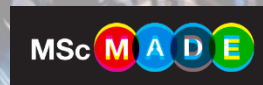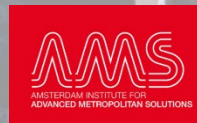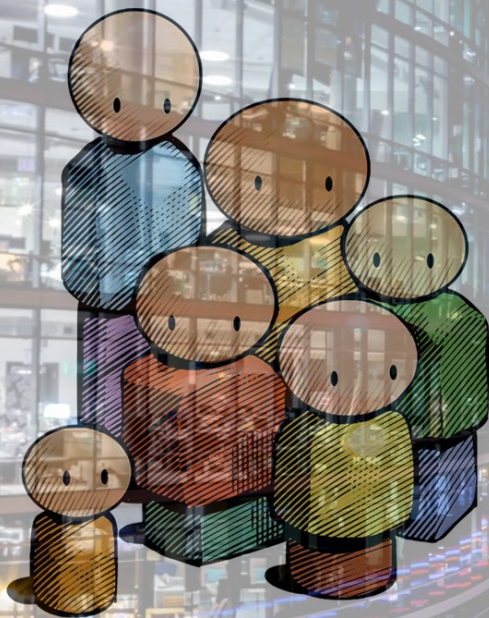# Re-thinking the Role of Citizens in Evaluating Quality of Life in the Smart City

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Re-thinking the Role of Citizens in Evaluating Quality of Life in the Smart City

<u>Master of Science Thesis</u>

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"You have your way. I have my way. As for the right way, the correct way, and the only way, it does not exist."

- Friedrich Wilhelm Nietzsche

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ABSTRACT

Cities around the world are struggling to cope with global challenges such as climate change, resource constraints, overpopulation, energy, and infrastructure management. To this effect, the "Smart City" concept over the last 20 years has promised to be the gateway to sustainable development and improved quality of life in cities through the use of innovative technologies and participation with citizens and users in the urban environment. Despite these promises, the concept has been largely criticised for being largely technology and market-driven rather than being able to solve problems for people living in the city. Existing research has identified that the citizen is largely just a bystander in the development of smart cities and that solutions more often than not fail to address the needs and wants of citizens. Still, the concept is being adopted all around the world and smart projects are being implemented continuously through public funding. Although there are multiple definitions of the concept, citizen engagement is understood as a crucial part of the approach and improving quality of life the overall goal of the smart city.

This study attempts to find out what role citizens can play in evaluating for quality of life by attempting to describe the relationship between the two in the context of smart city projects in Amsterdam. The inability of smart cities and smart projects to be able to identify their impact with respect quality of life demands the involvement of citizens in the process. Therefore, this research takes an interpretive approach to contextually study the setting of Amsterdam as a smart city and projects within it. The results show that Amsterdam despite being labelled a "smart city" does not call itself as such and is moving away from the term. Furthermore, its approach to development is inherently citizen-centric and places a large importance on the quality of life although, challenges exist. The smart city projects explored in this research highlight that there is a strong relationship between citizen engagement and quality of life. To this, the research finds that without engaging with citizens it would not be possible for developers and policymakers to assess the subjective values that matter to citizens as experienced in two out of the four projects studied. Despite the challenges observed within projects, results from this study support the assumption that that citizen engagement can help in identifying and understanding factors affecting the quality of life and improve assessment for it.

Keywords: Smart Cities, Quality of Life, Participation, Citizen Engagement, Impact Assessment

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List of Abbreviations

ASC – Amsterdam Smart City

AUAS – Amsterdam University of Applied Sciences

ICT – Information and Communication Technology

KPI – Key Performance Indicator

PED – Positive Energy District

1   Introduction

Cities are projected to host over two-thirds of the global population by 2050 (United Nations, 2014). The beginning of the 21st century saw cities emerge as the source for the greatest challenges the world has faced. Although they have proven to be humanity's engines of creativity, wealth creation and economic growth, cities have also been the source of much pollution and disease (Bettencourt and West, 2010). Rapid urbanization, shrinking resources, climate change, our cities face challenges of economic development, social inclusion, security, sustainability, mobility, housing etc. Governments, administrations, large firms, and citizen alike realize the need to become sustainable and resilient to tackle these challenges.

In recent years, the term "smart city" has been recognised as one that can propel a city towards being able to tackle the environmental, social, and economic challenges it faces. The advent of innovations and technologies in different fields has emerged as a way to leverage our current situation into an advantageous one. The term "smart city" in itself does not have a fixed or unique definition attached to it (Hollands, 2008). With multiple terminologies such as "creative city", "digital city", "knowledge city" or "intelligent city" there is a uncertainty over what a smart city is but it is also understood that single definition would not apply to all approaches to its application (Albino, Berardi, & Dangelico, 2015). From a long-standing focus on using Information and Communication Technology (ICT) enabled systems to build and understand the city, the term now is getting more closely related to the qualities of people and communities as well (Albino et al., 2015). Despite the lack of a clear definition, cities are embracing the notion of achieving smartness to foster long term sustainable development, economic growth, improve Quality of Life and increase happiness (Ballas, 2013).

Through the implementation of ICT, smart cities have been able to generate and gather vast amounts of data to sense the city. To become effective and efficient in their implementation, smart cities need to measure their performance through monitoring and evaluation frameworks (Girardi & Temporelli, 2017). In Europe, different organisations have tried to identify the best indices for quantifying/evaluating urban smartness (Garau & Pavan, 2018). The Finnish Technical Research Centre has created the CITYkeys project (2015–2017) (Bosch et al., 2016) which is funded by the European Union HORIZON 2020 programme and indicators to monitor and evaluate performance along with prescribing data collection procedures to monitor and compare smart city solutions in Europe. With other EU projects such as CIVITAS, ASCIMER all working to find a suitable framework to assess the impact of smart city initiatives it has become necessary to understand and evaluate how cities and territories are changing.

Cities need to identify and create value, beginning with their spatial, social, cultural, and relational resources (Garau & Pavan, 2018).

Although there are many indicators and indexes that rank cities based on various attributes of smartness from smart mobility to digital accessibility, most of these are published by established corporate entities aiming to further their economic interests (Sáez, Heras-Saizarbitoria, & Rodríguez-Núñez, 2020). This is particularly the case, as the term smart city has been used as a market labelling term that has resulted in more hype than actual impact (Hollands, 2008). The smart city concept has also been criticised for its largely technocratic and business-led focus to urban development. As noted by Batty et al. (2012), large companies, the likes of IBM, CISCO, Microsoft, Oracle, SAP are leading the development of ICT solutions, from networks infrastructures to software as services. They are thus beginning to define and extrapolate these products as they have identified cities around the world representing the markets that establish this new wave of product development. The indexes used to measure the performance of smart cities have also been criticised for ignoring complex urban causalities, lacking transparency in data collection, and being biased thus promoting the existing smart city stereotypes (Sáez et al., 2020).

With new channels of communication and interaction, citizens are now empowered to play a more active role in the city. This significant increase in democratization and production capability of citizens means that they have become key stakeholders in the innovation process and development of a city (Capdevila, Attour, Thierry Burger-Helmchen, & Zarlenga, 2015). The role of the community and its constituents thus forms a critical pillar of smart city development to achieve improved Quality of Life and has been identified as such through the Manifesto on Citizen Engagement and Inclusive Smart Cities (EIP-SCC, 2017). Also, ICT systems in the city have often been applied without consideration of the very citizens who are going to use them (De Filippi, Coscia, & Guido, 2019). Thus, citizen engagement, participation, its impact on the innovation process and the resulting improvement in Quality of Life have become a central feature in the smart city discourse.

"The rapid transition to a highly urbanized population has made cities to be actively developing strategies towards the goal of becoming "smart", with the promise of producing higher Quality of Life for citizens with the inclusion of the innovativeness, participation, collaboration and coordination in the urban environment" (Bolívar & López-Quiles, 2018). The primary and general result of the smart city is improved quality of life (Shapiro, 2006), through the production of different public values (Bakici, Almirall, & Wareham, 2013; Berntzen & Johannessen, 2016), and with higher amount of citizen participation and citizen-centric initiatives it can be expected that such cities can improve their Quality of Life (Bolívar & López-Quiles, 2018).

2   Literature Review

This chapter provides a background to this research through current literature on smart cities. Firstly, the conception of smart cities is presented followed by factors leading to the evolution of the concept that provides this research with a thematic definition of what a smart city is. Secondly, research on the main components of a smart city is presented and the position of Quality of Life and citizen engagement within these components is established. Through this review, the objective and conceptual framework for this research are framed in forthcoming sections.

2.1   Conception of the Smart City

Around the beginning of the 21st century it became apparent that for the emerging global society to tackle problems plaguing its future and safeguard natural, economic, and social resources, cities had to bear the responsibility of fostering change and transformation. According to the United Nations (2019) report on urbanization, around 55% of the global population already live in cities and this share is expected to rise to over 60% by 2030. In Europe, over 70% of the population already live in cities with numbers expected to cross 80% in the coming decade. Consuming between 60-80% of global energy resources, cities are responsible for around 70-80% of global CO_2 emissions as well (United Nations, 2019). With cities facing large amounts of rapid expansion, they face a multitude of challenges such as deteriorating infrastructure, increasing pollution and economic challenges such as unemployment (Nam & Pardo, 2011). Owing to these consequential problems of unsustainable urban development, new paradigms for development have been adopted to make cities sustainable, resilient, smarter and consequentially generate prosperity, liveability and well-being for citizens and making cities more environmentally friendly (Albino et al., 2015).

Improvement in the field of technology particularly in the field of information and communication technologies has provided planners and policymakers with new insights into how cities functions and the opportunity to understand it better. With such rapid improvement in technology, cities worldwide have looked to utilize such services for improved transportation, mixed-use urban planning, provision of services and improved economic opportunities all to improve the sustainability of the city and Quality of Life for citizens (Albino et al., 2015; Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014).

The term "smart city" was coined initially in the United States within IBM and CISCO's business environments to visualize the ideal urban environment connected to various topics of automation. Information and Communication Technology (ICT) in this regard is one of the main components

necessary to demonstrate urban intelligence (Rosati & Conti, 2016). Although ICT solutions have been a dominant feature in smart city planning and discourse, the term has rather proliferated through many sectors without an agreed-upon definition (Albino et al., 2015), also leading to confusion among policymakers looking to make their cities "smart".

Over the last decade, many definitions for "smart city" have been conceptualized each with their own contextual basis for it. This lack of synchronicity has led to the word "smart" being replaced by other descriptive words such as "intelligent", "creative", "innovative" or "digital" making the concept fuzzy and attributing a lack of consistency to the way it is used (Albino et al., 2015). As Batty et al. (2012) state, the idea of a city being smart was something that seemed unfathomable for much of the 20th century. But with advancements in technology and their embeddedness in systems through the use of devices considered now as "daily drivers" such as smartphones, the concept of a city becoming intelligent or even sentient is fast becoming a reality.

2.2 Definition for Smart City

Many different perspectives and factors have been used in research to conceptualize a working definition for smart cities and to identify the critical components that are a part of it. in their conceptualisation of the smart city, Nam and Pardo (2011) describe the choice for the word "smart" in comparison with "intelligent" from a marketing perspective wherein unlike "intelligent", "smart" does not imply an elitist sensibility and delves more into the adaptive and responsive attribute of a city. Further, from an urban planning aspect, "smart city" represent ideological meaning by which being smarter entails strategic decisions (Nam & Pardo, 2011), with public policymakers and governments embracing the need to deliver sustainable development, economic growth and Quality of Life for citizens (Ballas, 2013).

From the perspective of larger corporations, the use of technology in the city is what determines its ability to become smart. Criticisms have been made with regards to cities such as Masdar (UAE) and Songdo (Korea) for their inability to value complexity, unplanned scenarios, and mixed-use of public space by the creation of empty spaces. There is though the opportunity for cities to use technology to create value for citizens and empower them by having technological solutions that adapt to their needs rather than them having to adapt to the technologies (Kitchin, 2013; Vanolo, 2013). Albino et al. (2015), emphasize the missing focus from initial definitions of the smart city, which is that of community and people and state that the lack of attention to the social side of smart cities is the reason for terms like "creative" and "knowledge" to become associated to the smart city.

In their research on the definitions and dimensions of smart cities, Albino et al. (2015) highlight the different aspects that play a role in defining a smart city. A smart city is defined as ,"a high-tech intensive and advanced city that connects people, information and city elements using new technologies to create a sustainable, greener city, competitive and innovative commerce, and improved life quality" (Bakici et al., 2013). Similarly, a city is said to be smart when "investments in human and social capital and traditional (transport) and modern (ICT) communications infrastructure fuel sustainable economic growth and a high Quality of Life, with a wise management of natural resources through participatory governance" (Caragliu, Del Bo, & Nijkamp, 2011).

Nam and Pardo (2011) further go on to clarify the concept of a smart city by including the dimension of community. Analysing the concept based on three factors - technology, people and institutions – a distinction is drawn between the existing top-down implementation strategy to a bottom-up focus that emphasises the role of citizens in smart city development and value creation for them. One of the reasons there is no clear definition for a smart city is because it has been applied to different domains, namely "hard" domains and "soft" domains (Neirotti et al., 2014). "Hard" domains include buildings, natural resources, energy, and waste management where ICT can play a decisive role, whereas "soft" domains include culture, education, social inclusion, policy, and government wherein the role place by ICT is unclear.

From an initial focus on the permeation of technology within the urban fabric to the involvement of citizens and community in the development of a smart city, there is a significant shift in the approach to understanding and implementing smart cities. In line with this notion, De Filippi et al. (2019) highlight the smart city definition put forth in (Caragliu et al., 2011) as a change in the concept, which centralises citizens and their communities while also considering public authorities and governments. This fosters a collaborative relationship between the two entities and generates multi-dimensional impacts by creating agents of innovation and inclusion (De Filippi et al., 2019).

Although there is still no agreed-upon definition for a smart city since it has essentially become a form of labelling to generate interest and attraction along with setting up a self-congratulatory image (Hollands, 2008), the definition provided by Caragliu et al. (2011) presents a strong position for the further development in understanding the role of citizens in the smart city.

2.3 Smart City Components

With the clear need for combating challenges faced by the global society and its current ways of working, the objective of the smart city is to provide sustainable development while improving the Quality of Life for its citizens (Albino et al., 2015; Bakici et al., 2013; Bolívar & López-Quiles, 2018; Nam & Pardo, 2011).

Figure 1 Smart city Components and characteristics (Giffinger, Gudrun, Gudrun, & Haindlmaier, 2010).

Although the objectives can be considered broad and all-encompassing, they set the basis for identifying the main components or dimensions within the framework of a smart city. Giffinger, Fertner, Kramar, and Meijers (2007) identify four primary components of a smart city: industry, education, participation, and technical infrastructure. This was followed by a more extensive analysis into the components of a smart city which leads to the six main components or axes of a smart city: smart mobility, smart environment, smart people, smart living, smart economy and smart governance (Giffinger et al., 2010). This breakdown of the components of a smart city was developed in the assessment of 70 medium-sized European smart cities. As Albino et al. (2015) identify, this segmentation of the components of a smart

city follows neoclassical and traditional theories of urban development and growth – regional competitiveness, transport, ICT solutions, human and social capital, natural resources, Quality of Life and participation in society. The inclusion of Quality of Life is crucial as it strengthens the definition of a smart city as a way to improve Quality of Life for its citizens (Giffinger et al., 2007). The six components of the smart city are also synchronous with the hard and soft domains as identified by Neirotti et al. (2014) and hence cover all forms of application of the smart city concept. "Smarter cities begin with the human capital side rather than blindly believing that ICT can automatically create a smart city" (Hollands, 2008; Shapiro, 2006). As stated in the smart city definition, the role of citizens and communities in the development of smart cities is paramount to their success. While analysing the smart city from the perspective of "technology, people and institutions", Nam and Pardo (2011) identify a strong connection between the components of people and institutions which can truly create smart cities that promote sustainable development and improve Quality of Life. ICT enabled governance or e-governance is critical in bringing smart city initiatives to citizens and ensuring transparency in the process. The aim or smart governance must be "citizen-centric and citizen-driven" (Albino et al., 2015). Transparency in public organizations is also linked to greater public value and hence better Quality of Life (Bolívar & López-Quiles, 2018).

Bolívar and López-Quiles (2018), in an empirical study to identify the impact on Quality of Life as a result of becoming smart, indicate that Quality of Life is not just a broad goal of the smart city, but at the very core of the smart city concept. Thus, Quality of Life research and evaluation of the relationship between people and the quality of their environment and the Quality of Life metrics must be seriously considered in designing any strategy to become smart (Bolívar & López-Quiles, 2018). Challenges with assessing Quality of Life for both subjective and objective factors can be eased through the involvement of citizens in smart city development. This research further exemplifies that citizen engagement and participation strategies in smart city development are critical factors in achieving the goal of improved Quality of Life. Their study also identifies scope for further research in finding a connection between citizen engagement in smart cities and public value creation for improved Quality of Life.

Therefore, participation strategies are an important tool for policymakers and governments to garner support and find public value in solutions through new governance methods. Quality of Life is the fundamental goal of the smart city and thus evaluating for it, is critical to understand and develop the cities further (Bolívar & López-Quiles, 2018; Shapiro, 2006).

2.4 Quality of Life in the Smart City

The concern associated with humanity and Quality of Life is old, although its scientific treatment has been fairly recent (Mikkelsen & Di Nucci, 2015). It was in the late 1970s when the concept of Quality of Life achieved its own identity and definition. Despite being a broad, all-encompassing concept lacking accepted definition, Quality of Life is understood is being, "an integrative concept that involves all areas of life and refers to both objective conditions and subjective components" (Mikkelsen & Di Nucci, 2015). Furthermore, it is multidisciplinary, multidimensional and includes the satisfaction of material and non-material needs, desires and ambitions of people while being connected to the territory and culture (Mikkelsen & Di Nucci, 2015).

Quality of Life has developed exclusively as an academic discipline after the launch of the "Social Indicators Journal" in 1974". Growing as an opposition to the normative economic indicators, Social Indicators research brought to the forefront, the lack of ability possessed by economic indicators to evaluate well-being and Quality of Life of cities and nations. Quality of Life is now embraced by governments and policymakers to assess and evaluate the well-being of citizens, cities, regions and nations (MacLean & Salama, 2019). Despite Quality of Life being the focus of a number of studies, there is still no uniform, standardised, accepted definition for it leading to disagreements on the selection of indicators and how to measure Quality of Life (MacLean & Salama, 2019; Marans, 2015).

In recent times there has been a growing focus on the identification of subjective factors that affect Quality of Life as a response to the objective indicators that fail to incorporate adaptability and variability due to spatial distortion and consideration of individual experiences (Costanza et al., 2007). Mikkelsen and Di Nucci (2015) state that although objective indicators transform the material attributes (goods and services) received by a person to meet basic needs such as housing, employment, healthcare etc., they cannot provide information on a person's adaptability to cultural settings, values or their life as well. It is on this basis that subjective evaluations become important as it provides information on the internal expectations of individuals, "values they hold close, their vision of the world, aspirations and desires that lead to exclusively perspective aspects of approval and disapproval, happiness, satisfaction and dissatisfaction, pain or pleasure to different dimensions of life, in general, and of those goods and services located in the particular geographical area" (Abaleron, 1999 as cited in Mikkelsen and Di Nucci (2015)). Where objective indicators merely assess the opportunities for individuals to improve their Quality of Life, subjective indicators become useful in that they assess the very notion of Quality of Life (Costanza et al., 2007). Thus, reduced carbon dioxide emissions may be seen as a means to an improved environment and Quality of Life rather than an end in itself. This way, subjective

measures are valid tools in evaluating what factors are important to people concerning their happiness and well-being (Costanza et al., 2007).

Many terms have been used to explain and understand the notion of Quality of Life such as well-being, satisfaction, and happiness, with all of them attracting significant interest from the professional environment. In the context of urban environments, Marans and Stimson (2011) present the aspect of Quality of Urban Life (QoUL) highlighting the inherent connection between Quality of Life and *place* where the assessed subject is located. In this manner, the geographic setting or quality of a place is inherently a subjective phenomenon with each occupant in that place differing in their opinion and views about it. Further, these views reflect the perceptions and assessments of the individual influenced by their personal characteristics and past experiences (Marans, 2015; Marans & Stimson, 2011). Those experiences are standards against which current judgements are made. In doing so, (Marans, 2015; Marans & Stimson, 2011) highlight the relationship between objective indicators and the subjective responses that highlight the level of life satisfaction in a neighbourhood. The main assumptions in this framework are:

Figure 2Model showing the relationships between objective neighbourhood conditions, subjective responses and neighbourhood satisfaction (Marans & Stimson, 2011)

1. A single measure cannot capture the quality of the geographical or environmental setting and it requires multiple attributes to measure this setting (the region, city, neighbourhood or dwelling)(Marans & Stimson, 2011).

2. Quality is a subjective phenomenon that reflects the life experiences of the occupants of the setting wherein the objective conditions of the setting in themselves do not convey its true quality. Quality here reflects the meaning of those conditions to the occupant (Marans & Stimson, 2011).

Quality of Life thus finds itself as an integral part of the smart city approach to urban transformations. Smart city initiatives aim to change the urban environment through the use of ICT to improve human capital, social capital, environmental quality, economy and the efficient use of resources to improve Quality of Life (Caragliu et al., 2011). As previously stated, Quality of Life is a fundamental goal of the smart city (Shapiro, 2006), and so it is critical to be able to assess smart city development for its impact on Quality of Life (Bolívar & López-Quiles, 2018). The components of the smart city: smart governance, smart living, smart mobility, smart environment, smart economy, and smart people all have a direct influence on the Quality of Life of citizens. Enabling a successful transformation of the urban environment requires that solutions and their interventions be focussed on improving Quality of Life in the city and considering their impact on various factors, not limited to the objective indicators but also the subjective attributes of life in the city.

2.5   Citizens in the Smart City

The initial concept of the Smart City, induced the notion of the city as becoming "wired", "intelligent" (Albino et al., 2015) as coined by large corporations like IBM. There has since been a significant transformation of this perspective, from a technocratic and top-down approach to one that now is beginning to embrace a bottom-up approach that places citizens and at the centre of this urban development and transformation (Capdevila et al., 2015). Dameri (2014) states that too often smart city solutions have not been able to reach their intended objectives due to forced implementation of technology without consideration of the specificities of the territory and the people living in it. In the same breath, De Filippi et al. (2019) highlight the importance of the implementation of technology as a means to improve the city rather than an end (as defined targets) and focus on the needs of the citizens through their involvement in the design and implementation of the smart city.

There has been an increasing focus on the potential of varying participation strategies to involve citizens in the development of the smart city through the use of ICT platforms and tools in order to foster the

creation of smart communities (De Filippi et al., 2019). Induction of citizens in the development of smart cities has been associated with terms like "inclusive" and "creative" (Albino et al., 2015). The realization and action towards placing citizens in the centre of the smart city discourse and development have also been realised by the Smart City Expo World Congress which is a large, international conference for smart city professionals around the world with its 2017 edition aptly titled *"Empower Cities, Empower People" (SCEWC, 2017).*

Among the definitions of the smart city, Nam and Pardo (2011) explicitly describe the concept, its approach and the solutions derived out of it to be citizen-centric and collaborative to solve the problems of the territory for mobility, economy, governance, living, environment and people. Several cities have employed new forms of governance through digital means to bring citizens, authorities and policymakers closer to improve Quality of Life (Chourabi et al., 2012). Smart governance is understood as an important component of the smart city and is based on the practices of citizen engagement and public-private participation (Chourabi et al., 2012). This falls in line with the study on participatory governance in smart cities by Bolívar and López-Quiles (2018) in which they highlight, "it is necessary for governments and institutions to involve citizens in the development of the city to improve Quality of Life". In their study on citizens perspective on Quality of Life in the smart city of Curitiba in Brazil, Macke, Casagrande, Sarate, and Silva (2018) emphasize that for a city to achieve its goals of sustainability and holistic development for improved Quality of Life, then citizens must be inextricable from the discourse on development. A well-known concept associated with citizens role in the smart city is that of the "Quadruple Helix" (Leydesdorff, 2010) for the creation of a knowledge-based economy. This model for innovation and knowledge creation involves a strong connection between government-institution-business-citizens for the facilitation of innovation in the city with citizens as the fourth helix (Borkowska & Osborne, 2018; Leydesdorff, 2010).

To achieve active participation requires careful planning and organization (Berntzen & Johannessen, 2016) and the use of effective technologies representative of the spatial and demographic context in which participation is being carried out (Simonofski, Vallé, Serral, & Wautelet, 2019). Citizens provide local expertise, are data collectors (through the use of smartphones, and are democratic participants as part of the society we live in (Berntzen & Johannessen, 2016). Further, it is important to ensure that citizens' opinions and values are appropriately considered and evaluated to ensure effective participation (Berntzen & Johannessen, 2016). To optimise the development of solutions and to enable behavioural changes in consumption of energy and resources, engaging citizens is crucial for the success of the smart city.

2.6   Performance of Smart City Initiatives: Quality of Life

The use of rankings, benchmarking tools and indexes have become a universal phenomenon for public and private authorities around to world to develop and nurture performance measurement as being crucial for cities of the future. Being primarily used to measure sustainability and smartness of cities, such indicators and indexes are used as tools that aim to be helpful in guiding and evaluating local and regional policies (Sáez et al., 2020). In literature, there have been several attempts to measure urban smartness and Quality of Life. Some of the well-known classification frameworks are "Ranking of European medium-sized city", "Mercer Quality of Living Index", "The Smart Cities Wheel", "Smart City Index" (Riva Sanseverino, Riva Sanseverino, Vaccaro, Macaione, & Anello, 2017). There also exists the ISO 37120: 2014 "Sustainable development of communities: Indicators for city services and the Quality of Life".

The development and use of such rankings, benchmarking, and indexing tools has proliferated due to the need of developers and policymakers feel the to measure and connect complex outcomes of urban settings to more measurable values. To translate the qualitative complexities into quantifiable values by which to score and grade cities (Sáez et al., 2020). Although these performance tools are developed and used widely, their inherently composite nature along with lack of standardised construction and selection procedures makes them very controversial (Sáez et al., 2020). Previous research on Smart City initiatives has highlighted that, while the design, management, innovation, technology and participation of citizens in smart cities has been widely studied, social impact, policy and governance along with performance indicators and standardisation need further exploration (Gupta, Chauhan, & Jaiswal, 2019). Nevertheless, such indicators are useful as tools for learning, communication and bringing together policymaker's, citizens, and other relevant stakeholders (Sáez et al., 2020). Although most of the popular indicators are used as tools for creating competition between cities, most cities identify as only having an interest in making the process of innovation, implementations of smart technologies and assessing its impact on citizens and the city as their goal (Bosch et al., 2016).

In measuring the performance of smart city initiatives, there exists a considerable gap in the evaluation of Quality of Life and participation in smart projects. Owing to the inherent challenges present in that of measuring Quality of Life due to objective and subjective attributes (Bolívar & López-Quiles, 2018; Macke et al., 2018; Marans & Stimson, 2011), indicators have so far been unable to generate an ideal picture for the impact of the smart city on Quality of Life. Cities involved in the design of performance indicators expressed significant challenges when it comes to the collection, storage, and organization of

relevant data to evaluate for quality of life (Bosch et al., 2016). The aim of such frameworks remains to operationalise the data collection and management to derive quantitative outputs that can aid cities in assessing the performance of initiatives based on its objectives and Key Performance Indicators (KPI) (Bosch et al., 2016). Still, research has highlighted the importance of evaluating the quality of life subjectively not only from the perspective of smart city projects, but also from the view of human geography, urban planning, and social indicator research (Bonaiuto et al., 2015; Khalil, 2012; Mikkelsen & Di Nucci, 2015).

2.7 Amsterdam as a Smart City

In early 2009, following the global economic crisis, Amsterdam adopted the smart city approach as a way to reinvigorate its economy through employment in the technology, startup and innovation sector while focussing on becoming resilient and sustainable. In adopting this approach, the Amsterdam Smart City Program was developed by the Municipality of Amsterdam, the energy operator Liander and the Amsterdam Innovation Motor. From 2008 to 2011, this program was responsible for setting the objectives

Figure 3 Partners in the Amsterdam Smart City Network

and the strategies to be employed to achieve them. The primary goals of this program were to reduce carbon emissions, promote clean energy and reduce climate impact in the city using innovative technologies, ICT, collaboration of actors and knowledge dissemination (Mora & Bolici, 2017). In 2011, the Amsterdam Smart City Program developed into Amsterdam Smart City[1] (ASC) a platform for networking and connecting industry professionals, civic officials, and public and private research institutions to facilitate and support an innovation network that can foster urban solutions to make the city more resilient and liveable for the future (amsterdam smart city, n.d.). Similarly, the Amsterdam Innovation Motor transformed into the Amsterdam Economic Board to simplify and organize collaboration between the private entities, knowledge institutes and government organisations, to increase economic development and well-being in the Amsterdam Metropolitan Area (Amsterdam Economic Board, n.d.).

Along with the ASC platform and the Amsterdam Economic Board, there are several other foundations and institutions that make up the smart city ecosystem in Amsterdam. With institutes such as Waag technology and society (waag.org), ImpactHub Amsterdam (amsterdam.impacthub.net), StartHub Amsterdam (starthubs.co), Amsterdam University of Applied Sciences (AUAS), Smart City Academy, Advanced Metropolitan Solutions Institute and many more, the city is home to a diverse ecosystem where different actors and stakeholders in the urban space come together to facilitate the transition to a more sustainable and liveable smart city.

Amsterdam in the Smart City domain has been a frontrunner and pioneer in implementing various aspects of the Smart City such as Smart Mobility, Smart Living, Smart Energy, Open data access etc. Amsterdam recently became the first city in the world to formally adopt the Doughnut Economy principle for sustainable development as a mode to further itself into becoming a circular and resilient city (DEALL, 2020). With over 200 projects piloted through the ASC platform, the city has become centre for innovation not just from governments and corporations but from citizens as well who use these networks to interact and network with stakeholders who can support ideas to fruition.

The city was recently ranked at 11th place on the IMD Smart City Index (SCI) 2019, 3rd on the EasyPark SCI 2019, 4th on the Statista global SCI 2019 and 4th on the IESE Cities in Motion Index 2019. The city was also awarded the World Smart City Award for its Circular Economy program (SCEWC, 2017). Despite having no formal performance indicators or assessment tools, the city has been consistently ranked among the most liveable cities in the world with a high Quality of Life (MERCER, 2020).

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[1] Amsterdam Smart City (ASC) throughout this study refers to the collaboration and networking platform.

 In the case of Amsterdam, Smart City initiatives aim to enhance Quality of Life and economic development by positioning citizens as the main beneficiaries through organizations such as Amsterdam Smart City (ASC) (Borkowska & Osborne, 2018). There are general guidelines to assess Quality of Life in a neighbourhood and underlying principles that influence it, such as environmental City initiatives on the Quality of Life of the people who live and work the city (Borkowska & Osborne, 2018). quality, digitalization of public services, accessibility to public services and facilities (Dameri & Benevolo, 2016) However, there is not a well-defined set of indicators to measure the impact of Smart city initiatives on the lives of citizens living in Amsterdam.

2.8   Conceptual Framework

Justification for this study is based on the well-known statement that "if you want to know how the shoe fits, ask the person wearing it and not the one who made it". It has been established from existing

Figure 4 Conceptual Framework

research into the smart city concept that Quality of Life is a fundamental goal of smart cities. There is also a significant shift from focussing on the city to that of citizens and the community (De Filippi et al., 2019; Nam & Pardo, 2011). A grounded definition of a smart city from previous studies and the identification of the components of a smart city provide the basis for studying smart city initiatives for citizen engagement and improved Quality of Life. Challenges with assessing smart city initiatives for Quality of Life is reflected by the lack of proper indicators. Furthermore, the presence of both subjective and objective factors is a well-known problem in assessing Quality of Life. Citizen engagement in smart city projects provides cities and project developers to identify problems and offer solutions tailored to the needs of citizens. Involving citizens in local projects and policy can provide a more nuanced approach to implementing smart solutions and delivering higher quality services which can improve Quality of Life.

3   Research Problem

Quality of Life has been a particularly important and useful theme in planning and development especially for smart cities (Greco & Bencardino, 2014). Research also highlights that the overwhelming amount of study into smart cities has taken place after 2013 and that a significant majority of this research highlights Quality of Life as a critical aspect in smart city research (Macke et al., 2018). The complexities in measuring Quality of Life with both subjective and objective factors prevent the use of a single definition (Astiaso Garcia, 2013), thus making it harder for cities to have a satisfactory assessment of the impact of their interventions.

Any attempt to create and assess the social impact from the perspective of policymakers or city developers must begin with establishing contact with the citizens (Astiaso Garcia, 2013). The development of new participatory models such as the quadruple helix (Borkowska & Osborne, 2018;

Figure 5 Quadruple Helix Model of Innovation (Schütz, Heidingsfelder, & Schraudner, 2019)

Leydesdorff, 2010) that includes government, industry, academia and civil society in the innovation framework has led to the rethinking of citizens' role in the smart city and brings to light the need to involve citizens not just as users or testers but as active innovators and collaborators in policy, neighbourhood development and evaluation of smart city development. Despite their clear significance in the process, citizens have been to a large extent been excluded from the smart city (Engelbert, van Zoonen, & Hirzalla, 2019; Schütz et al., 2019).

In this world of smart cities, Amsterdam has emerged as one of the pioneers with its innovative economic climate located in the welfare state of the Netherlands where citizen participation and Quality of Life take clear precedence. Although the city ranks among the top liveable cities in the world, there still are no clear insights as to how smart city development is impacting Quality of Life in the city (Borkowska & Osborne, 2018). Although there have been assessments at a national policy level with regards to Quality of Life (*De sociale staat van Nederland*, 2019), in the context of urban development and the impact of smart city initiatives on Quality of Life, there are none yet.

The inability to satisfactorily assess changes to Quality of Life along with the desire and need to have citizens play a more active role in its development provides an avenue for research into their mutual relationship and understanding the impact of smart city initiatives.

3.1 Research Objective and Research Question

The objective of this study is to describe the relationship between citizen engagement and Quality of Life by interpretively studying smart city projects in Amsterdam. The underlying assumption in this objective is that citizen engagement contributes to identifying and understanding of factors affecting Quality of Life and hence improve the assessment of smart city projects for it. This research objective provides the primary research question.

> ***How can the relationship between Quality of Life and citizen engagement in smart city projects in Amsterdam be described?***

To answer this main research question, the following sub research questions have been formulated,

- SRQ1: How is the evolution of the smart city concept towards citizen engagement and Quality of Life experienced in Amsterdam?
- SRQ2: In what ways are citizen engagement and Quality of Life considered in different smart projects in Amsterdam?
- SRQ3: What role do citizen engagement and Quality of Life play in the assessment of smart city projects in Amsterdam?

4 Research Design

In this chapter, the design of the research undertaken, and the resulting actions and considerations made during the research process are explained. In the very beginning, it was realised that the study will first have to explore and understand what the smart city ecosystem in Amsterdam is. Only then would it be possible to further probe into the way citizen engagement and Quality of Life are considered in order to establish a relationship between them. This initial understanding required the study to follow an open and flexible approach to adapt to information from both literature and individuals with the smart city environment of Amsterdam. The study in this manner is qualitative and follows an interpretive research approach to answer the main research question.

An iterative-recursive approach is at the core of the interpretive research process where the researcher is required to be flexible, open-ended and is exploring the field and topic of research to develop a better understanding of the phenomenon from the perspective of an insider (Elliott & Timulak, 2005; Schwartz-Shea & Yanow, 2012). The research initially started out with some basic background from academic literature which provided the contextual basis for studying smart cities and framing of the initial research question and assumption. As new literature was accessed and interviews were conducted, the discovery of new information led to additions and reframing of the research question, the inclusion of new concepts and development of the overall research objective of this study. What this entails is that insights from each succeeding activity undertaken during this research process influenced the preceding steps. Abductive reasoning is taken when solving the puzzle (research objective) highlights other paths of study which when explored provide a richer understanding of the phenomenon at hand (Schwartz-Shea & Yanow, 2012). Thus, the research steps are not always chronological, and the research adapts to the new information as explained in sections 4.1 to 4.4. Therefore, the research design in this study acts mainly as a guiding framework but not exhaustive through the process.

An interpretive research approach encourages the finding of unexpected meanings (Elliott & Timulak, 2005). Contextual understanding of the phenomenon is generated through documents, observation, and interactions with actors in the field as the focus of an interpretive approach is open-ended, exploratory and leads to the formation of rich, descriptive accounts of the studied phenomenon. The choosing of relevant documents and actors to interview is dependent on the researcher's approach, accessibility of documents and interviewees, and the setting of the interviews as well. All of these factors are crucial to sense-making from data generated in interpretive research (Schwartz-Shea & Yanow, 2012). This

Figure 6 Research Process

reflexiveness in the process is further elucidated in each section describing the research process. Furthermore, to ensure transparency, considerations made and influences in the selection of interviewees, cases and documents are described thoroughly. This chapter is divided into four sections explaining each activity in the research process. First, the problem identification and framing of the research question is described. Second, the process of data collection is described. The second section also addresses the issue of accessibility in selecting interviewees and illustrates the exposure of the

interviewees' organisations in the context of Amsterdam as a smart city. Third, the process of conducting the interviews and the setting of the interviews is described. Finally, the chapter highlights the approach to the analysis of the data generated during this research.

4.1 Problem Identification and Framing of Research Question

As a qualitative study, the research process began with the identification of an initial problem and assumption. The primary interest within this research was to identify the impact of smart city initiatives on Quality of Life. Drawing on this motivation, the initial literature review identified a shortcoming in the way indicators represented the impact of smart city initiatives (Sáez et al., 2020) and the absence of indicators particularly in the case of Amsterdam (Borkowska & Osborne, 2018).

To drive this research forward, it was important to validate this problem as being relevant to the actual context of Amsterdam as a smart city. This is an important step in the interpretive approach wherein solving the puzzle requires making it simpler to understand or less complex and less surprising (Locke, Golden-Biddle, & Feldman, 2008). This process involved further exploration of academic literature, policy documents and conducting preliminary interviews with experts in the field (elaborated in section 5.2) simultaneously. This process of exploration follows the logic of abductive reasoning which is an inferential process that helps to further deconstruct the problem and identify possible explanations (Schwartz-Shea & Yanow, 2012, p. 28).

The hermeneutic circle is used to explain the way of thinking in interpretive research where the study begins with wherever the researcher is at that point and expands as the process of sense-making

"lamp post," t^0

search, t^1

search, t^2

Figure 7 The hermeneutic circle visualised as moving away from the light under a lamp post (Schwartz-Shea & Yanow, 2012).

develops further. The exploration for the meaning of and need to measure Quality of Life in smart city projects in Amsterdam led to the inclusion of citizen engagement as a way to look at the problem differently. As mentioned by Bolívar and López-Quiles (2018), there is an opportunity to explore how citizen engagement relates to improved Quality of Life in the context of smart city projects.

As the primary concepts of this research are subjective, following an interpretive approach provided the study with the ability to conduct research without an exhaustive research question and allowed for greater flexibility as information was gathered. The inclusion of citizen engagement through the iterative process led to the development of the main research question presented in section 4.1.

To answer the main research question, a set of sub research questions have been formulated to structure the study into an operational format through which, answering the sub-questions will enable the study to answer the main research question. Framing of the sub-question too subsequently involved an iterative approach similar to that of the main research question. The sub-research questions highlight the spatial context of the study as it focuses on projects either implemented or being implemented in Amsterdam. Further, each question analyses the relationship between the two main concepts of this research with respect to the smart city approach and smart initiatives in Amsterdam and their assessment. The development of each of these sub-questions and the overall main research question affects the choice of actors and cases accessed in this study which is described in the next section.

4.2 Data Collection

This section explains the approach to data collection highlighting the recognition of relevant information sources, the sampling strategy or mapping exposure of the study concerning the research context and hence its influence on the selection and accessing of interviewees and cases studied during this research.

The approach to this data collection activity was inherently open-ended and flexible, allowing the study to evolve and adapt to the situations and information arising from interactions with relevant actors and experiences in the setting. An interpretive approach evokes open-endedness and flexibility where initial understandings are questioned, assessed and reformulated in light of new evidence, knowledge and perspectives (Elliott & Timulak, 2005; Schwartz-Shea & Yanow, 2012). Particular aspects to this flexibility in this research are the accessibility of actors for interviews, smart city projects for studying, and other external factors from the environment, all of which will be explained in the sections below including considerations made in the representation of information from interviewees and their anonymity.

4.2.1 Sampling Method

Following the formulation of the initial research question, interpretive research steps into the activity of identifying potential sources of evidence that can lend meaning and context to the study being conducted. This initially meant establishing the relevance of understanding Quality of Life in the context of smart city projects in Amsterdam. As iterated by literature on Quality of Life, the concept is

Figure 8 Data collection Framework

subjective and variable depending on the lived-experiences of the subjects being studied (Marans & Stimson, 2011; Mikkelsen & Di Nucci, 2015). Subjectivity in this study required concept development through interactions with participants who are "local experts" and understanding their perspective and

views in relation to the themes of research. This approach is important not just for generating contextualised information but also for sense-making during the analysis of the generated data.

In selecting actors, to interview, they needed to be embedded within the smart city ecosystem of Amsterdam. Since the initial interviews comprised more of understanding the views of experts on Quality of Life in smart city projects, it was essential to utilise their knowledge and professional network to gain access to smart city projects in the city. As most smart city projects are conducted in conjunction with public, private, institutional actors and citizens, interacting all with actors was key to developing a rich understanding of the context and the various activities and perspectives within it. Studying projects that the interviewees were associated with allowed the research to not just accumulate evidence from participants in interviews but connect this evidence to their experience in the relevant smart city projects and essential to developing an interpretive research (Schwartz-Shea & Yanow, 2012).

To select smart city projects, it was decided that projects that would be studied, must meet at least one of two criteria. Firstly, the project must be termed or labelled as a smart city project, either by European Commission (EC) funding or be linked to the ASC (ASC) platform or any other smart city platform in Amsterdam (e.g.: Smart City Academy). Secondly, despite the broad definition of smart city, the project must fit within the conceptual definition prescribed by Caragliu et al. (2011) which is the guiding definition for a smart city and smart city initiatives in this study.

Four projects were studied during this research. These projects are ATELIER, RESILIO, Making Sense, and Buurt Budget, all of which are situated within the city of Amsterdam. These projects were not selected before the commencement of research, instead, their study was brought on through interviews conducted during research. In selecting the projects, the main criteria of influence were their accessibility. The possibility of an interviewee being able to provide access to the project through other relevant personnel and the accessibility of documents related to the project was important. Although projects like ATELIER and RESILIO are still in very early stages it was considered useful to understand the approach and role of Quality of Life and citizen engagement within these projects through interviews with those working in them. At the same time apart from accessibility, the projects had to fulfil the conditions mentioned above of fitting either in the definition of a smart city project or being part of the smart city platform i.e. ASC. The projects are both, infrastructural smart projects (ATELIER and RESILIO) and non-infrastructural citizen-centric projects (Buurt Budget and Making Sense). although these projects are not a complete representation of the smart projects being implemented in Amsterdam, they do highlight the diversity of the projects being implemented and the breadth of what is "smart" in Amsterdam. It is also useful to highlight that all of the projects provide open access to a

large amount of information through websites, online articles, blog posts, and newsletters which influenced their selection as the accessibility of documents is an important factor. Also, all projects studied in this research are connected to an interviewee accessed in this study which ensured establishing their context through the experience of the interviewee.

Thus, in this study, primary data was collected by conducting interviews while secondary data was collected through accumulating relevant project documents, websites, and other open-source publications. The choice of sources and their accessibility are highlighted below.

4.2.2 Primary Data

[2]To find the meaning, relevance, and usage of Quality of Life and citizen engagement (that emerged through iteration) within smart city projects in Amsterdam, it was important to understand the smart city ecosystem in Amsterdam. The ASC platform was identified as the first point of entry to understand this ecosystem or "lay of the land". As a networking platform for smart city projects, public/private institutions and independent innovators, the platform is very much at the centre of smart city activities and discourses in Amsterdam. Thus, it was considered only logical to utilise this network to gain broader

Figure 9 Mapping exposure through position of interviewee's organizations in the Amsterdam smart city ecosystem. and their connection to the cases studied

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[2] Image sources: www.amsterdamsmartcity.com ; www.smartcity-atelier.eu ; www.resilio.amsterdam ; www.combiwel.nl ; www.buurtbudget.amsterdam.nl ; (MakingSense, 2018)

access to the ecosystem. Interviewees from this platform included one organizational employee, a smart city ambassador, and a curator of the smart city platform. Although some interviews did not directly lead to the identification of further candidates for interviews, they provided a better understanding of the smart city network in Amsterdam and gave insights into further points of contact. Also, it was the insights from these initial interviews that set the basis for the reframing of the research question and inclusion of citizen engagement in this study.

As this study is conducted under the supervision of the AMS Institute, which is also a partner in the ASC platform, it was an ideal point of access to experts in the field of smart cities and smart urban development. Along with the AMS Institute, Amsterdam University of Applied Sciences, also a partner in the ASC platform was identified as an important point of contact. Through their Smart City Academy that conducts smart city research and development, interviews with their experts led to a string of contacts and the associated smart city projects, which have been studied in this research project.

The respondent from the AMS Institute was a program developer and formerly associated with the Municipality of Amsterdam and provided the study with contact to the Public Innovations and the Democratization teams within the municipality. Experts referred to from this interview provided access to the first case studied in this research which is Buurt Budget (Neighbourhood Budget). A similar pattern of access followed with each respondent from the municipality providing reference to further actors with potential insights on the research topic. Access through the AMS Institute network led to three interviews with experts from the Municipality of Amsterdam which further led to one interview with an expert from a social work and welfare organization. The Making Sense project was thus selected as a project to study as one of the experts from the municipality was among the coordinators of the project and provided information and details of the project that was very useful in the context of this research.

The interview with the AUAS Smart City Academy was conducted with a program coordinator who is also an academic researcher in the domain of smart city development. This interview also led to the broadening of potential contacts to access and relevant smart city projects to study. As the Smart City Academy is actively involved in research of specific smart city solutions in Amsterdam, it has a wide network and variety of projects and experts involved in smart city development. The interview introduced the remaining two projects that have been studied in this research i.e. ATELIER and RESILIO. the interview also provided access to two experts, one academic expert from the AUAS working with RESILIO and the other a project coordinator for ATELIER from the Waag Society.

The process of selecting these interviewees was highly dependent not just on the network of the organization but also the amount of activity taking place in relation to the research topic of this study. Projects that had already concluded were more difficult to access for interviews due to less activity and involved personnel usually moving onto different projects. There were also, numerous intermediary contacts in this process who were involved in recommending the eventual respondents either due to lack of expertise in light of the research focus or due to time constraints.

Ideally, the research would also have liked to access citizens who are (or) were engaged within these projects identified through the interviews and gain their perspectives on the aspects of Quality of Life and citizen engagement[3]. But this was not possible as the COVID-19 pandemic prompted a complete shutdown of society making it difficult not just to access but also to identify who to interview. In light of this situation and the prevailing social distancing norms, most interviews had to be conducted through a digital medium mainly video conferencing tools.

Finally, all interviewees were willing [4]participants in this study and were free to validate the recording of the interviews and choose anonymity in the representation of their views. Out of the 13 interviews conducted in this study, 5 respondents preferred to remain anonymous. To equally treat all viewpoints and ensure uniform representation of information, the identity of the interviewees have been anonymised. Only the organisation that they belong to and the project they were connected to have been provided. Interviewees' designation within the organization has been anonymised as well. All interviewees are henceforth referred to as *respondents, actors, participants,* or *interviewees.* The complete list of interviews conducted during this research is provided in Appendix 1[5].[6]

4.2.3 Secondary Data

Secondary data was collected by accessing relevant project reports, public research publications, policy documents along with articles about the projects and the platforms either on the website or on the open web. The smart city is a well-documented concept be it in academic contexts, public affairs, public policy, or journalistic inquisitiveness. With larger social aspects such as privacy, climate change, rights

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[3] Although it might have been possible to interview some personal contact, the author of this study was unable to contact someone with participatory experience in smart city projects. Also, interviewing someone not involved in a project in the city was assumed to be not relevant to the context.
[4] Since it was not possible to be physically conduct the interviews, verbal consent had to be taken at the beginning of the interview.
[5] There were also many in person interactions that were not formally interviews but had important contributions to this research even though they are not mentioned.
[6] The reference provided in this table is used to refer to information provided by interviewees in this study.

and more attached to it, there is a vast amount of published material that is useful in analysing the concepts this study deals with and the smart city projects selected. Furthermore, Quality of Life, citizen participation, governance, energy, and other components of the smart city concept are discussed extensively in the public open-source domain with many public research activities providing free access to their work. For this reason, grey literature provides valuable content and context creation when studying Quality of Life and citizen engagement in smart cities.

In relation to the projects, it is important to note that since not all of them have concluded or even begun implementation (primarily due to delays caused by the COVID-19 pandemic) the amount of secondary information sourced was dependent extensively on the information provided on their websites such as in the case of ATELIER and RESILIO. In the case of Buurt Budget, there are concerns of privacy and dissemination of internal evaluations and hence some documented information cannot be shared within this research.

4.3   Conducting Interviews: Design and Approach

For the purposes of this research, primary data was sourced by conducting semi-structured interviews with respondents. Before conducting the interviews, an interview protocol was designed, aimed at understanding the relevance of the key themes of the study in the context of Amsterdam. While this interview protocol was relatively fixed in the initial interviews, in light of new information and the different types of actors accessed in this process, the interview protocol had to be revised multiple times. This is intrinsic to the interpretive research approach as the process is inferential and participants are recognised as having their own identity and agency (Schwartz-Shea & Yanow, 2012). It is important in an interpretive approach to enable participants or respondents to actively participate in the co-generation of new information and in the research developing a more nuanced understanding of the context (Schwartz-Shea & Yanow, 2012).

In this research, the concepts of Quality of Life and citizen engagement and the smart city are well identified but not related yet, which is ideal for semi-structured interviews ("The SAGE Encyclopedia of Qualitative Research Methods," 2008). With the core aspects of this research being broad, subjective, and qualitative, semi-structured interviews allow for open-ended questions while keeping the discussion focussed on the elements of the interview. Such interviews are a useful tool to generate qualitative data when respondents are contributors or administratively related to the topic of research (Adams, 2015).

With a wide variety of participants all holding accountability for the development of projects in Amsterdam, probing is a necessary part of such interviews where participants may initially be hesitant to truly admit or express their thoughts, viewpoints and even feelings about the topic of research. Semi-structured interviews, therefore, allow for having an open-ended approach while ensuring a balance between quality insights, openness and personal relationship with the participant (Adams, 2015). Within this study, aspects of citizen engagement are closely related to governance and public policy which might have been hindered in a structured interview, while a semi-structured interview allows the respondent to be candid and express their opinions (Adams, 2015).

In conducting interviews, participants were contacted beforehand by e-mail which included an introductory outline of the motivation of the research, its aims, and a general set of questions that the study would like answers to from the participant. These questions provided to the participants were specifically tailored to their backgrounds and expertise as the research progressed and set the basis for the discussion in the interview. The average interview conducted was 45-60 minutes long and had between 7-10 main questions with further prompts to fit within the time available for the respondent taking part in the interview. It is important to note that the interviews were not just a question-answer interaction but allowed for the development of ideas within the research in what is described as co-generation of data within an interpretive approach (Schwartz-Shea & Yanow, 2012). This flexibility in the interview process required an improvisational approach wherein ideas from respondents were allowed to flow and meticulous attention was given to information that either answered or contradicted the focus of this research and thus warranted iterations.

The interviews began with a brief introduction about the author and a general introduction about the subject of research followed by a statement highlighting the relevance of the interviewee with this research study. This was followed by an introduction of the interviewee and their general experience within this domain of smart cities and specific smart city projects. Although this procedure was followed in principle for most interviews, in interactions with certain respondents working within smart city projects it was important to also share some doubts and insights from the previously collected information to create a relaxed atmosphere for the discussion to take place. This is relevant to the interpretive approach as researchers sometimes have to share common grounds and build synchronous thoughts with respondents to gather meaningful and contextual information that highlights the respondents' personal experience concerning the concepts of the study (Schwartz-Shea & Yanow, 2012).

4.4 Data Analysis Approach

In this section, the approach to analysing the data generated through the interviews conducted in this research and the documents collected are explained. The analysis consists of word-data which was gathered through transcripts of the interviews, note-making or memoing and textual references in documents. The analysis of qualitative data is an iterative and ongoing process that entails steps from the very beginning of data collection through to the final writing of the research project (Silverman, 2015). This process allows for the flexibility within interpretive research approaches to adapt to contingencies encountered during the process of discovery. In this study, the main forms of analysing the generated and collected qualitative data were through coding and memoing. The interview transcripts were coded using the qualitative analysis software Atlas.ti Version 8. The software simplifies the organization of the collected transcripts and allows for the coding process to take place seamlessly in a digital manner. This is particularly useful when as coding is an iterative process and by having all the textual data in one place and well organised helps to speed up the process.

The first step in the analysis is the organisation of all the data gathered during the data collection phase. This includes transcribing the interviews and assimilation of memos and fieldnotes generated throughout the research process. Since the interviews were conducted primarily through video conferencing tools, it was important to also take memos and notes during the interview process to avoid issues arising due to digital data corruption, poor audio or video quality and in some cases also the inability to record the interview due to the digital platform setup. Hence, memoing as a practice was critical in ensuring all the information gathered during the interview was elaborated succinctly before analysis. Memos are similar to fieldnotes (Silverman, 2015) and are embedded in the study of transcripts and documents gathered in the data collection process and help in defining codes as a source of abbreviated references. Although fieldnotes are usually referred to a researcher's note-making practice in the settings of data collection (Schwartz-Shea & Yanow, 2012; Silverman, 2015), in the context of this study, it refers to the note-making and the jotting down of observations during open interactions with people in the setting or afterthoughts following the interviews. These activities of memoing and fieldnotes supplemented the data generated from interviews and allowed coding of the data to take place in a more seamless manner. Although described in a chronological sequence, the practice of generating field notes and memos took place simultaneously throughout the course of this research and supported the iterations made to the overall research design.

Coding is essentially sorting data into relevant categories and themes (Silverman, 2015) which helps in further analysis of the information. It is an iterative process that helps narrow down the breadth of information presented by transcripts and documents. After the transcribing of the interviews, an initial

round of open coding was done where the entire transcript from an interview was read line by line and codes were attached to excerpts that signified relevant information to the study. As Silverman (2015) suggests, after the initial open coding, further rounds of focussed coding must be done by comparing initial codes to synthesise broader themes relevant to the research. This was done through the iterative analysis of transcripts, comparisons with similar codes developed in other transcripts and memoing during the process to attach more contextual descriptions to the codes and the ways in which codes related to each other. The objective of this coding process was to synthesise the broad textual evidence gathered into themes relevant to the concepts being studied. Doing this repetitively, increased familiarity with the context of the actors interviewed in light of their individual experiences, preferences and approach towards citizen engagement and Quality of Life in the smart city. It further assisted in relating this context to the evidence identified from documents and other materials gathered throughout the research process.

5   Results

This chapter reports the findings of this study undertaken in order to answer the question: how can the relationship between citizen engagement and Quality of Life in smart city projects in Amsterdam be described? To answer this research question, data was gathered through the use of semi-structured interviews by accessing actors within the smart city ecosystem of Amsterdam. To provide context to the experiences of the actors, the projects that they are (or) have been involved in were also studied. The projects were studied through both, first-hand account of the participants from interviews and available material such as project documents, project websites and open-source articles available online.

The chapter is divided into five sections. The first four sections describe each project studied individually. The theme of the project, the stakeholders involved, the existing outcomes of the project and the key findings from the projects are presented. The key findings provide details as to how a project is positioned within the smart city definition and the ecosystem of Amsterdam. This is followed by its approach (to) and utilisation of Quality of Life and citizen engagement in its development and implementation. The final i.e. the fifth section of this chapter elucidates the broader findings from this research and highlights some of the similarities and dissimilarities in the findings obtained during this research process.

5.1   Making Sense

5.1.1   About

Making Sense is a European Commission funded project which was a part of the Horizon 2020 ICT2015 call for Research and Innovation Action. The project was designed "to create collective and individual environmental awareness by harnessing the power of networks of people, knowledge, and sensors" (MakingSense, 2018). The aim of the project through its implementation and completion has been to increase focus and support for transitioning from collective awareness to collective action. This in turn leads to a better decision-making practice that is well-informed and empowers citizens through interactive participation (MakingSense, 2017). The project aims to use its approach to support change and transformation at community and individual levels (MakingSense, 2017). The core principles of the project are openness, co-creation, empowerment, and change-making. The project utilised open-source sensing technology, open data and data awareness in combination with participation strategies for diverse dimensions of change (MakingSense, 2017). the project implemented pilot projects which were

tested in three European cities: Amsterdam, Barcelona, and Pristina in Kosovo. The sensing technologies used are open source, such as the Smart Citizen Kit which has also been made open source. During its implementation, Making Sense worked in collaboration with communities to create, interpret, and make sense of sensor data. This way the project encouraged citizens to become aware of their local environment and empowered them to take action and implement change.

The goal of the project was to facilitate a collaborative and co-creative process to enable citizens to sense the environment without needing expensive, high-end sensor technology. The philosophy within the project was that availability of technology does not induce participation, rather it is important to have sound participation strategies and tools in place.

5.1.2   Stakeholders in the Project

Making Sense ran between 2015 and 2018. It was organized and executed by the Waag Society in Amsterdam; University of Dundee in Scotland; Fab Lab Barcelona at the Institute for Advanced Architecture in Catalonia; the Joint Research Centre of the European Commission in Brussels; Peer Educators Network in Kosovo, and University of Twente in Enschede. The project is a further development of the Smart Citizen Kit (an open-source, bottom-up sensing platform developed by Fab Lab Barcelona) and several previous pilots run by Waag Society in Amsterdam, FutureEverything in Manchester, Fab Lab Barcelona and the Peer Educators Network in Kosovo (MakingSense, 2017, 2018)

5.1.3   Project Outcomes

With this approach, the project conducted 9 pilots, 3 in each focus city and produced the Citizen Sensing Toolkit. This toolkit enables other organizations and private individuals to implement the participation strategy developed through this project to facilitate citizen engagement, gathering of resources and guiding developers through challenges of participative and co-creative processes. The framework is not limited to citizen sensing and addresses participation strategies for change-making and collective awareness with citizen sensing as an outcome of this approach. Each step in the participation framework highlights the key participants, the relevance of the step, how to conduct it, and the point in time of development of a project to organize the step.

The pilots conducted in the three cities provide some interesting examples of the impact of citizen sensing and citizen-led intervention. In the Amsterdam AirQ pilot conducted at the Valkenburgerstraat, citizens used their self-made sensors to generate data on air pollution caused due to NO_2 which led to citizens identifying health concerns for the residents living in the area. This further led to a movement which prompted the Dutch National Institute for Public Health and Environment (RIVM) to change its policy on citizen sensed environmental data to be considered as a valid information source (MakingSense, 2018). In the Barcelona pilot at the Plaza del Sol, a square with significant noise problems, citizen sensing brought about awareness among residents to the cause of noise pollution which was identified as night drinking and large congregations of crowds lasting late into the night. Through sensing and identifying the nature of the problem the residents were able to have an intervention through public demonstrations at the square which prompted the local government to undertake refurbishments in the neighbourhood to help alleviate the effect of noise pollution and improve liveability (MakingSense, 2018). Furthermore, following the conclusion of the project, the citizens

Figure 10 Cross-cutting principles and participation process in Making Sense (adapted from MakingSense (2018))

managed to alter the cleaning and sanitation times at the square that prompted an earlier dispersion of the crowds and reduced noise pollution which was verified by the sensor they installed at the square.

5.1.4   Key Findings

The Making Sense Project although not termed a smart city project is part of the ASC network by way of the Waag Society which is a partner of the platform and was called a smart city project in a broad sense. As stated succinctly in the Making Sense final deliverable (MakingSense, 2017) the main feature of the project is to enable citizens to take collective action by harnessing the power of networks, people, knowledge, and sensors (MakingSense, 2018), thus creating smart citizens and smart communities through the use of ICT and education. The project is in line with components of the smart city: smart people. Smart environment and smart governance. The governance factor comes to light as one of the key outcomes of the project was the acceptance of citizen sensed data as a valid information source by the Dutch National Institute for Public Health and Environment (RIVM). During the interview, the respondent highlighted the broader debate that took place within this project on the aspect of ownership of data that is produced by the public in public spaces (MakingSense, 2017). The project brings about the larger debates of active citizens and returning agency of the environment to the residents by empowering them.

"Making Sense in a way is a reaction to the smart city. We don't need Smart City's but Smart citizens. That we want to make our citizens and not our cities smarter. So, in a way we want to take back some agency as to what is being measured in the city and what control you have on the data being generated by you just living in the city."

-(INT7,2020)

In its evaluation of participation strategies, the project identified that one of the main hurdles to participation was the confidence of citizens in their ability to sense data or be skilled in the activity (MakingSense, 2017). As the project progressed, they observed a greater sense of confidence and personal development among participants in Making Sense. This skilling process was done through workshops, boot camps and hackathons as exemplified in Pristina. The project also involved citizens in co-creating the tools and the monitoring frameworks for their sensors which allowed them to collaborate more

effectively in the later stages of the project. Activities in this phase enable upskilling of citizens and developed their "data literacy" (MakingSense, 2017). Participants in the project highlighted a greater sense of ownership which led them to become more active community members which is exemplified by the Barcelona *citizen champions* and the AirQ pilot. The project experienced some challenges concerning diversity challenges particularly in Amsterdam and Barcelona where it was harder to get a diverse participating group although by the third pilot in Barcelona and the Smart Kids Lab in Amsterdam this problem was significantly reduced (MakingSense, 2017).

Figure 11 Word cloud generated from analysing Citizen Sensing a Toolkit (MakingSense (2018)

The project did not involve any KPIs to measure success. With regards to participation, on a broader level, the project had deliverables as to the number of visitors or readers of their blog posts and other communication channels such as social media. As the respondent highlights in his statement, "You also have indicators like, you want 5000 people clicking on the LinkedIn posts as engagement. But I do not think they are very interesting or useful and it is just like checking boxes" (INT7, 2020). In response to using citizen engagement to evaluate the impact of an initiative and identifying changes, the respondent stated,

> *"If you only have 30 to 50 people in a meeting, is that fair representation and if you want more how much is more, when is it really good enough? If you like subjectiveness, if there are 3 people and they create good things then is it a success because there were not 20 people? So it's hard to measure".*

-(INT7, 2020)

The primary evaluation that took place within the project was of the participatory process and strategy. Within the project itself, feedback and assessment were more valuable to the stakeholders rather than the European Commission funding the project. The outcomes of the pilots conducted show that the project has had a positive impact on the lives of the participants and the neighbourhoods in which they installed the sensors. As explained by the respondent from an example of one pilot in Barcelona where citizens effected physical changes to the neighbourhood along with other innovative approaches to curb noise pollution.

> *"In Barcelona one group setup some architectural changes in the neighbourhood. Another was people sitting on stairs who would make noise. So just cleaning an hour earlier significantly changed the neighbourhood. So, you use citizens as local experts and they can implement small but quite significant changes. If you can use this in such a way, it can have positive interventions and policy changes. Then participation definitely can have a positive impact. So, in Barcelona, this made the space much quieter and much more liveable".*

-(INT7,2020)

As funding of projects stops after a certain time it is difficult to assess or record long term impact. The project has also resulted in multiple spinoffs for the stakeholders such as the project *HollandseLucht* which is a larger citizen sensed air quality project organized by the Waag Society.

5.2 ATELIER

5.2.1 About

ATELIER (**A**ms**TE**rdam Bi**L**bao C**I**tizen Driv**E**n Sma**R**t Cities) is an EU funded Smart Cities project aimed at creating and replicating Positive Energy Districts (PEDs) within two Lighthouse Cities (Amsterdam and Bilbao) and six fellow cities (Bratislava, Budapest, Copenhagen, Krakow, Matosinhos and Riga) (ATELIER, 2020a). The main objective of ATELIER is to realise Positive Energy Districts in Amsterdam and Bilbao to save 1,7 kiloton of CO_2 emissions, demonstrating that integrated smart urban solutions support the deployment of PEDs and their replication in the six Fellow cities Bratislava, Budapest Copenhagen, Krakow, Matosinhos and Riga (ATELIER, 2020a). This objective is based upon three principles (ATELIER, 2020a):

1. **Reduction of CO2 emissions:** This is realised through the deployment of local smart urban solutions, addressing a combination of technical, financial, legal, and social measures that support system integration, local production of renewable energy and high energy efficiency, stimulating local public and private investments.

2. **Sustainable, secure and affordable energy systems for citizens:** The PEDs not only support the realisation of this objective and improve the quality of the urban surroundings of citizens living in and using the districts but also through smart systems contribute to the security and affordability of the system as a whole.

3. **Collaboration and knowledge sharing:** To realise, scale-up and replicate PEDs through smart urban solutions. ATELIER creates unique opportunities for collaboration in a network of public authorities, knowledge institutes, industries, and active citizens in the district and the city, and additionally shares knowledge and experiences with Fellow Cities, related Smart City projects, and other ambitious EU cities.

Figure 12 Location of ATELIER within Buiksloterham in Amsterdam

In Amsterdam, ATELIER is implementing the PED at six locations in the Buiksloterham neighbourhood in Amsterdam North. The former industrial neighbourhood is being transformed into a low-carbon, smart, Positive Energy District (PED) with mixed uses. In this district, new energy-efficient buildings are being built, a high share of RES (Renewable Energy System) generating solutions is installed and smart technology is deployed for optimising local energy balance and sharing between different users. In Amsterdam, this project utilises a special derogation from Dutch energy laws, exempting the PED

Figure 13 Visualization of the involved communities and renewable energy plots within the Amsterdam Demonstrator project in the Buiksloterham (Source: (Spectral, 2020))

from several potential legal obstacles that could otherwise be obstacles or even put an end to the development of an innovative efficient energy system (ATELIER, 2020a). This exemption enables those who receive it to experiment with innovative solutions, such as the 'Local Energy Market Platform', with which exchange of electricity and balance within the local energy network can be efficiently manages by energy communities (ATELIER, 2020a). The project aims to implement several solutions; green roofs and recycled building materials, large scale deployment of Photovoltaic panels, deployment of smart grids, energy market platform, setting up of energy communities, integrated e-mobility and charging stations to achieve the goal of a PED. These neighbourhoods aim to generate and transfer energy back into the grid.

According to the description by the EU-Smart City Information Systems on their website, "ATELIER puts citizens at the centre of all its activities: residents (<9000), local initiatives and energy communities will be included in decision-making processes and activities and will be strongly engaged in the development of the technical solutions throughout the project. Citizens will be involved in the Innovation Ateliers to create a maximum impact for the PEDs". According to the project website, ATELIER (2020a) will involve the inhabitants in the design of the environment such as the car-sharing facilities and evaluations of the various demonstrators. (SCIS, 2020)

5.2.2 Stakeholders in the Project

The overall ATELIER consortium consists of 30 partners from 11 in countries. In Amsterdam, the project is coordinated by the Municipality of Amsterdam along with a combination of research institutes (such as AMS Institute, AUAS, TNO, Fraunhofer Institute), Waternet, energy suppliers, operators and consultants (DNV GL, Spectral, Green choice) and real estate developers (Republica, Edwin Oostmeijer Real Estate) public research organisations like the Waag Society.

The Waag society within ATELIER is responsible for external communication and the coordination of the citizen engagement strategy through a dedicated work package within the project. The AMS Institute as part of the project is responsible for the implementation of the Living Lab methodology to ensure that the demonstrations from the project are can be learnt from and replicated in other cities (AMS Institute, n.d.). The AUAS leads the cooperation of the PED projects by developing a monitoring and evaluation framework (ATELIER, 2020b). As part of the EU-Smart Cities Information Systems and the Smart Cities and Communities (SCC1) network, the project also collaborates with 4 sister projects: +CityXChange, MAKINGCITY, SPARC's and POCITYF all of which are implementing similar solutions in other European Cities (ATELIER, 2020a).

5.2.3 Project Outcomes

The ATELIER project is a 5-year initiative to be implemented between 2020-2025. Initiated by the Municipality of Amsterdam, the project is driven by the city's policy plan which intends to become climate neutral by 2050. Currently, the project is still in the initial stages of implementation where technical detailing and design for the PED's has been established. The construction and physical implementation of the solutions is yet to begin. Therefore, the project is very much at a nascent stage and it is difficult to determine what the actual outcomes would be. At this stage of this research study, the project is facing further delays due to the COVID-19 pandemic. Nevertheless, the project has been

organizing internal workshops with regards to the participation and engagement strategy that should be implemented later in the project. In later stages, the project aims to organize demonstrations and living labs through which they aim to provide citizens with an experience of the PED.

5.2.4   Key Findings

The ATELIER project is very much at the core of the definition of a smart city and addresses every component identified within the smart city concept. Beyond that, it also terms itself as a smart city project and is funded under the European Commission's call for Smart City Solutions within the Horizon 2020 program. The project is primarily technical with the design and implementation of renewable and climate-neutral energy systems at a large scale. Despite this, it is significantly motivated by social factors such as people's behaviour regarding energy consumption and production. As expressed by the interviewee in stating the objective for citizen engagement in the project,

> *"In a general perspective, the Waag realizes that the energy transition which is the bigger theme of the project is a very involved process, requiring many different actors to play a certain role. Particularly with things like wicked problems."*

> -   (INT13,2020)

Furthermore, there is the crucial aspect of the living environment which must aim to provide people with a high Quality of Life. As noted by the interviewee from the Smart City Academy, within ATELIER, studying the social impact of the project is crucial particularly from the aspect of interaction (INT9,2020). The AUAS is quite interested in seeing how it would affect people to have a smart grid in their house. The respondent imagined that "Maybe it can be interesting, fun, exciting to feel connected to the system or to have more control over your energy use. On the contrary, when you don't know how to use it or if it's too complex or you have to spend a lot of time to get insights into the system and manage a couple of things it can be difficult and challenging" (INT9,2020). With the technical specifications and design of the project already set in stone, there are considerable hurdles with regards to the level of influence citizens can have in the project during its implementation. The project aims to involve citizen primarily within the adoption phase of the project.

Despite the realization that the energy transition fundamentally requires all citizens to take part in it, the project does face challenges with regards to participation as it is to be facilitated by all partners and not just the research partners. This way, the challenges approach a broader spectrum in the redefinition of the roles of actors and stakeholders in the process.

> ***"How do you convince legislators that they should allow for a redefinition of***
> ***what is a consumer/customer when they are also producers of energy ?"***

- (INT13, 2020)

Answering to the challenges faced regarding participation in the project, the respondent expressed the difficulties in organizing participation since it is very qualitative in the existing managerial, operational project approach. He further said that "There is a degree of discomfort in dealing with a very qualitative approach and calculate KPI's, monitor or demonstrate that if you participate this will be your reward". (INT13,2020) .Thus, on the one hand, such a project must enable social transformation by changing user behaviour and adaptation, but also change the approach of public institutions, civic official and businesses in how they implement ideas.

> ***"We really want to know what makes sense and as long as you don't really***
> ***know, we will go back to the primary questions while other agencies may go***
> ***back to solutions and say let's organize something like this for participation.***
> ***But we are really motivated by what is needed and how does it fit"***

- (INT13, 2020)

Figure 14 Community Level Indicators (CLI) framework (MakingSense, 2018)

The approach by the Waag society follows very much the co-creation concept used in the Making Sense project and utilises the framework (Figure 9) from the Citizen Sensing Toolkit (MakingSense, 2018). The

toolkit provides ATELIER with a strategy to position itself within the larger context of social change to empower citizens to take collective action. The project also utilises the community-level indicators (CLIs) developed by the Making Sense project to generate dynamic indicators.

Currently, in ATELIER there exist no concrete indicators with respect to social impact or Quality of Life. The participation process is still at a very nascent stage with no activities with citizens having taken place yet. Also, the project currently does not have a clear, well-defined plan to assess and monitor its participation strategy. Explaining the approach to formulating relevant ways to measure the performance of the project in comparison to the static indicators such as the number of citizens engaged, the respondent said,

> *"Within the project plan, the indicators are not robust and are checkboxes.*
> *The dynamic KPI's are related to what we think participation should be and*
> *the stakeholders should define what the KPI is, what is the outcome. We have*
> *not done it yet but we want to try it and document it. It will be interesting to*
> *see how people perceive these, what they feel is important, as objectives and*
> *metrics or things to take into account".*

- (INT13,2020)

An interesting aspect of this project is that citizens who plan on living there are not yet aware of the kind of dwelling they will be living in. Thereby, the project aims to take a reflexive approach to implement the solutions within the project and assess their impact through the quality and robustness of the participation process.

5.3 Buurt Budget (Neighbourhood Budgeting)

5.3.1 About

The Buurt Budget project is a municipality project for participatory budgeting in different neighbourhoods of Amsterdam. This is a 10-year-old project which has since 2019 developed an online platform to further improve participation, transparency, and access for citizens to the project and develop their own neighbourhood initiatives.

The project has been predominantly implemented in the West of Amsterdam with each neighbourhood receiving €150,000 every year to implement its own neighbourhood initiatives. Initiatives within the participatory budgeting project are all citizen-led initiatives that are conceptualised, proposed and implemented by the citizens of the neighbourhood. Initiatives are primarily not technology focussed

Figure 15 Neighbourhoods using the Buurt BudgetPlatform (BuurtBudget, 2020)

and vary significantly in their output from community meal programs, neighbourhood greening initiatives, managing noise and air pollution due to traffic, neighbourhood cleaning initiatives and other (BuurtBudget, 2020).

There are no pre-defined themes or restriction as to which initiatives can be implemented within the neighbourhood budgeting project. The applicant needs to go through four steps for the initiative to be implemented (BuurtBudget, 2020)

1. The applicant makes an application or proposal wherein a brief description of the initiative and the expected costs of the initiative are provided along with the parties or other citizens involved.
2. The applicant upon making the selection of the neighbourhood for implementation is contacted by the area broker who is a civil servant from the neighbourhood, to confirm the proposal and discuss requirements for the meeting with the neighbourhood steering committee. The steering committee comprises of citizens supported by the neighbourhood workers (ABC Alliantie) and the area brokers. This committee deliberates and accepts or rejects a proposal.

3. Upon approval from the steering committee, the initiative is eligible for a subsidy application for the required funds. The area broker assists the citizen initiator with this process.

4. Finally, upon implementation, the citizen initiator must submit a short report about the implementation of the project and their experience of it to enable further learning and sharing with other resident citizens to implement their own initiatives.

Which conditions must my application meet?

Support in the neighborhood is very important. Check if more people support your idea.

- Your initiative is aimed at a neighborhood in the West district.
- You are a resident of the West borough and actively involved in the initiative.
- If your initiative concerns an activity, it is one-off and has yet to take place.
- Your initiative is not commercial in nature and offers more than entertainment.
- Your initiative is supported by several residents and partners in the area.
- You provide permission, permits and exemptions yourself.
- You ensure that you are insured for any damage, etc.
- You must submit a short report showing that the activity has taken place within 8 weeks of the completion of the activity.
- You announce the activities via the communication channels known to the neighborhood.

Figure 16 Conditions to apply for your initiative in Buurt Budget(Source: https://buurtbudget.amsterdam.nl/veelgestelde-vragen)

The launch of the digital platform provides transparency not just with respect to what the municipality is offering and how budgets are allocated. It also allows other citizens in the neighbourhood to appraise themselves of initiatives and comment on initiatives and have an open discourse on ideas and provide suggestions to improve these initiatives.

Listed below are the goals of the Buurt Budget platform (BuurtBudget, 2020):

1. Inform residents about the possibilities of applying for money for activities.

2. Supporting good decision-making about applying for money for activities that residents want to carry out for their neighbourhood.

3. Digital support for the handling of applications from residents, by area brokers and the control groups of the areas.

4. Inspiring residents with stories and tips from residents who have previously organized an activity in their neighbourhood.

5. Increase transparency about initiatives and spending of the neighbourhood budget.

6. Gain support for the submitted proposals in the neighbourhood (other residents can comment on the site or register themselves to participate).

5.3.2 Stakeholders in the Project

The key stakeholders within this project are the citizens, the directing committee (Regiegroep in Dutch) the area brokers, the neighbourhood workers, local businesses (only for non-commercial activity) and the municipality. The process of participatory budgeting has been established over the years by the municipality and they control the platform and its core operations and design setup. The platform has been designed by the democratization team within the Municipality of Amsterdam. The area brokers and neighbourhood workers are the outreach organizations who are already well embedded within the local neighbourhood community and are responsible to aid citizens with the process and any of their concerns. While the area brokers must be contacted by the citizens, the care groups reach out to the citizens themselves and have stronger ties with the community. The Directing Committee plays a crucial role in developing, managing, and dissemination of social innovation plans for and by the municipality. They are responsible for the handling of municipal subsidies, managing meetings and interaction between municipalities. They also maintain connections with local interest groups to mutually realise the value of plans and provide a "housing" service for social innovation plans from the municipality. Finally, the citizens are the initiators, developers and beneficiaries of the initiatives realized within the Buurt Budget project.

5.3.3 Project Outcomes

In the year 2020, the Buurt Budget project has approved over 100 initiatives in the West of Amsterdam. The platform ran its first pilot in 2019 and saw a sharp increase in the number of initiatives proposed within the entire West district of the city. As stated in the goals of the project, the aim is to facilitate citizens to be more embedded in the neighbourhoods and promote transparency and social cohesion. Following the implementation in the west, the project now plans on launching the platform in other neighbourhoods of the city in a phase-wise manner as well. Due to the COVID-19 pandemic, the campaign planned by the municipality to promote the website could not take place due to which there has not been a significant increase in the number of active participants on the website apart from the initiators. A key aspect of this project is that it is an existing offline process undergoing digitisation without the removal of the offline channels and procedures. The digital process is the same as the offline process and existing channels of communication for neighbourhood initiatives remain the same. The

platform has recently been internally evaluated by the municipality through a survey with citizen initiators. A more thorough evaluation is being undertaken by the neighbourhood worker organization to evaluate the social impact of the project. The evaluation aims to highlight changes in social factors of inclusivity, safety, and neighbourhood social ratings by means of a dashboard which is also under development.

5.3.4   Key findings

The Buurt Budget project of the municipality is called a *public innovation* and *democratization* project rather than a smart city project. It receives no funding from the European Commission or any external body and neither is published in the network of the ASC platform. Although it does not fulfil these specific criteria for the selection of projects to study, the project is synonymous with the smart governance and smart people component of the smart city. The use of ICT solutions to facilitate citizen engagement, participation and bringing public authorities closer to citizens is the very essence of smart governance which aims for transparency, active decision making and promotes the development of active citizens. On the question of whether this project could be considered as "smart", one interviewee said, "Since there is no real agenda regarding smart cities, it is hard to say whether it comes under that. Within a broad reference of the smart city as an approach, it fulfils the criteria of citizen engagement, participation and user-created, innovation". This same view was corroborated by all other respondents relevant to this case. (INT4, 2020; INT8, 2020; INT12, 2020)

Within the scope of initiatives, the conditions clearly restrict commercial endeavours and encourage initiatives to go beyond plain entertainment and contribute to the quality of the neighbourhood. With citizens being able to view and comment on plans, those that do not comply with the needs of the neighbourhood or that deviate from the objectives of the project are openly debated which results in better decision making. This is also relevant in the context of one interviewee describing the citizen's influence in his work with the platform,

> "*There are a lot of citizens from the neighbourhood who are involved and are very much a part of the job because they often already work with this for years and they have quite a big feeling of ownership with these budgets and the way that it's being used. So, it's always working in close collaboration with them.*"

-(INT8,2020)

The continuation of the offline processes even after the launch of the digital platform ensures that those citizens accustomed to the offline process can continue to take part in the project in the same way.

Figure 17 Steps to apply for the neighbourhood budget (Source: https://buurtbudget.amsterdam.nl/westerpark/buurtbudget)

The internal survey conducted to evaluate the platform was a qualitative survey aimed at assessing the current process that applicants must go through and their experience through it. The survey consisted of interviews with 10 citizen initiators from 5 neighbourhoods (stadsdelen) in Amsterdam. Through this survey, the municipality intended to learn from problems in the current process and improve it for the following years (INT12,2020). As an internal survey, there is no output of results, and it was primarily a learning opportunity for the municipality. About the process, residents highlight that the process of applying for subsidies after approval of the proposal was something, they faced difficulty with. The financing process for initiatives too required some improvements and changes. Regarding the impact of the initiatives on the citizens themselves, the survey highlighted that citizens felt greater connectedness to the neighbourhood and their fellow residents by having to garner support for their initiatives. This also increased their sense of belonging and ownership within the neighbourhoods. Respondents of the survey also highlighted that they now have a different perspective of government and official processes after experiencing it themselves. Some respondents also attributed this to a sense of personal growth by implementing their initiatives. Being involved in the initiatives provided them with a greater sense of perseverance and understanding of the process (INT12,2020).

From an operational perspective, the neighbourhood budgeting platform still faces many challenges. While digitisation looks to automate and simplify processes, this is inherently difficult when people are involved as everyone has their own individual way of approaching a problem. This is reflected in this statement about the variability between neighbourhoods,

> *"My main task was to start the platform in other areas as well, particularly in other districts. So making sure that the process is still relatively similar in all districts as they differed quite a bit sometimes and because we have a big focus on neighbourhoods. But then there is always this trade-off. On one hand, you have to make sure that someone who has an idea does not have to go through a completely different process and get a different result in one neighbourhood versus another just a few hundred metres away. On the other hand, you want the input from the neighbourhood itself and take that into account. So we are always struggling and working with that and achieve a balance".*

-(INT8,2020)

Being a citizen focussed project, the ideal representation of the neighbourhood is always a challenge within the respective steering groups, and this is something that is being worked on by the municipality and the directing committees. The issue of representation is also crucial to ensuring transparency in the decision-making process. As this project has a long history behind it, citizens take an active role in the decisions about projects and funding for the neighbourhood. The last challenge is that of ensuring that the project remains for the citizens, by the citizens and does not succumb to external pressures. Being a public project, it is important to ensure that the public authorities do not begin to steer the way initiatives are implemented or the kind of initiatives that get implemented. One respondent highlighted this tension in ensuring the budget stays true to its origins by highlighting the difficult scenarios arising following the onset of the COVID-19 pandemic shutdown.

> *"There is also always the tension between those groups that give advice which is usually taken over by the daily board/politicians of the borough but in the end its an advice that also has legal reasons. But now with Covid-19 it also happens that politicians have the wish to fund something that does not fit within regulations officially so the neighbourhood budget can be a way to do it anyway which has been a challenge because it may be the first reflex to use that budget. But it is important to manage that with the citizens and not dent their feeling of ownership and belonging, you do not want to be intrusive with these budgets".*

-(INT8,2020)

According to the municipality, any subsidy below €5,000 is a free subsidy and does not require any follow-up or accountability thus not requiring the submission of any final report or outcome of the initiative. But the project stresses on the submission of a report for all projects big and small to ensure accountability and as a way of safeguarding the quality of the process and its outcomes. Thus, they validate the success of the process and enable the strengthening of the values of not just higher public authorities but also that of the citizens in the usefulness of this project. It also enables citizens to learn from each other, establish networks and develop skills.

> *"It is in the nature of the setup of the boroughs that we are not very good at evaluating initiatives even though a lot of good new ideas are coming up. We have not been very good at looking back and reflecting. So now city-wide there is also a report being made of about these sort of budgets but we are not really structurally measuring yet".*

-(INT8,2020)

This quote was made in reference to the type of evaluation being conducted across Amsterdam for the neighbourhood budgeting project. Another interviewee seconded the above statement and said that it was this lack of reflective evaluation and assessment of the project which prompted the qualitative survey to be conducted. The respondent also explained that there is a need for both citizens and governments to learn from each other. Citizens need to know that the municipality is always shorthanded and that there are always a certain amount of compromises to be made by them. On the other hand, cities need to know how to connect the abstract problems to tangible factors that affect individual citizens thus enabling a transition in the way society lives and functions. Concluding that, without dialogue, it is very difficult to achieve aspects of Quality of Life and sustainable development (INT12,2020; INT8,2020).

5.4 RESILIO

5.4.1 About

The RESILIO project aims to install 10,000 m² of smart blue-green roofs in Amsterdam. The project identifies blue-green roofs as a solution to the problem of excessive rainfall which is contradicted by excessive heat in the city. Realising the scarcity of public space within Amsterdam, the project aims to mitigate the urban heat island effect while also reducing the impact of waterlogging and floods which is

crucial to Amsterdam. The project is co-financed through the European Regional Development Fund (ERDF) of the EU through the Urban Innovation Action (UIA) program that grants subsidies every year for innovative pilot projects on various themes that are relevant for European cities (RESILIO, 2020). With RESILIO, Amsterdam is one of the 22 cities that were selected for the UIA subsidy in 2018, out of 184 cities that submitted a project proposal.

Figure 18 Project smart roof 2.0 at amsterdam-Onderzoeksdak (Source:)

The smart blue-green roofs have been planned for construction in five neighbourhoods in Amsterdam: Kattenburg, Oosterparkbuurt, Indische buurt, Rivierenbuurt and Geuzenveld. These neighbourhoods have been identified as suitable sites for constructing the blue-green roofs as they are under considerable risk of flooding during heavy downpours.

Figure 19 RESILIO project Locations within Amsterdam

The project is primarily being implemented on rooftops of social housing associations but also encourage private homeowners to install blue-green roofs on their rooftops. This is also supported by a subsidy from the municipality which is expected to come into effect from 2020 (RESILIO, 2020). The construction of these blue-green roofs has been split into two parts, first, the Municipality of Amsterdam is supporting the social housing corporations in building these roofs on 8000 sqm as they own a significant part of the housing stock. The remaining 2000 sqm is being retrofitted through a public grant available to private homeowners (Kapetas, 2020)

RESILIO is an evolved and scaled-up version of the first blue-green roof (Polderdak) which was installed in the summer of 2013 as an alternative way to store water on the Oldschool Zuidas (coop od De Dakdokters, Green Business Clubs Zuidas, Municipality of Amsterdam and Waternet) (RESILIO, 2020). The smart roof concept was also tested at the Marineterrein in Amsterdam which showed the positive cooling effect of the smart blue-green roof concept along with enhanced biodiversity (Kapetas, 2020).

Figure 20 Blue-Green roof technology (Source: https://www.projectsmartroof.nl/blauw-groene-oplossing-1)

Through this larger undertaking, the project aims to create a network of smart blue-green roofs throughout the city and aims to make a valuable business case for the implementation of blue-green roofs in Amsterdam and other cities.

5.4.2   Stakeholders in the project

RESILIO is a collaboration between the Municipality of Amsterdam, Waternet, Metropolder Company, Rooftop Revolution, Hogeschool van Amsterdam (Amsterdam University of Applied Sciences, AUAS), Vrije Universiteit Amsterdam and the social housing corporations Stadgenoot, De Alliantie, De Key and Consolidated. The project is led by the Municipality of Amsterdam which is the lead project coordinator. Along with these larger organizational partners, the project also recognizes the importance of including homeowners in the process and scientific partners to make the project collaborative and also aims to involve a wider range of external stakeholders who can potentially benefit from this project (Kapetas, 2020). The Urban Innovative Action acts as a coordinator for activities within the specific work packages in the project and focusses on the experience and knowledge gained through the project lifecycle.

5.4.3   Project Outcomes

The project had been launched in 2019 and is now in its second year of implementation. Delays have been experienced due to a large group of multi-disciplinary partners and challenges in integrating their work. The project has also realised the causes of these delays particularly due to challenges in procurement practices which have had a knock-on effect in construction and overall implementation (Kapetas, 2020). On 2nd July of 2020, the project launched its demonstration site on the rooftop of the Innovation Lab. The launch was also attended by some residents of the Oosterparkbuurt neighbourhood. This neighbourhood will be the first out of the 5 neighbourhoods in the city which will receive the installation of blue-green roofs.

Figure 21 Blue-green roof on top of the Innovation Lab at the HvA (Source: https://resilio.amsterdam/buurtpagina/oosterparkbuurt/)

5.4.4 Key Findings

In the context of smart city projects, RESILIO fits within the model as provided by Giffinger et al. (2007) by clearly finding a place within the components of smart environment, smart living and smart people. The project also fits within the definition of a smart city adopted in this study by (Caragliu et al., 2011). In clarifying this terminology, the respondent mentioned that, "Although the term "smart" is used when describing the roofs, and the overall setup of the project, I prefer to think of it as an *urban resilience* project" (INT9,2020).

As the project is inherently technical in nature and involving multiple stakeholders with different ways of working, challenges with participation are experienced at different levels. On a technical stakeholder level, participation is challenging in terms of procedural practices of one stakeholder that do not synchronise with those of another stakeholder, such as that of Waternet (the Water management organization in Amsterdam) and the construction companies since the installation of the blue-green roofs have a direct impact on the infrastructure at the street level of the city (Kapetas, 2020). Also, during the interview, it was articulated that, " a significant motivation for the city was to "showcase" or "show-off" this project with its attached benefits for climate adaptation, biodiversity etc, while for the organizations such as Waternet, the primary focus lies on cost-effectiveness associated to sanitation and waterlogging" (INT11,2020).

In terms of citizen engagement, the respondent stated that participation within the project is currently focussed on enhancing the consciousness of citizens towards climate change in the city and identifying methods for scaling up of the project (INT11,2020). Further, engagement with citizens in the project is quite limited in terms of their ability to influence the project as it is predominantly the housing corporations and the city who have control over where the roofs get constructed.

> *"It's not participation in this case but engagement with citizens that is taking place. The residents currently do not have any decision-making powers within the project. Engagement activities in this project are being undertaken in order to inform the citizens about the project and benefits of the blue-green roofs".*

- (INT11,2020)

At the point in time when the interview was conducted, the project was nearing the launch of its demonstration site at the Innovation Lab rooftop. The respondent mentioned that this was one of the activities being undertaken to engage with future residents of buildings with blue-green roofs and that

a short questionnaire would also be provided to understand citizens perspective to some factors of scalability. Questions included, "How much would you be willing to spend for a blue-green roof?", "Would you like to have a blue-green roof?", and "What problems with regards to water do you face"?. On this, the respondent clearly stated that the struggle with such questions was the open-ended nature of answers without the development of any insights into the specific qualities of the roofs that either attracts them to it or discourages them from getting one (INT11,2020). The respondent further explained that "having a clear objective and approach to the value generated or identified through participation remains a challenge within the project" (INT11,2020).

A key challenge identified by the respondent was the challenge of having participation with the housing corporation. As a public body that is responsible to a considerable degree with regards to the citizens, they provide housing to, housing corporations are pretty reluctant to have active participation and decision making with citizens to avoid liability in case of accidents. The respondent clarified that this is not always due to being participation averse, but also an emancipatory approach, to not bother residents with potential problems.

> *"It is difficult in the scope of research-oriented projects to identify the value of citizens input."*

> -   (INT11,2020)

A countering argument was presented in light of the above remark in the interview, "by engaging citizens and identifying values critical to aspects of the project could help in scaling and acceptance of the project?"[7] The interviewee not only agreed to this but went on to state, "Absolutely. If the project succeeds in improving these values the cost-benefit analysis could show either overall feasibility or highlight an economic conflict" (INT11,2020).

In response to the questions pertaining to the relevance of Quality of Life and assessing for it within the project, the respondent explicitly mentioned that in the current stage, there has been no development with regards to associating the potential impacts of the project with Quality of Life. Although it is clear citizens will be direct beneficiaries of the claimed positive effects of the project, translation of these benefits has yet to be simplified in a way that makes it relevant for citizens (INT11,2020) The performance indicators currently used within the project are purely technical and their meaningful translation to citizens is an important aspect. The main focus of the project remains that of scalability and transferability of the blue-green roof concept (Kapetas, 2020) and so tools such as cost-benefit analysis

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[7] This question was posed by the interviewer as a follow up to the response from the interviewee.

are what remains of greater focus at this stage of the project. Even in terms of citizen engagement, the project currently only identifies numeric measures of participants through their digital platforms.

5.5   Overall Findings

In this section of the results chapter, a broader account of the findings obtained during this research are provided. As this research follows an interpretive approach, there are many points of interesting information that cannot ideally be described or explained within the context of any single smart city project studied. Also, there is a considerable amount of contextual information that needs to be articulated particularly with the primary setting of this study which is the city of Amsterdam or more specifically the smart city ecosystem of Amsterdam. First, findings related to Amsterdam from the analysis of the data are provided. Then some of the similarities and dissimilarities in the results obtained from the projects studied in this research are presented along with the insights from interviews on assessing the quality of life and citizen engagement.

5.5.1   Where does Amsterdam stand in being "Smart"?

All respondents who took part in this study alluded to what some of them state as a "fact" which is that "Amsterdam cannot really be called a smart city" (INT3,2019; INT6, 2020). One respondent, formerly part of ASC in this regard says, "Amsterdam has never called itself a smart city. Its focus has always been on improving urban development through services and policy for the city" (INT3,2020). He further adds that " I find calling Amsterdam as smart quite premature, there is a lot more to do till it becomes "smart", but in this same context, I must emphasise that, Amsterdam in itself is independent of the smart city race" (INT3,2020). Similarly, a respondent from AUAS commented on this lack of official definition by saying, "it is actually good that Amsterdam does not have an official smart city policy as it does not become a goal" (INT9,2020). In explaining this contradiction between how Amsterdam is considered globally to its actual status of not referring to itself as a smart city and the absence of an official smart city policy, a respondent puts it in very clear meaning the cause of this demi status.

> *"The smart city is a marketing concept and the reason Amsterdam is as well-established as Barcelona is because we do our marketing right!"*

-(INT6, 2020)

Other respondents also weighed in on this, with the respondent from Making Sense stating the reason why it was termed a smart city project. saying, "sometimes if you call an initiative a smart city project,

Figure 22 Diagramming the evolution of Amsterdam as a Smart city

it automatically gains some traction and helps in implementing it quickly along with getting financial support for it". But he also stated that "while developing Making Sense, I never really felt like it was a smart city project. In fact, calling it a smart city project feels like the human side of the project is being taken away" (INT7,2020). This statement holds no truer than that stated by the former member of the ASC clarified in the absolute beginning of the interview, "while initially, the smart city was a focus of mine, I have now moved my interest towards the humane city" (INT3,2020).

When clarifying whether the Buurt Budget project could be termed as a smart city project, the respondents from the municipality answered, there is an aversion to the term smart and such projects are termed *innovation* projects and that there is a shift from the term smart city (INT7,2020; INT8,2020). The same point is iterated by two other respondents from both the AUAS and the ASC platform and highlight Amsterdam's departure from the smart city term (INT1,2019; INT3,2020; INT9, 2020).

There was an overarching sense of critique of the smart city concept when it was used to describe Amsterdam or the projects within it with respondents referring to the excessive technological focus attributed to the concept along with a lack of focus on citizens. In describing this development of Amsterdam apart from viewing Amsterdam as not being a smart city, respondents inherently also struggled in coming to grips with what being "smart" meant for the city (INT1, 2020; INT4, 2020; INT7,

2020; INT12, 2020). One respondent from the ASC platform explained that "while the intention behind initially adopting this approach was to reduce carbon dioxide emissions through clean energy and connectivity, that focus has now morphed into creating a more liveable place for the residents of the city" (INT6, 2020).

Despite the ever-present critique on the smart city term provided by the interviewees, all of them equally agreed that the inherent approach to urban development in Amsterdam is citizen-centric. In fact, in answering what is Amsterdam's (Municipality) view on the smart city, one interviewee said, "the main aspects of the Amsterdam vision on development are to have citizen-centred innovation with the help of public-private and institutional collaboration" (INT4,2020). Respondents from ASC also highlighted that "at the beginning of adopting the smart city approach, projects were generally top-down. The failure of a pilot project to install vehicle charging stations without engaging with citizens is what led us to start considering citizens' input in development and innovation projects" (INT6, 2020).

> *"From a top-down approach, we now go into the city, into the neighbourhoods, talk to people, have interviews. We have organized many evenings where we get an idea of local issues. We try to connect knowledge institutes and these days NGOs play a major role. Also, religious leaders play a major role in transferring messages. We try to talk to as many local leaders to get these citizens really engaged and really have dialogue with people"*

-(INT6, 2020)

Although the city has an inherent focus on citizen engagement from the perspective of most respondents, one respondent from ASC discussed that citizens in Amsterdam are involved mainly in a peripheral sense when it comes to projects in the city and that needs to change to a more inclusive system of engagement. Which means not just in the projects but also in the policy that can create more innovation in the city and increase the role of citizens (INT3, 2020). He further added,

> *"The fact is there is a lot of unused energy in citizens especially with respect to the city. It is important to engage them in a way where this energy can be effectively channelled and improve life in the city".*

-(INT3, 2020)

In expressing their views on Quality of Life, the overwhelming consensus among respondents was that Quality of Life in Amsterdam is essentially understood through happiness. "One way to understand happiness is through the democratic process of voting, if people vote against those in office, then they

know that something is not going right", one respondent said (INT6, 2020). Another respondent stated, "I am not aware of how Quality of Life is assessed because it is difficult to define, but there is the essence of developing the city to improve the happiness of residents" (INT4, 2020). The same respondent also stated that " although happiness can be understood as a consequence of positive Quality of Life, the important thing would be to identify if the projects contribute to the lives of people, quality of space and hence if it brings them happiness". A member of the ASC platform highlighted that for Quality of Life to improve it is important to set citizens in the agenda making role. This in his opinion was one way to close the gap between the meaning of Quality of Life and the future meaning of the city" (INT3, 2020).

Figure 23 Diagramming Quality of Life in Amsterdam

In the need to for the city to measure the impact of smart projects on Quality of Life, one respondent from ASC explained that "it is not a requirement but that is also a reason why Amsterdam still wants to understand how to evaluate Quality of Life and its improvement for the further development of the smart city concept and innovative projects" (INT6, 2020). Elaborating on the role of indicators in Amsterdam, he says, "They do play a role, but they are never kept as leading indicators for projects, unlike other cities. We think it is just nice to have them to evaluate or measure those indicators. But it is not an aim in itself and the reason is that if you are trying to fulfil those requirements then you are developing the city for the wrong reason. It tends to cloud the objectiveness and actually purpose for the city's growth" (INT6, 2020).

5.5.2   Similarities and Dissimilarities in projects

It is observed that both Buurt Budget and Making Sense have some similarities between them in that both fundamentally focus on citizen empowerment and citizen-led action. From both these projects,

citizens participating in them either acted in a way that positively impacted the neighbourhood or validated the fact that their involvement in the project has positively impacted their lives. In the case of Buurt budget, this can be interpreted from the responses of the citizens surveyed within the internal evaluation who highlight that, they felt a sense of personal development, developed perseverance, increased sense of belonging and control in the neighbourhood and a better understanding of the government and public processes (INT12, 2020). On the other hand, the example of Plaza de Sol in Barcelona where participants of the Making Sense project were able to reduce noise pollution in the neighbourhood by forcing the local government to conduct refurbishment works and through the use of their local knowledge, change cleaning times in such a way that the crowds moved away sooner leading to lesser noise and creating a healthy and more liveable environment (INT6, 2020).

ATELIER and RESILIO on the other hand also have some similarities. Apart from being the most technology-intensive projects in this study they also involve multiple partners in implementing the project, the projects have significant struggles, owing to participation and identifying an appropriate role for citizens. As the interviewee from ATELIER stated condescendingly in response to why have citizens involved in evaluating projects, "you can always ask why the focus on the citizens? Let them be since we have an emancipatory tradition" (INT13, 2020). This exact problem is faced by RESILIO wherein, the emancipatory approach of the housing corporations to avoid any form of liability leads to problems in engaging with citizens. In ATELIER, this is primarily experienced due to subdued enthusiasm from project partners or as the interviewee put it, "they feel like it is time-consuming. Why do we do it? It is boring" (INT13, 2020). In both projects, the legality of the role of citizens in participative processes is also a factor which can become problematic considering the responsibility of housing corporations towards citizens. The key difference between their approaches to participation is in the fact that while ATELIER identifies participation as a way to greater societal transition in terms of the behavioural aspects of energy consumption, RESILIO focusses on participation as a way to develop a business case for the blue-green roof. While ATELIER has identified a strategy for participation through the Making Sense citizen engagement framework and community-level indicators (MakingSense, 2018), RESILIO has still to identify what the input of citizens would be and how to utilise that input (INT10, 2020). Nevertheless, in RESILIO, engagement attempts have already been made through the online platforms and the innovation lab demonstration.

In all of the EC funded projects i.e., ATELIER, Making Sense, and RESILIO, indicators to measure the performance of the project are consistently amiss. Respondents from all three projects highlighted that performance indicators were essentially non-existent while the ones utilised were not robust and merely "checkboxes" to mark in the process of conducting the project. In criticism of performance indicators

and social impact assessments within smart projects, the respondent from Making Sense notes on his previous experience.

> *"All the times I worked with very well- renowned organizations, no one knows how to do it. If anyone says they know, then its absolute nonsense and they are pretending. I haven't seen a good social impact assessment at all."*

-(INT7, 2020)

Quality of Life among all projects was understood to be of important concern, but it became evident from the interviews that being able to gather and generate relevant information out of citizen input is a struggle experienced by all respondents. This is well articulated by one respondent who in expressing the difficulty of assessing impact within government projects exclaimed, "How do you evaluate something if it is not a number?" (INT7, 2020). As stated by other respondents, indicators fail to convey the details too often and go for generalizing the aspects of the city. It holds even more true to when respondents from the Buurt Budget describe the variability in processes between two neighbouring districts which can complicate processes and unifying them onto one platform. In one example of such a problem in Buurt Budget, the respondent explains how problems however small, arose due to consolidation of the Westerpark[8].

> *"Changing stuff like word limitations and cost details are challenging and create annoyances. For instance one of the things that is still happening since the westerpark area was consolidated is that the agenda that we download from the platform and forward to the regiegroep all say Westerpark and it is a big annoyance".*

-(INT8, 2020)

The problem with variability also connects closely with the challenges of representation posited by each project. All respondents from these projects acknowledged that one of the critical challenges in evaluating the impact of an initiative through participation of citizens was in ensuring accurate representation. The question of, "How much is enough?" and "what is ideal representation?", were common expressions from respondents. In Buurtbudget, this problem is also experienced in ensuring ideal representation of the neighbourhood in the Steering Committee for the neighbourhood budget. Similarly, in RESILIO, representation challenges stem from a significant number of consistent attendees

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[8] The area was earlier divided into multiple smaller neighbourhoods which have now been combined into the entire Westerpark district in Amsterdam West.

in participatory meetings who the interviewee responds to as "professional citizens", in that they are particular people of a certain age and have time to attend events (INT7, 2020; INT10, 2020, INT8, 2020).

Respondents from both ATELIER and Making Sense iterated that the crux of participation process of to promote broader societal transition lies is in the problem framing and objective setting of the participation strategy. This is not just to draw the most valuable outcomes from such activities but also to motivate partners and stakeholders within the project to identify the benefits of a good participatory approach that can be insightful in the design and implementation of a project.

> *"A good participatory project is able to highlight that questions are wrong*
> *and you're not answering questions to figure them out in the start. But that*
> *is the art of participation and its something we are figuring out and learning*
> *about. It is surely an iterative process."*

-(INT13, 2020)

To summarise, the interviews conducted and subsequently the projects studied within this research provide a number of interesting insights for discussion. The individuals and their experiences within the smart city ecosystem of Amsterdam, it's development and their work in smart city projects have a large role to play in their individual perspectives on citizen engagement, Quality of Life and the smart city concept as a whole. The projects studied provide a useful contextual backdrop to further discuss these findings in the next chapter.

6 Discussion

This is a qualitative study following an interpretive approach that aims to describe the relationship between citizen engagement and Quality of Life within the context of smart city projects in Amsterdam. The increasing focus on citizens' role in smart city initiatives combined with the inability of these initiatives to satisfactorily assess their impact on Quality of Life underpins the motivation to conduct this study. The underlying assumption in this study is that engagement with citizens in smart projects can contribute to understanding factors affecting Quality of Life and improve the social impact and its assessment in smart city projects. In this chapter, each sub-question is discussed chronologically followed by answering the main research question of this study. The last two sections highlight the limitations of this study and recommendations for further research.

6.1 How is the evolution of the smart city concept towards citizen engagement and Quality of Life experienced in Amsterdam?

In spite of being one of the early adopters of the smart city approach (Mora & Bolici, 2017), Amsterdam has always been independent of the smart city race. Even though the city's approach to development has closely mirrored the smart city approach, the lack of an official policy or defined approach has allowed the city to iterate itself according to the situation. The city approaches development by utilising technology and innovative collaboration practices with a focus on becoming resilient, circular, and improving liveability for residents in the city which aligns it with the smart city definition grounded in this research (Caragliu et al., 2011). As Albino et al. (2015) explain, the lack of a proper definition has made the smart city concept fuzzy and unclear. But in the case of Amsterdam, this has never been a problem. Unlike other cities where the term smart is inscribed into the city's approach to development, Amsterdam has not had to succumb to the smart-labelling phenomenon (Hollands, 2008) despite the city to be extensively marketed as such with the help of organizations such as ASC which represent the city in global events.

The smart city phenomenon has had to adapt to bottom-up approaches and citizen engagement in its development (Capdevila et al., 2015; De Filippi et al., 2019). Amsterdam, in this case, adopted a citizen-centric approach very early in its development as a smart city from technocratic approach. At the same time, the aspect of Quality of Life has been built into the city's approach to planning and development. As the smart city concept has evolved, so has the approach of Amsterdam with greater advocacy for

citizen-led initiatives, citizen participation in policymaking and more opportunities for citizens in place-making activities.

Quality of Life has always been of importance in the Netherlands (*De sociale staat van Nederland*, 2019) but in the context of development from a smart city perspective, there are no indicators used in Amsterdam to evaluate Quality of Life. Quality of Life has lately been connected to happiness of citizens with the two concepts differing temporally but involving the same level of subjectivity (Marans & Stimson, 2011). In Amsterdam, happiness of citizens is regarded as a way to understand and assess Quality of Life. The key to the city maintaining or improving Quality of Life is drawn towards creating happier citizens. The way to assess this happiness seems to be through democratic electoral voting or alternate communication strategies with citizens. In having a more citizen-centric approach, the city prefers to gain a better understanding of the subjective attributes that citizens value rather than using indicators to assess Quality of Life. Criticisms from experts on indicators follow closely those mentioned by Ballas (2013) in studying "what makes a happy city?".

Despite the city being independent in its approach, the term "smart" city still draws a significant amount of critique from the respondents. As identified during the course of this research, there is a significant shift from the use of the term smart city to others such as "humane" city or "resilient city". In this same breath, smart city projects, those funded by the European Commission or set up by the local government, are moving further away from the terms smart with municipal projects being termed "innovation projects" or "public innovation". Even the ASC platform does not use the word "smart" to describe itself on its website anymore. There is also an overwhelming consensus among actors accessed during this study that "smart" as a term is essentially outdated. Thus, as the smart city turns to smart citizens and smart communities, Amsterdam is turning further away from the smart city terminology, using definitions that fit with its specific requirements and developing strategies that are guided by its objectives.

6.2   In what ways are citizen engagement and Quality of Life considered in different smart projects in Amsterdam?

The smart city which was initially conceived from a technocratic perspective with the top-down implementation of projects is now more focussed towards citizen-centric solutions for improving Quality of Life (Capdevila et al., 2015). The smart city approach in Amsterdam has undergone a similar transition with citizen engagement and Quality of Life, being central aspects to the holistic development of the city and its smart city projects. This transformation took place through the city's experience in

setting up earlier projects, where citizens were not collaborators in developing solutions (Dameri, 2014), which caused them to not succeed as expected.

There are different types of participation strategies using technology (De Filippi et al., 2019) and Amsterdam implements a large variety of them such as mobile applications, online surveys, information through social media and more. At the same time though, the city still emphasises on physical, analogue modes of communication and interaction to bring citizens together and encourage participation to better understand what people want. It is important to identify the goal of participation before engaging with citizens and have clear strategies and tools in place to ensure that participation is successfully organised (Berntzen & Johannessen, 2016). Although citizen engagement is central to smart projects in Amsterdam, its practice is nuanced and depends to a large extent on the setting of the project i.e. the theme of the project, the aim, the actors and stakeholders involved and legal constraints.

In terms of citizen engagement, two types of from the projects can be identified, firstly the large infrastructural projects and the non-infrastructural projects. In creating smarter cities and improving Quality of Life there are current dominant models of implementation that need to be unlearned (Bolívar & López-Quiles, 2018). Within the larger infrastructural projects, participation strategies are challenged by the normative focus of such projects on technical and fiscal aspects, but these projects are challenged by another aspect which is the legality of rights. In the case of a participant who takes part in an engagement activity, the formal nature of activities makes participation strategies difficult to implement as partners or stakeholders refrain from opening themselves up to liability that is beyond their control. Another legal challenge is that of innovative projects wherein traditional positions of actors in a particular setting is changing such as that in ATELIER where the traditional role of a citizen consumer would change to a co-producer. How this new definition would change the way the individual is dealt with by society but more-so by larger organisational players in the project is of particular importance. The issue is similar to and reflects the challenges in providing citizens with control of data, its use and governance along with the understanding of technopolitical processes in city-making (Calzada, 2018).

Within Buurtbudget and Making Sense (since it has concluded) the objective, method and level of participation are well understood. In ATELIER there are clear goals for participation and the project also has the Citizen Sensing Toolkit (MakingSense, 2018) as a prospective framework. In RESILIO, while the current objective for engagement is understood, the engagement strategy is still unclear. Yet, there is some amount of engagement and communication taking place through online platforms, surveys and the Innovation Lab.

Cases	Objective	Engagement through
ATELIER	Social transition and behavioural change	Demonstrations
RESILIO	Upscaling and business case development	Demonstrations and experiments
Making Sense	Public Awareness for citizen-led action	Knowledge and skills
Buurt Budget	Community development through citizen-led action	Financial subsidy

Table 1 Citizen engagement approach in cases

An interesting difference between ATELIER and RESILIO is the use of participation strategies to achieve two different goals. In ATELIER, citizen engagement rose out of the understanding that the broader theme of energy transition requires participation and support from all actors to make it successful through behavioural transformations in society. Thus, identifying citizens not just as users but active participants in the transition to a more sustainable neighbourhood and city. In RESILIO, the approach to engagement with citizens is primarily to develop interest among residents and find opportunities and ways to scale up the project beyond the pilot stage. The project focusses on identifying early adopters for the solution and places citizens firmly in the role of users or conventional beneficiaries of a solution. One large infrastructural project aims at broader societal transformation while another aims at turning its solution into a successful business case through citizen engagement.

Within the non-infrastructural projects in the city i.e. Buurt Budget and Making Sense, citizen engagement and participation are the core concepts of the projects. The difference here is that in the case of Buurt Budget citizens with valid applications are given a subsidy in order to organise an activity or provide a service to the community that contributes to the quality of the neighbourhood positively. On the other hand, in Making Sense, participating citizens were provided skills in sensor making, coding, and data collection for understanding their environment better and building awareness to take action. There are two different forms of engagement here, in Buurt Budget through a policy tool (i.e. subsidies) citizens are empowered to take up place-making activities to improve their neighbourhood, while in Making Sense citizens are empowered through knowledge and skills to build awareness and affect public policy (as experienced in changing data validity norms by the RIVM). The approach in Buurt Budget can be considered as top-down as it is the local government that handles the project. But the way in which proposal topics are decided, the involvement of actors as key stakeholders and the tools used in implementation all have affected the level of participation and impact on Quality of Life in the communities (Goodman, Zwick, Spicer, & Carlsen, 2020). In Making Sense although the project

was conceptualised by the Waag, its development and outcomes were guided by the skill and will of the citizens primarily. In both cases, change is affected but at opposite levels and this is a particularly interesting finding and it is difficult to say if one is better than the other.

Unlike citizen engagement, which is clearly specified and strategized (to some extent), Quality of Life is a more intrinsic objective of the smart city projects (Bolívar & López-Quiles, 2018; Shapiro, 2006) in Amsterdam. While in the broader scope of Amsterdam, Quality of Life is associated and understood through happiness (Ballas, 2013; Marans & Stimson, 2011), within the context of the projects studied, there are no ways to assess or identify aspects critical to Quality of Life. Although in ATELIER, there is the intention to map out the interaction of citizens through interactive demonstrations and workshops to understand elements important to them, it can be assumed as a statement for the distant future since the project has not been implemented yet. In the case of RESILIO, even though the project is based upon extensive prototype testing of the smart blue-green roofs, the performance of these roofs has not yet been translated into any performance indicators that reflect aspects regarding Quality of Life. Even though the project claims to reduce roof and home temperatures, reduce waterlogging, improve neighbourhood aesthetics and save residents money through reduced sanitation taxes, none of these have yet been concretely translated into a format that can be understood by citizens and attempts to do so still remain inconclusive. In Buurt Budget, the improvement of neighbourhood quality, social cohesion and benefits to the individual as identified through the internal project evaluation are relevant insights for the project's impact on Quality of Life. The project does not specifically focus on Quality of Life, rather the aim is to get citizens to participate actively in neighbourhood development, improving liveability, and build social cohesion within the community. Also, within the project conditions for subsidies, it is stated that initiatives must contribute positively to the neighbourhood beyond entertainment. Thus, requiring initiatives to anchor their objective to broader social benefits, community development, liveability and Quality of Life in the neighbourhood. In Making Sense as well there was no consideration of Quality of Life during the project development and implementation process as its primary objective was the development of an effective engagement strategy in the broader scope of urban innovation through citizen empowerment and citizen-led action.

It is not surprising that in all of the projects there is no qualitative approach to the evaluation of Quality of Life since the dominant strategy for Quality of Life has been the use of objective measures (Ballas, 2013; De Guimarães, Severo, Felix Júnior, Da Costa, & Salmoria, 2020; Marans & Stimson, 2011). Apart from a broad definition of Quality of Life (Mikkelsen & Di Nucci, 2015), the projects tend to recognise and place happiness as being an inherent goal that represents Quality of Life. Thus, there is a significant

lack of any attempt for a qualitative understanding of Quality of Life and subjective elements of the concept were not considered within the scope of any project.

6.3   What role do citizen engagement and Quality of Life play in the assessment of smart city projects in Amsterdam?

The term "smart city" includes the key attribute of being attentive to the needs and wants of the citizens (Berntzen & Johannessen, 2016). This sentiment echoes throughout the accounts of the interviewees who participated in this study. Within Amsterdam, accessing citizens, sharing experiences with them, and understanding their problems was highlighted as the main method of impact assessment. Communication with citizens is identified as a key aspect of improving Quality of Life (Bolívar & López-Quiles, 2018; De Guimarães et al., 2020) and Amsterdam uses multiple channels to do so.

A dichotomy that is observed within the smart city projects is that, although communication and participation are key to understanding the needs and wants of citizens, within the smart city projects, it is not what the citizens say that is assessed but how well they are reached out to. Instead of assessing the issues and inputs provided by citizens and their role in the project, the current assessment measures the number of citizens that are reached through a specific communication channel. This evaluation is practised through the use of KPIs that state the number of citizens who have been reached out to through clicks on a particular newsletter link, or attendance for a project event. Such practice is seen in projects (ATELIER, RESILIO and Making Sense) that are funded by the European Commission and its partner organizations and it has only rightly been pointed out by respondents that such tools or measures are treated as checkboxes within the smart city project. It is also unclear how these KPIs are set and how their assessment of citizen participation and engagement helps provide insights to the implementation process and impact of the projects. The fact that these indicators are reflected upon as futile activities that purely support better grading from the funding commissions and help to secure funding for future projects points to the larger debate and criticisms on the use of indicator framework, indexes and KPIs to evaluate impact (Sáez et al., 2020).

Even though the formal assessments carried out within the EC funded projects are not robust, respondents showed keen interest in the opportunities for participation strategies to monitor and evaluate projects. In ATELIER this is being enacted through dynamic indicators that will be produced through participation with actors and stakeholders in the project through use of the Citizen Sensing Toolkit (MakingSense, 2018). This will be done through workshops and demonstrations that aim to actively involve citizens and other partners as key stakeholders to identify important parameters and

the method to evaluate them. Such activities are key to the implementation of smart solutions that aim for the broader transition of society and that position citizens as the main beneficiaries and active stakeholders in their execution (Goodman et al., 2020).

In RESILIO, the primary tool for assessment is a Cost-Benefit Analysis as the project is anchored on developing a business case at the end of its funding and scale up the solution. The primary participants in the assessment process are the organizational partners in the project and the role of citizens is yet to be determined and the intention to involve citizens in this process remains inconclusive. Despite this, Quality of Life was acknowledged as being important to assess and complement the Cost-Benefit Analysis to provide a deeper understanding of the feasibility of the project. At the time of conducting the interviews as part of this research, no further development had taken place in this regard within the project

The Making Sense project did not have any formal evaluations other than the requisite KPIs highlighting the number of blog posts from the project that were read through social media. Internal evaluations of the project were conducted with the participants through reflection session which was part of the participation strategy wherein questionnaires were used to gather feedback. Following this feedback, the entire process of the workshop/campaign was appraised with participants. The role of Quality of Life within this assessment of the project was not relevant but participants were able to share their experience of the activities in the process and its influence on the outcomes of the project.

Berntzen and Johannessen (2016) state the importance of operationalising the participatory tools used to engage with citizens in municipal projects. In Buurt Budget, evaluation takes place at two levels, first, citizen initiatives within the project initiatives are evaluated both before and after their implementation. Second, the overall platform and the process that citizens have to go through in getting a proposal accepted is evaluated. Being transparent, the platform allows other residents of the neighbourhood to provide feedback on proposed initiatives and provide support for their approval. Apart from this, for the platform and process, an initial internal evaluation has been conducted using qualitative in-person interviews. The interviews although an internal project evaluation with limited participants (10 respondents), highlight the benefits of the project on citizens' lives such as personal development, perseverance, ownership, social inclusion, control, and belonging. Citizen engagement within this project is crucial not only for implementation of initiatives but also for evaluating the initiatives and the platform as the specificity of feedback provided by citizens on subjective aspects could not have been gained through online channels or mailed survey forms. Transparency, communication, participation and accountability are important factors in smart governance projects that aim to improve Quality of

Life (De Guimarães et al., 2020). Although not a formal survey for dissemination, a similar protocol is being applied by the neighbourhood care groups to develop a city-wide social monitor of participatory budgeting neighbourhoods.

6.4 How can the relationship between Quality of Life and citizen engagement in smart city projects in Amsterdam be described?

The underlying assumption in answering this main research question is that citizen engagement contributes to the identification and understanding of factors affecting Quality of Life and hence improve the assessment of smart city projects for it. As Marans and Stimson (2011) explain, "quality is a subjective phenomenon that reflects the life experiences of the occupants of the setting wherein the objective conditions of the setting in themselves do not convey its true quality. Quality here reflects the meaning of those conditions to the occupant". Furthermore, Bolívar and López-Quiles (2018) highlight the importance of involving citizens in aspects of smart governance and in the identification of public value which in their study is based on the normative approach of public values to improve Quality of Life in the city. In improving the Quality of Life, the importance of transparency, collaboration, participation and partnership, communication and accountability in the context of smart governance projects is well established (De Guimarães et al., 2020). It is clear from literature that a relationship between the two concepts exists (Berntzen & Johannessen, 2016; Bolívar & López-Quiles, 2018; Dameri, 2014), not just by way of being central to the smart city concept and definition (Caragliu et al., 2011; Chourabi et al., 2012) but also through the inherently subjective nature of Quality of Life (Ballas, 2013; Marans & Stimson, 2011; Mikkelsen & Di Nucci, 2015) which requires contextual information about settings, and experiences and warrants a qualitative approach to understanding it.

The study has found that although citizen engagement and Quality of Life are integral to Amsterdam, and the smart city projects in it, their role within the projects are quite challenged. As Bolívar and López-Quiles (2018) iterate, "the improvement in Quality of Life using technologies needs to unlearn established inertias ingrained in the current dominant urban model". For Quality of Life, the research finds that assessing for it is dealt with a certain amount of hesitation and scepticism particularly with regards to a qualitative methodology. The objective approach to developing all-encompassing indicators is what currently drives smart city projects in measuring their performance and impact, as is true with the indicators used (Sáez et al., 2020). The highly operationalised and managerial approach to developing and implementing projects along with their evaluation is an important obstacle to overcome when considering a qualitative approach to Quality of Life by citizen engagement.

Participants in this study promptly acknowledged the relevance of participation in understanding Quality of Life while also drawing relations of synonymity between Quality of Life and happiness (Ballas, 2013; Marans & Stimson, 2011). Despite adhering to the connection between, and relevance of participation to assess Quality of Life, utilising participation strategies to do so was met with counterpoints pertaining to challenging operationalisation, broad definition, and difficulty in finding ideal representation. Goodman et al. (2020) highlighted the variety and challenges in making such choices in the case of participation strategies within smart city projects in Canada. There is no absolute or right way to engage with citizens and value their input in the development and implementation of a project. This allows for the interpretation of the concept and design of the approach based on the context of the project, the existing practices, and motivation of stakeholders. Citizen engagement in smart city projects faces challenges of motivation, organizational structure, lack of clarity in the process and expectations of value from the process.

In light of the above arguments being made during an interview, and a follow up on how the interviewee would assess Quality of Life, the response received was, "Through the democratic process of voting. If people are unhappy, then power will change hands and it becomes clear that something is not working". This statement was initially met with a degree of mild suspicion for two reasons. Firstly, for being too simplistic and second, in its ability to be absolute as a verdict in highlighting public satisfaction and Quality of Life. But when two more respondents iterated the same point, the statement became a lot more relevant and highlighted the political nature of Quality of Life in today's society. If a participatory act with no words and a single ballot can represent a person's happiness, then it should only be logical that a conversation or even observation in a setting should provide much more nuanced information; elaborate on the quality, perceptions and lived experience of an individual (Marans & Stimson, 2011; Mikkelsen & Di Nucci, 2015).

This idea was clarified through two interviews for the projects Buurt Budget and Making Sense. The responses from the Buurt Budget internal evaluation revealed that citizen initiators within the project experienced increased social cohesion, control over their environment, sense of belonging, personal development through the organization of the projects and developed a more humanistic view of public authorities. These aspects felt by the respondents of the internal evaluation of the project fit perfectly within the subjective responses to assess neighbourhood satisfaction developed by Marans and Stimson (2011). It further highlights the relationship and value of interactive, participatory and qualitative approaches to understanding the subjective factors affecting an individuals' Quality of Life (Bolívar & López-Quiles, 2018; Mikkelsen & Di Nucci, 2015)

Concerning the Making Sense project, the interviewee described the impact the project had on Plaza del Sol in Barcelona. The square was notorious for late-night crowds that caused significant nuisance and noise pollution in the neighbourhoods. By educating and training citizens in developing their own noise sensors, the project gave them the skills through an extensive co-creation process to collect, analyse, interpret, and act on data produced by the sensors. This gave citizens the ability to understand aspects of data generation, governance, use and ownership; challenges which were highlighted by Calzada (2018). The citizens in order to solve their noise problem installed the sensors at various locations of the square to understand the full extent of the problem. By identifying the locations of noise and with their own local knowledge of the area, citizens were able to put pressure on the local authorities to perform structural renovations to curb the noise problem. Furthermore, to stop the late-night nuisance at the square, they prompted sanitation workers to come a few hours earlier to begin cleaning. This led to the earlier dispersal of the crowds which reduced noise later into the night at the square. Not only did this work, but it was also validated by the sensors developed by the very citizens and helped them improve their neighbourhood Quality of Life.

While in Buurt Budget the positive effects of the neighbourhood budgeting plan were experienced and expressed by citizens and documented through the qualitative interviews with citizen initiators, in Making Sense, the positive impact was experienced and observed by both participants and project coordinators. From these instances in the two cases, the relationship between citizen engagement and Quality of Life can be described as a cause-effect or action-reaction relationship wherein interaction and involvement of citizens in the development, implementation and evaluation process not only empowers citizens to take positive action but allows them to identify and validate the expected and unexpected impact of a project, technology or solution. By involving citizens in the evaluation process and documenting their responses, project developers can gain insights on factors beyond technical and process characteristics of the project as experienced in both the projects. The increase in social cohesion, liveability, personal development, accountability, ownership, belonging, citizen control, trust and changing perspectives on public authorities are important factors to improve Quality of Life (Costanza et al., 2007; Marans & Stimson, 2011). Such insights are not possible to identify or collect through the existing objective parameters used in smart city projects and require direct interaction with citizens

Buurt Budget and Making Sense, in both cases the outcome of the project is driven completely by how citizens take the opportunity presented to them create positive change. On the other hand, in ATELIER and RESILIO, project implementation is not as dependent on participation or engagement with citizens since the partners can still implement the project without their involvement. As Goodman et al. (2020) question the need for citizens to be involved in smart city planning, participants in this study

highlighted unanimously that without the involvement of citizens it would be difficult to achieve a broader societal transition towards sustainable living that can also improve the Quality of Life. The lack of engagement within a project has been consistently associated with the failure of solutions (Dameri, 2014) and drawn the ire of citizens as experienced in the initial smart projects in Amsterdam. To ensure that technical solutions such as the PED's in ATELIER and smart blue-green roofs in RESILIO succeed it is important to engage citizens in the project, to not only identify and understand how they interact and experience the solution but also learn how it influences their life.

6.5 Recommendations for Further Research

This research followed an interpretive approach to identify the relationship between citizen engagement and Quality of Life in the context of smart city projects in Amsterdam. The study identified that citizen engagement and Quality of Life can be described as having a cause-effect or action-reaction. Participation not only improves the subjective factors of Quality of Life but also supports its identification and understanding within a specific context or setting. The study still finds some important aspects for further research and exploration.

With regards to the smart city concept and the trend of cities labelling themselves as such, it is clear that Amsterdam takes the benefit of labelling without any pitfalls of having an official policy. Adding to that, the inherent approach of citizen engagement in Amsterdam and the Netherlands overall has allowed the city to undertake large scale innovation projects be it in digitisation, clean energy, urban regeneration, climate change etc, while promoting participation and improving Quality of Life as evidenced by global rankings (MERCER, 2020). The study recommends further research into identifying the actual value of "smart", is it the term itself or is it the approach to development that improves Quality of Life? With cities around the world racing to become "smart" particularly in countries like India, Brazil, Nigeria, Ghana and more, where the concept brings promises of economic development and improved Quality of Life, it is useful to further study how an official smart city policy or lack thereof affects the implementation of socially and technologically innovative, sustainable solutions. How the presence or absence of this policy allows for the participation of society in improving the city without the dominance of larger corporations? The experience of Amsterdam in this regard lends for some positive discussions as to how cities can develop projects as per their requirements and objectives without having to necessarily call themselves smart.

With both ATELIER and Making Sense being implemented in multiple cities across Europe (See sections 5.1.1 and 5.2.1) further research can explore how such projects and solutions can be transferred beyond

the European context. Particularly in the Global South where smart cities, sustainability and climate change have an impact much beyond just the living environment. Involving citizens in projects in such contexts is also challenged, not just by the large population but also the state of governance and democracy. With regards to governance, it would also be useful to study how co-creation and co-production activities in such projects can be transferred and adapted to the context of other cities with different cultural backgrounds and social structures. A particularly interesting starting point would be to study how a project like Buurt Budget in Amsterdam is implemented in the more culturally diverse districts of the city to identify challenges and opportunities for such initiatives in different cultural contexts.

The research finds that Buurt Budget and Making Sense, inherently focus on citizen empowerment for action. While in the case of Making Sense, engagement with the community affected change onto policy, while in Buurt Budget, policy positively affected change in the community. In this regard, a future study is recommended into studying the effect of citizen engagement through government and citizen engagement through private institutions in generating impactful citizen-led initiatives. Particularly, how they create active citizens and what factors influence citizens to take part in such projects. In both the projects, it is the inherent motivation of the citizens that keeps the projects alive and running. Thus, it would be useful to identify how citizens perceive such projects that demand active participation and give opportunities to create positive change.

The larger infrastructural smart projects ATELIER and RESILIO have inherently different goals to achieve through citizen engagement. While in ATELIER the objective is to achieve a broader societal transition through PED's and smart grids, RESILIO aims to use citizen engagement to aid in the upscaling and development of a business model for smart blue-green roofs. Further research could explore how objectively different approaches to engagement influence the perception of citizens with regards to the impact of a project. Also, research can explore what level of participation do citizens prefer to have in such technical projects where they lack technical expertise but are direct beneficiaries of the project.

The study identified a general scepticism towards assessing Quality of Life using qualitative methods given the challenges elucidated by the interviewees. As this study itself is interpretive and exploratory, the study recommends a further exploration into identifying how interpretive approaches can be used to combat the challenges of accessibility experienced by quantitative approaches to assessing Quality of Life. Such a study could explore the key factors for ideal representation of citizens for participatory evaluation of projects. This could also be insightful as factors affecting Quality of Life vary spatially and

temporally (Marans & Stimson, 2011; Mikkelsen & Di Nucci, 2015). Thus, context-specific information remains crucial in assessing Quality of Life. Such a study can explore how representation varies through different neighbourhoods based on parameters such as cultural background, economic status, level of activity in the neighbourhood or legacy.

6.6 Research Limitations

The first limitation of this research is accessibility, which in the context of this study means access to interviewees and other secondary data materials. During the course of this research, there were many candidates who could not be accessed either due to their lack of time, expertise and simply due to not responding to the requests for interviews. The choice of access was also random in that it was not a methodically organised procedure. As an interpretive study, exploring the smart city landscape of Amsterdam was an important part of the process which meant attempting to access any individual who was relevant to the ecosystem. Although, once contact was established, most interviews led to further contacts who almost always responded positively to the interview request.

As this research was conducted during the COVID-19 pandemic, apart from the initial two interviews, all other interviews had to be conducted online through the use of digital conferencing platforms. The COVID-19 pandemic completely shut down society and restricted any form of personal contact between individuals. The situation created a very different interview setting in which it was hard to read the person's body language and readily gauge their state of mind when answering questions. This situation could potentially have influenced the data gathered during the interviews as it was difficult as a researcher to be efficient and get accustomed to the process of interviewing someone when they are not in the same physical vicinity. This also presented certain challenges with using the right platforms in order to record interviews. Certain interviews could not be recorded due to the problems with the video calling platform and so significant memoing and jotting of points had to be done. Although the note-making practice was consistent throughout all interviews, it was challenging in un-recorded interviews as it became a primary task making the activity more cumbersome. Being in the middle of such a pandemic also restricted the study from identifying or contacting citizens for interviews which would have been ideal considering the objective of this study. Furthermore, apart from Making Sense which had concluded, all other projects studied, experienced significant delays and constraints due to the pandemic. This meant that any future plans that may have taken place had to be stopped and most projects were in what can be understood as a state of limbo with little to no progress. Thus, a lot of

information provided by interviewees were based on plans before the pandemic as there was lack of clarity on how implementation of the project would progress in the future.

Within this research, the primary aim was to describe the relationship between citizen engagement and Quality of Life. Therefore, even though there are varying levels of participation in the projects studied, this aspect has not been explored in-depth and could be an avenue for further research. The inability to access citizens for interviews and lack of progress within projects was the main reason that this exploration was not undertaken as much of the information pertaining to this would remain largely hypothetical.

7   Conclusion

This study, through an interpretive research approach, has shown that the relationship between citizen engagement and Quality of Life in the smart city can be described as a cause-effect or action-reaction relationship. To understand and assess Quality of Life participatory activities must be conducted in order to gain contextual information and understand the experience of citizens and factors important to them.

As the study is focussed on smart city projects in Amsterdam, understanding the context of the city as a smart city and its evolution since being labelled as such is crucial to understanding how citizen engagement and Quality of Life are dealt with. The research finds that in the case of Amsterdam, the term "smart" is becoming redundant and has slowly started to phase itself out. The city although labelled "smart" has begun defining projects by its own preference and volition and despite deviating from the term and absence of a smart city policy, the city has not suffered from lack of innovation in the field of sustainable development and improving Quality of Life. In fact, the opposite is true as Amsterdam is regarded as a pioneering city in the domain of smart cities and serves as a model for other cities globally within this space. The criticisms offered through literature to the term smart city for being technocratic, a labelling phenomenon, top-down (Capdevila et al., 2015; De Filippi et al., 2019; Hollands, 2008) resonate among the respondents in this study as well. The city sets itself apart from the global smart city phenomenon by placing greater importance on participation, Quality of Life, and the development of solutions according to its requirements. The variety of projects implemented in the city highlight this as they are not solely focussed on implementing technology but utilising this technology through innovative collaborations, stakeholder management for making the city more sustainable and improving liveability for citizens in the city. Initiatives being implemented in the city define themselves by their objective such are "circular", "resilient", "co-creative" and so forth. Amsterdam is now developing its own strategies for sustainable urban development.

Despite placing citizen engagement and Quality of Life at the core of the urban development philosophy, Amsterdam still faces significant challenges. Although in a project such as Buurt Budget which is initiated by the city and focuses on participation and engagement to improve liveability in neighbourhoods and create active citizens, the same municipality struggles in encouraging participation in larger projects like ATELIER and RESILIO. The involvement of legacy partners such as housing corporations, the water board and energy companies and their different ways of working provides a significant challenge in ensuring participation with citizens is carried out appropriately. This means that

citizens must have a clear role in the planning and implementation of projects and channels to voice their concerns and recourse to resolve potential conflicts. Projects need to be clear in what their objectives for participation are and ensure that this is communicated effectively to citizens to ensure that they not only identify with the process but are satisfied with their role in it as well. The lack of motivation expressed by partners in such activities as identified by respondents in this study highlights the inherent challenge that restricts the project from having an effective participatory process. One of the main issues with this challenge is that there exists no clear form of monitoring in the implementation of such projects that are disseminated to the public. Yes, the projects do put out newsletters about events and general updates with regards to progress and although it may be premature to assume that the updates will not resonate the actual state and implementation of the project, it might be useful for the city to have a much more well-defined monitoring plan for such projects. To ensure that participatory planning is effectively implemented it is crucial to have a robust monitoring system as explained by McTague and Jakubowski (2013). They further highlight that although in participatory planning it may not be possible to fulfil the expectation of every participant in implementation, the success of such a plan does not depend on its complete implementation. But the lack of implementation is a significant issue in the participatory planning process and flirts with creating a meritless process and a hostile public. Therefore, the existing KPIs used by such smart projects do not encourage or motivate the organizing partners to develop clear objectives and methods to organize participation. Considering this approach of participatory planning can allow projects to be more flexible in their approach to finding ideal representation although this is still a challenge and must be addressed through careful study of the target beneficiaries of the project.

Quality of Life in Amsterdam has always played a pivotal role in the city's approach to planning, as expressed by respondents the approach to planning within the city remains closely tied to the happiness of its citizens. The fact that the city is still regarded as one that provides its residents with a high Quality of Life is an indicator that the existing method of implementation of projects does bode well for the residents of Amsterdam. Nevertheless, with the implementation of digital technology and smart urban solutions along with developments in Artificial Intelligence, society has to deal with concerns of privacy, ownership, and control all of which are relevant factors that impact the Quality of Life. Also, the implementation of new solutions for mobility, clean energy, smart grids, and circular waste solutions that aim at broader transition of urban society requires the participation of each and every resident. Ensuring that citizens are duly considered and positively impacted by such changes is critical to successful adoption of solutions and hence a broader societal transition. As identified by this study, even simple transitions like switching from gas to electric cooking require citizens to be educated and

involved in the process of transition. There is large amount of interest in the city to be able to successfully assess Quality of Life, be it in the form of happiness or as social impact. Interviewees also responded positively to the need to monitor and assess Quality of Life and highlight that the current framework of indictors present does not accurately represent the actual impact in the city and that there needs to be a qualitative approach to understanding and assessing Quality of Life. On the one hand within the scope of smart city projects, respondents reflected that the strength of a participation process can inherently highlight factors relevant to the citizens' Quality of Life. While on the other, as mentioned above, there remain challenges to getting different citizens to take part in engagement activities. The results that drive the answer to the main research question of this study though highlight that it is possible for the city to actually assess the impact of its initiatives on citizens' Quality of Life. Although the results from the survey in Buurt Budget can be agreed as not being representative, they do provide a starting point for the city to reflect not only on the implementation of the project but also in how to assess its impact on Quality of Life which can then be transferred to other smart projects in the city. Similarly, the observations of outcomes from Making Sense in both Barcelona for noise pollution and in Amsterdam for air quality and change in policy, highlight that a strong participation process can positively impact Quality of Life by empowering citizens. Results from these two projects show that along with a strong participatory process, qualitative evaluation through interviews and observations can be useful in evaluating projects for their impact on Quality of Life. To evaluate smart city projects for Quality of Life, it must be realised that most projects are being implemented as pilots and cover an extremely small demographic of people. This presents an opportunity for smart projects to actively engage citizens and involve them in the evaluation process and identify ways in which such qualitative approaches can be scaled up or how can representation be ensured when projects grow in size. Furthermore, since the approach in Amsterdam is related to the happiness of citizens, a qualitative approach through participation is even more relevant as Ballas (2013) explores the inconsistencies and weak correlations between happiness and objective indicators.

A particularly interesting aspect identified in this study was a statement by one of the respondents, "there is a lot of unused energy in citizens in the city especially with respect to the city. It is important to channel this energy in a way that can improve life in the city". The response highlights two aspects that are critical to understanding how citizen engagement can contribute to understanding and assessing Quality of Life. It offers insight into ways in which the problem of ideal representation can potentially be solved. Firstly, the statement highlights the abundance of energy present in citizens that needs to be channelled properly. Secondly and more importantly it highlights that this energy is specifically oriented towards the city and improving life in the city. A particularly interesting statement

it proposes is that there is an inherent motivation within urban residents to contribute to their surrounding environment positively. From the perspective of Abraham Maslow's famous hierarchy of human needs, such energy among human beings is possible when one has satisfied all of their lower needs i.e. physiological, safety, love/belonging and esteem (Maslow, 1943). The energy to contribute to the city and improve it highlights the motivation for self-actualization and the need to fulfil one's potential. Although this might be case in a city like Amsterdam that does promise a higher quality of life. As mentioned earlier, smart cities are a global phenomenon and in the developing world, it might be possible that motivation is driven not by a need for self-actualisation but actually the fulfilment of basic human needs. Understanding the perspective of citizens in such a manner can help projects

Figure 24 Maslow's Hierarchy of Needs

analyse what it is that people want at specific points in time and what they expect from a specific project. Those who are willing to spend time within a project are those who are actually motivated to fulfil a deeper requirement of theirs and thus are actually representatively relevant to the participatory process. Similarly, the statement that democratic voting is a way to assess Quality of Life falls short of the actual nature of self-actualization where the person needs to express themselves and fulfil their potential and contribute to society as voting aggregates a person's opinion and will not affect the final outcome and deny them a true sense of expression. Thus, it becomes even more critical that citizens be involved not

just in projects but also in their evaluation to contribute to a better and richer understanding of factors affecting Quality of Life.

The approach to assessing Quality of Life through citizen engagement and describing the relationship between citizen engagement and Quality of Life has broader implications on systems and services in the urban environment. As identified by De Guimarães et al. (2020), aspects of smart governance systems transparency, communication, collaboration, partnership and participation, and accountability positively correlate with Quality of Life. The same factors are the core principles of the Buurt Budget project in Amsterdam. The benefits to assessing Quality of Life through citizen involvement are also crucial to the design of public services and amenities as highlighted by (Batty et al., 2012) in the smart city of the future. Assessing Quality of Life through citizen engagement can provide insights into subjective variation among neighbourhoods in a city. With regards to the smart city, there is still a gap in identifying the relation between urban resilience and human wellbeing (da Silva, dos Santos, Maier, & da Rosa, 2019) and being able to assess the impact of innovative urban initiatives on the Quality of Life of citizens can provide insights into how policies on urban resilience impact the well-being of residents in a city. As mentioned in the ATELIER project objectives, participation will be used to design the public spaces and mobility services in the PEDs resulting from the project. This approach is taken further by (Andreani, Kalchschmidt, Pinto, & Sayegh, 2019) who propose for the design of cities that are human-centred through the use of adaptive street environments, responsive urban safety, and dynamic retail spaces. The focus of such an approach arises from specific needs and local opportunities, using technology to exemplify the intelligence of spaces and implementing a process of co-evolution through collaboration between citizens, stakeholders' designers and researchers. Such approaches to planning are inherently focussed on being beneficial to users and utilise an approach of bottom-up qualitative design rather than top-down quantitative.

In conclusion, citizen engagement and Quality of Life are intrinsically connected in that, to understand Quality of Life, it is necessary to engage with citizens and to improve Quality of Life, it is important to have citizens participate in development activities. The smart city is just a part of the larger domain of urban planning that constitutes design, regeneration of urban spaces, sustainable development, and urban resilience and more. The implications of this study are relevant to this broader domain of urban development and smart governance to ensure that implementation of solutions is being done not just in consultation with citizens but also through evaluation with citizens. It is the belief of this study that the smart city concept and its solutions have been developed in order to solve the broader problems of society. The smart city, therefore, places citizens as the main beneficiary of its implementation.

Therefore, it is only logical that citizens be actively involved in the development of the smart city since it is public taxes that are used to fund these projects and experiments. Results from this study strongly indicate that by placing citizens at the centre of the development process and empowering them to take control of their surroundings through the use of technology or innovative collaborative platforms leads to a positive impact on the quality of life. furthermore, in assessing the impact of such initiatives it is important to consider the citizens perspective that may highlight some expected or unexpected factors. Still, there remain critical challenges to overcome to ensure citizens can actively participate such as legal rights, stakeholder motivation, ideal representation, and clear strategies for participation. Amsterdam although independent from the smart city, appears to have an approach that is largely synonymous with the assumption of this study that engagement with citizens is critical to understanding and identifying factors affecting the quality of life and improving is assessment. But the city is yet to translate this approach into actual practice, although the presence of organizations and individuals (who were contacted in this study) motivated by this thought within the smart city projects is a sign that the city is largely moving in the right direction.

8 Reflection

Conducting this research was possible only due to the involvement of many actors from the smart city ecosystem in Amsterdam and those outside of it as well. Yet, one of the main participants in the interpretive research process is the researcher himself. Keeping up with the element of reflexivity that is crucial to such a research process, I find it prudent to reflect on my overall experience in conducting this study. As the opinions and views expressed here are my own, unlike the earlier sections of this thesis, I shall address myself in the first person here. In this section, I will first reflect on the interpretive research approach, my experience, and my thoughts on it. Second, I will reflect on the outcomes of this research and my position on some findings that I find interesting. Finally, I will reflect on some of my key takeaways from this research journey both personally and professionally.

8.1 Experience with Interpretive Research

Since the beginning of this research study, the one concept that has been a consistent feature has been quality of life. I began the process of searching for a research topic from my own interest in how the city of the future that is controlled by artificial intelligence, aims to be adaptive and is almost sentient nature could actually serve its residents. Residents who are unpredictable, emotional, social, creative, expressive, and constantly on the move. Reading Carlo Ratti's book *Cities of Tomorrow: Sensors, Networks, Hackers and the Future of Urban Life*, I realised that if technology and future developments in cities are not oriented towards citizens, not only would they not succeed but they could also be dangerous to society. It was at his point when I briefly developed an initial research question to identify *how artificial intelligence and big data in urban planning can assess quality of life in the city?* Although I still find this to be an interesting question, it is safe to say now that for the sentient city that we expect from technology is still very far away. Nevertheless, if not for this fascination of how the human experience in cities can be safeguarded, the research would never have reached this point.

The first word that comes to my mind when thinking of the interpretive research approach is *storytelling*. At the start of this research, I personally did not have any experience with qualitative studies which made it quite challenging to make sure that I was using the right kind of approach. Also, an interpretive and exploratory method of research follows abductive reasoning that makes it very easy to get lost within research activities. I felt this quite strongly throughout this study particularly when I was still developing a well-defined research question and was unclear of my research approach. At this point, I was reading a lot of different literature all of which provided avenues that could be explored, which

led me in circles around what eventually would become my main research question. Without my personal interest in quality of life and how cities can better understand and evaluate for it, I do think it would have been hard complete this study. This is why I use the word *storytelling* to describe the interpretive research approach. To ensure that a story is good, it is not just important to have an interesting concept or idea but to have characters who can ground this idea within the imagination and experiences of the listener. I found that the interpretive approach to research required me to not just develop my idea but pushed me to find the most suitable situations and characters to tell the story such that the listener at the end of it the listener can validate the outcome through their own experience irrespective of whether the idea still stands strong at the end.

Even though this research has been a challenging process in many ways, I find the interpretive approach to be extremely useful and actually enjoyable. As someone who inherently enjoys exploring new ideas and concepts, I found this approach to be extremely fulfilling. Considering the fact that the concepts driving this study: quality of life, citizen engagement and smart cities, are all extremely broad in definition, subjective, and widely debated, I do not think any other approach would have allowed me to reach the final outcome achieved int his study. Furthermore, as these concepts are extremely complex with their interpretation and meaning varying on an individual scale, the interpretive approach allowed me to adjust my approach as the situation demanded. Looking back, even though my initial interviews highlighted the importance and relevance of quality of life for Amsterdam, respondents were extremely sceptical about indicator frameworks and indexes to assess quality of life. Add to this the fact that although called as one, Amsterdam does not actually consider itself as a smart city and people in the city are generally critical of it. This was a significant obstacle since at that point of the study, the focus was on identifying how can impact on quality of life be represented through indicators. The lack of enthusiasm for this from respondents forced me to adapt my approach which led to the inclusion of citizen engagement into the scope of research. Immediately, the following interviews went a lot better and respondents reacted more positively to the idea of interacting with citizens to assess factors that impact their quality of life. I also realise now that this is also more closely related to Amsterdam's approach to urban planning and smart city development. The fact that the city still struggles with participation, social cohesion and assessing quality of life all culminated together to lead to final outcome of this research. Such transformations in research would not have been possible with any other approach. At the same time, the depth of information generated through this experience I feel is extremely valuable to understanding how the context of Amsterdam and any other city that may be studied is important for identifying the relationship between quality of life an citizen engagement.

8.2 Research Outcomes

I find the outcomes of this research to be interesting and useful at many levels. Throughout this research, I felt that although the outcome was very clear, there always seemed to be some aspect that appeared as a hurdle to the interviewee to fully commit to the fact that citizen engagement is crucial to assessing quality of life. Similar to the responses of many interviewees, I find that the managerial and operationalised nature of working in modern society has taken away the fulfilment offered by an interactive process. Although many respondents posed the example of, "it is challenging to identify what value citizens can add in a technical project", I find it to be an empty statement since input from citizens does not have to circumscribe every aspect of the project. Naturally, not all citizens are experts but all citizens are users, and without having them validate the intended experience to be provided by a solution, it will always remain difficult to scale up a project or further societal transition to more sustainable living.

Another statement that I find futile is that of the inability to assess something if it is not a number. The irony in this statement emerges from the fact that quality of life being subjective was almost unanimously acknowledged by respondents. Furthermore, by highlighting the challenges of representation it always seems possible to almost escape the need to involve citizens in evaluating quality of life. To participate in an activity requires motivation and if project developers can generate motivation among citizens then representation should ideally not be a problem. While I realise this may seem premature, on further thought, it highlights a two-way problem where larger partners and stakeholders lack motivation and factors that motivate citizens remain unclear. Either way it seems to be necessary to find common ground by which companies and stakeholders look forward to participation activities and so do citizens. such an approach is not just relevant to smart city projects but also in the broader contexts of urban planning, design of public spaces, management of public spaces and more. Even though it may be easy to say that project developers must engage with all citizens and organise events, go talk to them as such, I am cognizant of the challenges associated with planning such activities.

One of the important things I observed through this research is that both quality of life and citizen engagement are extremely political in their nature. The inherent aspects of representation and provision of services to improve someone's experience of life. I find smart governance an important aspect to improve quality of life as much of the things that make citizens unhappy are due to actions public and private authorities. Even within the projects, issues of legality, ownership, citizen rights, policy and decision-making power are consistently brought up ass barriers or opportunities. This could be indicative of the fact that much of what improves quality of life is a sense of power to influence can

create your own outcomes. Which is why I still remain critical of the point made by one respondent pertaining to voting being representative of the state of quality of life since voting aggregates and dismisses individuality of persona and statistically reduces their ability to influence the outcome.

Finally, hailing from India, I find a lot of positive attributes that the global society can take by looking at Amsterdam. The outcomes highlight an inherent will within the city to encourage active participation and give people the ability to positively influence their quality of life. I find this extremely important particularly when reflecting on the motivation of participants and stakeholders in relation to motivational theory. It would be very useful for cities in India and in other developing countries to identify what factors drive citizen participation. Particularly in projects like Buurt Budget where citizens are not running a business or earning money but just contributing to the improvement of the neighbourhood. Considering the fulfilment of basic human needs, I personally would really enjoy exploring how such policies and strategies can influence urban and rural transformation in developing countries.

8.3 Personal Takeaways

As I mentioned earlier, conducting this research has been a very challenging activity for me from the perspective of lack of knowledge and a broad and open-ended approach. Despite this, I personally feel this research process has benefitted me immensely not only from the perspective of gaining knowledge but on broader personal development. It would be impossible in this regard to not bring about the COVID-19 pandemic that brought the world to its knees. The onset of the pandemic and the ensuing social quarantining meant that the last six months of this research project have been spent largely in solitude. This makes it difficult to interact with people regularly and stimulate the mental aptitude of an individual. The time that has gone by had been significantly difficult in terms of keeping up motivation, focus and dedication with regards to completing this project. there were long periods of time when it was extremely hard to get any interviews since everyone around had to completely re-schedule their life to the *new normal.* Such times were very difficult to deal with as I began to miss the social being that I usually am and in the context of this thesis, it ironically meant that going and talking to people for me and for the projects was not possible. Even under normal circumstances, projects such as this can be challenging, difficult and draining but with the pandemic, things did become a lot harder. It is important in such instances to value the small wins that the process takes up which in the case of study was getting access to interviewees. As I was able to gather more responses from interviewees, it only improved the process as there was not just research work to do but also see progression of the idea.

On a more positive note, this research project has actually helped me realise a keen interest in qualitative research specifically into topics that are of broader societal value like participation, generating social value through urban transformation, facilitating societal transition in urban and rural contexts, and user-centred design of solutions. I had a very positive experience with regards to conducting interviews and thoroughly enjoyed the process. Even though certain interviewees wished to remain anonymous, the interview generated a lot of useful data and the respondent was candid as ever in my opinion. Many respondents also reacted positively to the research topic and viewpoints put forth by me which further increased my confidence and contributed significantly in my advancement in the process. the outcomes of this research have also helped me gain more confidence in my skills in conducting such research and have developed an interest in me to possibly pursue such opportunities in the future.

Upon critically reflecting in the way I engaged in the process I can say that there are many avenues for improvement. Firstly, I think, the level of transparency during the research process could have been improved which could possibly have opened up much more interesting and nuanced outcomes from this study. This is applicable to not just the research process but also in a general professional environment where keeping colleagues and collaborators up-to-date and appraised of developments is critical. The research conducted in this regard could have benefitted from a much more well-organised way of working. Nevertheless, planning and organization actively remains an area of personal improvement. Furthermore, the conducting this research has also helped me identify opportunities to improve certain technical and design-based skills that can contribute in developing a much richer output.

Finally, conducting this thesis has helped me better understand my drive, motivation, and capability to accomplish difficult goals successfully. Although presented with some unique challenges during the course of this research, I am happy that I did not give in to the situation and made sure that I kept progressing at all costs. This research project has helped me gain a lot more confidence in my skills and my approach to doing quality work. I hope the insights from this research project can be taken further and prove useful in the future efforts to understanding quality of life through citizen engagement.

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9   Appendix

1.   List of Interviews conducted during this research project

Table 2 List of Interviews Conducted during this research project[9]

No. (#)	Organization	Associated Project	Date of Interview	Reference (INT#)
1	ASC	None	29th October 2019 & 13th November 2019	INT1, 2019
2	City of Amsterdam	None	6th March, 2020	INT2, 2020
3	ASC	None	28th April, 2020	INT3, 2020
4	AMS Institute	None	29th April, 2020	INT4, 2020
5	Urban Innovation Action	None	30th April, 2020	INT5, 2020
6	ASC	None	1st May, 2020	INT6, 2020
7	City of Amsterdam	Making Sense	26th May, 2020	INT7, 2020
8	City of Amsterdam	Buurt Budget	27th May, 2020	INT8, 2020
9	AUAS	RESILIO, ATELIER	27th May, 2020	INT9, 2020
10	Combiwel	Buurt Budget	10th June, 2020	INT10,2020
11	AUAS	RESILIO	19th June, 2020	INT11, 2020
12	City of Amsterdam	Buurt Budget	22nd June, 2020	INT12, 2020
13	The Waag	ATELIER	23rd June, 2020	INT13, 2020

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[9] Not all interviewees accessed in this study had a connection the smart city projects that have been studied. Furthermore, it is important to note that while some interviewees have been extensively referred to, some of them were merely part of the research process and highlighted opportunities for this research to explore.