish and maintain the house. A Dutch household emits about 19,000 kilograms of CO_2 a year, with energy usage accounting for 17% (Milieu Centraal, n.d.). Utilities like water, waste, and sewage account for 7% and the consumption pattern of clothes, furniture, and decoration account for 11% (Milieu Centraal, n.d.). The Netherlands experienced a housing crisis for years. Between 1996 and 2006, residential areas have been expanded by 17,000 hectares (Centraal Bureau voor de Statistiek, 2010). Construction was slowed by the Great Recession of 2008 while the population kept growing, thereby causing a housing crisis (Garnier, 2022; Kraniotis, 2021). Moreover, globally changing demographics have caused household sizes to decline as people are marrying at a later age and the number of single parents has gone up (Zhang, 2016). About 40% of the houses in the Netherlands are inhabited by one person (Kraniotis, 2017). Declining household sizes and a growing

population aggravate the housing shortage. In 2022, there was a housing shortage of 315,000 dwellings and it is expected to reach its peak in 2024 with 326,000 (Ministry of the Interior and Kingdom Relations, n.d.-b). Providing accommodation requires large investments since land is scarce and rapidly rising in price, with severe economic consequences for house buyers (Zhang, 2016). Between 2013 and 2022, house prices almost doubled (Centraal Bureau voor de Statistiek, 2022).

Although tiny dwellings are not a novel idea, with their existence being around for quite a while, they have become more popular to meet the rising sustainability and housing demands of the century post-2008 crisis (Cohen, 2021; Shearer et al., 2018). The first Tiny House (TH) in the Netherlands was established in 2015 and about 1,500 more have been placed (Garnier, 2022). Thanks to the housing shortage, a desire to lower one's environmental footprint, and lifestyle simplification, THs have become popular (K. Evans, 2021b). This trend can release some pressure on the housing market, creating first-time buyer homes and enabling throughput when house owners sell their property and move into THs (Garnier, 2022; RTV Oost, 2022). THs have not been formally defined in relevant literature, but Shearer & Burton (2019) identified three structural factors including size, mobility, and design. Tiny House Nederland defines THs as dwellings of max 50m^2 with a limited environmental footprint (Tiny House Nederland, n.d.-c). Characterizing THs based on size, however, is insufficient since not all small dwellings can be identified as THs (Cohen, 2021). Their design often set THs apart as they are designed for optimal spatial use and environmental and economic sustainability (Shearer et al., 2018; Shearer & Burton, 2019). Their size and design make that THs are promoted as a sustainable alternative to conventional houses. Since a TH is significantly smaller than a conventional house, the construction process is less intensive in terms of GHG emissions, energy usage, and material consumption (Cohen, 2021; Wotton et al., 2018). Also, the energy and material consumption of THs once inhabited is limited (Wotton et al., 2018). Since the living space is limited, residents usually need to minimize their possessions and thus consumption (Cohen, 2021; Shearer & Burton, 2019). In comparison with conventional dwellings, financial benefits can be obtained thanks to the low purchase price and low maintenance costs (K. Evans, 2021b). This makes THs an affordable alternative for first-time buyers (Garnier, 2022). The social benefits of living in a TH relate to the freedom it might bring a resident. First, a TH can be mobile and residents have more freedom to choose where they want to live. A TH might also offer financial freedom from mortgage debt allowing residents to work less than full-time (Shearer & Burton, 2021). Moreover, due to the size, less time is spent on household tasks (e.g., cleaning and maintenance) (Cohen, 2021). Even though THs offer many opportunities and are viewed as a sustainable alternative to conventional housing, their sustainability performance may be modest (Cohen, 2021). THs are often presented as mobile, individual residences, which makes it possible for them to be

placed in remote locations (Cohen, 2021; K. Evans, 2021b). This lowers their sustainability performance as residents remain dependent on private vehicles and drive significant distances for groceries, work, and social relationships (Cohen, 2021).

A Tiny House Community (THC) consists of THs grouped on a shared plot of land. Matschoss et al (2021) define a community as a group of individuals (i.e., residents) that have a shared feeling of belonging to the community due to the sharing of a place or particular interest. Communities might promote social cohesion since a community can put informal pressure on an individual to comply with certain social norms (Matschoss et al., 2021). THCs might have an improved sustainability performance as they enjoy the opportunities THs offer while reducing direct energy use thanks to population density (Cohen, 2021). Despite potential sustainability opportunities, THCs are not extensively researched in literature and a standard definition is lacking. In the Netherlands, such THCs can be found in almost all provinces. About 60 TH projects have been set up with housing corporations and municipalities (Jonker, n.d.).

1.1. Outline of the Thesis

Since THCs are not extensively researched, this thesis aims to explore the opportunities and challenges of THCs as an alternative sustainable housing model in the Netherlands. This research aims to create policy and practitioner recommendations. The main research question is:

How can Tiny House Communities contribute to sustainability in the Netherlands?

The objective, therefore, is to broaden the knowledge base on Tiny House Communities by defining the concept and its emergence in recent years. The first sub-question deals with mapping the realization process, including initiation and community forming, and identifying key actors, their roles in this process, and faced challenges:

How are Dutch Tiny House Communities realized in terms of initiation and community forming and interaction with policymakers?

The second sub-question explores the opportunities and challenges that residents of THCs enjoy and face. It gives insight into why people choose to live in a THC and indicates potential issues.

What are the environmental, economic, and social opportunities and challenges of a Tiny House Community in the Netherlands?

The outline of the thesis is as follows: chapter two reviews the existing literature on THs and THCs and introduces the conceptual framework. Chapter three discusses the research design and methods used to execute the empirical study. The results of this empirical study are presented in chapter four. Chapter five discusses the results and recommendations. In chapter six, a conclusion is presented including the limitations of the research.

2. Theoretical Framework

2.1. Literature Review

THs are mainly characterized by their size, which is limited to 50m^2, and design, which is focused on optimal spatial use and environmental and economic sustainability (Shearer et al., 2018; Shearer & Burton, 2019; Tiny House Nederland, n.d.-c). Another characteristic is mobility, depending on the type of TH as defined by Shearer et al. (2018); Tiny House on Wheels (THoWs), potentially moveable tiny houses, and permanent tiny houses. THoWs are THs placed on trailer beds. Potentially moveable THs can take the form of a container. Permanent THs are fixed to a plot of land (Shearer & Burton, 2019). Kilman (2016) argues that living in a TH requires a change of lifestyle that "subverts the consumer-based mindset" (p. 8) and is focused on quality of life and an environmental ethic.

A THC is a group of individual TH residents who live in the same location. Most importantly, they have formed a community focused on environmental, economic, and social well-being. Community life is perceived as valuable by residents (Tiny House Nederland, n.d.-a). The concept of a THC is closely related to the idea of ecovillages; groups of individuals living together as a community. Ecovillages have similar interests; regenerating their environment as well as social, cultural, and economic aspects (GEN Europe, n.d.). Due to the similarities to THC, lessons from Cañada et al. (2017) and Van Schyndel Kasper (2008) can be drawn and applied to THCs.

Creating and maintaining a community requires a lot of effort and each community must establish a set of goals to work towards (Cañada et al., 2017; Van Schyndel Kasper, 2008). A community is built upon two pillars: the legal and organizational structure and a range of social arrangements (Cañada et al., 2017). Each community looks different, with specific structures and arrangements (Tiny House Nederland, n.d.-a). First, the legal and organizational structure of a community should be tailored to the set goals, defining the organization of governance, finances, and ownership (Cañada et al., 2017; Van Schyndel Kasper, 2008). Governance relates to the decision-making process (e.g., democracy) a community adopts (Van Schyndel Kasper, 2008). Participation in decision-making gives the residents a sense of ownership and more satisfaction with the outcome of the process (Van Schyndel Kasper, 2008). Finances need to be agreed upon for the realization and maintenance of a community (Cañada et al., 2017). Ownership can take many forms and influences the residents' legal rights; the land can be owned or leased (Shearer et al., 2018). Second, social arrangements include the group identity which is built on the communication culture, rituals and celebrations, meetings, shared tasks, and conflict-resolving mechanisms (Cañada et al., 2017). The

creation of a group identity is quite challenging and requires open communication and a safe space that allows for difficult conversations (Cañada et al., 2017). Shared vision, values, and objectives form the basis of such an identity (Cañada et al., 2017; Weil, 1996). A strong identity allows for a feeling of belonging for residents and easily attracts new residents (Cañada et al., 2017). The communication culture should allow for a shared space for formal and informal interactions (Cañada et al., 2017; K. Evans, 2021a). Formal meetings are necessary for a well-functioning community, whereas informal communication reinforces the sense of community (Cañada et al., 2017; Van Schyndel Kasper, 2008). Rituals (e.g., celebrations) homogenize the way of doing and can unify the world vision of residents, contributing to the group identity and feeling of belonging (Cañada et al., 2017). Shared tasks, like garden work, are key for community building (Cañada et al., 2017; Van Schyndel Kasper, 2008). Considering all residents invest time and effort in their community, the group dynamic improves as residents get a feeling of ownership and create a bond (Cañada et al., 2017; Weil, 1996).

2.1.1. The Sustainability Opportunities and Challenges of THCs

THCs offer many sustainability opportunities, due to the attributes of THs and the nature of communities. THs are more environmentally sustainable in construction compared to conventional houses (Wotton et al., 2018). Due to their small size, the construction process is shorter and requires less materials and energy (Cohen, 2021; Wotton et al., 2018). Also, energy consumption is lower because of the limited space to heat and illuminate (Cohen, 2021). Furthermore, THs can be customized. Residents have a say in the design and use of (recycled) materials (Kilman, 2016). Renewable energy, rainwater collection, and compostable toilets are common features (Kilman, 2016; Mutter, 2013). Moreover, being dependent on renewable energy and water collection and facing the challenge of human waste, residents may be more aware of their resource consumption and waste generation (Kilman, 2016; Saxton, 2019). According to Cohen (2021), THCs have an improved sustainability performance compared to THs as they can reduce direct energy use thanks to population density. According to Kilman (2016), residents of a TH are more in connection with nature. Since they have less space to be inside and more time on their hands, being in nature is more appealing. This helps foster an environmental ethic and residents are more aware of the surrounding nature (Kilman, 2016).

TH(C)s might also create economic opportunities. Housing prices in the Netherlands have been rising, which makes it difficult for first-time buyers to purchase a house (Garnier, 2022). Compared to conventional dwellings, THs are less expensive thanks to the low purchase price and low maintenance costs (K. Evans, 2021b). The use of recycled materials can further lower costs (Kilman, 2016). Housing

expenses are also lower since less energy is consumed, less furniture has to be purchased and there is limited space for material possessions (Boeckermann et al., 2019)(Cohen, 2021). In a THC, expenses are shared across residents, reducing costs. The purchase or lease of the land can be split, and investments in infrastructure and common areas are shared. THs have been promoted as a temporary solution to relieve pressure on the housing market. First-time buyers moving into a TH lowers demand. House owners moving into a TH can sell their property and create throughput on the market (Garnier, 2022; RTV Oost, 2022).

A THC can offer significant social opportunities, both for those living in one as well as larger society. The sense of community is often what attracts aspirants to live in a TH (Mutter, 2013). Residents live together with like-minded people who understand their situation and have similar values (Cohen, 2021; Shearer & Burton, 2019). Regarding larger society, the presence of a community can promote social cohesion. In a community, there is informal pressure to comply with certain social norms (Matschoss et al., 2021). As mentioned earlier, living in a TH means more financial freedom as there is a smaller mortgage debt allowing residents to work less than full-time (Shearer & Burton, 2021). Considering its size, a TH requires less maintenance and household tasks (e.g. cleaning) (Cohen, 2021). That means that residents have more time to participate in society and contribute to the local economy (Kilman, 2016). Another social aspect relates to simplicity. Aspirants are often attracted by the intentional lifestyle of simplicity that comes with living in a tiny space (Boeckermann et al., 2019). Due to the limited space, a cut in material possessions is necessary and only essential things are kept (Mutter, 2013). Besides decluttering, there is also a behavior change. Any material possession that is not essential or meaningful will be a burden (Kilman, 2016). This sense of simplicity can increase satisfaction through more (financial) freedom to enjoy experiences and focus on what is important (Boeckermann et al., 2019; Kilman, 2016).

A related way of looking at the sustainability impact of TH(C)s is through the concept of sufficiency. Sufficiency is the idea of having enough (Jungell-Michelsson & Heikkurinen, 2022). A sufficiency economy focuses on having enough to meet one's basic needs in a way that promotes environmental sustainability and social equitability (Alexander, 2012). It recognizes the limits to growth, which are the planetary boundaries needed to regulate the Earth (Raworth, 2017). When looking at housing from the viewpoint of sufficiency, three factors can be identified: the dwelling's location, its physical size, and the accumulation of material goods (Cohen, 2021; European Environmental Bureau, 2021). People living in urban areas characterized by high-density benefit from walkable distances and easy access to public transport. This is a conscious choice by city planners grounded in a sufficiency commitment to reduce resources (e.g., time and motorized vehicles) and its fulfillment depends on the location of the THC. The second characteristic

is the physical size of a dwelling, which relates to the environmental impact of a house (Cohen, 2021). According to Cohen (2021), architects and municipalities have been advocating for larger houses. Instrumental factors and practical considerations lie at the basis of the need for larger houses. In today's society, houses are seen as an investment and a signifier of status with big houses being held in higher regard. Practical considerations include spaciousness and adaptability to changing needs (Cohen, 2021). Despite the increase in housing size, evidence suggests that larger houses do not contribute to house satisfaction after a certain point (Bellet, 2019). Research shows that the sufficient house size is between $14m^2$ and $20m^2$ for a single individual (Cohen, 2021). Cohen (2021) argues that, to reach climate targets, house sizes must shrink. The third aspect relates to consumerism or the shift towards simplicity. Since residents of THs have less space, they are required to cut down on material possessions and reconsider what they think is essential (Mutter, 2013). This can increase satisfaction as expenses decrease and the freedom to have more meaningful experiences increases (Boeckermann et al., 2019). Yet, for some residents decluttering poses a challenge (Vasseur et al., 2022). It is important to note that a simplistic lifestyle is only tied to higher life satisfaction when it is a voluntary choice (Sandberg, 2018).

Living in a TH and specifically in a THC does not only come with opportunities. The realization and maintenance of a THC carry numerous challenges, including environmental, economic, social, and policy ones. Cohen (2021) argues that the sustainability performance of individual THs is lowered by the reliance of residents on their private vehicles, due to the isolated and individual characteristics of THs. People living in high-density areas often benefit from walkable distances and access to public transport (Cohen, 2021). Vasseur et al. (2022) found that most THs are located outside of urban areas. According to Van Schyndel Kasper (2008), this is due to strict land use controls, building codes, and high prices in urban areas. This could also be problematic for TH aspirants that prefer to live in urban cities and be in proximity to employment and commercial districts (Vasseur et al., 2022). Vasseur et al. (2022) argue whether THs belong in urban areas. Due to scarce building land, society might benefit more from a multi-story accommodation (Vasseur et al., 2022). Cohen (2021) mentions that THC would have an increased sustainability performance thanks to population density. Yet, this might be limited depending on the location and layout of the THC.

Even though THs are cheaper than conventional houses, they still require financing. According to Kilman (2016), there are few financing options for THs. In case a THC does not own the plot of land, residents can face difficulties securing a mortgage (Minitopia, n.d.). The investment is then financed with personal savings and a personal loan (Kilman, 2016; Minitopia, n.d.).

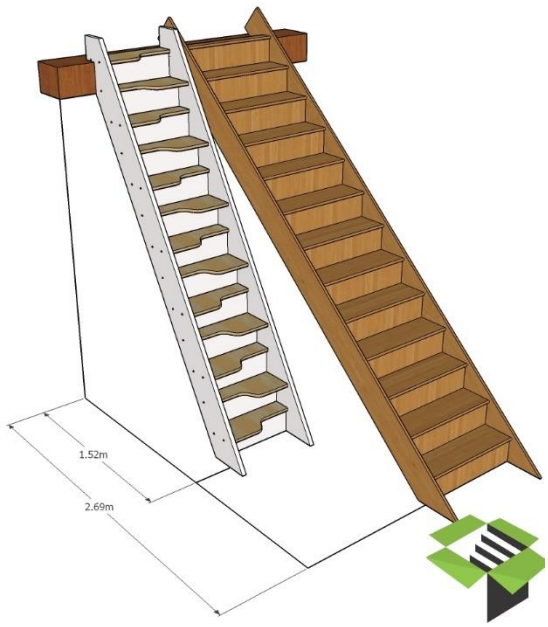
Social challenges include neighbors' concerns about alternative housing communities. In the context of social housing, Evans (2021a) found that neighbors can raise concerns about the establishment of a community in the neighborhood. These concerns are addressed as Not In My Backyard (NIMBY) (K. Evans, 2021a). Moreover, community life comes with challenges as residents are more in contact with each other than in conventional neighborhoods (Tiny House Nederland, n.d.-a). Conflicts can happen and can have disastrous results if not dealt with properly. Therefore, communities should have conflict resolution mechanisms in place (Cañada et al., 2017). Van Schyndel Kasper (2008) also points out the difficulty of finding residents as the cost is often a barrier to entry. This prohibits communities from reaching ethnic and socioeconomic diversity (Van Schyndel Kasper, 2008).

Communities face a variety of challenges regarding their realization due to the current policy landscape (Tiny House Nederland, n.d.-a; Van Schyndel Kasper, 2008). When searching for a plot of land several considerations need to be taken into account: location, size, price, land use controls, and neighborhood issues (Cohen, 2021; K. Evans, 2021a; Van Schyndel Kasper, 2008). According to Cohen (2021), the construction of larger houses is supported and encouraged by public policies. The TH market is rather niche and therefore the small dwellings are not recognized within policies, laws, and planning departments (Shearer et al., 2018). In 2024, a new law will come into effect in the Netherlands, the *Omgevingswet*, which bundles several building laws and regulations into one (Rijksoverheid, 2022). Dwellings, including THs, must apply for a development permit, the *Omgevingsvergunning*, at the municipality. This permit tests the dwelling with requirements currently described in the policies *Bestemmingsplan*, *Bouwbesluit 2012*, *Bouwverordening*, and *Welstand* (Jonker, 2017). In the Netherlands, houses can only be constructed in locations that are classified as residential in the *Omgevingsplan*, successor of *Bestemmingsplan*, a legally-binding municipal tool that dictates the usage and building possibilities of a location (Tiny House Nederland, n.d.-b). Therefore, a plot of land must be classified as a residential area and THs must be included in the structures prescribed by the *Omgevingsplan* (Rijkswaterstaat, n.d.). Even the number and the placement of the THs and their sizes are defined in the *Omgevingsplan*. Dwellings must comply with the building decree *Besluit Bouwwerken Leefomgeving* (BBL), successor of *Bouwbesluit 2012* (Ministry of the Interior and Kingdom Relations, n.d.-a; Tiny House Nederland, n.d.-b). This decree regulates the safety, health, environmental impact, and usability of the built environment (Informatiepunt Leefomgeving, n.d.-b). The BBL regulates the minimum number of square meters of a dwelling, which is 20.2m^2 (Vereniging Bouw- & Woningtoezicht Nederland, 2022). For buildings that do not comply with the decrees listed above, an equivalent measure (*Gelijkwaardige Maatregel*) can be met. This measure offers the possibility to deviate from the requirements as long as the same result is reached (Informatiepunt Leefomgeving, n.d.-

a). The basic principles (i.e. safety, health, usability, energy efficiency, and protection of the environment) of the *Omgevingsvergunning* must be incorporated into the dwelling's design (Oldejans, 2022). An example is the *Molenaarstrap* designed by architect Daan Bakker (see Figure 1). This is an alternative staircase for THs that, despite the steepness, guarantees safety (Vereniging Bouw- & Woningtoezicht Nederland, 2022). The municipality has a significant influence on the approval process (Vasseur et al., 2022). This could mean that the realization of a THC could be easier in some municipalities than in others.

Figure 1

Molenaarstrap



Note. From "Tiny Houses en het Bouwbesluit"by M. Jonker, 2019, *Marjolein in het Klein*, https://www.marjoleininhetklein.com/2019/07/01/tiny-houses-en-het-bouwbesluit/

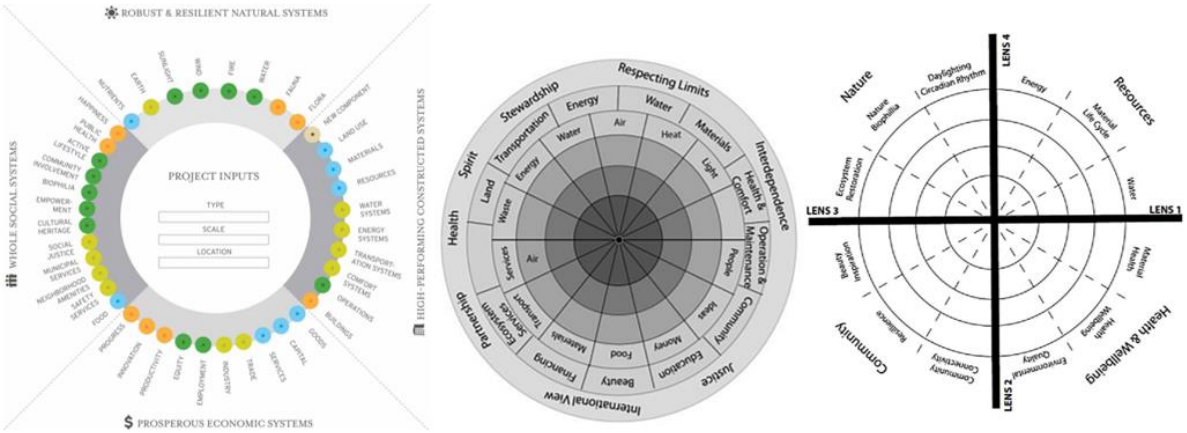
2.2. Conceptual Framework

To answer how THCs can contribute to sustainability and to identify opportunities and challenges, the conceptual framework Sustainable Project Appraisal Routine (SPeAR®) is applied in this thesis. Gou & Xie (2017) review sustainable building assessment frameworks, by comparing SPeAR®, REGEN, Living Environments in Natural, Social and Economic Systems (LENSES), and Perkins and Will Framework. Commonalities between these frameworks are the circular design, broad definition of sustainability, stimulation of dialogue between actors, and visualization of positive and negative impacts (Gou & Xie, 2017). REGEN cannot be used for rating but focuses on synergies within systems at different levels (Svec

et al., 2012). LENSES applies three lenses to explore interconnections (Gou & Xie, 2017; Plaut et al., 2012). The Perkins and Will Framework has four quadrants and has a limited number of indicators, mostly focused on environmental and social sustainability (Cole, 2012; Gou & Xie, 2017). An overview of REGEN, LENSES, and Peter and Willis Framework is presented in Figure 2.

Figure 2

Three alternative frameworks for sustainable building (from left to right: REGEN, LENSES, and Perkins and Will Framework).



Note. From "REGEN: Toward a tool for regenerative thinking" by P. Svec, R. Berkebile, and J. Todd, 2012, *Journal of Building Research & Information*, 40, p. 88 (10.1080/09613218.2012.629112). From "Evolving green building: triple bottom line or regenerative design?" by Z. Gou and X. Xie, 2017, *Journal of Cleaner Production*, 153, p. 603 (https://doi.org/10.1016/j.jclepro.2016.02.077).

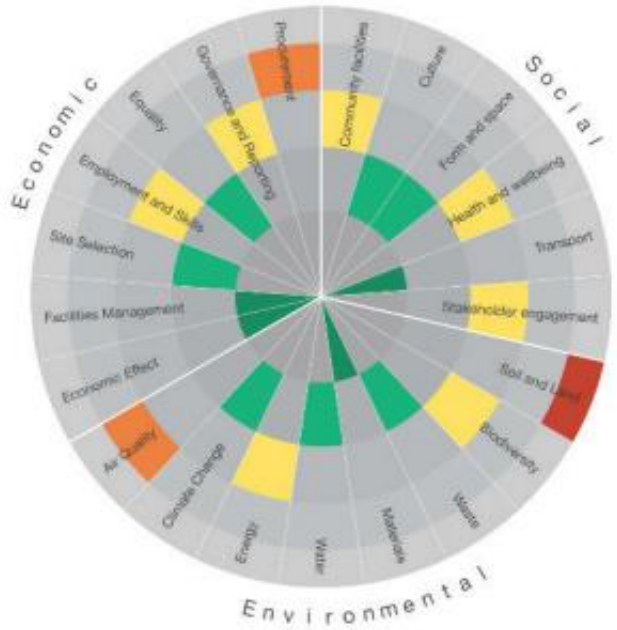
SPeAR® is developed by Consultancy Arup, specialized in sustainable built environment, and is a qualitative Sustainability Assessment tool that evaluates the extent of goal achievement and highlights areas for potential improvement of a project, by considering stakeholders' experiences (Raza et al., 2021). The performance is visualized as a bullseye divided into different sectors (e.g., environmental, economic, social) with a standard set of indicators for each (see Figure 3) (Arup, 2017). These indicators are based on the UK Sustainable Development Indicators, the Global Reporting Initiative, and UN indicator sets (Cappuyns, 2016). SPeAR® can be applied to any project, as the indicators can be customized based on the project's nature and goals (Raza et al., 2021). SPeAR® is chosen in this thesis due to several reasons. First, SPeAR® is the only framework that can be used both for the early stages of a project as well as the evaluation of completed projects (Arup, 2017; Gou & Xie, 2017). Moreover, this framework is intuitive,

can be used for rating, and has a certain flexibility to it that the other frameworks lack. Still, SPeAR® has its drawbacks. Due to its qualitative nature, the assessment is based on the researcher's judgment. The assessment of indicators is not measured and quantified, but rather based on experiences and regarding the best- and worst-case scenarios (Raza et al., 2021). Moreover, expert knowledge of the indicators benefits the assessment (Cappuyns, 2016).

The indicators used for the SPeAR® framework of this thesis (see Figure 4) are informed by a review of relevant literature. The Conceptual Framework for Sustainable – Affordable Housing, developed by Nair et al. (2005) was chosen as it recognizes the role of policy in the housing market. Nair et al. (2005) argue that "sustainable housing requires a strong supporting institutional (policy) framework" (p. 4433). Policy can be used as a strategy to support and promote sustainable housing taking the form of subsidies, infrastructure, and building standards (Nair et al., 2005). Nair et al. (2005) argue that sustainable and affordable housing can be reached through socio-cultural, economic, environmental, and technological sustainability. The authors identify factors for each pillar that influence the sustainability of that pillar (Nair et al., 2005). Some factors were deemed irrelevant as they focus on technology and the framework is designed for developing countries. This thesis uses the following indicators from Nair et al. (2015): "material use"; "energy use"; "durability"; "water supply"; "waste management"; "awareness"; "affordability"; "ownership"; "financing"; "infrastructure"; "community participation". Moreover, indicators from Winston & Eastaway (2008) and Shama & Motlak (2019), both looking into indicators for sustainable housing, showed similarities to Nair et al. (2005). Relevant indicators from Winston & Eastaway (2008) are: "infrastructure"; "affordability"; "mobility"; "energy use". Relevant indicators from Shama & Motlak (2019) are: "affordability"; "mobility"; "energy use"; "waste management"; "diversity". An overview of the indicators and their meaning can be found in Appendix A.

Figure 3

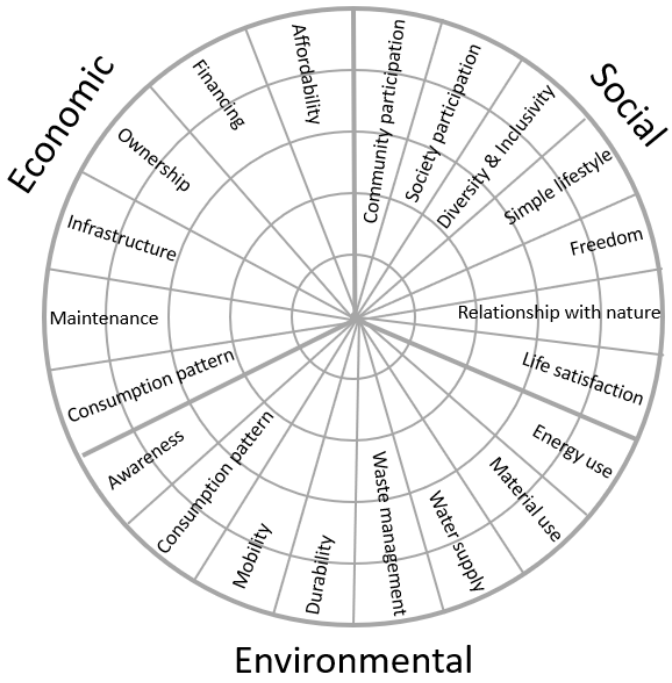
Arup SPeAR® model



Note. From "SPeAR Handbook 2017" by Arup, 2017, p. 6.

Figure 4

SPeAR® model



Note. Adjusted from "SPeAR Handbook 2017" by Arup, 2017, p. 6.

SPeAR® evaluates a project based on the indicators and a traffic light system visualizes the performance of each indicator (Arup, n.d.). In the original SPeAR® framework, the indicators are high-level sustainability issues scored to their proximity to the best- and worst-case scenario. The graduated rating system has five levels, ranging from -1 to +3 (see Figure 5) (Arup, 2017). SPeAR® makes use of qualitative methodology as the indicators, the scenarios, and the scoring are subjective (Pearce, 2008). Therefore, the grading must be justified by referring to evidence and experiences (Arup, 2017). Since this thesis makes use of qualitative research, the rating is done by residents based on how they perceived the indicator regarding THCs. The used grading template has scores -2 to 2 (see Figure 6), which is more balanced and more intuitive for the interviewed residents. The baseline is represented by 0 and is equal to the sustainability performance of conventional housing, as perceived by the residents. Score -2 is the worst-case scenario which means that the sustainability performance is experienced worse than in conventional housing. Score 2 is the best-case scenario which means that the sustainability performance is experienced as far superior to conventional housing. In this study, all residents scored the indicators. The scores were then averaged, resulting in a mean for each indicator which is presented in a SPeAR® model.

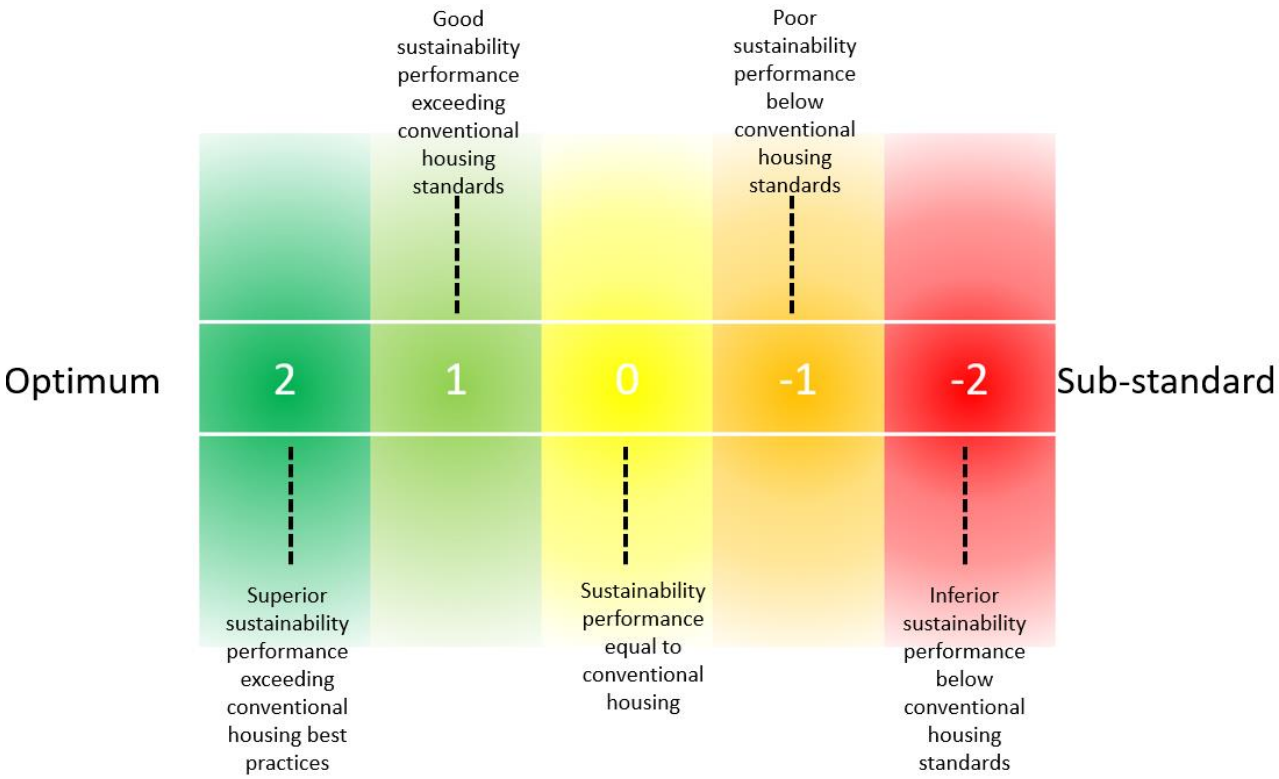
Figure 5

Arup scoring template.

Note. From "SPeAR Handbook 2017" by Arup, 2017, p. 7.

Figure 6

Scoring template



Note. Adjusted from "SPeAR Handbook 2017" by Arup, 2017, p. 7.

3. Research Design and Methods

The epistemological position of this thesis is interpretivism in which the social world is understood from the perspective of social actors (Bell et al., 2019). The social world, as experienced by social actors, consists of social properties which are given a subjective meaning by its social actors and which they act upon (Bryman, 2012). Interpretivism has the objective to explain social actions by trying to understand the motives behind them (Weber et al., 1947). This study research THCs in the Netherlands as social properties as experienced by its residents and other actors. The ontological position of this thesis is constructivism. Social actors are involved in the construction of their social reality, which is constantly being revised through social interaction (Bell et al., 2019; Bryman, 2012). By trying to understand the social property and its meaning to the social actor, the effect it may have on their behavior can be studied (Moses & Knutsen, 2019). Thus, the residents of THCs are believed to shape the community and its meaning. Therefore, this thesis tries to capture the experiences of community residents and how this shaped the perception of THCs. A deductive approach was taken in which available knowledge and frameworks informed the conceptual framework. This was tested by collecting data that is relevant to the concepts (Bryman, 2012). For this thesis, a qualitative research strategy is chosen as it fits best the underlying epistemological and ontological positions (Bell et al., 2019; Bryman, 2012). Moreover, qualitative research allows for extensive data collection on each social actor (Patten & Newhart, 2018a). The data collection consisted of three parts: desk research, semi-structured interviews, and participant observation.

3.1. Desk Research

The desk research collected secondary information to provide a first answer to the research questions and was used to build the conceptual framework and the interview guides. The desk research includes both academic and non-academic sources (e.g., policy documents, blogs), that deal with the topic of THCs and its opportunities and challenges. To find relevant publications, databases and search engines (e.g., Web of Science) were used with the main concepts (‘sustainability THC’, ‘limitations THC’, ‘policy barriers THC’, and ‘sufficiency TH’) and other concepts emerging during the desk research.

3.2. Semi-structured Interviews

The empirical study was executed through semi-structured interviews with relevant social actors. Semi-structured interviews were chosen as they offer flexibility while safeguarding the focus of the study (Ruslin et al., 2022). Due to the constructivist stance, there is an interest in how the actor frames and understands certain social properties. Qualitative interviewing allows for in-depth answers that expose the social world

as perceived by the participant, giving insight into life in a THC and experienced opportunities and challenges (Bryman, 2012). Generic purposive sampling was first used to identify a first set of relevant social actors (Bryman, 2012). An initial search for relevant actors was done online and they were contacted by email. Snowball sampling was then applied by asking these initial participants to suggest other relevant social actors (Bryman, 2012; Patten & Newhart, 2018a). To strengthen the study, different relevant actors were interviewed (Patten & Newhart, 2018a). Patten & Newhart (2018a) recommend a sample size of 20 to 50 participants, but due to limited resources and time constraints, this study aimed at a sample size of 21 participants. The sampling was done on two levels: context level and individual level (Bryman, 2012). Context sampling was applied to select six THCs located in the Netherlands, including: THC Carisborg in Kerkrade; THC Pionierskwartier in Delft; THC Westpark in Groningen; THC Landjegoed in Groningen; THC Tiny Oevers in Roosendaal; THC Alkmaar in Alkmaar. On an individual level, two residents per selected THC were interviewed. Only one resident of THC Alkmaar was able to be interviewed, resulting in eleven interviewed THC residents. Moreover, for each THC a municipal representative was interviewed. THC Westpark and THC Landjegoed are both located in Gemeente[1] Groningen and thus only one municipal representative of Gemeente Groningen was interviewed. Municipal representatives of Gemeente Alkmaar were unable to participate in this study, resulting in four interviewed municipal representatives. Other relevant actors such as interest groups were also interviewed, including Tiny Wonen Limburg (TWL), Minitopia, and LiberTerra. This resulted in a total of 18 participants. The participants of the interviews can be divided into different groups:

Group 1: THC residents provide first-hand insight into the opportunities and challenges experienced and provide an answer to the first and second sub-question.

Group 2: Municipal representatives are important actors, and they can provide insight into the current policies and possible improvements. Their input was used to answer the first sub-question and to provide recommendations.

Group 3: Interest groups play a key role in the Tiny House Movement as they are often the first point of contact for aspirants due to the provision of information on tiny living. These organizations contributed to answering the first and second questions and indicated improvements to be made.

[1] The translation of *gemeente* is municipality.

All participants were interviewed using an interview guideline (see Appendix D) and in the Dutch language, with interview quotes translated by the author. Moreover, residents received the SPeAR® model in advance, which was filled in by them and was then used as a guideline for questions regarding the environmental, economic, and social aspects of living in a THC. Table 1 offers an overview of all interviewed residents:

Table 1

Overview residents

Resident number	THC	Gender	Age
1	THC Carisborg	Female	/
2	THC Carisborg	/	/
3	THC Pionierskwartier, Deflt	Male	/
4	THC Pionierskwartier, Deflt	Female	27
5	THC Westpark, Groningen	Male	54
6	THC Westpark, Groningen	Female	32
7	THC Landjegoed, Groningen	Female	/
8	THC Landjegoed, Groningen	Female	29
9	THC Tiny Oevers, Roosendaal	Female	43
10	THC Tiny Oevers, Roosendaal	Male	28
11	THC Alkmaar	Female	/

3.3. Participant Observation

Participant observation was done on several occasions. The official opening of THC Carisborg took place on April 14th, which was celebrated with the THC residents, municipal representatives of Gemeente Kerkrade, TWL, neighbors, and others who were interested. On April 20th a knowledge day was organized by TWL at HuB.Bibliotheek Kerkrade, which included several speakers such as Gemeente Kerkrade and Gemeente Beekdaelen, engineering bureau Nieman, and Marjolein in het Klein. Attendees included municipal representatives of different municipalities of Limburg, THC aspirants, and other interested people. The webinar of Communities for Future took place on April 26th via Zoom with guest speaker LiberTerra. On June 3rd the TinyFindy Days took place at DemoParkNL in Almere, with guest speakers such as Minitopia, THC residents, and others. Attendees mostly consisted of THC aspirants. The researcher

immersed herself in a group of relevant actors for a limited period of time to observe participants and listen to conversations between them (Bryman, 2012). Fieldnotes were taken of relevant information regarding the research questions. This data was used for triangulation and allowed for confirmation of the information given by participants during the semi-structured interviews (Bryman, 2012).

3.4. Data Analysis

The data was categorized and reorganized to find patterns regarding the research questions (Ruslin et al., 2022). For that, the interviews were transcribed using GoodTape and coded in Atlas.ti. Coding is an iterative process and its first step is open coding, which identifies phenomena in the collected data and summarizes it by explaining its meaning (Patten & Newhart, 2018b; Saldana, 2009). The next step is axial coding, which reexamines the codes and divides them into categories (Patten & Newhart, 2018b). The final step is selective coding in which a core concept is identified capturing all categories (Patten & Newhart, 2018b; Saldana, 2009). The codes were recorded in a codebook, including descriptions of the codes, which were used as a guideline during the process and can be found in Appendix E.

Credibility (i.e., internal validity) relates to the truth of the research findings and is achieved by triangulation and member check (Bryman, 2012; Korstjens & Moser, 2018). Data triangulation was applied by including multiple Dutch THCs of which two individuals from each community were interviewed and by interviewing municipal representatives. Moreover, participant observation was conducted to confirm participants' statements. Member check, which is the opportunity for participants to confirm the researcher's interpretation, was conducted by sending interview summaries to each participant (Korstjens & Moser, 2018).

3.5. Ethics

To protect the integrity of this research and guarantee quality, certain ethical measures were taken. Participants of the empirical study received an information sheet stating the purpose, methods, and intended uses of the study. All participants signed an interview consent form which can be found in Appendix C. Personal information of participants was kept confidential and the anonymity of participants was respected. Participants took part voluntarily.

3.6. Scope

The scope of the thesis was determined by setting spatial and temporal boundaries. According to Enserink et al (2010), spatial boundaries limit the geographical area of the scope, which in this thesis is limited to

the Netherlands. Temporal boundaries limit the time frame of the scope (Enserink et al., 2010). This thesis focuses on established THCs consisting of THs that are detached and ground-bound (i.e., excluding apartments), but no distinction is made between movable and non-moveable THs. The included THCs all have a sense of community, which excludes Tiny Villages for tourism. Furthermore, a distinction needs to be made between TH residents who voluntarily live in a TH and those who involuntarily live in one. Involuntary residents often do so because they are forced (e.g., refugees who are placed in a TH) or because they cannot afford a larger dwelling. Voluntary TH residents choose to live in a TH because they want to (Sandberg, 2018). This thesis focuses on THCs created by voluntary TH residents. Therefore, THCs set up by housing corporations were not considered. The voluntary choice to live in a TH(C) is assumed to be motivated by sustainability concerns. From an environmental perspective, this thesis focuses on the opportunities of living in a community instead of in an isolated residence and on the motivations concerning the consumption patterns of residents.

3.7. Methodological Limitations

Methodological limitations include those associated with a qualitative approach. This is often criticized as too subjective as results rely on the interpretation of the researcher (Bryman, 2012). However, this was combated by executing a member check. Furthermore, qualitative studies are difficult to replicate and to draw generalizing conclusions from (Bryman, 2012). This research only represents a fraction of all THCs due to spatial and temporal boundaries and recommendations are meant for THCs and actors that fall within this scope. Moreover, the validity and transparency were difficult to demonstrate. Transferability (i.e. external validity) can be ensured by thick description, but including personal information would have endangered the integrity of this research (Bryman, 2012; Korstjens & Moser, 2018). Furthermore, dependability and confirmability (i.e. reliability and objectivity) were difficult to ensure, as a detailed record was not published (Bryman, 2012; Korstjens & Moser, 2018). Additionally, issues regarding the sample were identified. The aim was to interview at least 20 participants, as recommended by Patten & Newhart (2018a), but only 18 participants were included in this study. THC Alkmaar was only able to provide one participant instead of the two anticipated participants. Gemeente Alkmaar did not want to participate in this study and thus no municipal representative was interviewed for THC Alkmaar. When it comes to interviews, a common limitation is the social desirability bias, which is when participants give answers that are, in their perception, socially desirable (Bryman, 2012).

4. Results

4.1. Realization Process

Sub-question 1 asked, "How are Dutch Tiny House Communities realized in terms of initiation and community forming and interaction with policymakers?". Therefore, this section looks at the process of setting up a THC. The realization process of a THC consists of a couple of steps starting with the initiation by a citizen initiative, the municipality, or an interest group. Next, a location needs to be appointed. The chosen locations are often places that are not in use at that moment. For example, THC Tiny Oevers has been constructed in what will be a prospective new neighborhood. The following step is to permit the placement of THs on the terrain. First, the location needs to have an *Omgevingsplan* fit for living and the THs need to comply with BBL, possibly making use of the *Gelijkwaardige Maatregel*. Normally, each building needs to have a permit, but Gemeente Groningen[2] created an overarching permit[3] for the location of THC Landjegoed, which allows for a faster and cheaper process. Next, the terrain needs to be inspected and prepared for the THs, which includes installing infrastructure. The municipality is obligated to provide infrastructure until the terrain and infrastructure on the terrain is at the expense of residents. Gemeente Delft mentioned that this infrastructure was necessary to get permitted in accordance with BBL.

Simultaneously, the community is formed. Some municipalities asked an interest group for help, others left it up to the citizen initiators. The process generally consists of the following steps. An announcement is placed in the media, followed by an information moment. Those interested can apply with a motivation letter upon which a selection of potential residents is made. For example, Gemeente Kerkrade wanted the residents to be environmentally conscious[4]. Besides that, a legal and organizational structure needs to be set up. The interviewed THCs are all cooperatives, with a board and some THCs have several commissions (e.g., garden commission). Regarding the decision-making process, most interviewed THCs practice democracy while others practice sociocracy. Usually, there is a monthly meeting, but also plenty of informal moments can be identified: "Yesterday, with several neighbors, I went to see the band of one of my neighbors" (resident 3).

[2] Whenever a municipality is referred, the information is provided by a municipal representative.
[3] *Koepelvergunning*
[4] Whenever the term *duurzaam* was used by participants, this was translated to environmentally friendly/conscious, because the definition of sustainability (translation of *duurzaam*) has a different meaning in this thesis (environmental, economic, social).

The realization of a THC comes with opportunities for the municipality, including relief on the housing market, social cohesion, nature restoration, and an improved reputation. Minitopia[5] mentioned that THCs can act as a flexible buffer for the housing market: "If more houses are needed, people can simply build a house on vacant lots in a very short time period. … And if there are too many houses, those can be simply removed". Yet, municipalities express criticism regarding the housing model as they occupy much space even though the houses themselves are tiny. A multi-story accommodation would occupy as much space but can house more people. THCs create little throughput on the housing market: “It is not a solution for the current housing need and it is not a structural solution for the future” (Gemeente Delft). Additionally, Minitopia mentioned that municipalities want to learn about creating a sense of community to improve social cohesion. For example, some municipalities experienced trouble in vacant areas before the arrival of a THC. These projects also create a sense of ownership of a house and the direct environment. Furthermore, the presence of a THC can create an opportunity for nature restoration. Both residents 3 and 4 attested that the former auto repair shop used to have sandy terrain, “but … [they] have turned this into a very green place” (resident 4), and biodiversity has increased with the presence of untamed rabbits. Besides that, some residents mentioned that they have the feeling that municipalities engage with these housing models to improve their reputation and present themselves as trendy and environmentally friendly: "The municipality sees it as a prestige object" (resident 9).

The realization process comes with challenges for residents and municipalities, including finding a location, policy, misconception of THCs, NIMBY, and the realization process. First, finding a location proves to be a challenge: “Finding a place is the hardest part” (resident 8). Due to the lack of possibilities, resident 10 chose to move cities even though he preferred to stay in his hometown. Others started building their TH before even finding a location. Taking this risk was quite stressful for resident 4: “It is worrying to start building a house when you are not sure whether you are allowed to be here”. TWL attested that aspirants must make concessions if they want to live in a THC. Furthermore, an overarching challenge is the relatively new concept of tiny living, which is not incorporated in current policies. Minitopia commented that many municipalities are incorporating alternative housing models in their policy plans, but that execution of those remains challenging. The interviewed municipalities named the *Omgevingsplan* and the BBL as two challenging policies and had different approaches to tackling these. First, the THC locations are not necessarily classified as residential areas in the *Omgevingsplan*, which means that housing is not allowed. To allow for living, Gemeente Groningen had to give a waiver to violate the *Omgevingsplan*. Second, BBL

[5] Whenever an interest group is referred to, the information is provided by a representative.

has specific construction rules, which THs can often not fully comply with. An equivalent measure (*Gelijkwaardige Maatregel*) can be applied to deviate from the requirements, as mentioned by Gemeente Delft. Gemeente Kerkrade and Gemeente Delft respectively stated that, to realize the THCs, permit applications require more flexibility to be granted, but without losing sight of the basic principles that policies are built on: “In principle, you can always deviate from BBL, but you must motivate why you deviate and how you [can] ensure its principles” (Gemeente Delft). Several residents noticed that current regulations are not tailored to alternative housing models and that expertise within municipalities is lacking. Some residents experienced that the municipalities tried to fit them in within the current system, even though they were not able to meet standard regulations: “I think that the municipality always works … with a checklist of okay, check, check, check. That one gets approval, that one doesn't. But tiny houses are new" (resident 11). Gemeente Delft tried to support residents by informing them about the permitting process, which is necessary since citizens are unfamiliar with regulations (personal communication, April 20, 2023). A national policy for alternative housing models is lacking according to Gemeente Kerkrade, taking the example of the BBL. Other municipalities were interested in the realization process and Gemeente Kerkrade and Gemeente Groningen got questions and were in contact with those interested municipalities. Moreover, this newness results in a misunderstanding of tiny living and the comparison with trailer parks. Within Gemeente Kerkrade, the participant got questions and comments from colleagues about the similarities with trailer parks. Gemeente Groningen attested that tiny living is misunderstood and not viewed as a dignified lifestyle. TWL mentioned that municipalities are often hesitant because they do not want to lose face with citizens and the constituency. Residents noticed the municipalities’ hesitance during the realization process. Resident 1 mentioned that the municipality wanted to be very much in control and take care of all details. Moreover, all interviewed THCs have a temporary character, motivated by the municipalities’ inclination to explore the concept. Yet, 80% of THC residents want to have a permanent residence (personal communication, April 20, 2023). The temporary character is experienced negatively by some residents, like resident 8: "It hinders our initiative". Resident 9 mentioned that the temporary character is something that can hold back others from joining a THC, due to the uncertainty that comes with it. Another issue that comes with a temporary permit is that once a THC gets a permanent status, the THs need to comply with the regulations that apply at that moment. This implies that THs that meet the requirements at the time of implementation may become non-compliant in subsequent years due to evolving regulations (personal communication, April 20, 2023). Additionally, neighborhood concerns (NIMBY) can be a challenge (personal communication, April 20, 2023). Neighbors of THC Carisborg were concerned about its realization due to “the fact that they don't know [about THCs]"

(Gemeente Kerkrade). TWL attested that being uninformed about tiny living creates misunderstanding, commenting that “what we don’t know, we fear”. Participation processes can be a game changer (personal communication, April 20, 2023). Both Gemeente Kerkrade and Gemeente Groningen informed neighbors about tiny living and involved them in the process of realization. This changed the neighbors’ perception of tiny living: “[Neighbors] were very critical in the beginning and gradually, especially through communication and participation, they were like ‘I think it's fine actually’” (Gemeente Kerkrade). Lastly, while residents are thankful for the municipalities’ efforts, they did experience the realization process as a challenge: “I think it's just great that Gemeente Kerkrade has made this site available, but it didn't happen by itself and the communication didn't always go smoothly either” (resident 1). TWL mentioned that aspirants often do not realize how complicated the process is, which requires compromises: "Members [of Tiny Wonen Limburg] often do not realize that it is a complicated process. That you must have a long breath if you want this” (TWL). A few residents mentioned that they preferred to live completely in nature: “I would prefer to just live somewhere in the woods” (resident 3). However, Gemeente Groningen said that tiny living is fairly expensive. Most THCs are now located in agricultural plots, which are not destined for housing, while housing plots are far more expensive. LiberTerra commented that it is important for THCs to not only bring, but also give back to the municipality by making a business case for themselves: "What is extremely important is that you not only come to take but also to bring".

To sum up, the realization process consists of the following steps: initiation, location determination, permitting process, preparation of location, and installation of infrastructure. Simultaneously, the community-forming process is initiated by establishing a legal, organizational, and governance structure. These processes require the collaboration of all actors, including residents, policymakers and other officials, and interest groups. Experienced opportunities include the creation of throughput on the housing market, social cohesion, nature restoration, and improvement of public perception. Experienced challenges include finding a location, policies, misconceptions of THCs, NIMBY, and the realization process. The main challenge is policies as THs do not fit within conventional standards. Residents are unfamiliar with the regulations and municipalities have difficulties with deviating from regulations while safeguarding their purposes.

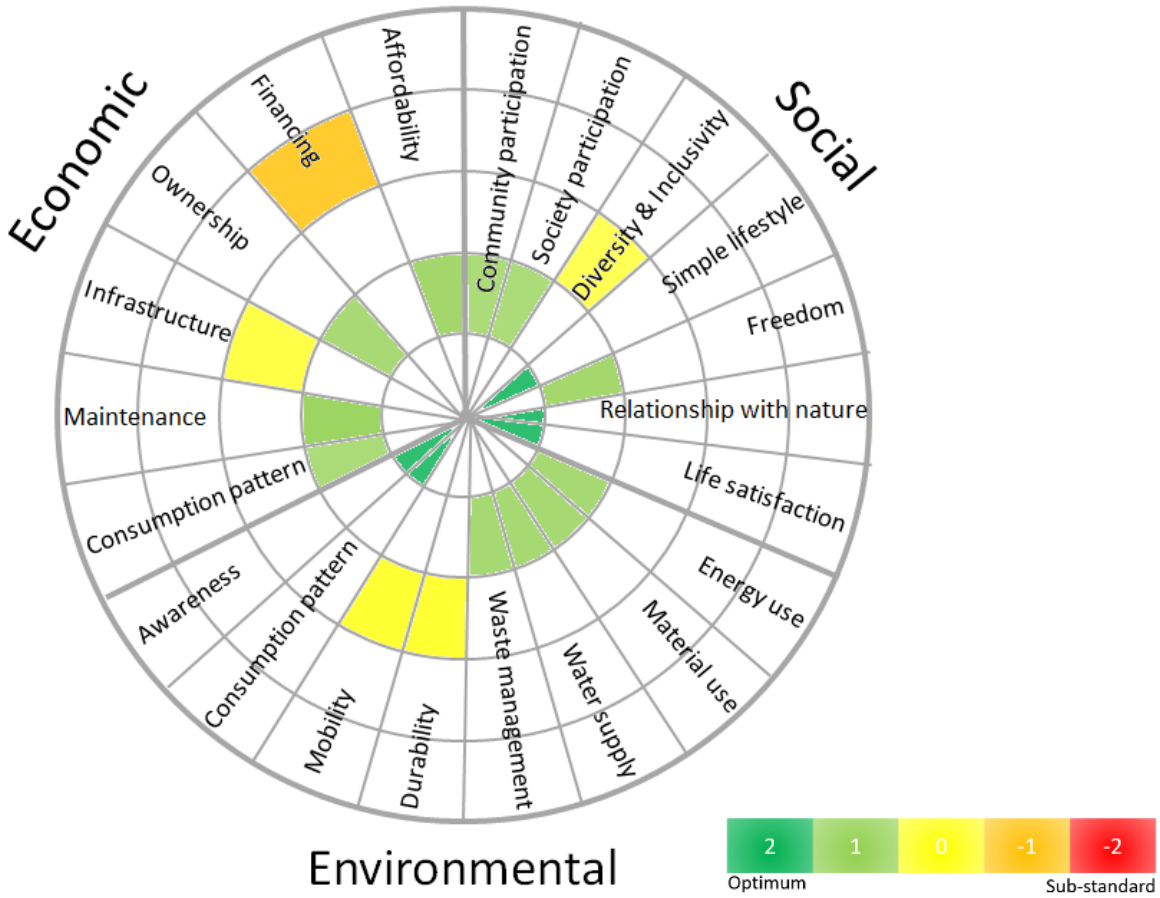
4.2. SPeAR® Model

Sub-question 2 asked, “What are the environmental, economic, and social opportunities and challenges of a Tiny House Community?”. Therefore, this section looks at the opportunities and challenges experienced by residents. Figure 7 displays the SPeAR® model which shows the mean for each indicator

that is derived by averaging the residents' given scores. Five indicators are experienced as very positive with a score of 2, while only one indicator is experienced negatively (Financing). However, the mean does not show the distribution of the scores. Table 2, therefore, displays a heatmap that shows the divergence between scores. For example, regarding the indicator "energy use" seven residents gave it a score of 1 and four residents gave it a score of 2. Contested indicators are "durability", "financing", "ownership", and "diversity & inclusivity". For each indicator, the residents' experiences are presented and explained.

Figure 7

SPeAR® model



Note. Adjusted from "SPeAR Handbook 2017" by Arup, 2017, p. 6.

Table 2

Heatmap

Heatmap	-2	-1	0	1	2
Energy use	0	0	0	7	4
Material use	0	0	1	6	4
Water supply	0	0	3	3	5
Waste management	0	0	4	2	5
Durability	0	5	4	1	1
Mobility	0	1	6	4	0
Consumption pattern	0	0	0	4	7
Awareness	0	0	0	3	8
Affordability	0	0	2	4	5
Financing	5	2	3	0	1
Ownership	0	2	3	2	4
Infrastructure	1	1	6	2	1
Maintenance	1	1	1	6	2
Consumption pattern	0	0	1	4	6
Community participation	0	0	2	2	7
Society participation	0	0	3	5	3
Diversity & inclusivity	0	4	3	3	1
Simple lifestyle	0	0	0	3	8
Freedom	0	0	3	3	5
Relationship with nature	0	0	0	5	6
Life Satisfaction	0	0	1	2	8

4.2.1. Environmental

Energy use

Energy use is experienced positively with an average score of 1. Energy use is an attribute of THs rather than of THCs. Numerous residents testified that their energy usage has decreased since living in the THC, due to the size of the TH. Some residents invested in high-quality insulation to optimize heating while others invested in solar panels to generate energy. The THC residents living off-grid mentioned that they are very aware of the limited resources available: “[Energy] might just run out, so you're thriftier with the available energy” (resident 11). However, resident 6 believes that THs are less energy efficient compared to a multi-story accommodation because THs are detached which is also the case for the interviewed THCs.

Material use

Material use is experienced positively with an average score of 1 and is also an attribute of THs. First, residents mentioned that they need fewer materials to build their TH. Second, some residents have used sustainable materials or used second-hand materials. However, residents who outsourced construction

were limited in their choices for sustainable and second-hand materials. Lastly, several residents believe that wood as a construction material is more sustainable as it is easier to reuse, recycle and break down than brick and cement, often used in conventional housing.

Water supply

Water supply too, is experienced rather positively with scores ranging between 0 and 2. Many residents capture rainwater and use it in their gardens. Some residents use alternative toilets that use less to no water. Yet, resident 9 mentioned that water usage is very personal and not necessarily related to living in a THC. Resident 5 said: “Because I am connected to the water infrastructure, I don't have to live frugally when it comes to water”. Still, residents 1 and 7 testified that they try to reduce their water usage by showering shorter for example. All residents living off-grid have given water supply the highest score. They capture rainwater, which is filtered and used for drinking, showering, and washing. They testified that they are more aware of their limited resources and what nature provides: “You become much more aware of what you are doing and how that affects the environment” (resident 4). Water supply seems to be an attribute of THs, but THCs can add value since residents support each other. For example, residents of THC Tiny Oevers were dealing with an extremely wet terrain and decided to invest in rain barrels: “If everyone starts collecting that water in a rain barrel, it will make a difference [for the terrain] and it is more sustainable. … Since you live with like-minded people, you reinforce each other” (resident 9).

Waste management

Experiences with waste management range between scores 0 and 2. Some residents think it is very personal, but resident 4 mentioned that the waste processing in a THC is often different than in conventional housing. Waste management is thus an attribute of THCs. Many THCs compost green materials, including human waste, which is used in their gardens, creating a circular loop. Some THCs have one shared general waste bin. Residents 3 and 7 mentioned that confrontation with waste generation has created awareness.

Durability

Residents have mixed experiences with the durability of THs. Even though the average score is 0, the scores range between -1 and 2 and are clustered around scores -1 and 0. Resident 7 thinks that a TH’s construction materials will last as long as those used in conventional houses. Others think that conventional houses, made from brick and cement, will outlast THs made from wood. Resident 10

experiences durability as positive, because their TH is modular and thus adjustable to his life phases (e.g., family expansion).

Mobility

Mobility is generally experienced as unchanged, with ranging scores between -1 and 1 and clustering around a score of 0. Mobility habits are not dependent on the type of house, but rather on the location. Mobility is an attribute of THCs and not of the THs themselves. Minitopia said that the locations of THCs are generally remote with limited access to public transport. Residents' experiences differ based on the location of the THC and thus their access to public transport. Some residents mentioned that they remain dependent on private vehicles. However, some THCs have (informal) shared mobility or are exploring shared mobility.

Consumption pattern

Consumption pattern is experienced very positively with an average score of 2. Living in a TH requires decluttering. For some, this was an easy task, but residents 3 and 5 experienced difficulties during the process of decluttering. All residents testified that they have decreased their consumption patterns as they have limited space to store items: "I buy much less. In fact, I hardly go into town anymore" (resident 7). Additionally, decluttering remains an ongoing process: "When my closet is full and I want to buy an item, something else has to go" (resident 1). Several residents mentioned that they extensively research items before making a purchase, looking for second-hand or sustainably produced alternatives that will last. For resident 4, living in a TH has "… saved [her] a lot of impulse purchases, because … [she] realized in the store that … [she] had nowhere to put it". This indicator seems to be an attribute of THs and is reinforced by THCs as LiberTerra said that THC residents often support each other with decluttering by having talks and sharing tips. Additionally, many THCs have set up a shared economy, in which residents share lawnmowers, tools, and washing machines. Many residents noticed that their awareness of their consumption pattern has increased: "I think living in a tiny house makes you very aware of your consumption pattern" (resident 8). Reduced consumption is experienced as positive; as residents save money and enjoy being surrounded by possessions considered meaningful: "Having experiences with people that mean a lot to me is worth much more to me than, for example, having the latest PlayStation" (resident 10).

Awareness

Awareness is experienced very positively with an average score of 2. Residents have noticed an increase in their awareness of resource use, nature, waste management, and consumption pattern. As mentioned above, especially off-grid residents are aware of their resource use, due to being dependent on what nature provides: “If it rains, then I'm like ‘Oh, I can take a shower again today’” (resident 3). On-grid residents are also more aware of nature and its importance, as mentioned by resident 2. Regarding waste management, residents are more aware of the generation of waste: “When I throw out my garbage bag now, I sometimes look at it and think ‘geez, what's in it?’ So, it has changed a lot” (resident 7). Regarding consumption patterns, residents are more aware due to confrontations with material possessions. While awareness is mainly an attribute of THs, THCs prove to be valuable for this sense of awareness: “You are more concerned with sustainability because you live with people who also have that interest. So, in that sense you reinforce each other” (resident 9).

4.2.2. Economic

Affordability

Affordability is experienced fairly positively with an average score of 1. Residents attested to experiencing decreased monthly expenses since living in a THC. Alongside costs for energy use and insurance, the main costs of living in a THC include: lease of terrain, permits, installation of infrastructure, construction of the TH, and a financial contribution to the THC. Since a TH is more affordable than a conventional house, residents were able to finance it themselves or get a loan that is a fraction of a mortgage. For first-time buyers, like resident 4, THs are an affordable alternative. However, Minitopia mentioned that due to inflation, material prices have gone up which makes building a TH more expensive. According to the residents, the lease of the terrain is fairly cheap compared to a rented house. Furthermore, investments in solar panels or a rainwater shower can further reduce monthly expenses. Initial costs of permits and infrastructure were negatively experienced when a resident did not know what was coming at the start of the process: “… it has disappointed me in the sense of, oh but that also comes with it and that too and that too and that too. And I didn't fully realize that when I thought, I'm going to live in a tiny house” (Resident 1). While affordability is mainly attributed to THs, THCs add value as they offer the possibility of a sharing economy, which can save money because residents do not have to purchase items individually.

Financing

Financing is contested but is overall experienced very negatively with an average score of -1 and answers clustering around -2. Financial institutions are hesitant to give out mortgages for temporary or mobile

housing and financing options are limited (Minitopia). Having a permanent residence facilitates the process of getting a mortgage (personal communication, April 20, 2023). An alternative is a personal loan, but resident 8 mentioned that these are very expensive due to high-interest rates. Resident 9 mentioned that, due to limited options, personal savings are essential. This indicator is an attribute of THs but influences THCs as accessibility to and diversity of THCs is restricted, as attested to by resident 3. This means that first-time buyers or people with a small budget are excluded from this lifestyle, confirmed by Minitopia. Yet, financing is experienced as positive by some residents thanks to their ability to finance the process of moving into a THC themselves.

Ownership

The experience of ownership is an attribute of THs. This indicator is contested as scores are fairly dispersed, but it has an average score of 1. On the one hand, it is experienced as positive by residents because they are house owners. For resident 2, this is because she does not have to pay off a mortgage. For resident 10, the positive experience is due to having the autonomy to do the maintenance themselves compared to living in a rental house. On the other hand, the residents do not own the THC location. Since the municipality owns the land and has the power to clear the location, uncertainty arises for temporary THC residents. Several residents attested to this and some feel that they need to constantly be on good behavior to assure the future of the THC. Moreover, residents 7 and 8 mentioned that they are less likely to make big investments in their homes due to the temporary permit. However, residents 1 and 11 do not mind the lack of land ownership: "If you have your plot of land, you will stay there for 20, 30 years. That would not make me very happy" (resident 11). With ownership comes the opportunity of customizability since THs are self-built or constructed to the resident's wishes. Customizability is less evident when buying an already existing house, buying an apartment in a building, or renting a house. The customizability of a TH allows residents to incorporate aspects that they find important (e.g., natural light, renewable energy) and contributes to a positive experience: "I think, since it is constructed based on your design, you are happy … [to] live in your dream house" (resident 6).

Infrastructure

Infrastructure is overall experienced as unchanged since THCs have the same utilities. As mentioned above, the costs associated with infrastructure can be negatively experienced.

Maintenance

Maintenance is an attribute of THs and is experienced positively with an average score of 1. Nevertheless, some residents noted that they have little experience yet. Residents mentioned that a wooden house requires more maintenance than a brick house, but that maintenance is less extensive due to the size of the TH. Residents have shared responsibility regarding the maintenance of the terrain, which is experienced positively by resident 9.

Consumption pattern

The consumption pattern from an economic perspective is also experienced positively and is both an attribute of THs as well as THCs. Thanks to the changed consumption patterns of residents and a sharing economy, expenses have decreased. This gives resident 10 the financial freedom to spend more money on experiences that matter to him. It is striking that the average score of the consumption pattern from an economic perspective is 1 point lower than the consumption pattern from an environmental perspective. Residents 1 and 2 scored the economic aspects lower than the environmental aspects. According to resident 1, this is the case because she has made expensive purchases or is planning on doing so, to finish the TH and THC.

4.2.3. Social

Community participation

Community participation is overall experienced as positive with an average score of 1 and answers clustering around a score of 2. This indicator is an attribute of THCs as they all have shared tasks (e.g., garden work) and many organize events for the entire neighborhood. Residents are in contact with each other often, either through formal meetings or informal contact. Residents describe their relationship with others as cordial and having a sense of friendship. Several residents mentioned that they enjoy living in a community, especially the accompanying support and social contacts compared to a conventional neighborhood: “I haven’t experienced this in a while” (resident 1). Furthermore, living with like-minded people and having shared goals, contributes to living more sustainably: “You inspire each other enormously” (LiberTerra). Nevertheless, living in a THC is not without challenges. Due to having different goals and values, tension can arise. Resident 8 experienced this during the community forming process in which some residents wanted to create a strong sense of community, while others did not. Friction can arise in conventional neighborhoods too, said resident 7, but it is more difficult to avoid confrontation in a THC: “Normally you can retreat in your house. That is also possible here, but the next day you run into each other again”. Moreover, residents can experience insecurity regarding shared responsibilities, like

resident 7: “Ultimately, I just want to be here even if, for example, everyone is working hard and I say, ‘I'm having a bad day and I'm not participating for a while’”.

Society participation

Society participation is experienced fairly positively with an average score of 1. According to Minitopia, a THC can create a new hotspot in a municipality and this indicator is thus attributed to THCs rather than THs. Many THCs open up their communal spaces for neighbors and are open to collaboration with other organizations as residents want to upkeep relationships with the municipality and neighbors. LiberTerra emphasizes the importance of doing this because neighbors can be anxious about new concepts and projects happening in their neighborhood. For example, THC Landjegoed organizes a yearly festival. Part of Gemeente Delft’s motivation was placemaking of the area where THC Pionierskwartier is located. Additionally, THCs can create win-win situations if they are combined with services such as educational centers and food forests (personal communication, April 20, 2023). Furthermore, non-organized contact occurs as a few THCs are located in public areas, resulting in neighbors taking a stroll in the area and having small talk with residents: “A lot of people from the neighborhood come here for a walk, so we often engage” (resident 1). However, this has resulted in some negative consequences for THCs Pionierskwartier and Tiny Oevers, as curious neighbors were looking through windows, infringing residents’ privacy. Most of the society participation happens at the THC, but some residents have since living in a THC gone to other places to participate. For example, residents of THC Landjegoed occasionally volunteer at a local retirement home. Moreover, resident 10 mentioned that the THC’s presence has increased social cohesion. Gemeente Kerkrade too, needed social cohesion as the former hockey club attracted youth lingering causing nuisance for neighbors.

Diversity & inclusivity

Diversity & inclusivity, an attribute of THCs, is contested as it has an average score of 0, but answers range from -1 to 2. Residents mentioned that there is diversity in age, gender, and professional background, but that diversity in culture is limited: “Well, it's very white” (resident 1). According to residents 3 and 9, this relates to the limited financing options, which can exclude potential residents. Nevertheless, resident 8 said that the acceptance rate is high: “Anyone is allowed to live here”. The future communal space of THC Landjegoed will possibly open doors to put minorities in the spotlight by, for example, having expositions.

Simple lifestyle

Simplicity is experienced as very positive with an average score of 2. Many residents noted that living in a THC contributes to a simple lifestyle. Resident 7 mentioned that this is, in part, thanks to a minimalistic consumption pattern. Resident 1 attested that all her material possessions are functional and that there are no vacant spaces. For resident 8, the city easily overstimulated her. Residents 5 and 6 described living in THC Westpark as less rushed, which they respectively associate with living closer to nature and living with like-minded people. Therefore, this indicator is both an attribute of THs and THCs.

Freedom

Freedom, mainly an attribute of THs, is experienced positively with an average score of 1 and has several dimensions. First, residents experience financial freedom thanks to limited monthly expenses, which decreases experienced work-related stress and financial worries (TWL). Residents 4 and 10 mentioned that they can spend more money on experiences they enjoy. Living in a THC has even allowed some residents to reduce working hours. In combination with less household work (e.g., cleaning), this can result in the next dimension of freedom: free time. However, some residents mentioned that living in a THC results in a higher workload regarding utilities and garden work. For example, a wood stove requires the collecting, cutting, and drying of wood. The closeness to nature is another dimension of freedom (Minitopia). This is attested to by resident 4: “That feels like physical freedom because we're just… well, in the middle of nature”. Resident 3 enjoys autonomy as another dimension of freedom thanks to living off-grid: “Freedom from, well, my decisions not being dictated by … [financial institutions or energy companies]”.

Relationship with nature

The relationship with nature is experienced positively with an average score of 2, which is mostly dependent on the THC’s location. Many THCs are located close to nature or residents have incorporated nature into their terrain. This has resulted in residents, like resident 2, having a stronger relationship with nature since living in a THC: “I feel much more connected to nature because nature is right here in front of [me]”. Residents are more aware of the nature surrounding them and the weather: “Because of the tiny house, you experience the elements more than in a brick house. So, when it rains, you immediately hear it on the roof” (resident 1). The knowledge of some residents about nature has increased since living in a THC, due to access to nature and the communal garden: “I suddenly recognize vegetables that I didn't know what they looked like before" (resident 8). Many residents mentioned that their appreciation for nature has grown and that they can be entertained by simply watching nature (e.g., birds).

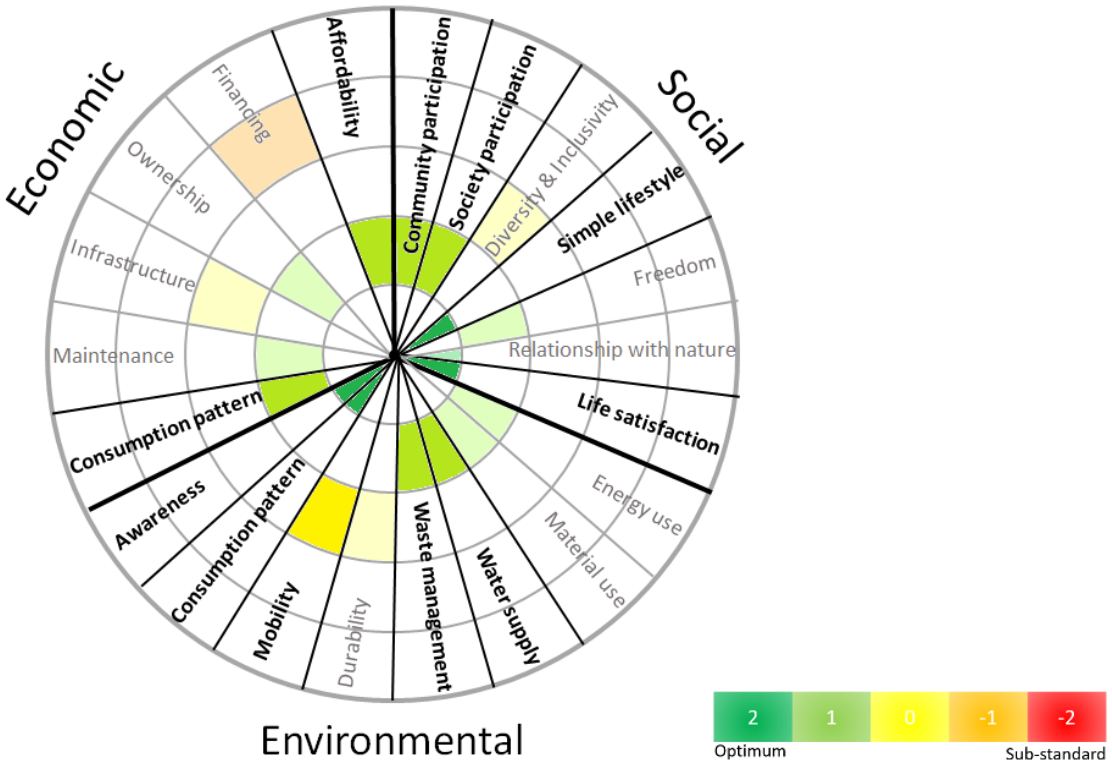
Life satisfaction

Life satisfaction is also experienced very positively with an average score of 2 and can be attributed both to THs and THCs. Many residents testified that living in a THC has contributed to their life satisfaction. Resident 1 mentioned that her relationship with other residents has contributed to her satisfaction. Nature is also a contributing factor for others. Living in a THC allows residents 8 and 10 to improve choices regarding time management. Residents 3 and 7 both attested that living in a THC suits them and resident 11 too would not want to have it any differently: “It has enriched my life enormously” (resident 2).

To sum up, most environmental and economic indicators are attributes of THs while most social indicators are attributes of THCs. Some environmental and economic indicators can be linked to THCs due to characteristics like population density and living with like-minded people. Population density allows for the creation of a shared economy which positively affects the indicators “mobility”, “consumption pattern”, and “affordability”. Living with like-minded people reinforces the sustainability focus of residents and positively impacts indicators “water supply”, “waste management”, “consumption pattern”, and “awareness”. Social indicators are mostly attributes of THCs due to residents living in a community. Ten indicators prove to be opportunities of THCs specifically, which are highlighted in Figure 8. The major opportunities of THCs are “consumption pattern”, “awareness”, “simple lifestyle”, and ultimately “life satisfaction”. Additionally, THCs enjoy the opportunities associated with THs. The main challenge for residents is the limited availability of financing. While this is an attribute of THs, it can be linked to THCs. The lack of land ownership and the temporary character of THCs make it unattractive for financial institutions to provide mortgages. This in turn restricts accessibility and diversity of THCs, which is experienced as unchanged by residents.

Figure 8

SPeAR® model



Note. Adjusted from "SPeAR Handbook 2017" by Arup, 2017, p. 6.

4.3. Research Question

The main research question asked, "How can Tiny House Communities contribute to sustainability in the Netherlands?". This alternative housing model can indeed contribute to sustainability, as it adds value to the environment, residents' lives, and broader society. First, THs have a smaller environmental footprint than conventional housing due to the characteristics of these small dwellings. Residents experienced a decrease in energy use and were to some extent able to use sustainable or second-hand materials. Moreover, residents rethink their water and waste management, often making use of rain barrels and composting organic matter. They also adjust their consumption patterns with a focus on decluttering and decreasing the number of purchases. Also, a sharing economy leads to further reductions. Important to note, residents experience an increase in awareness since living in a THC. This is due to living in a small dwelling, but also due to living in a community with like-minded people. This is where a THC can add value compared to a TH, as residents enjoy social contacts and support each other by exchanging ideas and tips. For broader society, THCs contribute to nature restoration. Second, economic sustainability is mainly

achieved because of the low expenses of a TH. A THC can add value when a sharing economy is set up, by decreasing individual consumption patterns and expenses. Third, social sustainability is mainly due to the community aspect of THCs that individual THs and conventional neighborhoods lack. Community participation is experienced positively by residents as they enjoy social interactions with other residents and feel supported on their journey of tiny and simple living. Living in a TH comes with a feeling of freedom, which can be expressed financially or in free time. Also, THCs located in nature contribute to this feeling of freedom and improve residents' relationships with nature. All these factors eventually contribute to the experienced life satisfaction of residents, where again the community aspects add significant value. For broader society, THCs create some throughput in the housing market albeit limited, due to the amount of space they require. THCs can be a hotspot in the municipality as they often open up their communal spaces for visitors and are open to collaboration with other organizations.

5. Discussion

THCs contribute to sustainability due to the attributes of THs and the opportunities that come with living in a community. First, THs' energy and material savings contribute to environmental sustainability (Cohen, 2021). Mutter (2013) pointed out that common features are rainwater barrels and compostable toilets, which could increase residents' awareness of resource consumption and waste generation. This was confirmed in the empirical study. Surprisingly, residents attested to the opportunities of a sharing economy in THCs. Kilman (2016) argued that tiny living comes with subverting the consumer-based mindset, which is attested to by residents who have reviewed their shopping habits. Second, the literature review and empirical study confirm that economic sustainability mainly arises because of the affordability of a TH. Moreover, house ownership allows residents to make investments to improve their environmental footprint and tailor the dwelling to their preferences. Third, the social pillar of sustainability can be found in social contact with like-minded people that is fostered by THCs, whereas conventional neighborhoods are individualistic. Communities promote social cohesion (Matschoss et al., 2021), and nuisance experienced by neighbors decreased in the case of THC Carisborg. The empirical study found that THCs can create hotspots and win-win situations by organizing events and providing services such as a food forest. Both the literature review and empirical study found that living in a TH could result in more financial freedom and free time (Cohen, 2021; Shearer & Burton, 2021). Kilman (2016) argued that residents are more in connection with nature. The empirical study showed that residents' knowledge of nature is expanded. All social aspects eventually contribute to residents' life satisfaction.

Due to these sustainability opportunities, THCs are viewed as an alternative, sustainable housing model. Their ability to relieve pressure on the housing market is controversial. Vasseur et al. (2022) argued that, due to scarce building land, multi-story accommodations would be more effective. This is confirmed by municipalities criticizing THCs for taking up much space while housing a limited number of people. Yet, most interviewed THCs are in places where a multi-story accommodation would not be desirable. THCs are not viewed as a structural solution for the housing market, nor are they claimed to be. This housing model differentiates the current housing market, which is much needed in a changing society. First, changing demographics lead to an increasing number of singles, who are occupying about 40% of the houses in the Netherlands (Kraniotis, 2017; Zhang, 2016). Yet, the housing market focuses on large households. As a result, singles or small households occupy homes that can accommodate large families. This results in a high average living space of 65m^2 per person compared to neighboring countries (Kraniotis, 2017). Second, attention for movements that diverge from consumerism is increasing. Many experience

the consumption society as stressful and voices are raised for a sufficiency-oriented lifestyle, characterized by simple living and minimalism (Callmer, 2019). THCs fit into this changing society since the size of the dwelling is suitable for singles and small households. TH(C)s are also resistant to life changes (e.g., moving, family expansion) as they can be moved, remodeled, or expanded. Moreover, THCs contribute to sustainability and promote a sufficiency-oriented lifestyle.

However, sufficiency-oriented lifestyles are hindered by social contexts (Tröger & Reese, 2021). This is also true for housing as houses are seen as investments and status signifiers (Cohen, 2021). Moreover, the empirical study found that there are quite some misconceptions and concerns regarding tiny living due to unfamiliarity. This is also reflected in the municipalities' approach and can lead to neighborhood concerns. Furthermore, Shearer et al. (2018) pointed out that TH(C)s are not recognized within policies and regulations, which is also the case in the Netherlands. Multiple municipal representatives mentioned that the permitting process poses a challenge. In case a location does not have the right *Omgevingsplan,* a common solution is to give off a waiver allowing for violation. Since a TH does not comply with the BBL, residents can apply for a *Gelijkwaardige Maatregel*. Vasseur et al. (2022) pointed out that the permitting process is significantly influenced by the municipality, meaning that this can differ from municipality to municipality. This is reflected in the empirical study, as every THC had different requirements to fulfill. The tiny lifestyle is further hindered by the lack of financing options. Van Schyndel Kasper (2008) pointed out that the associated cost of living in a TH would be a barrier to entry and would hinder reaching ethnic and socioeconomic diversity. Yet, the empirical study found that the limited financing options prove to be a challenge, due to the temporary permits of THCs. Residents attested that this does limit accessibility to the THC lifestyle and therefore diversity of the community.

5.1. Recommendations

To support the TH movement and the expansion of THCs in the Netherlands, a mentality change needs to take place. To reach a common understanding and acceptance of THCs as a dignified lifestyle, all actors need to contribute. First, residents of THCs should continue creating hotspots and win-win situations by engaging in and organizing social events and by combining their THC with other services (e.g., food forest). These actions would educate others about the lifestyle and show that it is a dignified lifestyle. Second, interest groups already have a supportive role and should continue advocating for and educating on non-conventional housing models. Third, future research could contribute to this mentality change by studying the origin of misconceptions around tiny living and how this is expressed by neighbors and municipal staff involved in the realization of THCs. Since most interviewed THCs have only been existing for a short period

of time and the number of THCs in the Netherlands is increasing, it would be interesting for future research to analyze the long-term impact of THCs on the housing market. Moreover, this research excluded housing corporations, but it could be interesting to research THCs as social housing regarding the impact on the housing market, accessibility of the lifestyle, and residents' lives.

The acceptance of an alternative, sustainable housing model requires a supporting policy framework, which can take the form of building standards and financial incentives (Nair et al., 2005). Therefore, policymakers are important actors and can take on a more supportive role by advocating for the inclusion of THs in national policies. TH(C)s are currently not defined in policies, which is needed since they differ from conventional housing and do not fit the regulations. This is not only an issue in the Netherlands, but also other countries deal with an unstandardized realization process. Due to lacking recognition in policies, Verenging Bouw- & Woningtoezicht Nederland and engineering bureau Nieman developed *Handreiking Tiny Houses*. This practical guide for municipalities tests THs against the requirements of the BBL. It includes a general definition of THs and deep dives into the requirements regarding size, fire safety, and much more. It also shows how the *Gelijkwaardige Maatregel* can be applied and how the *Omgevingsplan* can be adjusted to allow for housing in THs (Vereniging Bouw- & Woningtoezicht Nederland, 2022). This *Handreiking* could create unity in municipal approaches and ease the realization process. Therefore, it is recommended that municipalities widely adopt and use this guide. Additionally, municipalities need to improve communication between each other, to inform others about the realization process. Municipalities face similar challenges and they can thus learn from each other. This can simply be done by organizing and attending events, like the knowledge day in Kerkrade, and publishing about the realization process. Furthermore, municipalities should permit THCs for permanent residence. There is demand for THCs, their added value is proven, and successful case studies can be found. Therefore, it is time to move from temporary to permanent THCs. Knowing they can stay for a lifetime, residents would be more inclined to invest in their houses, the community, and the environment. Permanent residence would expand financing options and increase accessibility. Additionally, (local) governments could adopt government funding for THs, which was done in Queensland, Australia (9 News Australia, 2023). Moreover, financial institutions could offer low-interest loans for (temporary) THCs. Regarding accessibility, housing corporations could play a role as they provide housing for those who cannot rent on the private housing market.

6. Conclusion

A central relationship between humans and nature in the built environment is needed. The housing sector contributes to climate change mainly due to energy and material use. Furthermore, the Netherlands has been dealing with a housing crisis for years. Housing prices have been rapidly increasing due to increasing demand and a scarcity of land. The housing crisis sparked the TH movement known today, motivated by an aspiration to reduce environmental impact and simplify one's lifestyle. The first TH in the Netherlands was occupied in 2015 and about 60 THCs have been established. The current practice of housing is viewed as unsustainable and THCs are proposed as an alternative, sustainable housing model. THCs contain most opportunities that characterize THs. Due to the size of THs, the environmental impact is limited regarding energy and material consumption. Furthermore, THs are considered affordable due to the low purchase price and low maintenance costs. Residents also review and decrease their consumption patterns. Additionally, living in a community comes with social opportunities thanks to a feeling of belonging and working towards shared goals. In this thesis, the extent of THCs' sustainability in the Netherlands was researched. The objective was to map the realization process, including the involved actors and experienced challenges, as well as analyze the experienced sustainability opportunities and challenges of THCs with the SPeAR® model. The research question answered in this thesis is: *How can Tiny House Communities contribute to sustainability in the Netherlands?*

A THC is realized through the collaboration of key actors such as residents, policymakers and other officials, and interest groups. Two processes run simultaneously: realization of the location and THs and community forming. Key opportunities are the creation of social cohesion, nature restoration at the location, and improvement of the public perception of the municipality. Nevertheless, the realization process is challenging. The main challenge is that existing policies and regulations are not tailored to alternative housing models like THCs. Furthermore, outsiders are often unfamiliar with tiny living, which can result in (negative) assumptions.

The SPeAR® model visualizes the experienced opportunities and challenges. While THCs enjoy the opportunities of THs, the added value of the community aspects is mainly due to population density and living with like-minded people. Key opportunities are found in the environmental and social set of indicators. Residents have indeed reviewed their consumption patterns, moving away from consumerism and towards a simple lifestyle. Moreover, residents have set up sharing economies to decrease their environmental footprint and expenses. Residents have also attested to an increase in awareness of their

environmental impact since moving into a TH, which is reinforced by the community aspects. Participation in the community is experienced positively, as residents enjoy living and conversing with like-minded people. Additionally, they enjoy the simple lifestyle and freedom that comes with living in THCs, which eventually contributes to life satisfaction. The main challenge is the limited financing options, which in part is due to the lack of land ownership and the temporary permits of THCs. This in turn limits the accessibility and diversity of THCs.

THCs contribute in multiple ways to sustainability in the Netherlands and are viewed as an alternative, sustainable housing model that has proven to positively impact the broader society as well as the lives of residents. Even though THCs are not viewed as a structural solution for the housing crisis, they could relieve some pressure by creating throughput. Moreover, this housing model differentiates the housing market, which is much needed in a changing society where household sizes are declining and the focus is shifting from consumerism to sufficiency. Yet, the realization of THCs remains a challenge and is hindered by social contexts and policies. Houses are seen as status signifiers related to their size. Since THs are the opposite of big, there are quite some misconceptions about the tiny lifestyle. Furthermore, the housing model is not recognized in current policies, which poses a challenge for municipalities. Due to the lack of uniform regulations, the permitting process differs for each THC. Temporary permits create a financial barrier to accessibility and diversity of THCs since financial institutions are hesitant to give out mortgages.

To conclude, this thesis highlighted known opportunities and challenges of THs and found additional opportunities and challenges of THCs. Besides that, this thesis might be valuable to further research, THC residents and aspirants, interest groups, and municipalities can also draw lessons from this study. THC residents get insight into the challenges others experienced and the challenges that the municipality faced. It also sheds light on potential improvements to increase sustainability. THC aspirants get an overview of the realization process and the opportunities and challenges of THCs. Interest groups can draw lessons on how to expand their supporting services. Municipalities get insight into how residents experienced the realization process and the benefit of having a THC to the broader society. The thesis shed light on challenges experienced by municipalities and solutions they came up with, which can be of high importance to other municipalities looking into realizing a THC. Lastly, this thesis presents some recommendations for all involved actors, mainly focused on eliminating misconceptions and policy recommendations.

6.1. Limitations

Given the results presented and recommendations made in this thesis, it is important to reflect upon its limitations. Methodological limitations are discussed in section 3.7. Drawbacks of SPeAR® were discussed in section 2.2 and some were experienced in this study. While the SPeAR® manual states that the model can be used by anyone with knowledge of sustainability, the researcher has limited practical experience and lacks expert knowledge. Moreover, it was the residents themselves who scored the indicators by comparing their THC to their previous conventional house, which could have been a detached house or an apartment in a multi-story complex, either rented or owned. Each resident's previous situation is unique and unity among residents lack, which led to a wide range of scores for some indicators (e.g., financing). The scores were combined using an averaging approach, which poses the risk of scores centering around the middle range. To resolve both issues, a heatmap was displayed to show the divergence in scores. Another issue identified was the appropriateness of indicators. For example, "durability" was hard to evaluate for some residents as they had only recently moved into the THC. Since some indicators focused on THs, like material use, it was difficult to differentiate the opportunities and challenges between THs and THCs. This was reinforced by the fact that most residents did not have experience with isolated THs and thus could not compare that situation with THCs.

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Appendices

Appendix A: Definitions of Indicators

Environmental

- Energy use
    - The energy consumption of the TH once inhabited: the amount of energy, energy efficiency, renewable energy.
    - (Cohen, 2021; Mutter, 2013; Nair et al., 2005; Shama & Motlak, 2019; Winston & Eastaway, 2008)
- Material use
    - The material consumption in the construction process: the amount, the efficiency, the sustainability of the materials, the reusability of materials, and if recycled materials can be used.
    - (Kilman, 2016; Nair et al., 2005; Shama & Motlak, 2019; Wotton et al., 2018)
- Water supply
    - Water use, sustainable water supply (rain collection).
    - (Mutter, 2013; Nair et al., 2005; Saxton, 2019)
- Waste management
    - Generation of waste, drainage, and sanitation
    - (Mutter, 2013; Nair et al., 2005; Shama & Motlak, 2019; Winston & Eastaway, 2008)
- Durability
    - Relates to the ability to withstand wear: damageability and necessary maintenance.
    - (Nair et al., 2005)
- Mobility
    - Reliance on private vehicles: accessibility to public transport, proximity to employment centers, education, commercial districts, health facilities
    - (Cohen, 2021; Shama & Motlak, 2019)
- Consumption pattern
    - Accumulation of possessions: amount, frequency, sustainability of products
    - (Cohen, 2021; Kilman, 2016; Shearer & Burton, 2019)
- Awareness

    - Awareness of consumption pattern: accumulation of possessions, resource consumption (e.g., energy), waste generation
    - (Saxton, 2019)

Economic

- Affordability
    - Affordability includes the initial investment in the TH (purchase and construction, including material and labor costs) and the financial contribution to the THC.
    - (Cohen, 2021; K. Evans, 2021b; Kilman, 2016; Nair et al., 2005; Shama & Motlak, 2019; Winston & Eastaway, 2008)
- Securing financing
    - Financing options (e.g., mortgage, personal loan)
    - (Kilman, 2016; Minitopia, n.d.)
- Ownership
    - Ownership or lease, costs, and associated feelings.
    - (Nair et al., 2005; Shearer & Burton, 2021)
- Infrastructure
    - Infrastructure for utilities: availability, regulation (mandatory or not), costs.
    - (Nair et al., 2005)
- Maintenance
    - The costs regarding maintenance (material and labor costs).
    - (Nair et al., 2005; Winston & Eastaway, 2008)
- Consumption pattern
    - Costs related to consumption pattern: resource use (e.g., energy) and accumulation of possessions.
    - (Boeckermann et al., 2019; Cohen, 2021)

Social

- Community participation
    - Relationship with those within THC and participation in the community (e.g., events, shared tasks, shared property)
    - (Kilman, 2016; Mutter, 2013; Nair et al., 2005)
- Society participation

    - Relationships with those outside of the THC and participation in broader society (e.g., politics, economy, volunteer work, citizen initiatives, etc.)
    - (J. Evans, Vácha, T., Kok, H., and Watson, K., 2021)
- Diversity & inclusivity
    - Cultural diversity: residents with different backgrounds leading to cultural exchange and acceptance of other cultures.
    - (Nair et al., 2005; Shama & Motlak, 2019; Van Schyndel Kasper, 2008)
- Simple lifestyle
    - Having an intentional lifestyle of simplicity, relating to the accumulation of possessions
    - (Boeckermann et al., 2019; Kilman, 2016; Mutter, 2013; Nair et al., 2005)
- Freedom
    - Financial freedom and more free time at hand
    - (Cohen, 2021; Kilman, 2016; Shearer & Burton, 2021)
- Access to/connection with nature
    - Access to nature and time spent in nature, creation of environmental ethic.
    - (Kilman, 2016; Winston & Eastaway, 2008)
- Life satisfaction
    - Satisfaction with current situation and life overall
    - (Boeckermann et al., 2019; Kilman, 2016)

Appendix B: Interview Invitation and Information Sheet

Note: Participants received the invitation and information sheet in Dutch

Invitation

Dear Sir/Madam,

My name is Nancy Smeets, a student at Maastricht University where I'm following the master Sustainability Science, Policy, and Society. I am currently writing my master's thesis that examines the sustainability of Tiny House Communities in the Netherlands. I focus on the opportunities and challenges associated with Tiny House Communities and how these communities are realized.

In my research, I would like to involve the experiences of residents/policymakers/interest groups through interviews. Because of your involvement with Tiny House Community X, I would like to interview you.

If you have any questions and/or would like to participate, I would love to hear from you.

Yours sincerely,

Nancy Smeets

Information sheet

First of all, I would like to thank you for participating in this study. In this information sheet, you will find more information about the study and your part in it.

The purpose of this study is to research the sustainability of Tiny House Communities in the Netherlands. More specifically, this study looks into the experienced opportunities and challenges of realizing and living in a Tiny House Community. Interviews will shed light on the experiences of current users, policymakers, and interest groups.

I would like to interview you and include your experiences with and views on Tiny House Communities. The interview will be audio-recorded and will last approximately one hour. A consent form will be signed at the moment of the interview. The information provided by you will be used for research purposes.

Before the interview, I would like to ask you to complete the SPeAR® model. The SPeAR® model evaluates the performance of the Tiny House and the Tiny House Community based on a number of indicators. Attached you can find both the empty SPeAR® model and the explanation of the indicators mentioned.

Please do not hesitate if you have any questions.

Nancy Smeets, njc.smeets@student.maastrichtuniversity.nl

Appendix C: Consent Form

Note: Participants received the consent form in Dutch

Interview for SSP3021 Master Thesis – Master program on Sustainability Science, Policy, and Society - Maastricht Sustainability Institute

In this master thesis, the sustainability of Tiny House Communities in the Netherlands is researched. This is done by conducting desk research and interviews. The interviews will provide the opportunities and challenges of living in a Tiny House Community as experienced by the interviewee. Furthermore, the interviewee is able to shed light on the process of realizing such a community.

For more information, questions or complaints please contact me at njc.smeets@student.maastrichtuniversity.nl or my supervisor at l.niessen@maastrichtuniversity.nl.

By signing this form, you agree to participate in this research (i.e., in this interview) under the following conditions:

- The interview is voluntary and you can stop your participation in the interview at any moment.
- The interview will be recorded (audio-taped). The recordings will only be used by the researcher to re-listen and transcribe the interview.
- The recording can be stopped at any moment upon your request.
- Until the moment of publication you can always withdraw your participation in this research without providing any reasons. Simply send me an email.
- A summary report of the interview will be sent to you.
- Data (transcripts and recordings) will be stored with care and no longer than is necessary for the research. For study programs, raw data needs to be retrievable for 5 years (as a quality assurance measurement).
- In the case of data loss, the researcher commits her/himself to inform you about the loss and all details about the loss (i.e., what data has been lost, where and under what conditions/ circumstances).
- You give permission to use information from the interview in publications (e.g., assignments, reports, thesis, and academic articles).
- Please check off what applies to you:
    - I agree that my full name, gender, and affiliation are used (e.g., Brandon O'Loughlin from McDonalds London).
    - I agree that my family name, gender, and affiliation are used in publications (e.g., Mister CGanga or Misses Pietersen from the university of Stellenbosch)
    - I agree with mentioning the name of my company/organization, the type of organization and my role/function in the organization (e.g., a controller at the municipality of Amsterdam; a citizen in Jakarta)
    - I agree with mentioning my role only (e.g., one of the controllers)
    - I only agree with full anonymity (e.g., respondent X)

I understand all of the above and confirm participation in this research under the stated conditions:	**I confirm my responsibilities as researcher as stated above:**
Name participant:	Name researcher:
Signature :	Signature:
Date:	Date:

Appendix D: Interview Guides

Note: Participants received the interview guides in Dutch

Current Users

Pre-Interview

- Introduction researcher and research
- Explanation of anonymity of the participant
- Permission to record the interview
- Introduction participant

Questions

1. How would you define Tiny House Communities?
2. Can you tell me about the community?
3. Could you talk me through your process of joining this community?
4. What were the main motivators for joining a Tiny House Community?
5. What were the main challenges of joining a Tiny House Community?
6. Has living in a Tiny House Community changed your life?

SPeAR® model

Note: Per indicator was asked why the participant gave it that specific score and follow-up questions were asked, which can be seen below.

Environmental

- Energy use:
    7. How much energy do you consume compared to your previous (conventional) house?
    8. Do you make use of any renewable energy sources?
- Material use:
    9. How much material and energy was used during the construction process compared to your previous (conventional) house?
    10. What type of materials were used?
- Infrastructure
    11. Is your Tiny House connected to the grid?
    12. Can you tell me about the water management of this community (water supply, rain collection)?

13. Can you tell me about the waste management of this community (e.g., compostable toilets, drainage, separating waste, composting food waste)?

- Durability
    14. How do you feel about the durability of your Tiny House compared to your previous (conventional) house (e.g., damageability and necessary maintenance)?
- Transport
    15. How close is the community to employment centers, education, commercial districts, and health facilities?
    16. Do you have easy access to public transport?
    17. How do you usually get around?
- Consumption pattern
    18. Has your consumption pattern changed since living in a Tiny House?
- Awareness
    19. Has your attitude regarding consumption (e.g., possessions, resources) changed?
    20. Has your attitude regarding waste generation changed?

Economic

- Affordability
    21. What are some of the costs you made to live in the Tiny House Community (no details, just an overview of things that cost money)?
- Securing financing
    22. Can you tell me about the available financing options for living in a Tiny House (Community) (e.g., mortgage, personal loan)?
- Land ownership
    23. Who has ownership of the land?
    24. How do you feel about that?
- Infrastructure
    25. Can you tell me more about the infrastructure available at the location?
    26. Who covered these costs?
- Maintenance
    27. How is the maintenance of the plot of land managed?
- Consumption pattern
    28. Has your consumption pattern changed since living in a Tiny House?

29. How do your current costs compare to living in a conventional house (e.g., resource use, accumulation of possessions)?

Social

- Community participation
    30. How is the governance of the community set up?
    31. How would you describe the relationships of residents in the community?
    32. Is community participation stimulated?
- Society participation
    33. Are you in contact with neighbors outside of the community?
    34. How would you describe the relationships with neighbors outside of the community?
    35. Do you participate in the broader society? Has this changed since living in a Tiny House Community?
- Diversity & inclusion
    36. How would you describe the diversity among the group?
    37. How are new residents attracted?
- Simple lifestyle
    38. Has your lifestyle changed since you live in a Tiny House (Community)?
- Freedom
    39. Do you experience freedom?
    40. Has this changed since living in a Tiny House Community?
- Access to/connection with nature
    41. How would you describe your relationship with nature?
    42. How has your relationship with nature changed since living in a Tiny House Community?
- Life satisfaction
    43. Has your life satisfaction changed since living in a Tiny House Community?

Policy

44. What are some of the main drivers of support for Tiny House Communities?
45. What are some of the main barriers to establishing Tiny House Communities?
46. How could policy change so it would facilitate to realize THCs?

Post-Interview

- Express gratitude for participation

- Confirmation of sending a summary to the participant for feedback

Policymakers

Pre-Interview

- Introduction researcher and research
- Explanation of anonymity of the participant
- Permission to record the interview
- Introduction participant

Questions

1. How would you define Tiny House Communities?
2. What is the role of your organization?

Community

3. Can you tell me about the Tiny House Community in your municipality?
    a. Why was that exact location deemed fit for a Tiny House Community?
    b. Does the community own the land or do they lease it? Why?
    c. Is the community fixed to the grid? Was this a choice of the community?
4. What party initiated the conversation about establishing a Tiny House Community?
5. What is the process or the steps involved in establishing a Tiny House Community (e.g. finding aspirants, finding a plot, talking with the municipality, construction, community building)?
6. What are arguments for realizing a Tiny House Community in the municipality?
7. What are arguments against realizing a Tiny House Community in the municipality?
8. How did the neighborhood respond to the establishment of a Tiny House Community?

Policy

9. Which policies currently affect Tiny House Communities and how?
10. What are the main drivers of support for Tiny House Communities?
11. What are the main barriers of establishing Tiny House Communities?
12. How could policy change so it would facilitate to realize THCs?
13. What is your perception of Tiny House Community as an alternative, sustainable housing model (e.g., affordability, housing shortage, scalability)?
14. Is it likely that the perm for the current Tiny House Community will be expanded (if applicable)?
15. Is it likely that there will be another Tiny House Community in the municipality?

Post-Interview

- Express gratitude for participation
- Confirmation of sending a summary to the participant for feedback

Interest Groups

Pre-Interview

- Introduction researcher and research
- Explanation of anonymity of the participant
- Permission to record the interview
- Introduction participant

Questions

1. How would you define Tiny House Communities?
2. What is the role of your organization?
3. What is the process or the steps involved in establishing a Tiny House Community (e.g. finding aspirants, finding a plot, talking with the municipality, construction, community building)
4. What are arguments for realizing a Tiny House Community in the municipality?
5. What are arguments against realizing a Tiny House Community in the municipality?
6. What are the motivators of people moving into a Tiny House Community?
7. What is the impact of living in a Tiny House Community on residents?

Environmental

8. What environmental benefits come with living in a Tiny House Community?
    - How much energy consume Tiny Houses compared to conventional houses?
    - How much energy and material is used in the construction process of a Tiny House compared to conventional houses?
    - Do you feel like a Tiny House is as durable as a conventional house (e.g., damageability and necessary maintenance)?
    - Where are Tiny House Communities generally realized?
    - Does the consumption pattern of residents change once they inhabit a Tiny House?

Economic

9. What are the economic benefits of living in a Tiny House Community?
    - How affordable is it to live in a Tiny House Community?
    - Can you tell me about the available financing options for living in a Tiny House (Community) (e.g., mortgage, personal loan)?

Social

10. What are the social benefits of living in a Tiny House Community?
    - What benefits come with living in a community?
    - Do residents enjoy (more) freedom (e.g., financial freedom, more free time)?
    - Do residents develop a relationship with nature?
    - Does living in a Tiny House Community impact one's life satisfaction? How?

Policy

11. Which policies currently affect Tiny House Communities and how?
12. What are the main drivers of support for Tiny House Communities?
13. What are the main barriers of establishing Tiny House Communities?
14. How could policy change so it would facilitate to realize THCs?
15. What is your perception of Tiny House Community as an alternative, sustainable housing model (e.g., affordability, housing shortage, scalability)?

Post-Interview

- Express gratitude for participation
- Confirmation of sending a summary to the participant for feedback

Appendix E: Codebook

Concepts	Axial codes	Codes	Definition of code	Typical
Definition THC			The meaning of THCs	
	Environmental		Relating to organisms and their surroundings	
		Environmentalism	Concerns about the environment	"So, I think it's kind of a small community and people who are all focused on sustainability."
		Nature	Physical world, including plants animals, landscape, etc.	“And I really see a tiny community as a place where people live in a green environment.”
	Social		Relating to society or community	
		Shared goals/values	To have similar values and shared goals to work towards	“Well, at least like-minded ones. I can say that. They are different people, but with the same idea.”
		Community	A group of individuals having commonalities	“No fence, so no closed places. But really together in one area. Taking care of your place and each other together.”
		Diverse	Variety in shapes, values, etc.	“Yes, and furthermore I think communities are very broad of communities that do a lot together. Sharing together with people who just choose to live small. And yes, who also just want their privacy as in an ordinary street.”
		Tiny living	Lifestyle of living in a small house	“Well, it's a group of people who actually all want to live differently. smaller. “
Context			The circumstances	
	Realization process		The process of setting up the THC, including specific steps	
		THC initiation	Coming up with the idea and sitting down to initiate the process	“Well, that was in 2019. The municipal council that was active at the time asked the question in a committee meeting of the council, what was active at the time, of can we do something with tiny houses?”
		Requirements of municipality	Requirements made by the municipality during the process about the final product	“Shouldn't be ready-made tiny houses either. … So, it really had to be original and authentic. And as sustainable as possible, of course.”
		Location	Regarding the terrain or plot of land	“And Woldwijk is an area of almost 40 hectares in Ten Boer, which was once intended for housing. Part of it can now be temporarily lived in.”
		Infrastructure	Installation and presence of utilities	“We had to invest 7000 euros because we all had to build that infrastructure here.”
		Community building	Process of enhancing the sense of community among a group of individuals	“Rezone actually supervised the entire process to some extent. ... Rezone had asked who was interested via socials and everything. And that resulted in a number of selection procedures of people who already had a plan ready in the short term.”

		Financial costs	Necessary spending during the realization process	"Well, you have the construction of your house of course. ... Transporting your house costs money. We had to install infrastructure for utilities."
	Governance		Agreements about the structure and functioning of the THC	
		Formal communication	Exchange of official information regarding the THC	"We have a general resident meeting. So, for the real, serious stuff, it's voted on."
		Informal communication	Communication without a structured path	"And we also have a monthly coffee hour, just to chat."
Motivation (of THC residents)			Reason to engage with THCs	
	Environmental		Relating to organisms and their surroundings	
		Environmentalism	Concerns about the environment	"I wanted to have a more sustainable meaning in my life."
		Consumption pattern	Accumulation of possessions: amount, frequency, sustainability of products	"We were actually very busy with... I don't want to say minimalism per se but reducing consumption."
	Social		Relating to society or community	
		Nature	Physical world, including plants animals, landscape, etc.	"But I also like being outside a lot. And there are just very few ways to do that in this part of the country. And we do have those opportunities here."
		Community	A group of individuals having commonalities	"The idea of community living was also attractive to us."
		Freedom	Financial freedom and more free time at hand	"Yes, it offers a lot of freedom"
		Shared goals/values	To have similar values and shared goals to work towards	"And the nice thing about a community is a bit, yes, the same interests"
		Simple lifestyle	Having an intentional lifestyle of simplicity, relating to the accumulation of possessions	"Well, I did have a tendency to a simpler lifestyle too."
	Economic		Relating to economic decisions and financial aspects	
		Affordability	Affordability includes the initial investment in the TH (purchase and construction, including material and labor costs) and the financial contribution to the THC.	"Yes, and we also really wanted to reduce costs. So, we sold our previous house that came with paying off the mortgage."
		Ownership	Ownership or lease, costs, and associated feelings.	"Also, because it is easier to install a water purification system in your tiny house yourself … compared to a rental house. So, you have a little more say in that."
	Miscellaneous		Codes that do not fit under a specific axial code	
		Building a house	Experience of constructing a house	"I also thought it was a great adventure to build a house myself."
		Tiny living	Lifestyle of living in a small house	"I chose to live tiny because I wanted to live in a small wooden house for a long time"

		Mobility of TH	Moveability	“I thought, with a tiny house, after so many years, you take your house with you. And then you go to a different place. I thought, well, how nice do you want it?”
Municipality			Local government	
	Motivation		Reason to engage with THCs	
		Demand	Requests by interested parties	“It's more that you can meet a need that is also there. And that you can differentiate in your housing offer”
		Experimentation	To experiment with this housing model	“We wanted to experiment with alternative forms of living with tiny houses.”
		Environmentalism	Concerns about the environment	“And in addition, it is also really a sustainable form of living. So, it has very little CO2 emissions.”
		Social cohesion	Connectedness and solidarity within society	“We are close to an industrial area where no one lives. So also, a piece of social control.”
	Challenges		Experienced struggles	
		Neighborhood concerns	Concerning neighbors about the realization of a THC	“And it is sometimes thought that people who live in a tiny house must be very strange people.”
		New concept	The newness of tiny living and associated challenges	“Yes, this is of course a completely new project for the municipality. So, they've also run into things like, yeah, they've never done this before.”
		Policy	With regard to regulations	“In addition, when it comes to tiny houses, yurts, and squeaky cars and all that kind of alternative housing, you run into regulations. In the field of construction and the Building Decree in particular.”
	Miscellaneous		Codes that do not fit under a specific axial code	
		Communication between municipalities	The communication between with regard of sharing information about the realization process and policy	“We have regularly received questions from other municipalities.”
		Future of THCs	The existence of a specific THC in couple of years	“Discussions are now underway, including the municipality. That's complicated. Because it has to do with a lot of other things as well.”
Alternative, sustainable housing model			Judgements about THCs as an alternative, sustainable housing model	
	Environmental		Relating to organisms and their surroundings	
		Energy use	With regard to the energy consumption of the TH once inhabited: amount of energy, energy efficiency, renewable energy	“You have a smaller space to heat, for example.”
		Material use	The material consumption in the construction process: the amount, the efficiency, the sustainability of the materials, the reusability of materials, and if recycled materials can be used	“At the same time, yes, it's all wood and a lot of things are recyclable.”

		Water supply	Water use, sustainable water supply (e.g., rain collection)	“I have rain barrels, … but I still want to expand.”
		Waste management	Generation of waste, drainage, and sanitation	“I have a compost toilet, so I don't flush.”
		Durability	Relates to the ability to withstand wear: damageability and necessary maintenance	“Yes, I think it will not last as long as a brick house.”
		Mobility	Reliance on private vehicle: accessibility to public transport, proximity to employment centers, education, commercial districts, health facilities	“I think the distance to shops is a bit more. Mm-hm. Uh, so, uh, yeah, you have to have a bike or a car to go to the store, so to speak.”
		Consumption pattern	Accumulation of possessions: amount, frequency, sustainability of products	“And yes, when my closet is full, something has to go. If I want to put something in it.”
		Awareness	Awareness of consumption pattern: accumulation of possessions, resource consumption (e.g., energy), waste generation	“Yes, we are definitely more aware too. Because, for example, we now have a pallet stove. So, you don't just turn on the stove. You have to get pallets every time. So yes... Let's put on a sweater first”
	Economic		Relating to economic decisions and financial aspects	
		Affordability	Affordability includes the initial investment in the TH (purchase and construction, including material and labor costs) and the financial contribution to the THC.	“Well, if you would have a conventional house then this is still much more affordable.”
		Financing	Financing options (e.g., mortgage, personal loan)	“You don't get a mortgage on your house, of course. I didn't have the whole amount ready for the construction and furnishing. So, I also have a loan in my own network.”
		Ownership	Ownership or lease, costs, and associated feelings.	“Yes, the house is actually yours. And, uh, yeah, that feels really good when you've paid it all and everything.”
		Infrastructure	Infrastructure for utilities: availability, regulation (mandatory or not), costs.	“We all had to build that ourselves. Also, on our lot. The municipality has a duty to provide sewerage and utilities until the plots”.
		Maintenance	The costs regarding maintenance (material and labor costs).	“No, I notice less maintenance.”
		Consumption pattern	Costs related to consumption pattern: resource use (e.g., energy) and accumulation of possessions	“I buy much less just to buy something, so to speak.”
	Social		Relating to society or community	
		Community participation	Relationship with those within THC and participation in community (e.g., events, shared tasks, shared property)	“I would like to say, well, we are here as just good neighbors, but actually also friends.”
		Society participation	Relationships with those outside of the THC and participation in broader society (e.g., politics, economy, volunteer work, citizen initiatives, etc.)	“And now that I have come to live here, I notice that I have much more contact, of course with the neighbors, but also with the people who pass by, with the municipality.”

		Diversity & inclusivity	Cultural diversity: residents with different backgrounds leading to cultural exchange and acceptance of other cultures	“Well, it's very white.”
		Simple lifestyle	Having an intentional lifestyle of simplicity, relating to the accumulation of possessions	“Yes, I am living a lot simpler”
		Freedom	Financial freedom and more free time at hand	“I do have more freedom. I just have less cleaning”
		Access/connection to nature	Access to nature and time spent in nature, creation of environmental ethic.	“I suddenly recognize vegetables that I didn't know what they looked like before.”
		Life satisfaction	Satisfaction with current situation and life overall	“It has enriched my life enormously.”