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GREEN CITY ZONE

A Case-Study in a Multi-Stakeholder Initiative within a Smart City



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Abstract

As climate change concerns have taken a central spot in mainstream discourse, there has been an emergence of green smart city projects, resulting in an increased demand for research in these areas. As the EU has pledged a reduction of emissions, various projects have arisen, such as Climate Contract 2030, Move21, and this thesis' subject – the Gothenburg Green City Zone. A commonality amongst these projects is employing a multi-stakeholder collaborative approach, typically applying a triumvirate consisting of industry, government, and academia. Using previous research on smart cities, project management and triple helix, as well as MSI framework (Elia et al., 2020) utilizing both the temporal distance and sociotechnical system lenses, this thesis aims to observe and discern the complex dynamics of a long-term, large scale multi-stakeholder initiative within a smart city program. The findings yield a recognition that both institutional logics and balancing socio-technical systems are potential challenges. Additionally, the findings show the effect temporal distance plays on the various MSI genes, specifically, with increased focus on desirability (high construal) aspects of the initiative, fueled by a growing wave of systemic importance, as compared to the practical feasibility (low construal) aspects of how to achieve the end-goal of net-zero emissions by 2030. The insights from this thesis contribute to the growing discussion centered around regional emissions reduction schemes and how collaborative helix-based project management can be affected by time, and the importance of socio-technical systems balance.

Keywords:

net-zero emissions, multiple stakeholder management, construal level, temporal distance, system thinking, sociotechnical system theory, project management, smart city.

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1 Introduction

Today, countries and cities across the world are facing a plethora of challenges and issues, particularly regarding energy and climate change. While some of these questions focus on energy independence and transition from fossil fuels to renewable energy (Tinker, 2022), certain hurdles still need to be addressed, such as ensuring that replacement energy sources and technologies pay close attention to sustainability aspects (Schonhardt, 2022), that there is a clear strategy and time horizon in which the transition needs to take place (Rai-Roche, 2022; European Commission, 2022), and that industry recognizes these urgent needs and starts working towards a net-zero emissions future through the extensive use of technology, digitalization and innovation (Herweck and Weckesser, 2022; Volvo Cars, 2021). Furthermore, these issues constitute an emerging area of interest and investment across all sectors – industry, public and academic – where the necessity for rapid transition to renewable and sustainable sources of energy has been recognized and charted, doubled by pledges to curb greenhouse gas emissions by 55% by 2030, with the end-goal of becoming carbon-neutral by 2050 (European Commission, 2019a).

In order to meet these growing demands, national and local governments have pivoted and have started making the transition to smart cities, where they can further leverage the benefits brought about by widespread use of technology, data and digitalization to significantly improve the quality of services provided to its citizens, their quality of life and economic opportunities, whilst working towards a more sustainable and equitable future. To this extent, various smart city project initiatives have been established across Europe to help meet these goals, for example in Berlin and Paris (Juraschek et al., 2012; Mancebo, 2020), Hamburg, Munich, Rome, and Toulouse (Move21, 2021). Within Sweden, Gothenburg City has taken the role of innovator and has spearheaded several projects and initiatives that center on smart city elements, such as Climate Contract, DenCity (by Lindholmen Science Park), ElectriCity and SCALE (Viable Cities, 2022; Göteborg Stad, 2021; Lindholmen Science Park, 2021). The most ambitious smart city project to date in Gothenburg is the Green City Zone (GCZ), a complex multi-stakeholder initiative formed in the first half of 2020; its target goal is achieving net-zero emissions in three defined zones within Gothenburg City. This initiative requires collaboration of stakeholders across the three main sectors in Gothenburg – industry, public sector and academia (triple helix) – to deliver on its targets. Yet in such a complex environment, how can we be certain that obstacles will not appear or interfere with the initiative or its

projects? And how can we further understand the role of time in such an intricate and innovative endeavor?

This thesis focuses on identifying management challenges in multi-stakeholder smart city initiatives that utilize a triple helix approach (Etzkowitz, 2008) to achieve their targets. In addition, this thesis aims to understand what effect large time horizons have on risk management and decision-making in a multi-stakeholder initiative. To this extent, the research questions are framed as follows:

“What are the challenges of a multi-stakeholder smart city initiative utilizing a triple helix approach?” and

“What effect does temporal distance have on the risk management and decision making within a multi-stakeholder smart city initiative?”

To answer these questions, the researchers chose to embark on a case-study of the Gothenburg Green City Zone. First, to re-emphasize the importance of smart cities, this thesis leverages existing definitions, stages of maturity and issues relating to sustainability, energy, and emissions. The smart city conceptual model is widely used in various fields - urban planning, information systems, governance - that advocates the importance of information and communication technology (ICT) and data in helping address complex challenges (Neirotti et al. 2014, European Commission, 2019). In line with this argumentation, smart cities can be further developed by engagement of multiple stakeholders and expanded upon through diverse project management methodologies. Second, to analyze the relations between the multiple stakeholders within the GCZ, this research chose a multi-sided initiative perspective (MSI), doubled by construal level theory and socio-technical systems theory. While MSI indicates the four genes and resulting governance at the center of any initiative, construal level theory highlights influence of the temporal distance on large-scale project management, and socio-technical theory help us examine the relationship between humans and machines.

There exist multiple pieces of research that explore multi-sided endeavors in relation to *platforms*. However, when it comes to research exploring multi-sided endeavors as applied to *initiatives*, the existing body of literature is limited. Moreover, although there is a plethora of research on the roles that time horizons or relationships between humans and machines play in large-scale projects or initiatives, there is very little research on all these factors influencing the outcome of an initiative or project.

Consequently, from a practical standpoint, this thesis hopes to assist both the GCZ initiative in identifying and addressing the core causes of their challenges and suggest ways in mitigating them. From an academic standpoint, this thesis aims to make the following contributions. First, this thesis aims to add to the existing limited

knowledge repository of multi-sided initiatives, as viewed through the lenses of construal level theory and socio-technical theory. Second, this thesis aims to contribute to leadership and management literature by providing useful insight on smart city initiatives in Sweden.

1.1 Thesis structure outline

The structure of this thesis is as follows. First, the researchers will present the selected literature from various relevant subjects, such as stages and maturity of a smart cities; multiple stakeholders – in relation to institutional logics, decision making, boundaries and innovation ecosystems; project management – in relation to governance and scalability; and lastly triple and quadruple helix operational constructs. Second, the research team will introduce the key frameworks and theories that provide the lenses through which to operationalize the data. Third, the selected case-study of Gothenburg Green City Zone will be presented, as well as the methodology utilized throughout this thesis. This will be followed by an exhaustive breakdown of the thematic analysis of the interviews conducted for this project, as well as the civil society survey. Fourth, the results will be discussed, as well as how they relate to this thesis' theoretical contributions. Lastly, this research will present an overview of the limitations, contributions, as well as opportunities for further research.

2 Previous Research

The concept of smart city, urban digitalization, and interconnection, as well as the social and political underpinnings of smart city models have been thoroughly explored in the existing literature, with research from various fields such as city planning, business strategy and the environment, information systems and management, and informatics. Furthermore, the construct of smart city, its governing and organizing frameworks have received attention from private and public research agencies alike, indicating the increasing/mounting interest - but also need - to transition towards energy efficient, sustainable and clean cities, where citizens can prosper. The following section first introduces the reader to the notion of smart city and its encompassing characteristics; second, it then introduces concepts pertaining to multiple stakeholders, for example institutional logics, project management and the triple helix model.

2.1 Smart City

2.1.1 Definition of a smart city

According to Neirotti et al. (2014), there is no shared definition of a smart city (SC), and global trends revolving around smart cities are hard to identify. However, there is a wide consensus that SCs are distinguished by a pervading use of Information and Communication Technologies (ICT), which, depending on the urban context, assist cities in better leveraging their resources. Thanks in part to different barriers that hinder ICT diffusion, and the leading role of economical, political and cultural factors that tend to shape the means through which cities become smarter, it can be stated that there is no one distinctive model of SC evolution in the wider world. In their deep dive on the subject, the researchers discovered that the evolution patterns of smart cities are highly dependent on local context factors, such as structural factors (size and demographic density), economic development, technology development, environmental-friendly policies and other country-specific factors.

Table 1 is an adapted version of Neirotti et al. (2014) systematic literature review of smart city literature. The authors identify a series of themes in the existing literature, and they classify it in six main categories. Moreover, each category has been further deconstructed in sub-domains, where each area has been provided with a description.

Table 1
Systematic smart city literature review – adapted from Neirotti et al. (2014).

Category	Sub-category	Description
Natural resources and energy	Smart grids	Electricity networks are able to take into account the behaviors of all the connected users in order to efficiently deliver sustainable, economic, and secure electricity supplies. Smart grids should be self-healing and resilient to system anomalies
	Public lighting	Illumination of public spaces with streetlamps that offer different functions, such as air pollution control and Wi-Fi connectivity. Centralized management systems that directly communicate with the lampposts can allow reducing maintenance and operating costs, analyzing real-time information about weather conditions, and consequently regulating the intensity of light by means of LED technology
	Green or renewable energies	Exploiting natural resources that are regenerative or inexhaustible, such as heat, water, and wind power
Transport and mobility	City logistics	Improving logistics flows in cities by effectively integrating business needs with traffic conditions, geographical, and environmental issues
	Info-mobility	Distributing and using selected dynamic and multi-modal information, both pre-trip and, more importantly, on-trip, with the aim of improving traffic and transport efficiency as well as ensuring a high-quality travel experience
	People mobility	Innovative and sustainable ways to provide the transport of people in cities, such as the development of public transport modes and vehicles based on environmental-friendly fuels and propulsion systems, supported by advanced technologies and proactive citizens' behaviors
Buildings	Facility management	Cleaning, maintenance, property, leasing, technology, and operating modes associated with facilities in urban areas
	Building services	Various systems that exist in a building such as electric networks, elevators, fire safety, telecommunication, data processing, and water supply systems. Computer-based systems to control the electrical and mechanical equipment of a building
	Housing quality	Aspects related to the quality of life in a residential building such as comfort, lighting, and Heating, Ventilation and Air Conditioning (HVAC). It includes all that concerns the level of satisfaction of people living in a house
Living	Entertainment	Ways of stimulating tourism and providing information about entertainment events and proposals for free time and night life
	Hospitality	Ability of a city to accommodate foreign students, tourists, and other non-resident people by offering appropriate solutions to their needs
	Pollution control	Controlling emissions and effluents by using different kinds of devices. Stimulating decisions to improve the quality of air, water, and the environment in general
	Public safety	Protecting citizens and their possessions through the active involvement of local public organizations, the police force, and the citizens themselves. Collecting and monitoring information for crime prevention
	Culture	Facilitating the diffusion of information about cultural activities and motivating people to be involved in them

	Public spaces management	Care, maintenance, and active management of public spaces to improve the attractiveness of a city. Solutions to provide information about the main places to visit in a city
Government	E-government	Digitizing the public administration by managing documents and procedures through ICT tools in order to optimize work and offer fast and new services to citizens
	Procurement	Allowing the public sector improving procurement procedures and the associated contract management, with the purpose of assuring best value for money without decreasing quality
	Transparency	Enabling every citizen to access official documents in a simple way and to take part in the decision processes of a municipality. Decreasing the possibility for authorities of abusing the system for their own interests or hiding relevant information
Economy and people	Innovation and entrepreneurship	Measures to foster the innovation systems and entrepreneurship in the urban ecosystem (e.g., presence of local incubators)
	Cultural heritage management	The use of ICT systems (e.g., augmented reality technologies) for delivering new customer experience in enjoying the city's cultural heritage. Use of asset management information systems to handle the maintenance of historical buildings
	Digital Education	Extensive Use of modern ICT tools (e.g., interactive whiteboards, e-learning systems) in public schools
	Human capital management	Policies to improve human capital investments and attract and retain new talents, avoiding human capital flight (brain drain)

On a conceptual level, a smart city “integrates information and communication technology and various physical devices that are connected to the IoT network to optimize the efficiency of city operations and services and connect to citizens” (Anthopoulos, 2019). A commonly understood explanation involves an urban area that uses different types of electronic methods and sensors to collect data that is further used to administer different things efficiently. The data is taken from citizens and devices equality and is analyzed and monitored to govern the city’s functions such as traffic, transport systems, various utilities, water supply, waste, crime, schools, libraries, and other community services (McLaren and Agyeman, 2015). In their research article on digitalization of cities and smart city interventions that focuses on Sarajevo, Kljuno and Dizdarević (2021) highlight the four principles originally proposed by Deakin and Al Waer (2011) as being the base onto which cities have been steadily improving everyday pursuits for their residents, namely applying a wide range of electronic and digital technologies to cities and communities, using ICT to alter life and working conditions within a given region, incorporating ICTs in government systems, interweaving people and ICTs to increase and diffuse innovation and knowledge-sharing.

As part of their exploration of smart city concept and public sector digitalization in Finland, Ylipulli and Luusa (2020) take a step back to reframe the discussion surrounding welfare capitalism from the liberal and consertavite models present in North America and continental Europe, to the typical Nordic model of social democracy (p.4). By recontextualizing how resources are accessed and distributed in

other parts of the world - control of the market in North America and work performance with regards to earnings in continental Europe - the authors can focus on the strong role the state plays in the distribution of resources in Nordic countries, where welfare is viewed as an individual right. Moreover, this reframing stresses the clash between the Nordic welfare system, which focuses on public services and citizen rights, and the widely accepted neoliberal concept of citizenship, which lies at the core of smart city developments (Ylipulli and Luusa, 2020: pp.3-4).

Shifting perspective from academia to policy makers, it appears that various national and local legislatures have made efforts to define and map the concept of a smart city and its components. The European Commission (EC) (2019) defines smart cities as “a place where traditional networks and services are made more efficient with the use of digital solutions for the benefit of its inhabitants and business”. Furthermore, on an infrastructure level, a smart city leverages smarter urban transport networks, enhanced water supply and waste disposal facilities and increased efficiency in lighting and heating structures and houses; on an administration level, it involves a responsive and collaborative city administration, safer public spaces, and meeting the needs of its aging citizens (European Commission, 2019). In a common report developed by UrbanTide together with the Scottish Parliament (2017, p.4), the report defines a smart city as “the integration of data and digital technologies into a strategic approach to sustainability, citizen well-being and economic development”. The report further mentions that smart cities adopt a “system-of-systems” approach to deliver services and develop connected service models which focus across organizational boundaries. The expectation is that cities or regions could make use of digital technologies and data to address urban congestion, fully utilize energy consumption through the use of smart grids and bolster resilience. As the report mentions in its conclusion, the smart city concept is contingent on its ability to replicate data processes across diverse systems, which can deliver increasingly greater benefits though implementation across service areas.

Similarly, in a draft proposal on smart city schemes, the Indian Ministry for Urban Development (MoUD) defines smart cities as exhibiting smart (or intelligent) physical, institutional, social and economic infrastructure. Moreover, the article identifies four foundational pillars of a smart city, namely social infrastructure, physical infrastructure, institutional infrastructure and economic infrastructure (ArcIndia News, 2015: pp.20-21). Within each pillar lie well-defined areas of interest, such as: power, multimodal transport, cyber connection, connectivity (of roads, airports, railways) and housing - as part of physical infrastructure; job creation, market growth, gross domestic product (GDP) contribution and livelihood activities - as part of economic infrastructure; ICT based service delivery, environmental sustainability, people’s participation in decision-making and citizen advisory committee - as part of institutional infrastructure; inclusive planning,

building homes and entertainment (green areas and parks, culture and heritage, music, tourist spots and sports) - as part of social infrastructure (ArcIndia News, 2015: p.21). The smart city concept strives to bring improvements in all the aforementioned areas of interests, whilst also disseminating access to goods and services within the population, lowering the barrier of access and democratizing how cities are planned and run.

2.1.2 Stages of smart city maturity

As outlined by the UrbanTide report (2017) and based on the British Standards Institution PAS 181 model, there are five different levels of maturity that smart cities can exhibit. From lowest to highest, these are ad-hoc, opportunistic, purposeful & repeatable, operationalized and optimized. What differentiates growing from mature implementations of smart city models are the city management status, smart city status and the effects on outcomes. The following table has been adapted from the report and presents the differences and interplay between the several factors.

Table 2
Smart city maturity levels.

Level	Ad-Hoc (1)	Opportunistic (2)	Purposeful & repeatable (3)	Operationalized (4)	Optimized (5)
City management status	Siloed	System Collaboration	System Integration	Managed system	Sustainable and Open "System-of-Systems"
Smart city status	Operation focused digital and data driven service improvement	Holistic system thinking and emergent sharing of data	Strategy led and outcome driven. Enabled by system-wide technology investment	Technology and data enabled dynamic sense and response systems	Continuously adaptive city-wide 'smart' deployment
Effects on outcomes	Capturing evidence and building business case	Cross boundary partnerships emerging to focus on shared outcomes	Shared accountability for outcomes and joint system-wide investment program	Improved prediction, prevention and real-time response delivers improved outcomes	City-wide open 'system of systems' approach drives innovation that enhances city competitiveness

As can be seen from the existing body of literature, there is difficulty in achieving consensus on a unitary definition of a smart city due to the complex interdependencies at work, including the maturity stage; being recognized as a smart city is an evolutionary process, and not static as with traditional cities. Therefore, for the purpose of this thesis, we identify that Gothenburg is a smart city, due to its involvement in initiatives such as the Gothenburg Green City Zone, as they are employing and operationalizing many of the sub-categories proposed by Neirotti et al. (2014), such as green or renewable energies, city logistics and people mobility, pollution control and are working towards implementing other previously stated sub-

categories. Additionally, it can be suggested that Gothenburg currently exhibits 'Level 2' maturity traits.

2.1.3 Difference between a traditional city and smart city

In their research article that explores the concept of the smart city as a socio-technical system, Kopackova and Libalova (2017) identify three structural differences between a traditional city and a smart city. The first difference lies within the allocation of roles, as traditional structures envision/assume citizen engagement/participation in public affairs only at specific times, such as during elections. After that, it is the duty of elected representatives to oversee the day-to-day operations and affairs of the city, with minor interference from citizens (Kopackova and Libalova, 2017: p.6). The second difference lies with organizational change of government bodies, where the required circumstances for this change are the sharing and integration of knowledge and information. Whilst transformations in technology - such as network infrastructure - complement this revision, it must also be followed by a rethinking of processes (Kopackova and Libalova, 2017: p.7). The third and last difference lies in the transparency and openness of government processes. Generally, government agencies gather large amounts of data, which serve as the basis for decision-making. By opening and sharing information, smart cities concurrently increase their transparency and enhance trust in government and community alike (Kopackova and Libalova, 2017: p.7).

2.1.4 Sustainability, emissions and energy

As Elia et al. (2020) underline in their research article on building responses to sustainable development challenges, sustainability and sustainable development are characterized as wicked problems, resulting directly from multiple driving factors and exhibiting no specific articulation or valid solution; their answers can be better or worse, depending on the angle they are viewed from (Rittel & Webber, 1973). One this is certain though: in order to address sustainable development challenges, knowledge is required beyond the boundaries of a single organization, cooperation between multiple stakeholders that are impacted by developmental risks and/or benefits is necessary in order to suitably define, fully perceive and effectively attempt to resolve these issues (Goodman et al., 2017; Saravanamuthu, 2018; Barnett et al., 2018).

As illustrated by the existing body of literature that focuses on smart city concepts and sustainability, the two most common and recurring themes were those of emission and energy. According to Kljuno and Dizdarević (2021), by implementing concepts, for instance, of resilience or smart city technologies in urban environments, emissions could be drastically reduced, and natural resources could be better managed, urban transport infrastructures, waste disposal facilities and water supplies could be augmented to modern and efficient standards, and the energy efficiency of

buildings could be increased (2021: p.2). On the topic of emissions, Pee and Pan (2022) state that cities are critical in climate measures and need to be engaged with, as they comprise the primary source of greenhouse gas emissions. Additionally, the researchers state that the path towards zero emissions requires resilient urbanization that is conceived to withstand energy and climate shocks that cities are expected to endure in the future (Pee and Pan, 2022). In their study regarding digitalization of cities and smart grids, De Dutta and Prasad (2020) identify that digital technology can be used to help cities manage their demand for energy through large-scale implementations of smart grids. This can be achieved through the merger of data with digital connectivity to enhance core functions, including sustainable energy management (De Dutta and Prasad, 2020: p.1386). Furthermore, as Konhäuser (2021) also emphasizes, efficient generation and distribution of energy in buildings requires the wide use of various digital components, such as sensors, meters, actuators, and energy management systems on premises of homes and offices and allow different digital components to interface through communication networks.

2.2 Multiple stakeholders

2.2.1 Institutional Logics

Institutional logics serve as the classifying principles for a given field, such as capitalism, family, the bureaucratic state, democracy, Christianity (Friedland and Alford, 1991). They are the base for assumed procedures that guide the behavior of field-level actors; they also “refer to the belief systems and related practices that predominate in an organizational field” (Scott, 2001: p.139). As a theoretical construct, logics play an important role in helping explain linkages that generate a sense of shared purpose and unity within an organizational field (Reay and Hinings, 2009: p.629). As Reay and Hinings (2009) underline in their article, this has been used by institutional theorists to assert that organizational fields are categorized by a dominant institutional logic, even though two or more institutional logics may be present concurrently (p.629). In their analysis of the Canadian healthcare system and the competing logics within it, Reay and Hinings (2009) identified four mechanisms through which local physicians and regional health authorities (RHAs) managed to provide services, even though they were governed by different institutional logics. These mechanisms are differentiating medical decisions from other RHA decisions, seeking informal input from physicians as part of decision-making processes, working together against the government and jointly innovating in experimental sites (pp. 640-42).

In their book “The institutional logics perspective: A new approach to culture, structure and process”, Thornton et al. (2012: p.2) define institutional logics as

“the socially constructed patterns of symbols and material practices, assumptions, values, beliefs, and rules by which individuals and

organizations produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality.”

According to the authors, institutional logics perspective (ILP) focuses on the heterogeneity of cultural meaning and how it varies by institutional order (Thornton et al., 2012: p.2). ILP is a meta-theory that should be used in conjunction with other social science theories to integrate and augment them in order to better comprehend the effects of culture and institutions in many critical domains (Thornton et al., 2012: p.15).

2.2.2 Project management

Project management as an organizing technique is a modern phenomenon; it is characterized by its mechanisms of restructuring management, on one hand, and special management techniques, on the other hand, with the objective of attaining better control and usage of existing resources (Kerzner, 2013: p.2). Due to unhindered progress in technology and the marketplace, enormous pressure has been placed on existing organizational forms and traditional bureaucratic structures; consequently, traditional management structures have to be replaced by more organic and responsive management structures (Kerzner, 2013: p.2). This is the gap that project management aims to address, as both industry and academia have identified its capacity to reform current hierarchical organizational structures and reduce bureaucracy and friction.

Project governance can be envisioned as a framework for decision-making; more broadly, governance outlines decisions that impact expectations, accountability, responsibility, verification of performance or granting of power. Furthermore, governance permits effective and efficient decision-making to occur, as it bolsters consistent management, cohesive processes and policies and decision-making prerogatives for distinct areas of responsibility (Kerzner, 2013: p.21). Projects can exhibit different governance frameworks, regardless of shared management methodologies, and governance can operate either independently or as part of project management leadership (Kerzner, 2013: p.21). However, governance occasionally fails or underperforms, as people confound corporate governance with project governance. In general, this is a result of differences regarding alignment, direction, dashboards or membership between corporate governance groups and project groups (Kerzner, 2013: p.22). Conversely, planning acts as a complementary function to governance, and can be regarded as the selection of enterprise objectives, establishment of procedures, policies and programs that are requisite in achieving them. In a project environment, planning refers to establishing predetermined courses of action within a predicted environment (Kerzner, 2013: p.506). Overall, project planning presents four traits, such as being systematic, being flexible to accommodate unique activities, being disciplined through controls and reviews, and

capable of accepting multifunctional inputs. Project planning is an iterative process and must be performed through the lifecycle of a project; furthermore, it is a continuous process of accommodating entrepreneurial decisions with considerations to the future, as well as systematically organizing the necessary effort to implement such decisions (Kerzner, 2013: pp.506-8).

In relation to smart cities and governance challenges, Deakin (2014: p.2) identifies and highlights three critical issues, namely smart city rankings, future Internet developments and the Triple Helix model of smart cities. In the author's opinion, all three issues capture, to a certain extent, something indicative regarding the three governance challenges and offer insight into the organization and functioning of smart cities (2014: p.2). However, in order to properly address such challenges, a comprehensive toolset needs to first be assembled to measure the performance of smart cities; such a toolkit should include instruments, for example, models, networks, analytical frameworks and metrics that are specifically designed to evaluate the "smartness" of a city and the governance challenges at hand (Deakin, 2014: p.13).

2.2.3 Triple Helix Model

The Triple Helix Model (TH) brings together three sectors to work collaboratively in an exchange of knowledge, ideas and objectives. As Etzkowitz (2008, p. 8) explained:

"a Triple Helix regime typically begins as university, industry, and government enters into a reciprocal relationship with each other in which each attempts to enhance the performance of the other".

Essentially, according to Leydesdorff and Etzkowitz (1998), the key to the triple helix is the breakdown of boundaries between sectors, in order to allow for collaborative innovation. With this model, individuals from all three sectors (industry, government and academic) pool their human capital resources in order to create new solutions (Etzkowitz, 1996). The three sectors that form the triple helix each play specific initial roles. The education sector is meant to provide research and knowledge, while the industry sector is focused on commercial products, services and goods, and the government sector serves as a regulatory body.

While the three sectors work together towards 'mutual shaping' (Leydesdorff and Etzkowitz, 1998: p.200), the iteration and feedback loop lead to alignment within the target, while also the flexibility to change the path and restart the iteration process again. While it is good to have alignment for the sake of stability, it is also vital to have some differentiation, as with this friction should come new ideas and perspectives (Leydesdorff and Etzkowitz, 1998). Conversely, Leydesdorff and

Etzkowitz (1998), also stipulate that conflicts need to be discussed and dealt with, likely with codification.

The Triple Helix model is successful in dealing with complex innovation process inquiries, due to the established framework. Such inquiries are, as explained by Cai and Amaral (2021: p.221), “1) What are the key actors; 2) What are the mechanisms of interactions between the actors; 3) What are the enabling conditions of the interactions.” Traditionally, the key actors within the triple helix are academia, government and industry.

As is natural with the concept of the triple helix model actors to be fluid and dynamic, so too must the framework itself. In a recent article mapping out the strengths and weaknesses of the Triple Helix Model, Cai and Lattu (2022) identified three dimensional features that were in flux. In particular, one deals with the temporal dimension, in which “innovation must be sustainable” (Cai and Amaral, 2021: p.223), in order to safeguard for future generations. Additionally, a second dimension focuses on the spatial dimension, in which innovation happens in a global realm as opposed to the previous individual, regional, and national levels.

According to Cai and Lattu (2022), there are three main misunderstandings that often occur when interpreting the triple helix model. Firstly, the triple helix does not include civil society. The counterargument is that in fact society is actually, “the launch pad for take-off [of] triple helix interactions.” (Etzkowitz, 2014: p.19) or the institutional ground of the the Triple Helix (Cai, 2015), with the triple helix success being reliant upon “broad social participation” According to Etzkowitz (2008: p.74),” civil society is the foundation stone of the triple helix and of the relationship between science policy and democracy.” (Cai and Lattu, 2022: p.7). The second misunderstanding is attributed to likening the Triple Helix model to an innovation system. The Triple Helix model developmental process needs to be “an organized acceleration process” (Cai and Lattu, 2022: p.7) that is intentional, planned and structured (Leydesdorff and Meyer, 2006). Finally, the third misunderstanding is that the Triple Helix model is simply a collaboration of three spheres or networks. According to Etzkowitz (2008), the three actors are meant to take on the role of one another during the process.

Cai and Lattu (2019), proposed a new civically engaged Triple Helix Model, as they felt civil society was too large and important to be an equal parallel partner. They also called for a future research agenda that would consider a new designation for the actors within the helices (Cai and Etzkowitz, 2020), to be sustainable entrepreneurial university, sustainable corporation, and sustainable government, due to a shared interest and commitment toward social responsibility and sustainable goals, which would require social engagement for success (Cai and Lattu, 2019).

3 Theoretical Background

In this study, we adopted the multi-sided initiative framework to examine the different mechanisms of the operationalization of the Gothenburg Green City Zone Initiative. Temporal construal theory was utilized as a lens to understand the temporal issues related to a long-term initiative and how it affects the decision making and project management of the GCZ. Finally, as this is a complex initiative utilizing a Triple Helix ordination with great effects on both society and technology, we chose to use socio-technical system thinking when evaluating how ultimately the MSI components, temporal issues, society and technology are intertwined within the decision making and implementation process.

3.1 From Multi-Sided Platform (MSP) to Multi-sided Initiative (MSI)

The primary framework identified to help explain the dynamics of the multi-stakeholder initiative was Elia et al. (2020) multi-stakeholder framework for sustainable development. The authors employ an interdisciplinary business management and collaborative innovation literature to propose a conceptual framework of a multi-sided platform (MSP) as a cooperation structure garnering interested participants that are prepared to propose solutions to sustainable development quandaries.

Their model builds on existing literature focusing on MSPs as an organizational model. In short, MSPs were conceived as internet-based systems that facilitated direct interactions between customers and participants related to the platform, as well as access to various information, resources and value-added services (Parker, Alstynne, & Choudary, 2016). Furthermore, MSPs can be broken down into either transaction platforms and online marketplaces - where value is created through the buying and selling of goods and services, or innovation platforms - where ecosystem members create new complementary products and services (Elia et al., 2020: p.2468).

Viewed through a digital entrepreneurship lens, a MSP can be regarded as a “digital platform that offers a shared set of services and architectural components and hosts complementary offerings and software interfaces that guarantee communication and interoperability.” (Elia et al., 2020: p.2468). This interpretation falls in line with the one proposed by Parker, Alstynne, & Choudary (2016) in their seminal book “Platform revolution: How networked markets are transforming the economy and how to make them work for you”, which explores the nature of relationships and

complexities surrounding platforms, their participants and their products. Other interpretations of MSPs include, but are not limited to, digital ecosystems, digital entrepreneurship ecosystems or a rising form of organization that is facilitated by digital technologies (Elia et al., 2020).

As originally proposed by Malone et al. (2010) - and focusing on collective intelligence systems - and later applied by Elia et al. (2020) in their research paper, four “genes” can be discerned based on the focus (or ‘what’), the participating sides (or ‘who’), the actions initiated through or within the platform environment (or ‘how’), as well as the driving factors of value that define the MSP (or ‘why’).

In the following part, each gene will be further characterized and analyzed to better understand its role in the context of the framework.

3.1.1 Genes

3.1.1.1 ‘What’

This dimension refers to strategic intent, orientation and focus of the MSP. Broadly speaking, an MSP is created to support processes such as innovation processes or business transactions within distinct industry, business or organizational scenarios. In the context of sustainable development, objectives/targets and competencies can be equated with the achievement of one or more sustainable development goals, such as those outlined by the United Nations in Agenda 2030 (2015), or individually drafted by any stakeholder(s). Thus, the “focus” of the sustainable development driven MSP can arise either as a top-down definition or stem from multiple areas, for instance social innovation and entrepreneurship, open dialogue, problem breakdown and solving or from public consultations (Elia et al., 2020: pp.2468-69).

3.1.1.2 ‘Who’

This dimension refers to actors or groups and the sides of the platform. Whilst MSPs act as facilitators between two sides or more, their utility derives from their ever-increasing diversity of groups that operate on them to better leverage cross-side network effects, as well as scale and their different sources of revenue. Societal issues can be characterized as wicked in nature; in order to address them, multiple stakeholders have to collaborate and cooperate over long-time horizons to thoroughly define and address them. In the context of sustainable development, the MSP could act as the gathering space and organizer of a wide range of participants such as citizens, professionals, companies, researchers and scientists, policy makers and complementors who can take an active role in contributing towards the sustainability discussion (Elia et al., 2020: p.2469). Whilst participation in the platform should be open and free at any point, certain roles or participation traits (such as those derived from expertise or knowledge) could be distinguished based

on particular actions or consultations grounded in the platform's policies towards contribution through the use of matchmaking algorithms (Elia et al., 2020: p.2469).

3.1.1.3 'How'

This dimension refers to the strategy and processes (actions, flows, and procedures) aimed to set up and develop the MSP. Some of the issues that fall under this umbrella are processes and actions that allow the expansion/propagation of network effects, the mitigation of "chicken-and-egg" problem (Parker, Alstyne, & Choudary, 2016), the convergence of roles and performance monitoring (Elia et al., 2020: p.2469). As related to sustainable development, what is worth noting here are the network effects and its cascading externalities (direct or indirect) that could stem from active participation in public debates and contributions towards problem solving. Such actions could comprise awareness building actions, on one hand, or social innovation actions, on the other hand (Elia et al., 2020: p.2469). However, the critical hindrance is that of the chicken-and-egg, where key actors or organizations that are prepared to financially support the initiative and are open to provide a testbed for experimentation and pilot initiatives to take place must be engaged from the on-start (Elia et al., 2020: p.2469).

3.1.1.4 'Why'

This dimension refers to the motivating factors, benefits, and incentives (externalities and value sources) that bring participants to join the platform and operate actively within the same. Due in part to the strength and permeation of network effects, the underlying value the MSP can generate for stakeholders lies in the number of active participants that engage on each side. Some of these value drivers include resource optimization and matchmaking, audience building and efficiency seeking, and cost reduction. Furthermore, additional incentives include enhanced decision-making and problem solving, innovation, and collaboration (Elia et al., 2020: p.2469). As related to sustainable development, some of the motivations that could drive actors are a sense of awareness regarding sustainability and a willingness to contribute to problem research and public discourse around the topic, as well as contributing with potential solutions to the aforementioned issues (Elia et al., 2020: pp.2469-70). In addition, specific actors or stakeholders may also be guided or driven by social concern and altruism, commitment, prestige, *and/or financial rewards resulting from project funding*, and collaboration across industries and sectors (Elia et al., 2020: p.2470).

3.1.1.5 'Governance'

This dimension refers to the guiding principles. Elia et al. define governance as "a set of explicit and implicit rules regulating the affiliation, participation, and interaction within the platform" (2020: p.2470). Moreover, other aspects to consider include certification of services and contents, budgetary and human resource management matters related to the management of the platform, and the settlement of any possible conflicts that could arise within the MSP ecosystem (Elia et al., 2020:

p.2470). The following table has been adapted from Elia et al. (2020), and it presents each gene, a brief description, and how it relates with this thesis.

Table 3
Multi-stakeholder initiative (MSI) genes – adapted from Elia et al. (2020).

Genes	Description	Green City Zone
WHAT (focus, strategic intent, orientation)	<ul style="list-style-type: none"> ➤ Vision of the initiative and specialization in relation to supporting discussion and actions into specific business or nonbusiness domains ➤ Orientation in terms of being a transaction (marketplace), <i>innovation</i> (design and creation), or hybrid initiative 	<ul style="list-style-type: none"> ➤ Discussions on net-zero emissions future and collaborative decision-making ➤ Argumentation on net-zero emissions future definitions and causes ➤ Breakdown of net-zero emissions future sub causes and variables ➤ Innovation and initiatives on net-zero emissions future
WHO (sides, actors, groups)	<ul style="list-style-type: none"> ➤ Groups of actors and other stakeholders impacted by or impacting on policies, goals and relevant actions of the initiative ➤ Stakeholders interested in interacting with other groups and agents, and affiliated to the initiative (membership process) 	<ul style="list-style-type: none"> ➤ Individual citizens willing to participate in a net-zero emissions future (foreseen in the near future) ➤ Professional expertise (RISE, GU, Chalmers) ➤ Business organizations working on net-zero emissions future (Volvo Cars) ➤ Policy makers and institutions focused on net-zero emissions future (Business Region Gothenburg) ➤ Complementors and providers of services of relevance for the community
HOW (actions, flows, mechanism)	<ul style="list-style-type: none"> ➤ Value adding coordination and relations/flows among members facilitated by matching algorithms and interaction tools ➤ Working mechanisms of the initiative and activities undertaken to support its strategic focus 	<ul style="list-style-type: none"> ➤ Early expert involvement to overcome (chicken-and-egg) problem ➤ Operating workgroups to intermediate needs ➤ Value attractors for enhancing commitment ➤ Economic sustainability of the initiative (one of our questions) ➤ Feedback system, aggregation and networking ➤ Necessary infrastructure of the initiative or sub-projects ➤ Ideas about how to mitigate consequences of climate change
WHY (value drivers, benefits, externalities)	<ul style="list-style-type: none"> ➤ Benefits obtained by actors from participation, advantages from having their demand coordinated with other members/groups, direct and indirect network effects for nonlinear increases in utility (value) ➤ Motivations driving stakeholders and actors to participate in the initiative and contribute into discussion and coordinated actions 	<ul style="list-style-type: none"> ➤ Resource matching and optimization ➤ Audience building and awareness development ➤ Passion and incentives for participants ➤ Multiple drivers: environmental, economic, densification, safety and traffic congestion ➤ Enhanced problem-solving and robust decision-making ➤ Sharing of resources among participants ➤ Collaboration and knowledge exchanges for innovation
GOVERNANCE	<ul style="list-style-type: none"> ➤ Rules governing the affiliation, participation and interaction on the platform ➤ Acts as the link that connects the genes 	<ul style="list-style-type: none"> ➤ Guiding principles for the projects or initiative ➤ Resource comitance for projects as barrier of entrance ➤ Tacit acceptance of ideas

3.2 Management of Large-Scale Project and the Influence of Temporal Construal

Construal Level Theory (CLT) analyzes how various types of psychological distance affect a person's reasoning and thinking, such as concrete (low-level) or abstract (high-level) (Trope and Liberman, 2010). Trope and Liberman (2010) further explain there is a direct correlation between the construal level and the psychological distance of an object, specifically, as the psychological distance from an object (or goal) increases, so does the level of construal. There are various types of psychological distance, such as: spatial distance, social distance, hypothetical and temporal distance. For the purpose of this research, the focus is on temporal distance.

Construal level theory divides the modes of thinking into two delineated categories. First is low-level (concrete), and the second is high-level (abstract) thinking. When thinking abstractly, the individual is thinking of the bigger picture and giving little attention to the details. Contrarily, high level thinking focuses more on the details.

3.2.1 Temporal Construal Theory

According to Trope and Liberman (2003), temporal distance affects the way people view and respond to future events. In essence, the further away an event is, the more likely a person is to view it in limited abstract features (high-level construals) as opposed to events in closer temporal proximity (low-level construals) with practical and concrete details (Trope and Liberman, 2003). An example of this, given by Trope and Liberman (2003: p.404), explains, "at a greater temporal distance, the value of the meals is more likely to depend on its nutritious value than on its tastiness." What this shows is that the motivation behind the choice is driven by what is healthier for the individual, practical (low-level) as opposed to what is desired (high-level).

3.2.1.1 Feasibility versus desirability

Trope and Liberman (1998), took a deeper look at both feasibility and desirability and how it related to temporal construal theory. During a series of studies evaluating how time affected goal directed activities, they were able to find that feasibility was associated with low-level construal, while desirability was associated with high-level construal. They found that temporal distance had an effect on the decision-making, in such decisions about events in the distant future were made more on the factor of desirability and less on the factor of feasibility (Trope and Liberman, 1998). Additionally, Lu et al. (2012) states that typically when making a decision for other people, individuals tend to focus more on desirability than feasibility.

3.2.1.2 Optimism Bias (Planning fallacy)

When focusing primarily on the desirability and not focusing sufficiently on the feasibility, it is possible to overestimate the success of an endeavor or overestimate the importance of one's goal. When this occurs, it is called optimism bias. There is another aspect of optimism bias when the individual has an incorrect image of the amount of time needed to complete a task (Nussbaum et al., 2006), often attributing

not enough time to complete a task or goal, resulting in a planning fallacy. Nussbaum et al. (2006: p.1304) further explained that “idealistic imagination about time required for task execution is common”. Conversely, Lerner et al. (2016), performed three studies to evaluate how construal level theory played a role in estimating risk and probabilities. Their research found construal level does influence risk estimation. As such, it was recommended that manipulation of the construal level can be used, by implementing a more “concrete mindset” (low-level) to improve risk estimation as it pertains to the likelihood of most events.

3.3 Socio-technical Interdependence

Socio-technical system (STS) was conceived by Trist and Emery in the 1950’s in the context of labor studies (Emery and Trist, 1960), to understand the complex and dynamic relationship between humans and machines (Baxter and Somerville, 2010) and to reshape the conditions of both the technical and social conditions (Ropohl, 1999). In order to understand the socio-technical concept, one must first understand general systems theory. Systems thinking goes back, in essence, to Aristotle (1966), who believed that the whole is not merely distinguished by the parts that make up the whole, but also the interplay between the parts themselves (Ropohl, 1999). With this logic in mind, then social-technical systems represent both the social system and the technical system as parts of the whole.

Using STS and systems thinking as the backdrop, it is important to look at how the Green City Zone is functioning on an organizational level. First, there is the Gothenburg Green City Zone environment, with its smart city-esque ambitions. Within it, there are various subsystems that impact how the initiative as a whole functions. Some examples of such subsystems include transportation, business, communication, etc. (Kopackova and Libalova, 2017). Within this city system and its various moving parts, there is a reciprocal balancing act that needs to be performed between the social system and the technical system. It is imperative to constantly consider one when developing the other, as they are interconnected, therefore making a change to, for example, technology, will result in changes to the social system (Kopackova and Libalova, 2017).

All three of these theoretical components help to understand the broad and complex data gathered in the following section. The intersection between the multiple-stakeholder initiative framework and the STS model is to focus on the various parts of the system and how they affect each other, as well as the whole. Additionally, construal level theory addresses the temporal issues arising from such a complex longitudinal initiative. All three frameworks are then applied to examine the dynamics of the stakeholder management and decision making that will either aid or inhibit the success of the GCZ Initiative goals.

4 Method

4.1 Research design and context

This study focuses on the Gothenburg GCZ Initiative - a district-based smart city project, focused on achieving net-zero emissions by 2030. Below, we provide a detailed view of the background information of this initiative, for example, its governance model, a detailed review of its districts, as well as testing of the sub-projects within the GCZ umbrella.

4.1.1 Governance Model

The Gothenburg Green City Zone was originally conceived by Volvo Cars, who presented the idea to Business Region Gothenburg (BRG) in order to propose a collaborative endeavor. BRG was receptive to the idea, and the Research Institute of Sweden (RISE) was brought in as a third partner. This completes the triple helix formation using industry, government, and academia stakeholders to develop the initiative (see **Figure 1**, yellow circles denote founding parties). A preliminary steering committee was formed with a variety of stakeholders from all three sectors. As this initiative was established during the COVID-19 pandemic, it was slow to begin and relied heavily on digital communication resources. Additionally, it was revealed to the researchers through interviews that it had a broad array of stakeholders on the steering committee, broadly acting as informational or advisory roles.

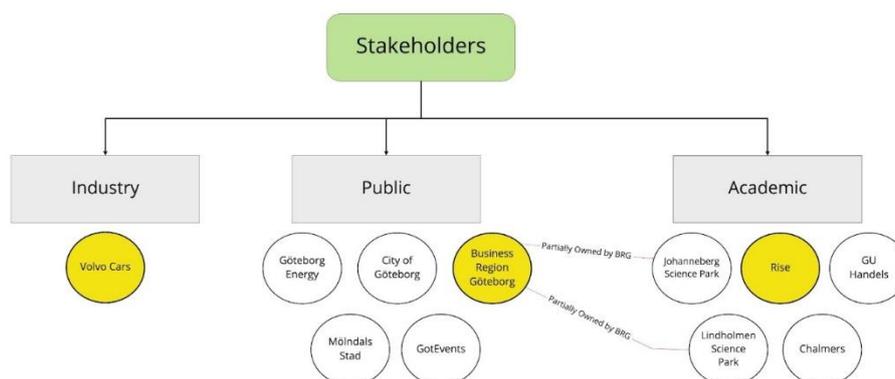


Figure 1 Triple Helix model of the GCZ stakeholders

As of January 2022, the GCZ steering committee underwent major restructuring and overhaul. BRG took the role of initiative orchestrator, primarily overseeing the

centralization of information and overall project management of the initiative. With a new process leader at the helm, BRG first limited the number of stakeholders with decision-making power on the steering committee. Instead, they opted to have various workgroups or boards acting in various capacities. **Figure 2** (presented below) depicts the current governance and organizational structure of the initiative. Under the steering committee umbrella, there is the operational management group, followed by operational working groups. The steering committee has six held seats at the moment, with the space to go up to nine sitting members. As such, there is a nomination committee to advance potential nominations. Additionally, there are two live advisory groups, with two more planned for the 2022-2023 timeframe.

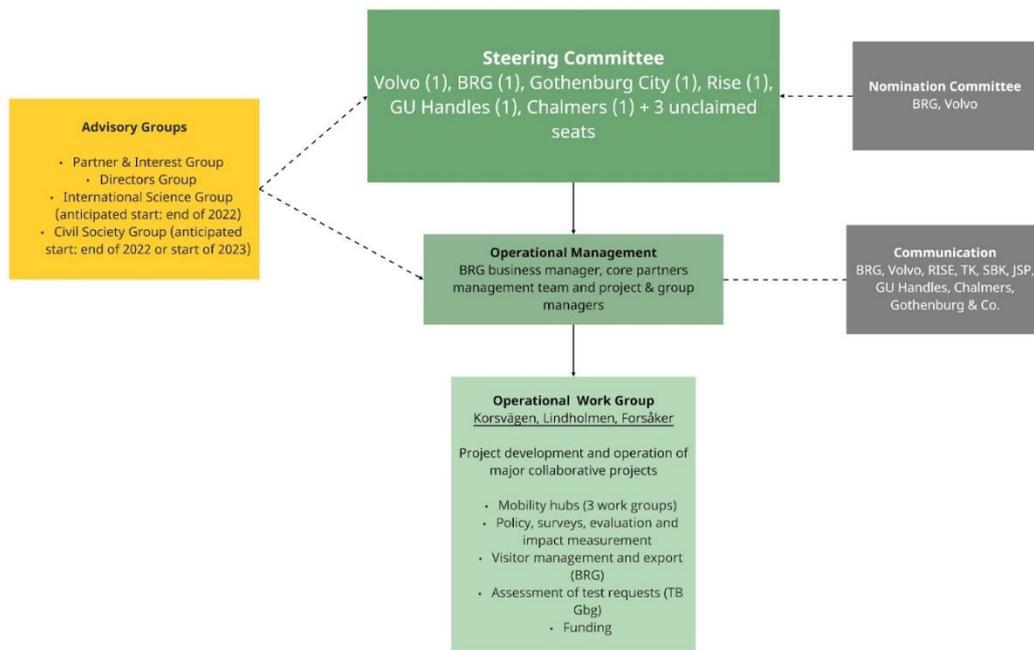


Figure 2 Governance and organizational structure of GCZ

4.1.1.1 Key stakeholders

The key stakeholders of this endeavor come from a diverse background, including private, public and academic fields. More specifically, Volvo Cars - a private automotive manufacturer and mobility company (Volvo Cars, 2018) - represents the private field and is the initiator of the GCZ initiative. Representing the public field, Business Region Gothenburg (BRG) - a public company owned and operated by the City of Gothenburg (Business Region Göteborg, 2022) - is the secondary stakeholder and the orchestrator of the endeavor. It represents the City of Gothenburg, but also the interests of thirteen other municipalities in the Västra Götaland region. More stakeholders from the public field include: Got Event - an event organizer owned and operated by the City of Gothenburg (Got Event, 2022), Göteborg Energi - a public utility company specialized in generation and distribution of energy in the Gothenburg region, and Mölndal Stad - a municipality located south of Gothenburg

city. Representing the academic community, the Research Institute of Sweden (RISE) is the main stakeholder, contributing with knowledge and people resources to the GCZ initiative. Additional stakeholders include, but are not limited to, Göteborgs Universitet Handelshögskolan - the Law and Economics Faculty of Gothenburg University, Chalmers Tekniska Högskola - a technical university and research hub located in Gothenburg City, as well as Lindholmen Science Park located in Gothenburg and Johanneberg Science Park located in Mölndal.

4.1.2 District Based Approach

Having studied other city models, such as Berlin, Paris, and Manhattan (Juraschek et al., 2012; Mancebo, 2020; Ducao, 2015), the key stakeholders of the Green City Zone initiative decided a district-based approach was more applicable. The term “Zone” is used in this instance as terminology in lieu of “district”. Each district was chosen for its unique attributes. The three distinct zones in the initiative are *Korsvägen* – The Events Zone; *Lindholmen* – The Tech Zone and *Forsåker* – The Residential and Office Zone.

As GCZ is an initiative, it consists of a variety of sub-projects. As the initiative is still early on its journey, there are only a few live or near-live projects. The three that were discussed in this research are: wireless charging, mobility hubs (goods and local) and green events.

The wireless charging project is a multi-stakeholder endeavor featuring several industry and public actors. This project is testing embedded wireless charging pads in the form of 2 stations (with 2 pads each) located in the Lindholmen zone. This project is working in close collaboration with Cabsonline for fast charging capabilities (Volvo Cars, 2022).

The mobility hubs project has two distinct tracks, namely the goods hub track and the local hub track. Both tracks are in development or in progress in the Korsvägen zone at the time of this research. The goods hub is meant to ensure all delivery and goods-related traffic within the zones are emission free. This track is still in a “pre-study” phase or in development. The plan is to work with companies such as DB Schenker and LiveNation to ensure that the items being trucked in are done so in an emission free mode. The local hub project is, in essence, a plan for how to transport people into and around the zones (events zone for starters) using zero emissions. There is currently a major construction project underway in Korsvägen to accommodate a new underground train stop, as well as reorganization of the trams and bus terminal in the area. In addition to this, there are hopes to further develop and promote already existing alternatives such as electric scooters and bike rentals to the public.

The green events subproject involves working with all the key arenas and event centers in the Korsvägen Zone to become emission free. This includes the distribution of goods, as well as the maintenance and presentation of events. As such, current discussions are ongoing with LiveNation and DB Schenker for how best to collaborate in order to meet the 2030 target goals. Göteborg & Co is handling much of promotional communication targeting tourism related activities within this area. The good mobility hub project is also closely intertwined with this project.

4.2 Research Methods

As the objective of this thesis is to investigate the organizational structure, its decision-making processes, and potential challenges in a large-scale smart city initiative that involves multiple stakeholders from a variety of organizations, a qualitative approach was utilized. The researchers conducted interviews with the private/industry, government, and academic stakeholders, and collected archival data from websites, news reports, press releases, and government and executive reports. In addition to the interviews and archival data, a survey was conducted to include the citizens' perspective. This research was conducted from February to May 2022 in Gothenburg, Sweden. We conducted digital interviews through Zoom, as this method allowed for convenience and flexibility, on account of there being many stakeholders from a variety of companies and organizations. Additionally, the interviews were recorded for easier transcription and review purposes, after being given the consents of each participant.

4.2.1 Data Collection (Interviews, Archival Data, Survey)

The researchers began by emailing key parties associated with the Gothenburg Green City Zone to request scheduling an interview via Zoom at their convenience. Each interview was planned to last approximately 60 minutes, in order to explore a series of topics related to this complex initiative.

We conducted semi-structured interviews, and the interviews lasted from 20 minutes to 85 minutes, with an average of approximately 60 minutes. The semi-structured interview approach was selected to give the participant ample space to answer the questions freely and allow the interview to progress organically. Therefore, the structure of the interview was to first identify themes to discuss, and then select a few open-ended questions to guide the interview forward. Such themes from the first round of interviews consisted of background information, Green City Zone, steering committee, funding, mobility as a service, and citizen/civil society. There were some niche interviewees that warranted more targeted themes, relating to for example wireless charging or political processes. Additionally, approximately 4-6 weeks after the initial interviews, two follow-up interviews were conducted with the core stakeholders on the steering committee, after they had their first working committee meeting.

In total, 13 interviews were performed, two of which were follow-up interviews with previous participants.

Table 4

Interview participants (including affiliation and roles).

Helix Pillar	Participant ID	Participant Affiliation	Participant Role	With a follow-up interview
Industry	1	Volvo Cars	Head of Strategic Knowledge & Research	–
	2	Volvo Cars	Senior Technical Lead - Electrification	–
	3	Volvo Cars	Vice President - Leading Gothenburg Mobilization (Steering Committee)	–
	4	Volvo Cars	Director of External Research Exploration & Coordination	–
Public	5	BRG	Process Manager - Green City Zone (Steering Committee)	Yes
	6	City of Gothenburg	Deputy Mayor - Environmental Party	–
	7	City of Gothenburg	Green Agenda Responsible	–
	8	Urban Transport Administration (Trafikkontoret)	Project Manager - Parking Agreements	–
	9	Göteborg & Co	Process Leader - Long term strategic development	–
Academic	10	GU Handels	Dean of Business & Law School (Steering Committee)	–
	11	RISE	Senior Research Project Manager (Steering Committee)	Yes

In addition to the primary source of data gathered (interviews), the researchers also utilized secondary data sources, such as digital text mining and a civil society survey.

Archival data was collected to gather information that various stakeholders have published online. The first step in this process was identifying the stakeholders, then reviewing their various publishing platforms (websites, press centers, etc.). Additionally, online searches for “gothenburg green city zone” were performed to search for third party news and publications related to the initiative.

The final data collection method consisted of an online survey (see Appendix \$), published and distributed through various channels in order to maximize exposure. The survey was created to gather insight into the civil society perspective, as it relates to awareness of the GCZ Initiative and the willingness of the participants to change their mobility behaviors. The survey consisted of single selection, multiple choice, open ended and Likert scale questions. The survey was created using Google Forms and broken down into sections with a precursory explanation before the individual following section.

The method of distribution was a matter of convenience. The researchers reached out to key parties associated with the project to further help disseminate the survey (i.e., academic supervisor, professional mentor, GCZ project manager, and Gothenburg & Co process leader), as well as social media means (i.e. personal Facebook wall, WhatsApp, and associated region specific Facebook groups). Additionally, a mass email requesting survey participation was sent out to the student body within Gothenburg University's Department of Applied IT. The survey was open for responses for approximately ten days, during which time 137 responses were gathered.

4.2.2 Data Analysis (Thematic Analysis, Survey Analysis)

4.2.2.1 Interview data analysis

In order to analyze the data, the interviews were first transcribed via automated transcription tools (Otter.ai), then manually reviewed for accuracy. During this phase, key comments were highlighted for annotation. After each transcript was thoroughly verified, it was then exported for coding purposes into specialized software (Atlas.ti). While the interviews, transcription and coding was ongoing, a digital whiteboard tool (Miro) was used to map out question themes. Each participant was assigned a specific color note, and then answers corresponding to question themes were added to the whiteboard. After gathering data from several interviews, certain thematic patterns became apparent (Braun and Clark, 2006), thus allowing for a thematic analysis to be performed. When the coding process commenced within the software suite (Atlas), the themes identified were conveyed into codes, such as “aims”, “challenges”, “method of motivation”, “civil society/citizen”, “organizational structure”, etc. While in the same software suite, the overarching themes were further developed into micro-themes, such as “test arena”, “scalability”, “carrot”, “stick”, “future of transportation”, “knowledge gap”, “funding”, etc.

4.2.2.2 Survey data analysis

As the survey contained several answer types (single selection, multiple choice, Likert scale, and open ended/motivation), it was necessary to take a two-pronged approach toward analysis. First, the single selection, multiple choice and Likert scale questions were computationally analyzed looking at frequency patterns. A bar chart

was chosen to illustrate the Likert scale responses; concurrently, a pie chart was chosen to illustrate the single selection multiple choice questions. Thematic analysis coding was applied to analyze the open-ended motivation responses. Detailed results of the survey are included in the appendix. In the results section, we focus on findings from the survey that are about citizens' perspective, which complement the findings from the interviews.

5 Results

As there were two key data collection methods (interviews and survey), the following section will break down the results in two separate subsections, specifically interview results and survey results. While the interview results will focus on the impacts of temporal distance as well as potential challenges associated with a multi stakeholder initiative within a smart city, the survey results will focus on the citizens' perspective with regards to awareness of the Gothenburg Green City Zone and their willingness to change their mobility behaviors.

5.1 Interview Results

As previously stated, the interview questions were broken down into several main themes (aim/vision, method of motivation, possible challenges, project management, socio-technical and construal level). Upon reviewing the answers to these questions, further micro-themes and patterns were identified linking back to the issues of temporal distance effects and potential challenges of a triple helix driven multi stakeholder smart city initiative.

5.1.1 The impacts of temporal distance

As the literature on construal level theory, more specifically temporal distance, has alluded to there is a clear distinction of the difference between high level (abstract) construal versus low level (practical) construal and their effects on decision making. High level construals focus on predominantly desirability, in this case that applies to the 'what' and 'why' genes of the MSI; while low level (practical) construals focus on the feasibility, in this case the how and governance genes. During the course of the interview process, there was a clear pattern of consensus among the stakeholders with regards to the desirability of the GCZ Initiative. As sustainability is a growing topic of interest, the unified vision of net zero emissions only further enhances the desirability appeal of the vision.

5.1.1.1 Desirability factors of the GCZ Initiative – ('What' and 'Why' Genes)

When analyzing the aim/vision theme observed it is possible to see a correlation to the 'what' and 'why' genes described in the MSI framework. In reviewing the following data, it is apparent that the stakeholders interviewed have a strong consensus as it pertains to the various aims and/or vision of the initiative. The key *desirability driven* aims agreed upon are: "zero emissions by 2030", "test arena", "scalability" and the "future of transportation". From the interview excerpts below,

it is clear that to date, there has been a clear focus on the desirability ('what' and 'why' genes) of the initiative.

Aims/Vision - Zero Emission by 2030, Test Arena, Scalability, Future of Transportation

The most agreed upon topic was certainly the aim/purpose of the initiative itself, to achieve zero emissions by 2030. This was discussed by 9 out of 11 people interviewed, including a politician not directly affiliated with the initiative.

Another highly aligned topic pertained to the purpose (*why gene*) of the initiative and the zones. It was reiterated that the Gothenburg Green City Zone was meant to act as a live testbed, where new ideas could be tested for viability, and then perfected for scalability if they were successful (Academic ID #10). The motivations and ambitions behind the testbed were mentioned sporadically and spoke toward Volvo Cars' ambition to use this as a showcase for their "new products and services" as depicted by one respondent from the academic pillar (#11).

Scalability is an important aspect that 7 out 11 respondents brought up. One of the goals of this initiative was to replicate or scale up this concept extensively, from additional areas in the city, in other cities around Sweden, or even across the world.

"When I speak about system level, it's about collaborating with others. The private sector, with the public sector with academia, with other Institutes, with other companies, that's the system level. And as a result, if you then come up with the right system level solutions, then yes, there is the possibility to scale." - Industry #3

"Because it's not about the projects being successful, it's about having them scale up, becoming not a project but becoming a regular service. But if the business model will not be sustainable, then we have a problem, of course." ... "There are these zones that could be generalized to any city in Europe, any city of the same size as Gothenburg. So if we test something here, we know that it could work in many other places as well." - Public #5

"They should be having an intention to be sort of generalizable and put it to other zones or other cities" ... "If we can make this, if we can build this, this first hub and we show that it works, then we can probably set an example for rolling out bigger flows bigger and also more commercial logistics from other actors." - Academic #11

However, one respondent (Industry #4) raised concerns that this could in fact become a major challenge. They discussed the risk of incompatibility of what is done in Gothenburg being replicated in Paris or even Stockholm, ascribing some of these issues to cultural differences.

While many had varying answers on how they viewed the future of transportation, again they were all moderately congruent on the purpose of the future of transportation. All interviewees agreed there needed to be less traffic within the project zones and hoped for greater use of the public transportation system, walking, biking, or other more target aligned modalities.

Additionally, two respondents from the industry pillar (ID #1 and #3) painted a picture of a future where there was one centralized platform, in which users could arrange their transportation needs. This platform would merge both public and private alternatives in one centralized app or service. Their idea was that a user could, for example, take the train into the city, arrange for some other mode of transportation within the city (such as an electric scooter or bike rental), all in one app, as opposed to the current system that requires a different app for each separate entity.

One respondent, Public ID #5, viewed the future of transportation within the zones, especially within the events zone (Korsvägen), should rely mostly on bike or walking between venues and areas, using mobility hubs outside of the zones, leaving their cars behind and biking or shuttling into the zone.

While high consensus was observed between ‘what’ and ‘why’ genes that resulted from strongly motivated desirability construal, there is a probability of optimism bias being present, to the extent that there is an overestimate of success by the established target deadline if feasibility factors are not properly examined.

5.1.1.2 Feasibility factors of the GCZ Initiative – (‘How’ and ‘Governance’ Genes)

Throughout the course of the interview process, we attempted to extract information on how exactly the stakeholders intended to reach the ultimate intended goal of zero emissions by 2030, thereby observing the feasibility factors of the GCZ Initiative. In the effort, we observed that there seems to be a lack of focus on the low construal (practical) elements, more specifically a structured operational plan on how to achieve a long-term goal with intermittent and detailed short-term goals. Additionally, the ‘governance’ gene appeared to be in the midst of a restructuring effort that has yet to be properly tested at the time of writing this thesis.

Steering Committee - The 'Governance' Gene

Here, we review the themes relating to the 'governance' gene, specifically the formation and function of the steering committee. We begin by reviewing the reorganization process, the role of consensus and finally the documentation scheme.

Reorganization started

During the interview process, it was brought up on several occasions that the current iteration of the steering committee was new and untested. It was also inferred that the previous iteration was too broad and stagnated with progress. The current steering committee underwent a major reorganization in January 2022, when a new project manager was brought on board. Similarly, Academic #10 also raised some concerns about the slower start, but also felt hopeful that things were finally on track,

"I would say that, right now, we are in a formation phase. And by the end of the spring, we will be going in a more operational manner."

Issues regarding the organizational structure and flow of information, as well as decision-making were raised in several interviews. A respondent from the city (Public #8), also raised concerns regarding the organizational structure and personnel changes within leadership. He described functioning under three different project managers, all with a different approach and speed. He explained that the traffic office needed ample time to gather research and resources before undertaking a project, but this was not always respected by one project manager, who wanted things done at a much faster pace. He also described one project manager leaving the job and not hearing anything for months before a new project manager began, this was further corroborated by Public #9 who experienced a similar situation. That being said, Public #8 also felt hope and confidence in the current leadership.

Consensus

While consensus is not a clearly defined requirement for governance progression, it is a preferred conclusion. Some felt consensus was not an issue of concern, as of yet.

"I think there is a great deal of consensus within the steering committee and between the different parties, I can't see at this time any tensions or anything like that, there is a great deal of sharing of common costs in this. So, I mean, the objective is clear, there is a consensus when it comes to the objective." - Academic #10

Conversely, Industry #3, had several points of contention as it related to consensus within the steering committee. First, they raised the issue of autonomy in that:

“Every stakeholder has formal independence. It’s like having 10 countries agreeing on something. No one can force the other one to anything, or at least it won’t end up there because it goes off very quickly.”

Additionally, when asked how to deal with dissent and or conflicting priorities within the steering committee, Industry #3 admitted that, as of yet, there was no formal plan on how to counteract this scenario. This was further corroborated by Public #5 with:

“We haven’t ended up in that situation. Currently we don’t have that type of issue on the table. We have reached an agreement that solves some of those issues. Maybe a partner would like to leave the initiatives. But we do not have regulations or written down standards for like two thirds more than 50% full or full consent”

Both Industry #3 and Public #5 went on to further explain that any parties not wanting to commit resources could instead choose to opt-out or abstain from participation. In which case tacit acceptance is needed for a project or motion to move forward.

However, Public #5, also explained agreement hasn’t always been easy:

“But the one thing that I think I will say is that what they have struggled with during the year is really defining what this is.” - referring to defining the green sector zones.

While total agreement, especially within a triple helix model, is not a requirement, some form of codification (Leydesdorff and Etkowitz, 1998) or action plan to deal with inevitable dissent and disagreement is highly recommended to avoid potential conflict that could present future viability risk. The stakeholders, at the time of writing this thesis, seem to be in a “honeymoon phase” in which everyone is in agreement, and no one has had to make any major concessions or compromises, thus there has been no need for conflict resolution codifications at this stage.

Documentation

Documentation and knowledge sharing (communication) is a fundamental element found within both the triple helix framework as well as socio-technical system model. Additionally, it could be included in the processes and progress monitoring within the how gene of the MSI framework. Therefore, it is an integral element from an operational viewpoint. However, a noticeable pattern during the interviewing process was a lack of documentation able to be shared by the respondents with the interviewers. Frequently, when asked if there were any product able to be shared to

demonstrate the progress and structure of the projects within the overall initiative, the respondents either said they had none, or were unable to share for proprietary reasons. That being said, some documentation was shared with the researchers for use within this project.

As a follow up, several respondents admitted to having no knowledge of any clear and centralized documentation beyond the agreed upon principles of the GCZ Initiative. When asking Public #5 for documentation on the progress of the initiative and its sub-projects, he had the following two comments:

“I will see what we have. I think that is a weakness currently. I mean, I'm new to this work and just setting myself up. I'm currently in the place where I'm trying to really grasp all of the things that have been initiated and are going on and the discussion thread.” ... “No, not written down. In that sense. We have a roadmap for the year or for me getting on board and for this, but I don't let me think if we have it more presentable than in notes and excel sheets. “

It is worth noting that Public #5 showed us a slideshow presentation that demonstrated the governance model, as of March 2022, based on the new restructuring. Additionally, Academic #11 referenced a gap analysis conducted and subsequently shared that document with the research team. It is unclear if all stakeholders are aware of the gap analysis report. During a follow up interview with Public #5, it was explained that they are currently working on a communication protocol and in the midst of setting up a SharePoint for key stakeholders to access. Therefore, a move towards further development of documentation and communication procedures is in the process of being improved upon.

Project Management - The ‘How’ Gene

Within this section is a further examination of the operationalized elements of the ‘how’ gene; essentially, how exactly the stakeholders intend to achieve the zero emissions by 2030 goal. The micro-themes analyzed are: “planning”, “funding”, “prioritization”, and “digital twin/scenario planning”.

Planning

When discussing further the planning and strategy behind the operational side of the initiative, there were several points of note. There were some concerns raised about the pragmatic details and operational functionalities within the initiative.

As the Green City Zone is not a project, but an initiative functioning as an umbrella under which a series of projects would be derived, there was instead a focus on developing sub projects that would address various concerns and goals. As such, it

was explained that each sub-project had its own deliverables and stakeholders responsible. In discussing how these sub-projects were organized and planned Public ID #5 explained,

“Where I’m responsible, and I have people from (industry) and (academic). And we are the ones that actively see the projects. And we’re also responsible for defining new ideas of projects and having actors being collected. But each project is responsible for the project itself. So we do not have a project leader to hand out to certain projects.”

Public #8, also depicted how the planning and organizational structure of the sub-projects within the initiative have transpired thus far,

“Gothenburg City representatives could say it has been the project lead on this but then all the stakeholders have been together and make up the plans and supported all the deliverables” ... “we have sponsored ourselves together to meet a specific time plan because you know, there can be many reasons why you don’t meet the time plan and that has been I will say the more important aspect of the project meetings to really setting up a clear target and meet the target together.”

Despite Public #5 and #8 feeling optimistic about the planning and target goal and achievement, one respondent (Academic #11) raised concerns relating to a more myopic approach with regards to focusing more on testing the sub-projects, rather than developing clear and concise interim targets, goals and regulations and end up being 2028 or 2029 and they have only a year or two left to achieve the goal. The same respondent also acknowledged a gap analysis (Tyrens, 2022) performed that exposed a disparity between the target and the trajectory.

“We know that there is a gap. We know that we’re not going to meet the goals if we just continue doing the same thing as we do today, or just a little bit better.” - Academic #11

From the academic perspective, one respondent (GU #10), raised concerns about the lack of progress with developing relevant research questions to date, but is hopeful that the situation is due to improve, thanks to current priorities to develop structures to identify the relevant research questions. This sentiment was corroborated by his fellow academic representative ID #11.

One respondent (Public #9) raised several concerns about the practicality and speed of which initiative was operationalized. The quotes suggested that regarding project

planning, there is a tendency to focus on the desirability aspect, but the operationalization is more or less neglected, which is in line with the findings of Trope and Liberman (2008):

“I got involved, I think it went very quickly. From introduction to what the project was and then bam, down to very operational questions and very operational work in the project. We started to do user journeys and all that and really, just getting into the details. I find that there was a gap in the strategic discussions with all the organizations that I have mentioned today that we should have had maybe a more strategic conversation and, you know, mutual planning together. Because I think that some of the main issues with the hubs outside the city center and thinking about okay, how will the visitors think of that? Are Liseberg visitors really keen on parking their car and then taking a shuttle.” ... “before we try to go too much into details, we need to agree on some of the more strategic choices in this project or alternatives” ... “As far as I know, they didn't discuss those major strategic areas in that group either. So I think that there's been a gap between you know, everyone's so excited. Let's do this. Let's do this and then go down to the operational side...And are we sure it will work?” - Public #9

While there is a clear end goal, there seems to be some difficulty, amongst the stakeholders, with mapping out how exactly to get to the goal. During the interviews, there was some discussion of a back casting process needing to be performed. While it was evident, this process had to be sufficiently completed, one respondent (Academic ID #11), explained there would be an upcoming two-day workshop in which this was to be the priority,

“It looks better now. We will have a two full day workshop. I think hopefully we can come up with something more realistic.”

Public #5, further substantiates the lack of feasibility driven interim goal planning thus far, however with the hopes of rectifying the insufficiency, by stating,

“Because up until now, we have only had the main goal, the zero emission by 2030, electrification and reducing traffic. And we have had the principles of the projects.” - Public #5” ... “I would say that for us the next step is to try to find where we could do some kind of back casting or something to analyze, okay, what is that gap? What type of transportation needs is that today is still in that, if you call it that gap” ... (in reference to a green event planning structure) “So hopefully it's in a pre-study phase now and hopefully we'll test in a small scale with

an event that is occurring during 2023, and then in a large scale for a full event in 2025. So that's the hypothesis right now.”

Based on the interviews conducted, it starts to become clear there are some insufficient areas that stakeholders are aware of, but have yet to further develop, though they do have the intention of doing so in the near future. For example, the academic pillar, which is driven by knowledge gathering and sharing, is lacking focused research questions. Another example is the lack of interim goals to help focus on the long-term feasibility of achieving the 2030 goal. However, again, this is a challenge that some stakeholders are aware of and have a plan to address. Both of these examples show that to date there has been greater focus on the high-level construal elements as opposed to the low-level construal (practical) elements.

Funding

Linked closely with the consensus issue is the issue of funding. As the funding is first and foremost done by each stakeholder committing their own resources both financial and human capital to the initiative and its subprojects. Additionally, this is a critical issue with the function of the how gene, as a project cannot move forward without an adequate funding structure in place to ensure its viability.

When asked about a funding plan for the initiative, the general consensus was everyone is to bring their own resources. As corroborated by Industry #2,

“There are many stakeholders in this and we are sort of sharing the expenses...all of us are taking a fair share of the costs here we are sharing the cost together.”

This is further exemplified by Public #5,

“Municipality has given city politicians the assignment to aid in the transition for electrification. As such, Göteborg Energi took their own costs for connecting the wireless charging sub-project to the grid”

That being said, both Academic #11 and Industry #3, have responded that there is no clear funding model that will be used across the projects. Some projects will be funded by stakeholders, others by Vinnova or other Swedish government actors, but also by the European Union grants. As such, each model will vary depending on the project challenges, stakeholder involvement and contribution and finally by funding method.

However, a unique funding risk element that was discussed, by both Industry #3 and Academic #11, related to the financial security within the academic pillar. The

academic pillar, within Sweden, is contingent upon external funding resources. So essentially, should external funding dry up, then they would no longer be able to readily commit resources to the initiative. Industry #3, specifically referred to this as the “financial slack”.

When asked about the division of cost and ownership of resources within sub-projects, such as the wireless charging project, Industry #3 had this response,

“That’s why it’s so important to arrive at the challenge areas together, and then go out and influence calls. Seek financing on the basis of that. So that is that’s definitely a priority. That’s part of the financing”

On the topic of funding in the future, Public #5 had the following response,

“Yeah, as it is today. I know we have had some thoughts of creating its own entity of Green City Zone. So that the Green City Zone is funded instead by [...] with money, and then GCZ will have its own entity.”

On the topic of risk management with regard to investment, respondent #7 from the city had this to say,

“generally speaking, we don’t want to be the big risk takers in new technology.”

Prioritization

During several interviews it came up regarding how to go about managing all the current and future subprojects, as well as how to prioritize what when. This further speaks to not only the how gene but also feasibility of the “how” to achieve the 2030 goal.

Respondents from both Public (ID #5) and Academic (ID #11), felt the back-casting process was a priority that needed to be addressed soon, with Academic #11 expressly stating,

“We haven’t really had any structured way of doing that. [...] We will have a two day workshop. Where we will work with the targets to 2030. We call it backcasting, and we will try to put in different years. Maybe that’s what kind of targets you have by 2025, 2027 etc. Hopefully we can make it a priority there.”

Respondent #11 (academic), went on to further explain project quantity management moving forward as well as project prioritization,

“It's important to have maybe fewer projects and more short deliveries from those than 20 projects that you cannot really grasp.” ... “But I think the priority is actually things that we need to, that have a long lead time, that we have to plan out. For example, if you want to build out the cable harness for the power grid. That's a typical thing that takes maybe eight years.”

When asked about a roadmap or plan on how to achieve the 2030 goal, Academic #11, even acknowledged that there is high level (construal) thinking, and not much focus on the practical (feasibility), with this response,

“ We know, you know where we should be, in 2030 on a very high level, but we don't we haven't broken down the targets yet. And that is something we should have done. I think my colleagues think we should have done it one year ago.”

5.1.2 Potential Challenges - Balancing Socio-technical Concerns & Institutional Logics

One of the more insightful main thematic sections of the interview discussed the potential challenges involved with the GCZ Initiative. Within this section, two key themes are focused on, balancing socio-technical concerns and institutional logics. Both of these key themes are prevalent due to the smart city nature as well as there being a multi-stakeholder triple helix approach, respectively. Several other themes were also mentioned (“densification”, “traffic congestion”, and “safety”), but are not the focus of this section.

5.1.2.1 Institutional Logics

When looking at institutional logics, we need to consider what institutions we are dealing with. As the GCZ initiative adopts a triple helix approach, with the collaboration of academic, industrial, and governmental institutions, we noticed that the stakeholders self-identified issues with regard to different operating institutional logics. In particular with regard to

“That has been a challenge since as I said many of the actors that are taking part already have their plans of how to achieve more. More on how to achieve low emission so the challenge has been to define what does the green city zone bring to the table in this case,” ... “I think, in the beginning it came from being a public actor. And when everything that comes with that in Sweden, with full disclosure, and cooperating with big business is a challenge in itself. Because we have different perspectives. We have a different line of command if you say. I mean

they have their structure of how they make decisions and we have our structure of how we make decisions.” - Public #5

“You could say and then we at Volvo cars, of course, we have our own corporate strategy. And from that corporate strategy, we see these are our priorities and these are the challenges that we see.” - Industry #3

“So but being a private company, although just as complex as a public organization, there are two different complexities or two different fundamentally different logics” ... “UPS, DB Schenker, and stuff like those large businesses that may not have the same motivations and goals as the core group has and the same ambitions.” - Academic #11

Academic #10 discussed that the collaboration allowed for different perspectives to come together to look at issues dynamically, but also raised the question of dealing with politically set goals. This respondent later continued to articulate what working in a collaborative environment was like with the following quotation,

“Much of the operational work so far, has been funneled through Business Region Gothenburg with numerous concrete projects, everything from building up an infrastructure for charging electric vehicles, to a number of analyses of how to create logistic hubs, etc. But from an academic point of view, I mean, what's interesting for us, that's questions like, how do we create effective structures for public private partnerships? Because public private partnerships will be necessary in the development of sustainable urban environments.”

While discussing stakeholder management and collaboration, Industry #4, raised questions and concerns he sees for the Gothenburg Green City Zone,

“how do we manage the public private interface, for both the policy part, but also the research part? What are the financial models? How to actually manage the equation of getting a sustainable society?”

One of the issues raised with regards to institutional logics had to do with the speed of response or the speed of change. Industry #4 explained that climate change is happening now and cannot simply wait for political processes. He went on to explain how the decision-making and funding process differs between the public and private sectors

“We want to sell electric cars, so you need to provide parking spots to charge. But of course, let's say that the government or the city needs to

invest a lot of money. It has various long, slow and tedious processes. It's actually much quicker in industry, in that sense. Bring it to the board, the board takes a decision, they look to see if we have the money in the bank, or can we borrow the money," - Industry #4

Another point of contention raised regarding different operating logics, pertained to information sharing.

"Companies tend to hold information back a little" ... "Yeah, in a way it is. I mean, it's a known challenge to share data. Shared data is necessary to solve all these systemic challenges we have. We're always pushing on that. And we are actually pushing hard right now, together with several projects, several companies that we have to share data in order to solve all these challenges." - Academic #11

Conversely, one respondent (Academic #10) spoke positively about the collaboration and the different perspectives,

"Gothenburg Green City Zone, it's a perfect opportunity for us to work together with the city, the corporate sector, and also with our friends at Chalmers University of Technology and participate in the project with the aim to have these zones within the GreenCity zone project as experimental laboratories in order to create knowledge that could be generally applicable"

As previously mentioned, there is another institutional logic disparity regarding funding. Both the academic and public pillars are reliant on external funding resources, academic more so, while the industry pillar has internal funding. As such, the industrial pillar can readily look to their own advisory/steering boards for clearance to move forward with a project or plan. All they have to do is check that they have the funding clearance and go ahead.

5.1.2.2 Balancing socio-technical concerns

The second main theme identified pertaining to potential challenges, deals with the balancing act that a smart city initiative has between society and technology. This is particularly important in smart city instances, as they will rely heavily on technological change for sustainable means, and societal acceptance of the technological change. As Kopackova and Libalova (2017) expressed, if you make a change to one, the other is impacted and will also change. Based on the responses from the interviews, we observed that there has been a greater focus on technology, and solving technological issues, while relatively little attention given to addressing societal concerns at the time of this thesis. However, there was also an observed

undercurrent of awareness that this is an issue that needed to be rectified moving forward.

Society ('Who' Gene)

The “who” gene encompasses all the various stakeholders and actors that play a role and are affected by the GCZ Initiative. As previously identified, the Green City Zone is using a triumvirate framework based on key stakeholders from industry, government (public) and academic sectors. However, there is also a societal aspect that must be considered. Within the triple helix framework, this is often referred to as civil society, while in socio-technical systems theory they are simply referred to as society. During the course of the interviews, we asked various participants about their views regarding civil society within the GCZ Initiative. Here, there is a general agreement that a large element of the success of the initiative will be reliant upon acceptance by civil society. This acceptance will only come from first awareness of the initiative, its subprojects, and the demands they will have upon civil society. Then there is a requirement of behavior change from many of the citizens and actors within the civil society. This includes businesses and organizations of all sizes having to adapt to net zero emission actions by 2030. It should be noted that the terms civil society, society, and citizen are used interchangeably throughout the interviews and the respondents' answers.

Triple helix view on the importance of civil society

According to the overall project manager at Public #5, the civil society sector is quite important and should be incorporated into the organizational structure of the initiative. It is for this reason that the project manager has a projection to create a civil society group in 2022-2023, to represent various members of the community to act in an advisory capacity. When asked if there should be a member from the civil society group to sit on the steering committee and have voting power, as opposed to just the planned advisory role, Public #5 admitted he hoped so, but thought that would be at a later stage. While Public #5 felt the citizen role was important and needed to be represented within the organizational structure, a respondent from the city (ID #7) felt that the citizens' role was for testing. They continued that the citizens were important for the ultimate success of the initiative by way of their acceptance. This respondent also felt that the citizens needed to take a more active role in demanding change, for example with regards to the logistics solutions to be more in line with the emission free target.

“So I think that the behavior aspects of these different kinds of projects will be the hardest issue and therefore we are keen on getting this civil society advisory board up and running. Get acceptance for the new services. I think that will be the hardest question of them all. Because behavior shift is hard” - Public #5

When discussing the future of the civil society advisory board, and if there could ever be a representative from the advisory board on the steering committee in a decision-making role, BRG #5 had the following response,

“If we could come to that situation where we have such a strong advisory board from the civil society that they could take part of that. That they could have a representative within I think that would be great. I mean, I think that would be a really, really good place to be for the Green City Zone if we have that perspective clearly within the steering committee.”

Triple helix perspective of civil society acceptance

Both Public #5 and Public #7, spoke fervently about the need for civil society acceptance to be successful within this project. Even speaking about the relationship between this year's election and the way the politicians are speaking to the people, and how the people choose to vote.

“Therefore it's really important to get the acceptance from the citizens within this, otherwise we will not get the strong force the city actors and the politicians that we need.” - Public #5

Behavior Change

One of the challenges discussed frequently (discussed by 7 out of 11 people interviewed) throughout the interviews was dealing with user behavior and how to motivate people to change said behavior in order to achieve target success. This clearly shows the importance of society and the need for further focus to be applied to this area.

“There's a much larger issue, as I said before, with the behaviors of how people use their cars and so on. That is much more critical to address.” - Public #5

“I think habits could be difficult.” ... “I think the citizens need to, to make informed choices. And maybe with these initiatives, we can show what could be done if they choose that way. And it's up to us to show or also the companies within so to show what could be useful” - Public #7

“It can also be a challenge to try to make people do anything else than they are used to, to change habits.” - Public #6

“It will be a huge communication project to make them change their behavior because we know that that is what we're asking of them.” - Public #9

“Some people will say, but I can't charge but the problem is that no, you can't charge exactly when you want to charge, but you will be able to charge when you need to charge and that is - there is a difference there that comes back to the behavior.” - Public #5 (from the follow-up interview)

During one interview, a respondent brought up issues regarding how time is viewed with regards to the goals of this initiative and when to bring in the user perspective. This shows that temporal distance issues not only affect the project management aspect of the initiative, but also, potentially, how the citizens perceive the goals and the changes required within the initiative.

“The year 2030 is far away for most people. So I'm not sure about how it would be, maybe it will be easy. If I asked my dad who's 77, ‘What do you think about this and it will happen in 20 years?’ He will just say ‘that'll be fine’ because he knows he won't be there. So he won't need to make an effort to change his behavior. So maybe that's very abstract or something for people. Even thinking about how it will work in 2030, so they won't have an opinion. So maybe it's hard to answer that when it's so far away, or maybe it's the right time because you will get a really positive answer because yes, of course I would” - Public #9

Behavior change is not just limited to the end users taking the bus or riding their bike, it also includes businesses and stakeholders that wish to function within the zones. Respondent Public #9 raised a concern regarding this exact issue,

“I think a major challenge is to talk to those transportation services to the companies and try to get them on board. For example, Live Nation, a huge global company that needs to do a major change of behavior when it comes to their transportation to the Scandinavium arena where they have been doing transportations in the exact same manner for over 30 years.”

During the course of the interviews, it was often discussed the need for motivation methods to get the users to change their behavior, as a frequent challenge mentioned was exactly that, getting the users to change their mobility behaviors. The researchers identified two modes of motivation, positive/indirect or incentive based (carrot) and forced (stick) based.

The carrot-based motivation tools consisted of things such as education and awareness of risks of fossil fuels, and the promotion of carbon free alternatives. Some potential financially beneficial motivation tools were also discussed as possibilities but would likely be the counterbalance of regulation/legislation. A few of the mentioned examples included:

“we would like to work with the carrot within the zones to to bring out the entrepreneurship innovations that could come” ... “the most of the companies, in Sweden at least, take the climate change on quite serious and quite serious notes and understand that we need to change and by that we can incentivize them to take part in some” - Public #5

“And maybe we should try to find incentives for people to be more efficient in their mobility.” - Industry #4

“In the Green City Zone, with the tickets for an event, for theaters or visitors in Scandinavium or something like that should also include the transportation.” - Public #6

“We actually have a time based fee right now in Gothenburg, and we could have a number of people based fees. If you don't want to share that information, well you pay a higher fee.” - Industry #1 (speaking of carpool incentivization)

Conversely, the stick-based motivation tools consisted of regulation and legislation that would force the users to change their behavior. It is worth noting that all stakeholders interviewed (4) who sit on the steering committee agreed that they believe radical change was needed and eventual legislation and regulation may be needed to get to the end goal. This also included discussions regarding limiting some areas to electric vehicles only, or even vehicle free areas. Several respondents brought up examples from other cities, such as Berlin, Manhattan, Paris and Amsterdam. It is also worth noting, that even nearly 50% of the citizens' polled in the survey (below) felt that regulation would be needed to motivate their own mobility behavior change.

“One important aspect is that for the city, in the city toolbox, we have regulations. We could as a person from the city say, ‘Okay, this is an admission free area from 2025, for example, we're not allowing any cars with fossil fuels.’” ... “Yeah, the Trafikkontoret, the road authority, in the city, the politicians have given them a responsibility to try that out for a new area in the city. They haven't gone that far yet

but they have that on the table to try out. How would that work? If we would say this area is only for electric cars for example, or emission free cars. My idea of bringing that up is that it is real because in the goals that the city has for 2030, reaching almost zero, they say that if we don't do not reach this by any other means, we will use all the tools in our toolbox.” - Public #5

“If you pollute, then you pay more.” - Public #7

“I think we need to have brave politicians who actually, who might not be so popular in the coming years, have to make tough decisions.” - Academic #11

Another respondent (Public #8) expressed hope to have car-free or electric-only areas within the city by 2030, but admitted there are limitations due to city planning laws regarding it

“But I mean today I think we have a lot of problems to have a car free zone there, because you have to have access to your home when you're buying a sofa. Or if you don't have a car then you have to buy that service from this sofa's shop to get it to your home.”

While several brought up other city examples, such as Berlin (ID #1, #4, and #11) or Manhattan (#11), some felt it was risky to result to restrictions and regulations, as exemplified by Industry #4,

“I think it's bad for the citizens to have restrictions, it's much better than to have the possibility of choice” ... “There was an article in the newspaper where Berlin had had a suggestion to essentially cancel all traffic within the ring road. I think that's a naive approach and that might even empty part of that inner circle, or at least some people will not want to live there” - Industry #4

When discussing how to motivate people to change their behavior, using either incentivization or forced regulation, Industry #4, felt there had to be a balance between the two, but that regulation is often too slow. He elaborated further, that his company isn't waiting, by saying

“Because we're really saying it doesn't matter if you can charge your car in Gothenburg city, we're going electric. We don't have a choice anymore. Because we have undersigned the climate agreement. And

we're dealing with this, and we're actually stepping up possibly quicker than the municipalities, even Sweden as a nation.”

Technical

When looking at the technology challenges within the GCZ Initiative, we have focused primarily on infrastructure. It is here we can see much of the focus of concern and problem solving has been focused thus far. It appears, the approach is to resolve the infrastructure, and then address the people who will have to live within and use it.

Infrastructure

Several concerns regarding infrastructure were raised during the course of the interviews. In the following part, the key quotations have been grouped by topic, for a better presentation.

There was some discussion in several interviews about electrification, the grid capacity in particular and being able to meet the demand in order to achieve the targets of 2030.

*“On a very high level, electrification is one of those challenges.” ...
“One of the main challenges will be to supply different modes of transport with electricity, because electricity is essentially where we're going more or less.” - Industry #3*

“I mean for the electric grid, for example, there is a lot of complexity there. For example, they are not allowed to build on expectation. They're not allowed to build new electric grids, because they think they have customers in the future. The regulations regarding electric grids are based on that you build only when you get a customer that asks for the need. That is why it's lagging today, because the need has increased so fast the last few years at a pace that they didn't foresee.” - Public #5

“If you want to have a new power cable into Gothenburg, which is being discussed now. They expect that Gothenburg will need about double the amount of power in the grid in order to manage the transition by 2040. Because I mean, it's not only the vehicles that will be electrified, this industry is as well. And we have lots of refineries, for example, we have, Volvo plants on Torslanda, we have factories, and we will also have a new battery factory in Gothenburg” - Academic #11

Further discussions were had regarding the charging infrastructure and availability to the end users.

“I think that you need to have enough charging stations for this and of course also enough to meet a minimum amount of cars and then of course you need to see that it needs to go in line with the volume in total.” - Industry #2

“One challenge is that owning a car in the central areas is quite difficult, I mean, owning an electric car. It's going to be very hard if you don't have the capability to charge at night. Because most cars will charge at night, more or less, maybe not every night, but every other and it doesn't seem like it's an easy task to solve. It's easy to solve the charging if you will live in a private house, outside of the cities, but in the central area is going to be a challenge” - Academic #11

“One of the challenges I think is that you need to have enough charging stations for this and of course also enough to meet a minimum amount of cars. Then of course you need to see that the needs go in line with the volumen in total” - Public #8

While discussing the dynamic complexities around the charging infrastructure, Industry #4, also discusses the role data and digitalization plays, but most poignantly trust that must be present as well. This is a prime example of the balancing act between society and technology. Kopackova and Libalova (2017) discussed, transparency and trust are critical for success of smart city initiatives.

“And electrification, we know it's happening. Of course, how do we manage that? And this is also where, so to say, a possibility, and an aspect of the Green City Zone enters because if we, for instance, need electric cars in the city, they might need to have charging places. And of course, there's a digital layer, when it comes to that type of infrastructure that's not in place today. It's a lot about data. Of course, it's a lot about access, it's a lot about trust. So it's a very complex system, which is very tangible, part of the Green City Zone.” - Industry #4

City #8 brought up the benefits of focusing more on wireless and conductive charging, as opposed to plug-in charging infrastructure for safety and for extended product life management. He explained there would be less exposed and moving parts and therefore less risk of needing to change cables or having customers tripping and falling over them.

When asked about the society side of this initiative, it was admitted in one particular interview (Academic #11), that they have not really thought of the society aspect, but rather had spent the last year focusing just on the technical side of things. Academic #11 further described that the focus has been on electrification infrastructure, especially as it relates to light and heavy trucks, as well as studying

the electricity net for future needs. Thus further exemplifying the interdependency of society and technology upon each other.

Respondent #5 from BRG corroborated respondent #11's statement, and further expanded it by,

"We would like to because we understand that this cannot only be a technical project. If we're gonna reach the goals, we need to understand that to a big, large extent behavior shifts from the people living, working or visiting the zones. They need to change their behavior. We will not solve this with only new technology. So therefore it's really important to get those people onboard." - BRG #5

What can be inferred based on the socio-technical chapter, is that there is a clear understanding that society is important, but how and when exactly to focus on and engage society has yet to be resolved. There is an overwhelming response that there will be a need for a behavior shift in order to accept the new technology and resources to achieve the net zero emissions by 2030 target.

5.2 Citizen's Perspective Survey

The citizen survey consists of 137 individual responses. The survey results have been focused into four groups: first, awareness of the initiative and subprojects; second, current mobility behaviors; third, willingness to change their mobility behavior; and lastly what GCZ should focus on in the future. This chapter focuses solely on the citizens' perspective. As the literature has shown, both in regard to triple helix and socio-technical systems thinking, society (alternatively citizens) play a critical role for the success of an initiative, especially one that is essentially a smart city initiative. Therefore, this chapter examines exactly how the citizen perspective is at the time of this thesis, pertaining to the Green City Zone Initiative.

5.2.1 Awareness

According to the responses of the survey, there is a substantial lack of awareness of the Gothenburg Green City Zone Initiative, with 78.1% responding to having no knowledge of it. There is even a greater lack of awareness, at 88.3% of respondents, of the Green Events Initiative, which is one of the elements of the Gothenburg Green City Zone. Lastly, the sub-project with the greatest awareness of the two polled, is the mobility hubs, with 73.7% of respondents saying they have not heard about the project. This shows there seems to be a substantial knowledge gap regarding the awareness of the Gothenburg Green City Zone and its polled sub-projects.

One respondent (Survey #136) recommended that the GCZ Initiative's future focus should be more on raising awareness of the initiative to garner further support for people to change their behaviors,

“To start spreading more information about the initiative itself, it has barely any exposure around the different parts of the city. If they start campaigning about it more around more parts of the city and not only the innermost parts, it can probably make more people aware of the initiative.”

5.2.2 Current Mobility Behaviors

When looking at public transportation behaviors, we chose to look at the behaviors of people traveling from the outside in, likely visitors, and the behaviors of people within the city, likely locals. A majority of respondents, 79.6%, said “yes” to currently using public transportation within Gothenburg and 16.1% choosing sometimes, while 56.2% confirmed they use public transportation to travel into Gothenburg. However, 24.8% of prospective visitors said they sometimes use public transportation to get into the city. Even factoring in those that sometimes use public transportation, there are approximately 15% more private transportation occurrences from people traveling into the city than those already in the city.

As with the public transportation example, we chose to look at the behaviors of respondents within the city as well as those traveling into the city. Carpooling in general appears to be rarely utilized. Both within the city and traveling into the city, as the polling shows 90.5% and 91.2% respectively negative responses. One more mode of mobility behavior was polled, as a means of transportation within Gothenburg, namely bikes and electric scooters. Of the 137 respondents, 65.7% said they do not use bike or scooter rentals. That leaves 44.3% that either said “yes” or sometimes to using this mode of transportation currently.

When analyzing the patterns within the current mobility behaviors, it can be seen that public transportation (trams, buses, trains) are the preferred mode of transportation. As both questions (traveling in the city and into the city) were asked of all 137 respondents, it is difficult to ascertain exactly what percentage are using public transportation due to proximity (living in or near the city) or necessity (lack of vehicle).

As the motivation field was optional, not everyone chose to leave feedback. Therefore, the total count of motivation feedback is 135. For the most part, participants using their modes of transportation mentioned factors such as convenience (62 out of 135), price (36 out of 135), time saving/availability (25 out of 135) and ease of use (19 out of 135) as their reasons for transportation choices.

Meanwhile, 21 respondents mentioned the environment or sustainability as motivations for their transportation choices.

Respondents listed convenience as they lived either in or near the city for their use of transportation mode. Meanwhile, one respondent (Survey #52) expressed that it is too difficult to drive their car in the city, so they reluctantly chose public transportation sometimes. 17 respondents specifically mentioned having no car and therefore needing to use public transportation, walking or biking methods.

One respondent (Survey #72) expressed great hesitation to using public transportation, despite sometimes needing to, due to the high costs. Despite this, many felt that the cost of public transportation was cheaper than owning a car, due to gas, maintenance costs, and parking fees. Conversely, Survey respondent #19 stipulated if bikes and scooters were free to use, then they would likely use them, otherwise they would rather stick to the freedom of movement their car provides.

The main reason people referred to time as a factor, when it came to either road congestion taking too long to drive, or perhaps they were too short on time to walk.

One survey respondent (Survey #14) raised concerns about hygiene issues related to public scooters that are just left on the ground and not cleaned in between users. Another respondent (Survey #29) felt scooters were a death trap.

Another survey respondent (Survey #15) explained that using the public transit system caused stress and anxiety and that is why they chose to drive instead. While 13 respondents said they either needed to drive their car due to poor public transportation communications, or a car provided greater convenience for them and/or their family needs. One respondent (Survey #26) specifically said they are “lazy and want to take their car everywhere.”

Several respondents felt that the city was small enough or they were centrally located well enough to walk or bike to their destinations. With approximately referring to using or owning a bike. In a couple of these cases, they also stipulated using public transportation systems when the weather was too poor for walking or biking.

Considering all available information, it appears that price, convenience and time (both saving and availability) are the primary factors impacting the respondents' motivations to use their preferred methods of transportation, especially as it pertains to public transportation. Respondents both criticized and hailed the pricing of public transportation, typically feeling it was a more economically sustainable option than owning a vehicle which would incur several kinds of extraneous costs.

5.2.3 Willingness – Liseberg, Fast Wireless Charging, Motivation for change

When looking at willingness to change their behavior, we first asked the respondents if they were willing to change their behavior, before moving into two hypothetical examples to test their willingness to accept change. Both hypothetical examples relate to either existing options or currently discussed options among the GCZ Initiative stakeholders.

Looking at the respondents' self-reported willingness to change their behavior, based on the Likert scale method (1 = not willing; 5 = willing to change), 60.6% of respondents answered in the affirmative at either 4 or 5. 27.7% of respondents in the neutral form, choosing 3, while 11.7% responded in the negative, choosing 1 or 2.

This scenario was to imagine that Liseberg has removed most of their parking facilities to reduce traffic congestion in the area. Instead, included with the purchase of a ticket to the park is a shuttle/bus ticket from a parking facility (mobility hub) outside the city, directly to the park.

The respondents were then given two Likert scale statements to see how strongly they disagreed (1) or agreed (5) with the statement. The first statement was that this would deter them from going to Liseberg, while the second statement was that they would be willing to use the shuttle services. 12 of the 137 responses agreed to some degree that this policy change would deter them from going to Liseberg. Conversely, 84 out of 137 responses agreed to some degree to their willingness to use the shuttle service.

One survey respondent (Survey #10) brought up several concerns on this scenario for families traveling with bags and strollers, as well as for people with handicap accessibilities during the optional feedback.

The second scenario was regarding fast wireless charging options: “The City of Gothenburg has installed fast-charging wireless charging pads in selected parking spots within the city center for public use. The cost associated with charging your vehicles this way is slightly more expensive per kWh, as opposed to plug-in fast-charging. With the wireless charging option, you would simply drive over the plate and charge as much as needed/wanted.”

It is worth noting that 11 respondents (8%) motivated their choice of choosing 1 as that they either did not drive or did not have a car. Conversely, one of those respondents actually said that even if they did have a car, they would not use this option anyway, as they felt wireless charging was a luxury.

Another respondent (Survey #69) spoke on the economic feasibility related to these scenarios with the following response,

“If I had a car, I would, given current circumstances, given inflation choose the less expensive. I think the cost of making sustainable choices should not be carried by consumers - economic incentives must be considered. Companies should bear these costs.”

When it came to the example of utilizing wireless charging, there was more feedback, especially related to ease of use (convenience) and cost/value. Essentially, it was not enough to be either cost efficient or convenient, there had to be a balance. Some were willing to pay a little more for convenience, but the convenience had to be improved than what currently exists. While others felt that it may be more convenient, but the cost would not warrant the extra convenience.

“I don’t have a car so I don’t really care atm (at the moment). But if I have an electric car my focus would be on the speed of charging as long as the extra speed is not massively overpriced.” - Survey #8

“I would appreciate the convenience of just having to drive over the plate and charge.” - Survey #9

“It seems like a no-brainer to be able to drive over pads and charge your car. How much quicker is it? I think that would matter to a lot of people. I have friends with electric cars who don't have access to plug in at home, so they go to other places around the city just to charge, and I think the fast-charging pad would be smart for people like that.” - Survey #13

“Again, I don't drive...but I can imagine situations where that option would be very convenient and a higher price would seem justified (kind of like grabbing a quick snack from a convenience store quicker as opposed to going into a big supermarket to get it cheaper)” - Survey #25

“If I drove an EV I'd use the charging I could find. if it's much more expensive that could deter me. plugging in to charge wouldn't deter me.” - Survey #94

“It might feel more convenient but it is most likely not a smart choice for myself in the long run. If it costs more, even if it is just a certain

smaller amount, it would probably still add up to quite a sum after a year of frequent use.” - Survey #102

“I wouldn't use it if it is more expensive per kWh and not charging any faster than the plug-in "fast-charging" option.” - Survey #39

“Not if the cost is higher and it is as effective” - Survey #51

Given that the two hypothetical examples could require a behavior change from current mobility behaviors, the scenarios corroborate the first question asked regarding willing to change behavior.

Based on some of the feedback regarding the wireless charging option, there seems to be some debate regarding the value of the service as it pertains to cost and convenience. With some raising concerns that the price needs to match the convenience otherwise the value threshold is not met. These scenarios show that, again, price seems to be a key factor to motivate user mobility behavior choices.

When questioned as to what would help motivate your change of mobility behaviors, the response was quite close. 50.4% felt that being made aware of their choices and the dangers of not improving their mobility behaviors would be sufficient in encouraging change. However, conversely, 49.6%, admitted that regulation would be needed to change their behaviors.

When reviewing the qualitative feedback on this particular question, nine people (6.5%) stipulated to some effect that they felt regulation would be needed in addition to education to get society to change.

As it was optional to leave feedback to motivate your selection regarding motivation, the survey received only 115 feedback responses. 30 out of 115 (26.1%) of the people surveyed, left feedback that they felt change would be easiest with regulation, even if they were already educated. 15 out of 115 (13%) felt that price was a key factor for their behavior. Either stipulating that more green options had to be cheaper, or there needed to be financial incentives to make the changes. 10 of the 115 respondents (8.7%) felt that convenience needed to be a deciding factor for them to make mobility changes.

One survey respondent (Survey #13) brought up several points of consideration regarding how to motivate people to change their behavior.

“Education often does very little when it comes to things that don't affect us right away (i.e. people know they should exercise and eat well,

but still don't). That doesn't mean they don't want to change, but it's easier not to. To make changes happen in this instance, the eco-friendly choice needs to be easy, convenient, reliable, and of good monetary value. To just add regulations forcing things will not win over people, especially if the systems don't work like they should. Case in point, trains across Sweden are notorious for being late. Why would I take a train to Stockholm when flying is often the same price, quicker and more reliable?"

5.2.4 Future Focus

As it was optional to leave feedback regarding what the GCZ should focus on in the future, we only received 38 feedback responses. Of the 38 responses, the three most commented issues raised were cost/pricing (9 out 38, 23.7%), convenience (9 out 38, 23.7%), and education (9 out 38, 23.7%). With regard to cost/pricing, the big concern was making public transportation and other green alternatives more cost effective for everyone. Convenience was mentioned 4 out of the 9 times in combination with price, in the regards of being accessible, comfortable and easily available. The next most discussed topics for focus were more green and environmental options (5 out 38, 13.15%) and societal behavioral change (4 out 38, 10.5%).

The survey responses reveal, not only the awareness gap, but also several user behaviors change challenges the Green City Zone could encounter in order to achieve their goals. Thus, further showing the importance of balance and interplay between the social system and the technological system (Ropohl, 1999). In order to achieve acceptance, there needs to first be awareness, and a concerted effort to address the resistance to change the users could potentially present. Additionally, Kopackova and Libalova (2017), continued to explain how successfulness of a smart city is measured; specifically, by user acceptance, especially as it relates to “usefulness and perceived ease of use” (p. 7), both concepts raised within the survey results.

6 Discussion

Based on this case study of the Gothenburg Green City Zone Initiative we were able to address our two research questions, namely what are the challenges of a multi-stakeholder smart city initiative utilizing a triple helix approach? and what effect does temporal distance have on the risk management and decision making within a multi-stakeholder smart city initiative?

As this smart city initiative is in the beginning stage and only now finding its footing, after a restructuring, it goes without saying that there is not a substantial amount of completed projects or data to analyze to date. However, there are some patterns that are visible and can become challenges in the future if not properly addressed in due time. As such, in this section, we will discuss the potential challenges of this multi-stakeholder smart city initiative, from the theoretical lens of socio-technical balance and institutional logics. Additionally, we will discuss the effects of temporal distance in the operationalization of this initiative. Finally, we will review the theoretical and practical contributions of this thesis.

6.1 Theoretical Contributions

Smart city initiatives usually involve multiple stakeholders and can be large-scale in terms of project scope and length. In addition, smart city initiatives target sustainability goals, and involve technical, social and economic aspects. In this study, we introduced the construal-level (temporal distance in particular) layer to the smart city research. As such, examining the Gothenburg Green City Zone Initiative, not just as a smart city project with multiple stakeholders, but also observing how temporal distance influences the project management of a large-scale complex initiative. In addition, we also leverage the triple helix lens and institutional logics to examine the perspectives of an alliance among the different stakeholders.

6.2 Potential Challenges of a Multi-stakeholder Smart City Initiative

As smart city initiatives are expanding, especially with regards to energy sustainability, with programs such as Move21 and Climate Contract 2030, it is apparent this is an area that warrants more research focus, not just for academic gains but also for practical implications. A common occurrence within the aforementioned projects is the collaboration between different sectors, namely government, industry and academia. As the GCZ Initiative is a complex initiative, still a work in progress,

that utilizes the previously stated triple helix collaboration mechanism, we next look at the potential challenges that arise due to socio-technical interdependencies and institutional logics, thus addressing RQ #1.

6.2.1 Socio-technical Influences Over Smart City Projects

Prior social-technical literature has suggested that it is important to have the societal and the technological systems work together (Ropohl, 1999; Aristotle 1966; Kopackova and Libalova, 2017). As with smart city projects, they rely heavily on technological innovation, but more importantly, need user acceptance in order to be successful and sustainable. As Kopackova and Libalova (2017: p.7) clearly explain, “Smart City initiatives at the user level determines individual acceptance, especially perceived usefulness and perceived ease of use.” However, smart city projects’ heavy focus on technological systems may lead to the relative negligence of the social aspect. Throughout the interviews it was clear that, to this date, the central focus within the GCZ Initiative, has been on technological elements, despite the explicit understanding of the significance society plays in successfully achieving the target goals. According to Baxter and Sommerville (2010), this could risk failure to achieve the goals. Prior studies also noted that changes to one aspect affects the other aspect (Kopackova and Libalova, 2017). As this initiative is a large-scale smart city initiative with multiple stakeholders and subsystems at play, it is important to take a systems-based approach when considering how the entire environment functions, not just looking at the whole, but also how the parts work together (Ropohl, 1999). Our findings reveal that smart city initiative that consist of significant technological elements may have a tendency to focus more on the technical side in the project planning, and this may lead to obstacles in the future for the smart city project.

Our findings echo prior research that examines the suggested failure of an organizational program, or in this case a smart city initiative, could be due focusing on the technical aspect, without taking into account the complex interdependencies that occur between both the technical and the social systems (Leeds University Business School, 2022).

Given the goal of net-zero emissions within all three zones by 2030, much of the focus, thus far, has been on electrification infrastructure, establishing green events, and developing the local and goods mobility hubs. However, there was clear awareness from the key stakeholders that society was going to play a pivotal role but lacked dedicated attention as to how to get not just the citizens but the local societal organizations and smaller businesses on board. This disparity aligns with the literature (Leeds University Business School, 2022) that states socio-technological balances are typically when the focus is primarily on the technological side of the system.

6.2.2 Institutional logics – challenge and resolution

According to Etzkowitz (1996), the differences that arise between representatives of different pillars within a triple helix framework are inevitable, but this provides an opportunity for resolving issues through the use of new perspectives. Therefore, consolidating unconventional partners within a large-scale multi-stakeholder smart city initiative such as the GCZ provides an avenue for unleashing previously untapped creative innovation (Elia et al., 2020). This is contingent upon the creation of an environment which is well-prepared for addressing or resolving any existing institutional logics pitfalls between the various stakeholders, as prescribed by Reay and Hinings (2009). As identified throughout the interviews, there were several points relating to funding structures, actionable speed, transparency or communication and motivators. One specific example is that the public and academic sectors have different transparency requirements compared to the industry sector; based on the researchers' observations during the interviews, there seems to be certain resistance in regard to information sharing. Additionally, as per the distinct focus of the triple helix model - namely, industry focus on commercial goods, academia focus on research and government focus on regulation (Leydesdorff, 2012). In the case of the GCZ, it seems to be an example where the underlying motivation of institutional logic has been raised as a potential challenge, albeit minimal or occasional.

6.3 How Construals Affect the five Genes of a Multi-stakeholder Initiative

This section discusses the intersection between the MSI framework and construal level theory within the context of the Gothenburg Green City Initiative. As this section deals with the impact time and construals have on the GCZ Initiative, it will address RQ #2.

6.3.1 Feasibility of the ‘How’ Versus Desirability of the ‘What’ and ‘Why’

Prior research has discussed construals influence on climate change (Brugger, 2020), participatory sustainable development (Strongheart et al., 2010), and organizational decision making (Raue et al., 2015); however, to the best of our knowledge, this research is one of the early studies that explicitly examines construals effects on project management within a multi-stakeholder smart city initiative. Smart city projects typically address sustainability problems, and thus have a natural focus on desirability. In addition, smart city projects are usually long term, spanning from several years to decades. Hence the influence of temporal distance becomes especially salient.

Our findings suggested that at an early stage of the smart city initiative, the key

stakeholders are generally focusing more on the desirability (high level) of their goals rather than on the feasibility (low level) of how to achieve them. Conversely, Lerner et al. (2016), showed that focusing on concrete details, as opposed to abstract ideas, results in higher risk estimates. As such, by operating without a more concrete and detailed plan on how to achieve the 2030 emission free target, there is an increased risk of unforeseen and unanticipated challenges arising that could prevent target success. However, during follow up interviews with Public #5 and Academic #11, they explained a two-day workshop was to take place, later in May, that would focus on back casting and setting interim goals, as well as undergoing a new gap analysis in approximately 2024 to re-evaluate their progress towards their end goals. If these actions come to pass, then this shows that there is a shift starting to occur moving more towards feasibility (low level construal), which will improve risk estimation (Kerzner, 2013) and allow for quicker course correction.

There is agreement across the helices pertaining to desirability, specifically ‘*what*’ the vision and goal of the initiative is, net-zero emissions by 2030, as well as a firm understanding to the ‘*why*’, sustainability and necessity to stay on par with the overall conversational shift (the mainstream demand for greener initiatives), however, the ‘*how*’ is still a work in progress (Elia et al., 2020: pp.2469-70). As sustainability and smart city development has attracted great attention in recent years, it may exacerbate the focus on the desirability (Kopackova and Libalova, 2017; Ferraris et al., 2020). The findings suggest more emphasis on feasibility is needed.

6.3.1.1 Optimism Bias and Lacking Being Tested

Trope & Liberman (2010) stated that confidence in distant situations (such as a net zero 2030 goal) is heavily dependent upon high level construals (abstract). Meanwhile, per Nussbaum’s (2006), studies showed temporal distance can cause issues with predicting task execution, resulting in overly optimistic ideas on completion. In the current research context, our findings also suggest temporal distance, i.e., viewing net zero emissions goals at the end of project in 2030 from 2022, may lead to dependence on high level construals.

We would like to emphasize that the current smart city initiative is still at an early stage. The new restructured steering committee is only approximately five months old at the time of writing this thesis. There have been two steering committee meetings, to date, using the new format. The first meeting was merely to work out what the new structure was going to be and establishing clear initiative principles. The second meeting, which took place April 21, 2022, was the first “test” of the new system and trial run with the stakeholder dynamics. As such, there has not been much opportunity to really gauge the likelihood of success. Despite experiencing several setbacks (such as the Covid-19 pandemic), there has been no changes made to the

end goal, therefore implying continued confidence in the ability to achieve successful execution.

6.3.2 The Importance of ‘Who’ (Governance)

Another issue that seems to be clearly raised by the interview results is the need for continuity across all key stakeholders and the need for fit leadership at the helm. Several respondents highlighted issues with stagnant movement in organizational development. After a new initiative project manager was brought in to coordinate everything, suddenly the initiative gained momentum and traction. What happens if this project manager moves on to another project or job? This is also imperative according to the Triple Helix model, which stipulates the leader needs to respect all the key players (Cai & Etzkowitz, 2020).

As Elia et al. (2020), expressed governance is reliant on shared guiding principles. This is also seen in triple helix literature, that while all parties cannot always agree, there needs to be a shared vision and codification in place to deal with dissent (Leydesdorff & Etzkowitz, 1998), something that has yet to be fully developed within the GCZ Initiative.

6.4 Practical Contributions

As this is a large-scale initiative that is still in a developmental stage, we have identified two areas, where this literature can offer practical contribution. Namely, with regards to further developing their focus on the low-level construal (feasibility) elements, and how to better balance their socio-technical system thinking with suggestions relating to dealing with civil society.

6.4.1 Feasibility

As observed during the course of the interviews, it is evident that there has been a greater focus on the desirability elements of the initiative, namely net-zero emission 2030 and why this is so crucial; especially since BRG is also a stakeholder in Move21, an EU initiative that shares similar ambitions, and is using Gothenburg as a testbed city. However, based on the research of construal level theory and temporal distance, it is evident that a change of course with now a greater focus on the feasibility elements of the initiative would have a greater boost toward likelihood of completion. Therefore, it is recommended that there be more enhanced concentration of resources towards back casting, setting interim goals and having a tighter iteration process with feedback loops in order to better manage the practicalities involved with mapping the feasibility of achieving the 2030 target goal. This will hopefully help to reduce the risk of goal failure and project stagnation.

Another element crucial for the ‘governance’ gene that needs to be developed further is clear documentation and communication (Elia et al., 2020, Neirotti et al., 2014).

We have seen, thus far, that there have been some inconsistencies with having centralized and accessible documentation on the GCZ initiatives' project processes and progress. However, during a follow up interview with Public #5, it was revealed there is a current focus on developing a clear communication channel and SharePoint database for knowledge sharing.

We suggest that for long-term large-scale projects such as this smart city initiative, temporal distance is a factor that needs to be continually evaluated to avoid pitfall resulting in goal failure or delay. Additionally, there are some challenges related to the differences of the various institutions involved and how all the stakeholders work together to deal with systemic issues.

6.4.1 Civil Society

According to the interviews, it is evident that user behavior is an anticipated challenge that will need to be addressed. Given the lack of communication and research done to date regarding user behavior, we feel that making the civil society advisory group is a priority, as well as a communication campaign to engage both tourists and local inhabitants of Gothenburg, to work to prepare them for the inevitable change. As witnessed by several survey respondents, they feel regulation would be necessary in addition to education and information. Some even suggested that regulation could lead to resistance to change, therefore, if ample communication is done in advance, in a dialogue approach, then perhaps the users will be more amenable to the regulation. It is also our recommendation that, as Etzkowitz (2014) and Cai (2015) explained, the users are a large and crucial element. As such, it is our recommendation to, posthaste, allot one, possibly even two in the future, slots on the steering committee for civil society representatives to ensure their voice is not just heard but carries defined weight. While it could be argued that the representative from the city on the steering committee speaks for the citizens, as they are elected officials, it is not our standing that the civil society voice should be restrained to a political voice.

Survey responses showed citizens have little awareness of the GCZ and its various subprojects. As Etzkowitz (2014: p.19) explained, civil society is "the launch pad" within the triple helix framework for innovation, which only further corroborates the importance of society within the socio-technical system. Therefore, there is surely a need for a focus shift within the initiative to address not only the awareness gap that currently exists, as seen in the survey results, but also to begin to bring in the voice and opinion of both the citizens and the communities within the three zones in order to improve chances of acceptance and ultimately, success. Given the lack of citizens' awareness shown in the survey, it is hard to expect society to get on board with the goals and ambitions of the initiative if they are unaware of its existence. While this initiative is still very early on its development, it is not overwhelmingly expected to

have a substantial communication campaign already invigorating society. That being said, per the participant feedback, they wish for more knowledge and education, they wish to be more aware.

With relation to the concerns of addressing how to motivate user behavior change, both the stakeholders and the citizen participants seem to allude to the necessity of some form of regulation in order to achieve the net zero emissions by 2030. It is also clear from the polling that regulation will be needed to achieve the 2030 goal. While many of those interviewed spoke of regulation as a last resort and hoping everyone would choose the 'right path', the survey participants admit that they will not change unless forced to. One respondent even admitted they do not care about the environment. That is not an individual likely to be swayed by a marketing and informational campaign. On the note of education, many respondents said the information is out there, people know what they should do, but just don't feel the motivation to do what should be done. This is further proof that regulation and legislation will be needed to truly change behavior. However, it is not our belief that only legislation and regulation should be used. As several survey respondents and interviewees remarked, a package based on communication/education and regulation would be best at getting society on board with the initiatives.

In addition to education as a method of motivation, price and convenience are possibly the two largest factors that need to be considered and addressed by the GCZ initiative and its stakeholders. These should be factored in when looking at the viability of the business models considered for the various subprojects and regulations.

7 Limitations and Future Research

This initiative is still relatively in the infancy of its development. As of the writing of this thesis, there has not been a completed project to observe for analysis. As such, much of the interviews discussed visions, goals and aims, rather than on specific project details.

While this initiative features three distinct zones, we were unable to interview key stakeholders responsible for the Lindholmen and Forsåker zones. Therefore, the information attained that was related to those zones was generally speculative. This information gap is redoubled by the lack of progression in those zones.

Not all stakeholders were able to be interviewed for this project. In this particular case, as electrification is the central theme of the initiative, it would have been ideal to interview at least one individual from Göteborg Energi, which is the primary stakeholder responsible for the energy grid, as issues regarding the electrification infrastructure was brought up several times in this research.

7.1.1 Survey Limitations

In retrospect, some limitations were identified that could be improved for a next iteration of this research. First, while we ask the respondents to speak to their behaviors traveling into the city and within the city, it would have been ideal to ask an accompanying question checking for their location, either in the city or outside the city, to better filter the responses.

We offered several opportunities to explain or motivate their responses, but perhaps adding the option for this feature when discussing their awareness would have been a benefit.

With regards to the A/B question as to what would motivate people to change their behavior, it is obvious from the feedback, that an option of ‘both’ would have been a suitable third option.

7.2 Future research

This initiative is projected to be an ongoing process for nearly a decade to go, therefore it would be ideal to study this phenomenon as a longitudinal study to evaluate its evolution. This would provide an opportunity to see if the anticipated challenges came to fruition and how exactly the stakeholders overcame them; or conversely identified additional challenges that were not anticipated. In particular

what the dynamics would be in actuality once the projects were tested in real world application as well as if/when the civil society segment was further incorporated thus moving into a more quadruple helix formation instead of the current triple helix.

As this research was conducted in Sweden, which does utilize the Nordic Welfare State model, we feel this could be an intersection that could be further studies to include more geopolitical aspects. Namely, it was revealed during the interviews that the initiative experienced some limitations in execution due to inability to regulate or control certain factors, that were managed by either state (Sweden) or EU counterparts. Therefore, further research analyzing the ability of regional smart city initiatives to function with stakeholders from other geopolitical agencies, especially using a social democratic based model (i.e., Nordic Welfare State), would be worthwhile.

Something of interest that could be worth further research and review is the origination of the proposed projects/programs. The Green Party in Sweden has been trying to create environmental zones since 1991, according to one respondent, but never gained political traction to move forward. It wasn't until a major global industry homed in Gothenburg brought forth an idea to Business Region Gothenburg that the Gothenburg Green City Zone finally started gaining support from all pillars. Why exactly was an initiative proposed by a private organization that would clearly benefit from such an initiative, as it aligned with their corporate strategy, more successful than a variety of projects and initiatives proposed by a small fraction of the political government? Does the origination of the proposal matter when it comes to gaining broad support?

8 Conclusion

Throughout the course of this thesis, the researchers sought to a) identify management challenges in multi-stakeholder smart city initiatives, and b) to explore the impacts of large temporal distance on risk management and decision-making in such initiatives. The study contributes to the understanding of multi-stakeholder smart city initiative through analyzing it from the multi-sided genes. We also examined the influence of temporal construals and considered socio-technical aspects. The study contributed both theoretically and practically to multi-stakeholder large scale project management in general, and smart city initiatives in Sweden in particular. Upon review of our findings and research experience, the following inferences were made.

First, being interlinked with the initiative's stated goal - net-zero emissions by 2030, underemphasizing the temporal aspect has led the initiative's stakeholders to focus and prioritize the desirability of the goals (operationalized through 'what' and 'why') at the detriment of feasibility and achieving said goals (operationalized through 'how'). This may have long-term consequences on the feasibility of such initiatives and its stakeholders. Consequently, as part of the MSI framework, temporality performs a strategic role for projects or initiatives and prescribes farsighted management.

Second, the results of our study lead us to conclude that focusing on technological elements or artifacts is not sufficient for achieving the target goals. An in-depth analysis of decisions and processes in the GCZ disclosed the need for a systems-based view in future planning, particularly on how different parts work together, even though the system as a whole and its components are given sufficient attention.

Finally, to create new lasting and sustainable behaviors, as well as changing current ones, it is important to consider from the start the users of the services and technological artifacts. User acceptance and habits are vital for sustainable-oriented MSI. Additionally, their involvement in co-creation - besides design and social input – is crucial.

In our endeavor to identify challenges in multi-stakeholder initiatives or projects, a multi-sided initiative (MSI) lens was adopted. MSI is a modular and flexible framework converted from studying multi-sided platforms (MSP), enabling collaboration and applicable for various topics or circumstances. Throughout our

research, MSI exhibited potential for use as a management tool. To conclude, the researchers want to highlight that in the course of a multi-stakeholder initiative, it is imperative to have clear goals, timeframes, and means of achieving them.

9 References

- Anthopoulos, L. (2019). *Smart City Emergence: Cases from Around the World*. Elsevier.
- Aristotle; Hope, R. (1966). *Metaphysics*. University of Michigan Press.
- Transforming our world: the 2030 Agenda for Sustainable Development, 35 1 (2015).
https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E
- Barnett, M. L., Henriques, I., & Husted, B. W. (2018). Governing the void between stakeholder management and sustainability. In *Sustainability, stakeholder governance, and corporate social responsibility*. Emerald Publishing Limited.
- Baxter, G., & Sommerville, I. (2010). Socio-technical systems: From design methods to systems engineering. *Interacting with Computers*, 23(1), 4-17.
<https://doi.org/10.1016/j.intcom.2010.07.003>
- Brügger, A. (2020). Understanding the psychological distance of climate change: The limitations of construal level theory and suggestions for alternative theoretical perspectives. *Global Environmental Change*, 60, 102023.
<https://doi.org/https://doi.org/10.1016/j.gloenvcha.2019.102023>
- Cai, Y. (2015). What contextual factors shape ‘innovation in innovation’? Integration of insights from the Triple Helix and the institutional logics perspective. *Social Science Information*, 54(3), 299-326.
<https://doi.org/10.1177/0539018415583527>
- Cai, Y., & Amaral, M. (2021). The Triple Helix Model and the Future of Innovation: A Reflection on the Triple Helix Research Agenda. *Triple Helix*, 8(2), 217-229. <https://doi.org/https://doi.org/10.1163/21971927-12340004>
- Cai, Y., & Etzkowitz, H. (2020). Theorizing the Triple Helix model: Past, present, and future. *Triple Helix*, 7(2-3), 189-226.
<https://doi.org/https://doi.org/10.1163/21971927-bja10003>
- Cai, Y., & Lattu, A. (2019). Civically grounded Triple Helix: synergies between Triple Helix and Quadruple Helix models of innovation. XVII International Triple Helix Conference,
- Cai, Y., & Lattu, A. (2022). Triple Helix or Quadruple Helix: Which Model of Innovation to Choose for Empirical Studies? *Minerva*, 60(2), 257-280.
<https://doi.org/10.1007/s11024-021-09453-6>
- Cars, V. (2018, 04/07/2018). *Volvo Car Mobility launches mobility brand M*
<https://www.media.volvocars.com/global/en->

- gb/media/pressreleases/234576/volvo-car-mobility-launches-mobility-brand-m
- Cars, V. (2021, 10/11/2021). *Volvo Cars signs zero emission road transport declaration at COP26, reveals groundbreaking internal carbon pricing mechanism* <https://www.media.volvocars.com/global/en-gb/media/pressreleases/290035/volvo-cars-signs-zero-emission-road-transport-declaration-at-cop26-reveals-groundbreaking-internal-c>
- Cities, V. (2022). *Climate City Contract 2030*. Viable Cities. Retrieved 24/05 from <https://en.viablecities.se/klimatkontrakt-2030>
- Commission, E. (2019, 15/12/2021). *A European Green Deal*. Directorate-General for Communication. Retrieved 24/05 from <https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/>
- Commission, E. (2019). *Smart cities*. Directorate-General for Communication. Retrieved 13/05 from https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en
- Commission, E. (2022). *REPowerEU: affordable, secure and sustainable energy for Europe*. Directorate-General for Communication. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en
- Datz, V. C. R. (2022, 03/03/2022). *Volvo Cars tests new wireless charging technology* [Global Press Release]. <https://www.media.volvocars.com/us/en-us/media/pressreleases/295720/volvo-cars-tests-new-wireless-charging-technology>
- Deakin, M. (2014). Smart cities: the state-of-the-art and governance challenge. *Triple Helix*, 1(1), 7. <https://doi.org/10.1186/s40604-014-0007-9>
- Deakin, M., & Al Waer, H. (2011). From intelligent to smart cities. *Intelligent Buildings International*, 3(3), 140-152.
- Ducao, A. (2015). *MindRider Maps Manhattan: A New Approach to the Smart City*. DuKorp.
- Dutta, S. D., & Prasad, R. (2020). Digitalization of Global Cities and the Smart Grid. *Wireless Personal Communications*, 113(3), 1385-1395. <https://doi.org/10.1007/s11277-020-07478-w>
- Elia, G., Margherita, A., & Petti, C. (2020). Building responses to sustainable development challenges: A multistakeholder collaboration framework and application to climate change. *Business Strategy and the Environment*, 29(6), 2465-2478. <https://doi.org/https://doi.org/10.1002/bse.2514>
- Etzkowitz, H. (1996). A triple helix of academic–industry–government relations: Development models beyond 'capitalism versus socialism'. *Current Science*, 70(8), 690-693.

- <http://www.jstor.org.ezproxy.ub.gu.se/stable/24097580>
- Etzkowitz, H. (2014). Making a humanities town: knowledge-infused clusters, civic entrepreneurship and civil society in local innovation systems. *Triple Helix*, 2(1), 1. <https://doi.org/10.1186/s40604-014-0012-z>
- Etzkowitz, H., & Zhou, C. (2008). *The triple helix : university-industry-government innovation in action* (First edition. ed.). Routledge. http://whel-primo.hosted.exlibrisgroup.com/openurl/44WHELFLW/44WHELFLW_services_page?u.ignore_date_coverage=true&rft.mms_id=99958557902419
- https://tcdlibrary.lids.org/vdc_100048888353.0x000001
- Event, G. (2022). *Vi möjliggör underhållningen*. Got Event. Retrieved 24/05 from <https://gotevent.se/om-oss/>
- Ferraris, A., Santoro, G., & Pellicelli, A. C. (2020). “Openness” of public governments in smart cities: removing the barriers for innovation and entrepreneurship. *International Entrepreneurship and Management Journal*, 16(4), 1259-1280. <https://doi.org/10.1007/s11365-020-00651-4>
- Friedland, R., & Alford, R. (1991). Bringing society back in: Symbols, practices, and institutional contradictions. *The new institutionalism in organizational analysis*, 232-263.
- Goodman, J., Korsunova, A., & Halme, M. (2017). Our collaborative future: Activities and roles of stakeholders in sustainability-oriented innovation. *Business Strategy and the Environment*, 26(6), 731-753.
- Göteborg, B. R. (2022). *Om Business Region Göteborg*. Business Region Göteborg. Retrieved 24/05 from <https://www.businessregiongoteborg.se/om-oss>
- Herweck, P. W., Peter. (2022, 21/05/2022). *Digitalization is the key that can unlock net-zero for industry* World Economic Forum. Retrieved 24/05 from <https://www.weforum.org/agenda/2022/05/digitalization-key-net-zero-schneiderelectric/>
- Hudović Kljuno, A., & Krivošić Dizdarević, L. (2021). DIGITALIZATION OF CITIES – SMART CITY INTERVENTIONS IN THE CASE OF SARAJEVO. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.*, XLVI-4/W5-2021, 273-278. <https://doi.org/10.5194/isprs-archives-XLVI-4-W5-2021-273-2021>
- Juraschek, F., Zubow, A., Hahm, O., Scheidgen, M., Blywis, B., Sombrutzki, R., Günes, M., & Fischer, J. (2012, 22-25 Oct. 2012). Towards Smart Berlin - an experimental facility for heterogeneous Smart City infrastructures. 37th Annual IEEE Conference on Local Computer Networks - Workshops,
- Kerzner, H., & Kerzner, H. R. (2013). *Project Management : A Systems Approach to Planning, Scheduling, and Controlling*. John Wiley & Sons, Incorporated.
- <http://ebookcentral.proquest.com/lib/gu/detail.action?docID=1113482>
- Kim, H. M., & Han, S. S. (2012). Seoul. *Cities*, 29(2), 142-154.

- <https://doi.org/https://doi.org/10.1016/j.cities.2011.02.003>
- Konhäuser, W. (2021). Digitalization in Buildings and Smart Cities on the Way to 6G. *Wireless Personal Communications*, 121(2), 1289-1302. <https://doi.org/10.1007/s11277-021-09069-9>
- Kopackova, H., & Libalova, P. (2017). Smart city concept as socio-technical system. 2017 International Conference on Information and Digital Technologies (IDT),
- Lermer, E., Streicher, B., Sachs, R., Raue, M., & Frey, D. (2016). Thinking concretely increases the perceived likelihood of risks: The effect of construal level on risk estimation. *Risk Analysis*, 36(3), 623-637.
- Leydesdorff, L. (2012). The knowledge-based economy and the triple helix model. *arXiv preprint arXiv:1201.4553*.
- Leydesdorff, L., & Etzkowitz, H. (1998). The triple helix as a model for innovation studies. *Science and public policy*, 25(3), 195-203.
- Leydesdorff, L., & Meyer, M. (2006). Triple Helix indicators of knowledge-based innovation systems: Introduction to the special issue. *Research policy*, 35(10), 1441-1449.
- Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology*, 75(1), 5-18. <https://doi.org/https://doi.org/10.1037/0022-3514.75.1.5>
- Lu, J., Xie, X., & Xu, J. (2013). Desirability or Feasibility: Self-Other Decision-Making Differences. *Personality and Social Psychology Bulletin*, 39(2), 144-155. <https://doi.org/10.1177/0146167212470146>
- Malone, T. W., Laubacher, R., & Dellarocas, C. (2010). The collective intelligence genome. *MIT Sloan management review*, 51(3), 21.
- Mancebo, F. (2020). Smart city strategies: time to involve people. Comparing Amsterdam, Barcelona and Paris. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 13(2), 133-152. <https://doi.org/10.1080/17549175.2019.1649711>
- McLaren, D., & Agyeman, J. (2015). *Sharing cities: A case for truly smart and sustainable cities*. MIT press.
- Move21. (2021). *Gothenburg - Sweden*. Move21. Retrieved 13/05 from <https://move21.eu/city/goth/>
- Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in Smart City initiatives: Some stylised facts. *Cities*, 38, 25-36. <https://doi.org/https://doi.org/10.1016/j.cities.2013.12.010>
- Nussbaum, S., Liberman, N., & Trope, Y. (2006). Predicting the near and distant future. *Journal of Experimental Psychology: General*, 135(2), 152-161. <https://doi.org/https://doi.org/10.1037/0096-3445.135.2.152>
- Park, L. S. (2021, 2021). *ElectriCity – cooperation on tomorrow's transports*. Retrieved 24/05 from <https://www.electricitygoteborg.se/en/node/19505>

- Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). *Platform revolution: How networked markets are transforming the economy and how to make them work for you*. WW Norton & Company.
- Pee, L. G., & Pan, S. L. (2022). Climate-intelligent cities and resilient urbanisation: Challenges and opportunities for information research. *International Journal of Information Management*, 63, 102446. <https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2021.102446>
- Rai-Roche, S. (2022, 18/05/2022). UN sets out five actions to jumpstart renewable energy transition. *PVTech*. <https://www.pv-tech.org/un-sets-out-five-actions-to-jumpstart-renewable-energy-transition/>
- Raue, M., Streicher, B., Lermer, E., & Frey, D. (2015). How far does it feel? Construal level and decisions under risk. *Journal of Applied Research in Memory and Cognition*, 4(3), 256-264. <https://doi.org/https://doi.org/10.1016/j.jarmac.2014.09.005>
- Reay, T., & Hinings, C. R. (2009). Managing the rivalry of competing institutional logics. *Organization studies*, 30(6), 629-652.
- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, 4(2), 155-169.
- Ropohl, G. (1999). Philosophy of socio-technical systems. *Society for Philosophy and Technology Quarterly Electronic Journal*, 4(3), 186-194.
- Saravanamuthu, K. (2018). How risk information and stakeholder-participation affect the sustainability of collaborative decisions: A case study on how the sustainability of stakeholder decisions is affected by different levels of stakeholder participation in preparing risk information. *Business Strategy and the Environment*, 27(7), 1067-1078.
- Schonhardt, S. (2022, 19/05/2022). Europe's Historic Clean Energy Plan Faces a Mining Problem. *Scientific American*. <https://www.scientificamerican.com/article/europes-historic-clean-energy-plan-faces-a-mining-problem/#>
- School, L. U. B. (2022). *Socio-technical systems theory*. Leeds University Business School. Retrieved 24/05 from <https://business.leeds.ac.uk/research-stc/doc/socio-technical-systems-theory#:~:text=Socio%2Dtechnical%20theory%20has%20at,parts%20of%20a%20complex%20system>
- Scott, W. R., & Leftwich, A. (2001). *Institutions and organizations* (2nd ed.). Sage. <http://www.loc.gov/catdir/enhancements/fy0658/00011072-t.html>
- Stad, G. (2021). *DENCITY*. Göteborg Stad. Retrieved 24/05 from <https://goteborg.se/wps/portal/enhetssida/Innovation-och-utveckling-far-framtidens-mobilitet-i-Gateborg/in-english/density>
- Strongheart, D. H., Obison, F., & Bordoni, F. (2010). Applying Construal Level Theory to Communication Strategies for Participatory Sustainable Development.

- Sweden, S. C. (2021, 12/01/2021). *Gothenburg Green City Zone leads the way towards zero-emissions transportation*. Retrieved 13/05 from <https://smartcitysweden.com/gothenburg-green-city-zone-leads-the-way-towards-zero-emissions-transportation/>
- Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). *The institutional logics perspective: A new approach to culture, structure and process*. OUP Oxford.
- Tide, U. (2017). *Overview of the Smart Cities Maturity Model*. U. Tide. https://static1.squarespace.com/static/5527ba84e4b09a3d0e89e14d/t/55aebffce4b0f8960472ef49/1437515772651/UT_Smart_Model_FINAL.pdf
- Tinker, S. (2022). The Dual Challenge: Energy and Environment. *Journal of Petroleum Technology*. <https://jpt.spe.org/the-dual-challenge-energy-and-environment>
- Trist, E., & Emery, F. (1960). Socio-technical systems theory. In: Oxford, UK: Pergamon.
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*(3), 403-421. <https://doi.org/https://doi.org/10.1037/0033-295X.110.3.403>
- Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440-463. <https://doi.org/https://doi.org/10.1037/a0018963>
- Tyréns. (2022). *Gothenburg Green city zone - Nuläge och scenarier för år 2030* [Consultancy report].
- Unknown. (2015). Smart Cities as envisioned by MoUD. *Arc India News | esri India*, *9*(1), 44. <https://www.esri.in/~media/esri-india/files/pdfs/news/arcindianews/Vol9/gis-for-smart-cities.pdf>
- Ylipulli, J., & Luusua, A. (2020). Smart cities with a Nordic twist? Public sector digitalization in Finnish data-rich cities. *Telematics and Informatics*, *55*, 101457. <https://doi.org/https://doi.org/10.1016/j.tele.2020.101457>

10 Appendices

10.1 Appendix A: Sample Interview Guide

Interview Guide

Green City Zone

- What is Volvo's role (if any) in the sub-projects
 - Wireless charging zone
 - Mobility Hubs
 - Green Events
- What is the actual plan to achieve the goals?
 - (e.g) Short term, mid term, long term goals
- What are the benefits of this project?
 - What is the progress of this project?

Problems/Pain Points

- Have you encountered any challenges in this project?
 - Do you foresee any potential challenges?
 - Is there a plan on how to deal with the challenges?

Steering Committee (Decision making process)

- Do you have some kind of organizational structure?
 - Do you foresee any challenges with this structure?
- What was the decision process like before the recent overhaul?
- What is the structure of the committee meetings and workgroups like?
- Funding
 - How is the Green City Zone and its sub-projects funded?
 - Who is responsible for maintenance and upkeep

Mobility as a Service

- What sort of transportation model would be preferred inside the GCZ?
 - What means of transportation is desired within the GCZ? (bikes, electric scooters, ride sharing, etc.?)
- Is the focus on pedestrian flows or traffic flows in the designated area?
- Are there any plans to establish private alternatives to public transportation in the GCZ?

Citizen

- Has there been any user research conducted to gauge the societal acceptance of the changes in the GCZ?
 - At what point in development of the subprojects is the user and their behavior considered?
 - At what stage in the initiative do you think the citizen/civil society element should be involved in the decision making/deliberation process?
- Can you tell us a bit how you see/study the role of the citizens in this project?
- Do you anticipate any challenges with regards to citizen participation/acceptance in GCZ?
- How do you think the initiative needs to address any potential behavioral changes of the citizens, the stakeholders, the businesses?

10.2 Appendix B: Sample Citizen's Survey Guide

Citizens' Perspective Survey Guide

Section 1: Awareness

1. Have you heard about the Gothenburg Green City Zone? *(yes, no, I don't know)*
2. Have you heard about the Green Events Initiative in the Korsvägen area? *(yes, no, I don't know)*
3. Have you heard about mobility hubs in the Gothenburg area? *(yes, no, I don't know)*

Section 2: Current mobility behaviors

1. Do you use public transportation within Gothenburg? *(yes, no, sometimes)*
2. Do you use public transportation to get into Gothenburg? *(yes, no, sometimes)*
3. Do you use carpooling within Gothenburg? *(yes, no, sometimes)*
4. Do you use carpooling to get into Gothenburg? *(yes, no, sometimes)*
5. Do you use rental bicycles/electric scooters to get around Gothenburg? *(yes, no, sometimes)*
6. What motivates you to use these options? *(open ended answer)*

Section 3: Willingness to change behavior

1. I am willing to change my mobility behaviors. *(Likert scale: 1 (not willing) - 5 (very willing))*

Here two scenario situations were presented:

- **Liseberg:** Liseberg has removed most of their parking facilities to reduce traffic congestion in the area. Instead, included with the purchase of your ticket to the park is a shuttle/bus ticket from a parking facility (mobility hub) outside the city, directly to the park.
 1. This would deter me from going to Liseberg. *(Likert scale: 1 (strongly disagree) - 5 (strongly agree))*
 2. I would utilize the included shuttle services. *(Likert scale: 1 (strongly disagree) - 5 (strongly agree))*
 3. Optional: Please explain your answer(s): *(open ended answer)*
- **Wireless vehicle charging:** The City of Gothenburg has installed fast-charging wireless charging pads in selected parking spots within the city center for public use. The cost associated with charging your vehicles this way is slightly more expensive

per kWh, as opposed to plug-in fast-charging. With the wireless charging option, you would simply drive over the plate and charge as much as needed/wanted.

1. I would use the fast-charging wireless option. (*Likert scale: 1 (strongly disagree) - 5 (strongly agree)*)
2. Optional: Please explain your answer(s): (*open ended answer*)
3. I would use fast-charging wireless option because it's more convenient. (*Likert scale: 1 (strongly disagree) - 5 (strongly agree)*)
4. What would most likely motivate your change in mobility behavior?
(*Education on dangers of my current behavior, leading to voluntary change. Regulation stipulating behavior must change, leading to forced change.*)
5. Please explain your answer(s): (*open ended answer*)
6. Optional: What do you think the Green City Zone initiative should focus on?
(*open ended answer*)

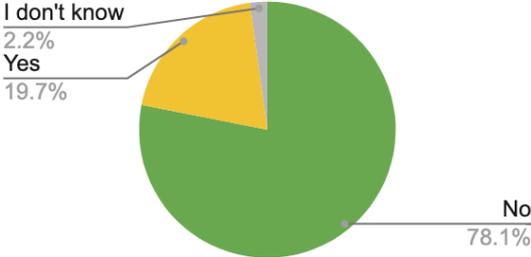
Section 4: Practical questions

1. How did you hear about/find this survey?
2. Age range
3. Gender

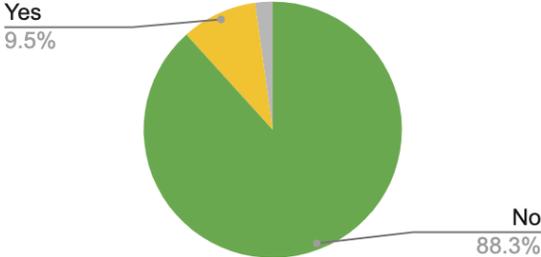
10.3 Appendix C: Survey Results Diagrams

Section 1: Awareness

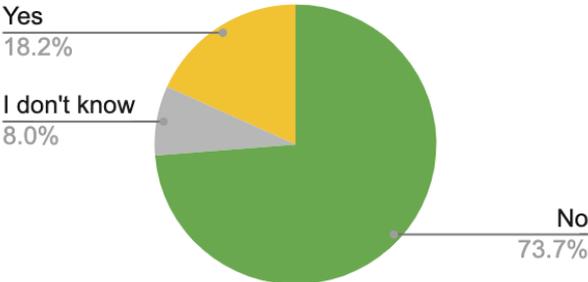
Have you heard about the Gothenburg Green City Zone Initiative?



Have you heard about the Green Events Initiative in the Korsvägen area?

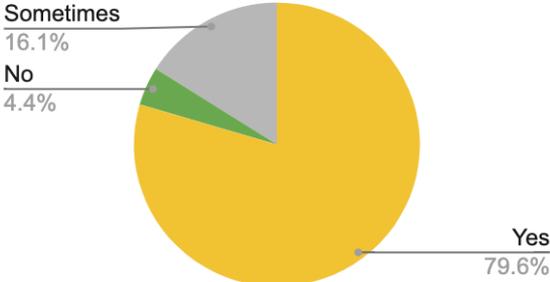


Have you heard about mobility hubs in the Gothenburg area?

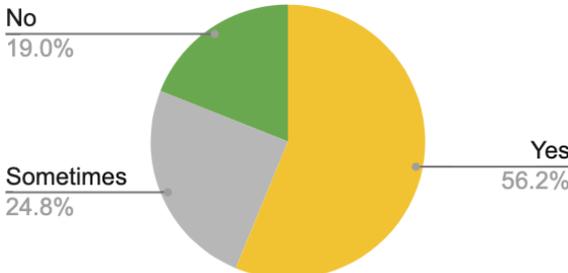


Section 2: Current Mobility Behaviors

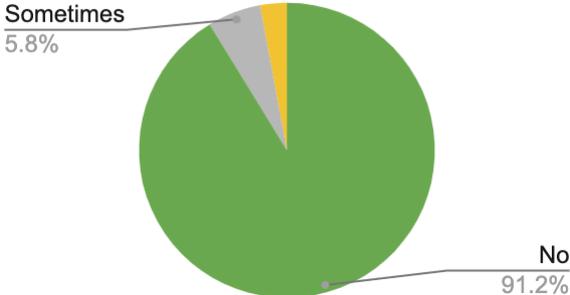
Do you use public transportation within Gothenburg?



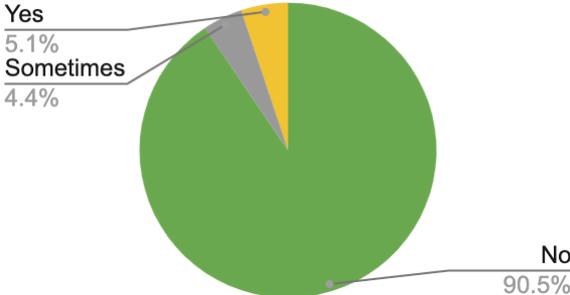
Do you use public transportation to get into Gothenburg?

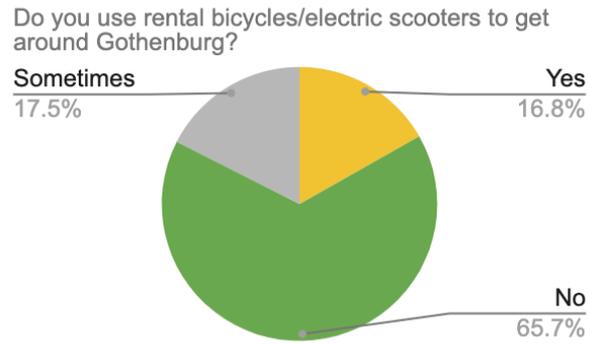


Do you use carpooling to get into Gothenburg?



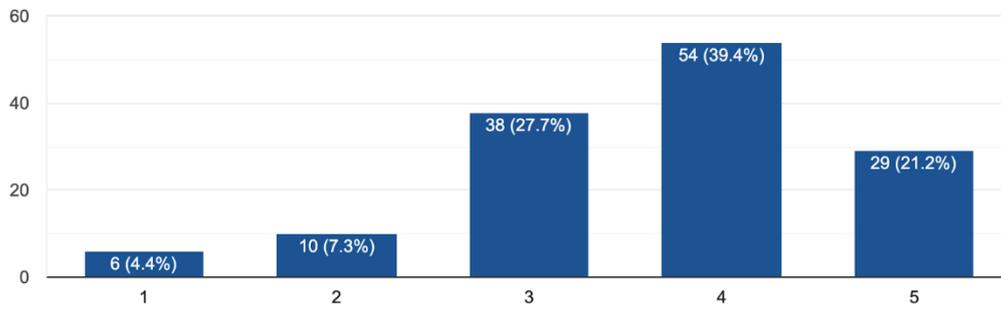
Do you use carpooling within Gothenburg?





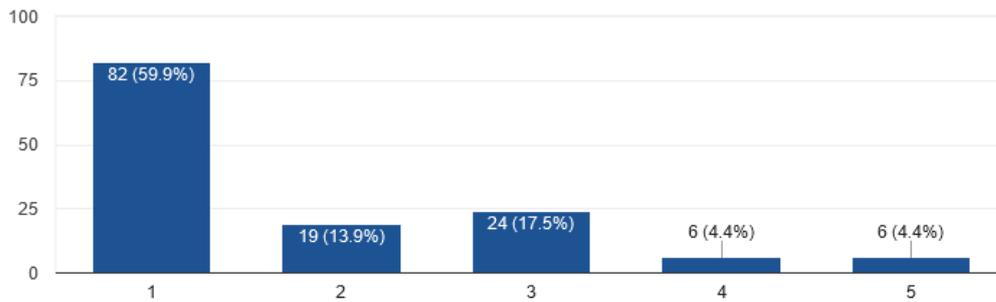
Section 3: Willingness to change behavior

I am willing to change my mobility behaviors:
137 responses



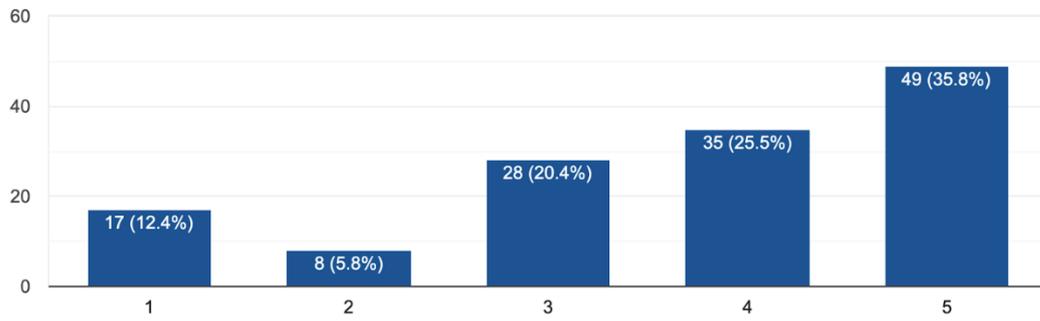
Liseberg Hypothetical Scenario

This would deter me from going to Liseberg:
137 responses



I would utilize the included shuttle services.

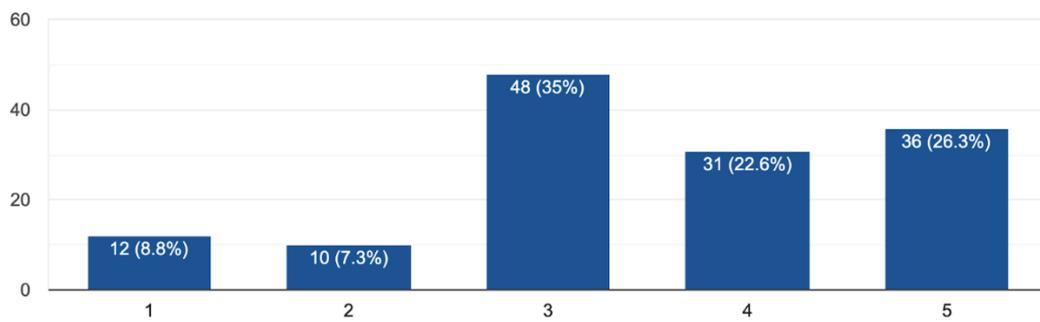
137 responses



Wireless Charging Hypothetical Scenario

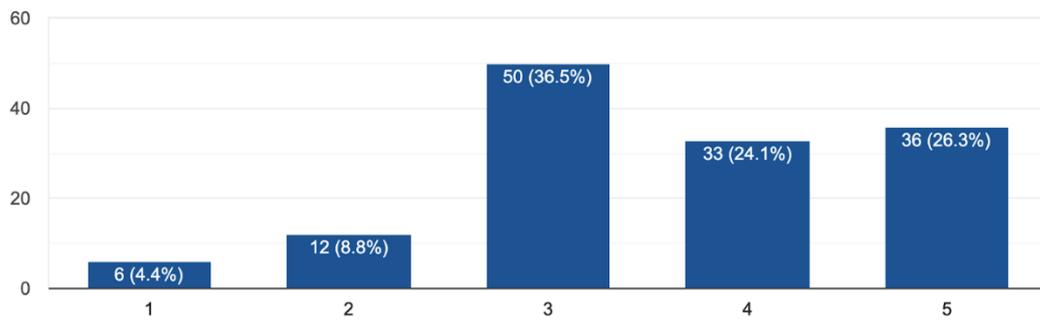
I would use the fast-charging wireless option.

137 responses



I would use fast-charging wireless option because it's more convenient.

137 responses



Behavior Change Motivator

What would most likely motivate your change in mobility behavior?

