Sustainability City Governance and matter of Epistemological Shifts

The Case of Stockholm's Hammarby Sjöstad district

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Acknowledgements

This thesis marks an extensive eight-year research journey, delving into the intricate realm of sustainability governance and its multifaceted nature in transition processes.

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For Lorea and Katixa;

Eskerrik asko Aita eta Ama;

Abstract

This study introduces the idea of understanding city management and sustainability development as an epistemological and practical form of governance. The thesis introduces integral aspects to the urgent need to rethink how sustainability governance is perceived in relation to Gaia (natural environment) and how it can open the possibility to introduce a discussion of critical epistemological shifts that have been taking shape in engaging in sustainability issues. The research draws on rich empirical material to carry out a well-grounded and conceptually consistent analysis of the emerging aspects of sustainability governance, taking on concepts and ideas developed in "An Inquiry into the Modes of Existence" (AIME) project. The aim is to observe and explore sustainability city governance and its critical issues in practice to track the potential epistemological shifts that are in play throughout the case study in Hammarby Sjöstad district in Stockholm (Sweden). The thesis presents a qualitative case study with in-depth semi-structured interviews and extensive textual and visual content material. The emphasis is placed on observing the selected case through the interpretation of concepts from the AIME project (Latour, 2013a) to adopt a conceptual framework that allows to map these “MoE” concepts and evaluate the epistemological shifts within the presented case study.

The thesis has enabled a valuable contribution to knowledge and to the AIME project (Latour, 2013a), developing and theorising with the concepts, aspects, and ideas that emerged from the Modes of Existence approach. The research outcome gives detailed insights into possible forms of transformative sustainability and the drawing on relevant aspects of Latour's engagement with Gaia, the emerging possibility of an epistemological critique of the moderns and adopting the Modes of Existence as a conceptual approach to the design and implementation of research development in the social sciences field to interpret and analyse empirical findings.

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Preface

The original objective of the 2012 study was to research "Degrowth Economy" and "Degrowth Society" to transition into sustainability and understand how to overcome the current economic, social, and environmental crisis. An initial model called "Paradigm Shift and Transition Theory" and a literature review on sustainability governance, development, and transition were drafted. The aim was to explore and develop a theoretical model to argue the possibility of transitioning into an ecologically minded society. The critical transformational factor was adopting a new emerging episteme where sustainability became integral to our society. "Chapter 1. Introduction" and the literature review in Chapters 2 and 3 include the review of this argument to understand sustainability governance and its complexity.

Bruno Latour's AIME project (2013a) was chosen as the main inspiration to understand how the emerging episteme was allowing the transition into sustainability. At an early stage in the research, I realised that understanding, exploring and developing the study with the Modes of Existence approach (Latour, 2013a) required a complex methodology with an interpretive and subjective perspective. Latour's (2013a) work in AIME became the main character of the research study. Theorising with the Modes of Existence approach has enabled the thesis to understand how Latour's thinking can help us to understand and explore sustainability and how sustainability can be explained by looking at the transition process from a management and governance context. The initial research included analysing two case studies with eco-urban development examples: Hammarby Sjöstad eco-development in Sweden and Yantai Hammarby eco-development in China. The purpose of the comparative analysis was to compare different factors influencing the transition into sustainability in different countries using the Modes of Existence approach to understand the possibilities and difficulties of the process. The fieldwork and the interviews in Sweden concluded in October 2019, and the plan was to travel to China to visit Yantai Hammarby in March 2020. However, like many affected PhD researchers, I was forced first to postpone the trip to China due to the COVID-19 pandemic and, later, due to the length of the Chinese government's official border closure, to abandon the data collection trip in China altogether. Instead, I decided to focus on the data collected in Sweden and develop one case study analysis. Understanding the Modes of Existence approach and structuring the research has been more complex and time-consuming than expected. The thesis has developed novel research in understanding and observing sustainability governance and the possible epistemological shifts. The complexity of Latour's thinking in the AIME project allows an in-depth understanding of sustainability from the possibility of the epistemological shift. It allows for the re-discovery of the process's mistakes, assumptions, and errors. The presented thesis aims to incorporate Latourian thinking, ideas, concepts, and aspects to understand the complexity of sustainability and how to look through the different patterns and contribute to the AIME project.

Declaration

I, the author, confirm that the Thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not been previously presented for an award at this, or any other, university.

Content from my own written work has been used throughout the Thesis which refer to the "Confirmation Review" document and academic papers presented for the "White Rose Conference" (2015) and the "28th International Sustainable Development Research Society Conference" (2022).

CHAPTER 1 Introduction

1.1 Initial Overview on the case of Hammarby Sjöstad district

Hammarby Sjöstad (City on Hammarby Lake) is a district built on an industrial area on the south side of Stockholm (China Development Bank Capital, 2015). The City of Stockholm was involved in the planning, design and development process of the Hammarby Sjöstad district from 1996 to 2017, and it was the initiator and coordinator of the project (China Development Bank, 2015). Although since the 1980s, redevelopment plans have been taken into consideration in the Hammarby area, the redevelopment project of Hammarby Sjöstad was proposed in the 1990s. The Stockholm City Planning Administration identified several areas that needed to be developed for the growing population and demand across the city. Most of these identified areas were ex-industrial sites; the City of Stockholm was planning to develop them as extensions of the city rather than suburbs. One of these sites was Hammarby Sjöstad, a run-down industrial area that acted as a shipyard with a small-scale industry and workshops. The area's industrial processes and hazardous products left the soil and water contaminated by hazardous chemicals and materials (China Development Bank, 2015).

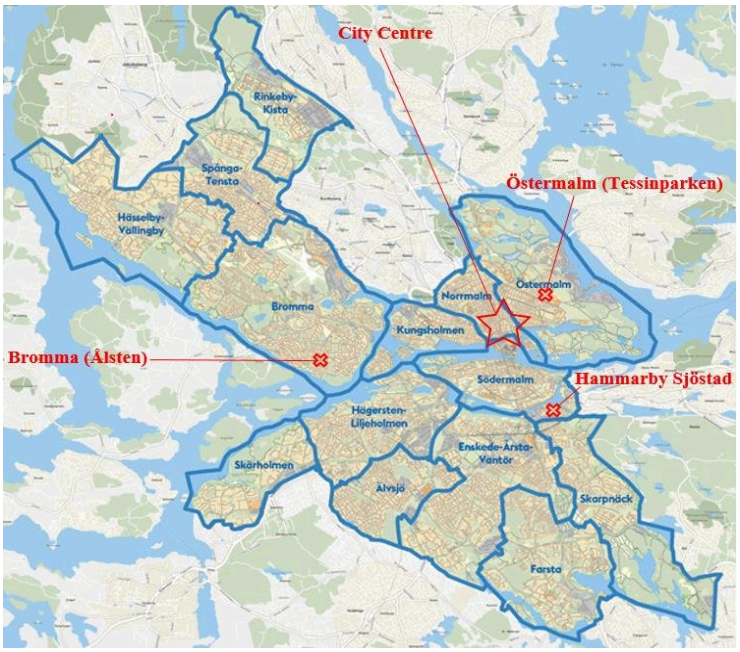


Figure 1. The City of Stockholm's map-location of Hammarby Sjöstad (Suen, 2017)

In the last 20 years, Hammarby Sjöstad has been transformed from a run-down industrial area into an eco-district with an environmentally integrated design for water, air, energy, waste, transportation, and sustainable living. The district has become a high-profile example (ElectriCity Stockholm, 2019) and a demo site for sustainable city development in countries such as China, the UK, Norway and Dubai (White Peak, 2019); contributing to Stockholm being awarded the first “Green Capital” in Europe in 2010 (ElectriCity, 2019).

1.1.1 Motivations for taking Hammarby Sjöstad as a Case Study on Sustainability City Governance

The main focus of the Hammarby Sjöstad project has been to create a sustainable urban district with a new sustainability concept: the “Hammarby Model”. Initially, it was to be included as part of the Olympic Village for the Swedish application to host the 2004 Olympic Games in Stockholm. The Sydney 2000 Olympics inspired the sustainability concept of the “Hammarby Model”, the Brundtland Report, and Agenda 21 to meet the International Olympic Committee's environmental focus in the applications for the Olympic Games (China Development Bank Capital, 2015). An environmental programme called the "Hammarby Model" was developed in 1996 to incorporate infrastructure systems such as waste management, water treatment, heating and electricity (Vaxer Stockholm, 2024). However, as the Swedish application for the Olympic Games was unsuccessful, the Hammarby Sjöstad area was designed as a comprehensive sustainability city infrastructure project by the City of Stockholm. The new sustainability concept, the "Hammarby Model", was integrated into the project as an environmental programme to deliver an eco-district development project as part of Stockholm City's sustainability transformation process (Suen, 2017). Since the 1990s, Stockholm City has been committed to building its reputation by integrating the sustainable development concept into its institutions and governance (City of Stockholm, 2017; cited by Suen). Stockholm City has developed an integrated administrative system that guarantees that environmental aspects are considered in budgets, operational planning, reporting, and monitoring (City of Stockholm, 2017; cited by Suen, 2017). Environmental policies have allowed to cut carbon dioxide emissions by %25 per inhabitant and set the objective of being fossil fuel-free by 2050 (City of Stockholm, 2017; cited by Suen, 2017). The World Bank in 2010 described Stockholm as a vanguard of green urban policymaking on an international level and sustainable urbanism (Rutherford, 2013; cited by China Development Bank Capital, 2015) based on climate impact reduction, local transport development, green area development and air quality (City of Stockholm, 2015; cited by Suen, 2017). The timeline below shows the steps that Stockholm City has taken in sustainable urban development from the 1960s until the present:

- **In 1968**, the General Planning Committee presented a large housing planning program for the Södermalm area, including the north side of Hammarby (Stockholm Stad, 2024).
- **From 1981 to 1990,** the plan's implementation was delayed until 1981, and in 1990, a new phase of planning began to expand the Hammarby North area (Stockholm Stad, 2024).
- **In 1991,** Stockholm City presented a proposal for an in-depth comprehensive plan for the whole Hammarby Sjöstad area, which would involve urban expansion over a 250-hectare area

containing approximately 8,500 apartments and approximately 350,000 square metres for new businesses (Stockholm Stad, 2024).

- **In 1996,** Stockholm City decided to apply for the Olympic Games in 2004 and to place the Olympic Village in Hammarby Sjöstad. The district would be built as one of the world's most environmentally adapted urban development projects; therefore, a unique environmental program (Hammarby Model) was created with the goal of "twice as good" compared to the construction in 1990 (Stockholm Stad, 2024).

- **In 2010,** The European Commission named Stockholm "First European Green Capital" to recognise local initiatives to improve the cities' environmental, economic, and social well-being (European Commission, 2017; cited by Suen, 2017).

- **In 2014**, the Municipal Assembly of Stockholm approved the "Roadmap for a fossil fuel-free Stockholm 2050" (Suen, 2017).

- **In 2016,** "Strategy for a fossil-fuel-free Stockholm by 2040" was published by the Executive Office of the City of Stockholm. "Stockholm can and must be a leader in efforts to reduce human impact on the global climate by making a successful transition from a society built on fossil fuels to one based on renewables" (City of Stockholm, 2016; cited by Suen, 2017, p. 12).

- **In 2016,** the City of Stockholm put forward the vision for Stockholm to become the First Smart City in the world by 2040 with four main objectives: a cohesive society, a climate-smart city, and a financially and democratically sustainable city (Business Sweden, 2016; cited by Suen, 2017).

1.1.2 Sustainability Governing at Hammarby Sjöstad district: The Project Team

The sustainability governing at Hammarby Sjöstad district can be differentiated into two major stages at the project level: Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0. Hammarby Sjöstad 1.0 has provided the district with a new eco-development plan with urban design, technology, and infrastructure based on environmental solutions with a sustainability vision (ElectriCity Stockholm, 2019). The key success factors of the project have been a strong political commitment by the authorities in Stockholm with the aim of "twice as good as anything built before", with a pioneering planning and design development using a new concept for city development with the “Eco-Governance” and horizontal planning with all the parties involved working together and collaborating (ElectriCity Stockholm, 2019). The Hammarby Sjöstad 1.0 project was characterised by the cooperation, collaboration and transparency between all the actors involved in the process (Sweco,

2012). Throughout the process of design, planning, development and implementation, cooperation between all the actors was vital: "People were engaged in the project from the start until the end and had a better understanding of why things were done and how affected their interest" (Sweco, 2012, p. 7). The "twice as good" environmental goal pushed the project team to use innovative methods, tools and solutions to meet the objectives (Svane, 2002; cited by China Development Bank Capital, 2015).

The second stage of the Hammarby Sjöstad transformation has been driven by the Hammarby Sjöstad 2.0 project, which has been created and managed by the Hammarby Community and residents involvement. In 2015, a group of residents in Hammarby Sjöstad got together to create a new social initiative to discuss the district's environmental, social and economic issues. The residents believed that the Hammarby Sjöstad 1.0 project was ending, and there was a need to keep developing the sustainability strategies and the environmental goals set for the Hammarby Sjöstad district (ElectriCity Stockholm, 2019). The Hammarby Sjöstad 2.0 initiative was created to become the most climate-friendly district in Sweden and reach the Paris Agreement Goals by 2030, further transforming Hammarby Sjöstad (Hammarby Sjöstad 2.0, 2022). Their mission has been to incorporate and implement the Paris Climate Deal 2050 strategic goals in energy, building, mobility, and circular economy (ElectriCITY Stockholm, 2019). The Hammarby 2.0 project initiative has involved residents, businesses, and research organisations in implementing smart and sustainable solutions and supporting residents' involvement in the Hammarby Sjöstad area (ElectriCITY Stockholm, 2019). As part of the 2.0 project, ElectriCity Stockholm organisation has been created to follow these initiatives about the Agenda 2030 to define which measures and solutions are required for urban areas in energy efficiency, renewable energy sources and sustainable transport (Hammarby Sjöstad 2.0, 2022).

Both project teams at the 1.0 and 2.0 stages have different characteristics and factors in sustainability governing the Hammarby Sjöstad district. Diagram 1 illustrates and incorporates the main differences at each transformation stage:

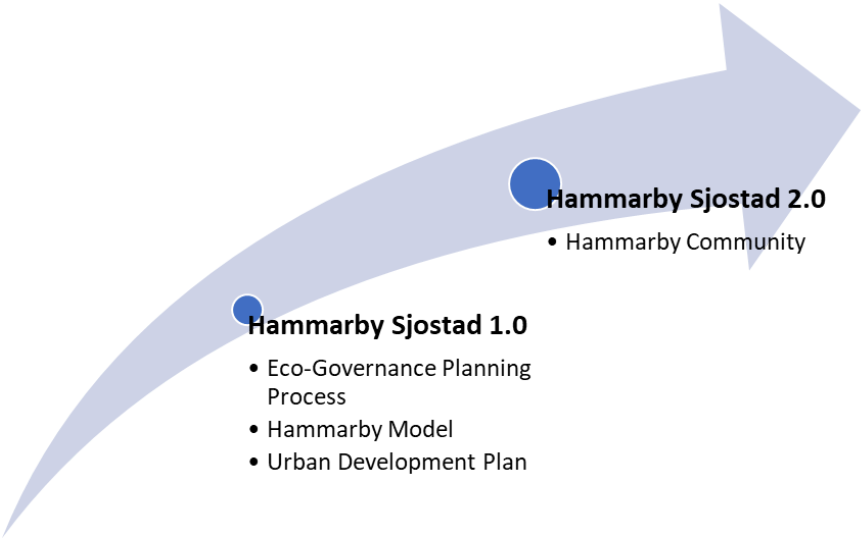


Diagram 1. Hammarby Sjöstad Transformation Stages.

1.2 Problematizing Sustainability City Governance

The case of Stockholm's Hammarby Sjöstad district is an example of metropolitan areas around the world that have engaged in different initiatives and projects to renew and transform urban infrastructure and services (De Jong *et al.*, 2015). The city governance has been transformed to incorporate sustainability aspects in a context of increased global environmental issues with climate change. Cities are becoming central to understanding the current environmental concerns represented by climate change; energy systems shift towards sustainable and renewable energy, biodiversity loss and the safekeeping of ecosystems (Mörtberg *et al.*, 2013). Half of the population lives in urban areas, and these urbanised areas are causing a major significant direct and indirect impact on sustainability (Grimm *et al.*, 2008).

The Agenda 2030 for sustainable development, adopted by all United Nations Member States in 2015, has provided a shared vision for people and the planet with 17 Sustainable Development Goals (SDGs), which involve actions to be taken by all countries globally (UN, 2022). The "Sustainable Development Goal 11: Sustainable Cities and Communities" explains that the world will become more urbanised as 60% of the world population will live in cities by 2030, accounting for 70% of global carbon emissions and 60% of resource use (UN, 2022).

However, there is an increasing academic argument with the belief that the Brundtland Report's sustainable development discourse and the International treaties such as the Kyoto Protocol, Agenda 21 and Paris Agreement have been unable to produce the policies and radical change needed at individual and collective scales (Capellán-Pérez *et al.*, 2015). Academics and professionals such as Kallis, Martinez-Alier, Norgaard (2009) and Jackson (2009) argue that these environmental crises are non-cyclical and will get worse as time progresses, leading to deep ecological and social problems,

emphasising that the current environmental crises are a symptom of a deep-lying system crisis, which has its origins in the unsustainable consumption and production patterns from the industrial revolution. The future of sustainable city governance is changing, and organisations are implementing new initiatives to reconnect societies to ecological and social concerns. However, it seems that is not enough. New environmental regulations, international agreements and climate change awareness are not changing the current scenario fast enough. There is a crucial factor missing. Do we need to reconsider how we understand sustainability governance?

1.2.1 Sustainability Wording: "Fashionable" concept?

The "Sustainability" concepts have been around for several decades; different concepts have been debated and argued in academia, business, economy, and many other areas. It is characterised by its longevity and popularity within public organisations, particularly as public discourse organisations such as the United Nations (UN) with the Sustainable Goals (SDGs) and the European Union (EU) promoting policies like the Green Capital Award (Adolfsson, Lindblad and Peacock, 2021). Also, the "sustainability" concept has been integrated within the city governance and urban challenges as part of the solution for a sustainable future with international initiatives such as the European Sustainable Cities Platform and national policy agendas of many countries worldwide (Adolfsson, Lindblad and Peacock, 2021).

The concept of "Sustainable development" started being used in the 1960s when the ecological pollution and resource scarcity problems became more evident to the public. In 1968, the Club of Rome was formed with individuals from different academic and professional fields. In 1972, "The Limits to Growth " was published, challenging the traditional economics ideology of unlimited growth and proposing the "zero growth" concept as a new ecological perspective to the growing ecological planetary problems (Meadows *et al.*, 1972). Latouche (2010) argues that "The Limits to Growth" was "an awakening to the material limits of the world environment and the tragic consequences of an unreasoned exploitation of the earth resources is essential to the emergence of new modes of thought which will lead to a fundamental revision, both of the behaviour of men and, consequently, the structure of today's society as a whole" (p. 520). "The Limits to Growth" publication was very criticised by traditional economists. In 1974, a second report by Mesarovic and Pestel, "Mankind at the turning point: the second report to the Club of Rome" was published. The report introduced the concept of "Sustainability" as an intrinsic development, considering humanity as a living organism as part of a complex system (Bermejo *et al.*, 2010). Academics argue that the term "Sustainability" or "Sustainable Development" has been misused and often used as a "catch-all phrase" (p. 294) to describe a phenomenon that can be replicated in the long term in areas such as finance, economic policy, or competitive advantage (Borland *et al.*, 2016).

a) The Anthropocentric Views on "Sustainable Development"

The anthropocentric views on "Sustainable Development" and "Human Development" concepts were introduced by the World Commission on Environment and Development with "Our Common Future" (Brundtland Report, 1987), the United Nations Development Programme (1997) and Amartya Sen's extensive work in human development through the capability approach (CA) framework to evaluate justice and well-being in developing countries (Mabsout, 2015).

The "Sustainable Development" concept has been defined as the "development that meets the needs of present (species) without compromising the ability of future generations to meet their own needs" (Borland *et al*., 2016, p. 175). The Brundtland report gives a new long-term perspective on sustainable development with the integration of economic, environmental and social aspects (Mickwitz *et al.*, 2011); however, academics argue that the "Sustainable Development" concept has been taken out of context and stretched out to support primarily human development (Borland *et al.*, 2016).

Policy development has taken a primary role in the last 30 years, such as Agenda 21 and Rio+20 agendas from the UN Conference on Environment and Development in 1992 and 2012, and the Kyoto Protocol international treaty in 1997. Also, the Paris Agreement international treaty on climate change in action plans and policy development has raised awareness amongst the public, organisations and government institutions. The Agenda 21 action plan involved 106 UN member states and developed national sustainable development strategies such as the Finnish Sustainable Consumption and Production Programme (Mickwitz *et al.*, 2011). However, as the planning and implementation approach has limitations for several reasons, the Finnish policy programme to promote sustainable consumption and production has yet to result in many specific outputs or outcomes in decreasing material or energy use (Mickwitz *et al.*, 2011). Supporting the argument that "the same is probably true of many of the world's 100-plus sustainable development strategies" (Mickwitz *et al.*, 2011, p. 1783).

These limitations were explained by Berg and Hukkinen in 2011 when they proposed a transition perspective through the "Degrowth Economy Cycle'". The "Degrowth Economy Cycle'" presents the argument that the present society is structured within the "Vulnerable growth economy" (current Neo-liberal and industrialised society), "Eco-efficient growth economy" (Environmental awareness and technological innovation) and "Growth critique" (ecological crisis and environmental debate). These three topics are interrelated and affect each other, as presented in Diagram 2 bellow:

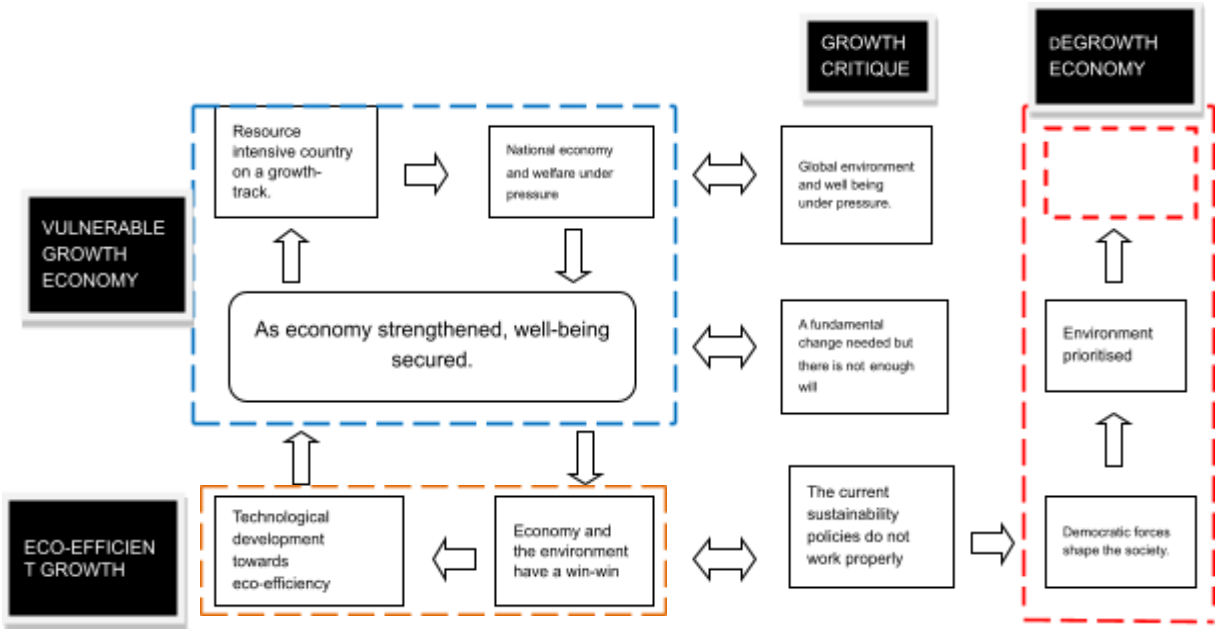


Diagram 2. Interpretation of Degrowth Economy Cycle (Berg and Hukkinen, 2011)

Vulnerable Growth Economy

The "Vulnerable Growth Economy" has strong relations with the traditional economist discourse of resource-intensive countries and continuous growth theory to strengthen and secure the economy. The current economy is based on growth economic activities and investment development, which had led to an industrialised path reinforced by "the dependency of the capitalist expansion on mineral resources" (Van Griethuysen, 2010, p. 592). This affects the natural environment through over-exploitation, global biodiversity crisis, depletion of natural resources, lowering ecosystem resilience, and disruption of the biosphere. Traditional economists understand sustainable development and how to overcome sustainability complexity by introducing sustainable and ethical business activities, focusing on implementing environmental regulations and sustainable measures within the current globalised economic model. As Van Griethuysen (2010) argues, "In the capitalist rationale, considerations of an ecological and social nature are relegated to the background" (p. 592).

Eco-Efficient Growth

"Eco-Efficient Growth" defends that technological development towards eco-efficiency will lead to a win-win relationship between the economy and the environment. Environmental economists defend that a transition to an eco-efficient society is possible. There is an optimistic view that technological innovation and resource substitution will keep spinning the economic wheel and generate more wealth to overcome biophysical limits (Daly, 1974). The environmental Kuznets curve's theory, "growth first and clean up later" defended by Beckerman in 1992, argues that the first stage of industrialisation, with pollution growing rapidly, will shift as the country gets wealthier, and as eco-efficiency

technology and sustainable development policies and programmes restore the damaged environmental conditions (Liu, 2012, p. 86). Several academics (Hueting, 1996; Dasgupta *et al.*, 2006; Liu, 2012) have challenged the environmental Kuznets curve theory, referring to it as a myth that drifts further away from environmental sustainability. Jackson (2009) also argues that the "Green stimulus" (p. 104) to accelerate the economic recovery with international agreements, consensus, and transition to a low-carbon economy fails to provide a sustainable future with technological innovation. Latour (1998) mentions that the "globalisation of environmentalism" (p. 223) has not been able to replace political action because it is unrealistic and transcends the horizons of ordinary citizens. He also argues that ecology and the environment cannot be used to replace some of the gaps to overcome the current economic and environmental crises.

Growth Critique

"The Growth Critique" is defended mainly by Ecological Economists, Degrowth Economists and Steady State Economists such as Daly (1974, 1980), Georgescu-Roegen (1979), Norgaard (1994), Odum and Odum (2001), Victor (2008), Jackson (2009), Latouche (2010), Martinez-Alier (2009), Kerschner (2010) and Kallis (2011). Over the years, these academics and professionals have criticised traditional economics for having the capacity to implement ecology and environment within the system to safeguard human beings' well-being within the Earth's limits. Kallis, Kerschner and Martinez-Alier (2012) argue that "degrowth is the path of transition to a lower steady-state" (p. 173), and the transition could be achieved by sustainable degrowth with equitable downscaling of production and consumption to increase human well-being and ecological conditions in the short and long term (Schneider, Kallis and Martinez-Alier, 2010). Kallis, Kerschner and Martinez-Alier (2012) raise the following question: "But should the steady-state be lower than today, or can we do it with zero growth at current levels?" (p. 173). The authors of the degrowth movement do not defend sustainable degrowth forever; instead, they propose a transition path to change the current prosperity and growth paradigm. However, advocates and critics of sustainable degrowth question whether prosperous degrowth is feasible.

Degrowth Economy

"The Degrowth Economy" implies the adverse effects of the degrowth economy in an economic paradigm dominated by capital growth and economic prosperity. Academics argue that economic degrowth can be unstable, leading to unemployment, expenditure, reduction of social welfare, lower GDP and a possible fiscal crisis of the state (Jackson, 2009; Kallis, Kerschner and Martinez-Alier, 2012). A transition to a balanced path is necessary with production downscaling, reduction in private consumption and ongoing increase in leisure and well-being (Bilancini and D'Alessandro, 2012). Berg and Hukkinen (2011) opened a window towards a possible "Degrowth Economy" to tackle economic and social problems and prioritise the environment and well-being. However, they did not clarify how

the transition process and change will happen. This void is represented with an empty box to put forward the unanswered question about what is missing to make sustainability a successful move from an integrated capitalist society towards an ecologically minded society.

1.2.2 Alternative Views on "Sustainability" Thinking

While "Sustainable Development" focuses primarily on human development (anthropocentric), "Sustainability" is defined from an ecological sustainability perspective: "the capacity for continuance into the long-term future" living within the constraints and limits of the biophysical world (Porritt, 2007, p. 33). "Sustainability" considers equally all species, including the balance of Nature and human development (Borland *et al.*, 2016); social and economic levels are secondary objectives preconditioned by ecological sustainability within the Earth's systems and limits (Porrit, 2007)

The "Sustainability" concept introduces the complexity of different realities involved in ruling our actions and decisions in the economy, society and environment. The "red empty box" discussed by Berg and Hukkinen (2011, p. 157) in the "Degrowth Economy" stage represents the lack of knowledge on how to proceed to manage the change needed for sustainable living. What is the missing link to succeed in the quest? The "red empty box" has provoked and raised a lot of discrepancies in the academic world by traditional economists, ecological economists and the degrowth movement to develop the complete picture of sustainability within the ecological limits. Many academics, such as Kallis, Martinez-Alier and Norgaard (2009), believe that the current economic growth paradigm offers an episteme opportunity to develop an alternative view to understand what sustainability complexity implies in our current socio-economic and environmental context.

The main question at this point is that maybe we need to understand sustainability from alternative views to challenge the current perspective to pursue a more in-depth discussion away from different concepts and use or wording (Czarniawska, 2019) that can translate into action (Czarniawska, 2009) for implementing sustainability. Is there an opportunity for a "real" change or a need for an epistemological shift? Bruno Latour (1998, 2013a) introduces the possibility of understanding Nature by embracing a deeper understanding and thinking about sustainability away from the modern episteme and the modernisation of the world (Latour, 2013a, 2017).

Birkin and Polesie (2012, 2013) and Bruno Latour (2013a) defend the idea of an episteme opportunity as essential to further understanding our current social, economic and environmental situation. They argue that the emerging episteme can answer the missing link to understanding sustainability from a complex perspective. Latour (1998, 2013a) defends that Nature needs to be understood as an alternative to modernisation, where it integrates itself into everyday life, abandoning the concept of

Nature as an external entity that has nothing to do with humanity. He describes the Anthropocene views on sustainability as a new climate regime. He introduces the concept of "Gaia" proposed by James Lovelock to address Earth's natural world's fragile and complex system (Latour, 2017). Bruno Latour, with his work in "An Inquiry into the Modes of Existence" (2013a), introduces the possibility of transitioning into sustainability, taking the emerging episteme as a key transformative element to support "real" change to embrace Gaia through the understanding of the connections between the human activities and the natural world (Latour, 2017). Latour (2013a) defines transformation with the concept of metamorphosis, a mutation (p. 426), and refers to the "real" change as reaching the "optimum" with "optimal distribution of end and means" (p. 455). The "optimal" combination of the plurality of the existents will need to be assembled to be optimised by reconsidering their compatibility (Latour, 2013a, p. 458). Latour's work in "An Inquiry into the Modes of Existence" (2013a) introduces the argument of transformation taking the emerging episteme as a key transformative element to the "optimum". Latour (1998, 2013a) defends that ecology needs to be understood as an alternative to modernisation, where it integrates itself into everyday life, abandoning the concept of Nature as an external entity that has nothing to do with humanity. He argues that ecology and environment are interconnected with human societies, representing a subsystem within Nature where process thinking and openness are crucial to rethinking our existence and the dichotomy between the economy and nature as explained below:

> "They are travellers in transit, displaced masses currently wandering between the dystopia of The Economy and the utopia of ecology, in need of an urbanist who can design a shelter for them, show them drawings of a temporary living space" (Latour, 2013a, p. 23).

a) Introduction to Latour's AIME Project

"An Inquiry into the Modes of Existence" (Latour, 2013a) opens a new perspective in understanding sustainability governance and the epistemological transition process between the economy and nature. Latour argues that 15 main modes of being are interconnected and continually interact with each other within a complex network. He asserts that the modes of being interact and evolve in different ways in two natures: First Nature (Ecology) and Second Nature (Economy). Latour (2013a) argues that second Nature has become predominant in our society, and the AIME (An Inquiry into the Modes of Existence) project introduces the possibility of understanding the factors that allow transitioning into First Nature (Ecology).

Each mode represents a different ontology connected and interrelated with different roles and ways of working (Latour, 2013a; Conway, 2016; Tummons, 2020). Latour (2013a) also claims that the 15 modes are not definitive; they are amendable, open to addition and subject to experience rather than a

priori rationalisation. They must be encountered on their terms and understood individually as equals (Latour, 2013a). Furthermore, Latour (2013a) suggests that three main modes have the transformative factor: Attachments [ATT], Morality [MOR] and Organizations [ORG]. Latour (2013a) argues that if AIME (An Inquiry into the Modes of Existence) can identify and understand these three modes, there is a possibility of being liberated from Second Nature (Economy) and transitioning to First Nature (Ecology). Furthermore, Latour (2013a) encourages conducting further research based on "An Inquiry into the Modes of Existence" work to reveal the contradictions and issues alienating sustainability governance in a given transition process.

"An Inquiry into the Modes of Existence" (Latour, 2013a) allows research with the Modes of Existence approach to observe and identify the different realities within real-life case studies. This approach has the potential to explore and understand sustainability governance, and it gives the opportunity to observe, describe, and understand the complexity within transition processes. Therefore, AIME (An Inquiry into the Modes of Existence) can contribute to understanding the associations within sustainability governance.

While Latour states the theoretical foundations of AIME (An Inquiry into the Modes of Existence), he opens the project for further development to support and expand the knowledge in social sciences research. The Modes of Existence approach requires further research practice, as the investigator needs to consider how the modes have been linguistically defined, how they act in reality, how they can be spotted on the field and how they can be translated into practice (Amat, 2016). The modes of existence approach needs to be understood and applied to specific situations to describe new ways of talking about the plurality of the world, ways of linking and networking, and coexisting (Amat, 2016). The different modes are interested in observing a phenomenon whose knowledge and answers are to be built, and they are hybrid instead of relying on the human/non-human distinction argued by the "Actor-Network Theory" (Amat, 2016). Latour's work in AIME (2013a) introduces each mode of existence chapter after chapter without being ready to use; the modes must be articulated to empirical situations to be understood. Therefore, it is necessary to confront them with a real-life situation to evaluate its potential benefits in developing a further understanding of our current social, economic and environmental situation from an opportunity for epistemological shift into "real" change.

Latour has been aware of the limitations of the AIME project and the Modes of Existence approach within academic research. Therefore, a research community has been created by Latour through a virtual platform (http://modesofexistence.org/) to appeal to the public to take part in the Modes of Existence research. This virtual platform aims to add to the AIME project as the Modes of Existence approach is subject to interpretation and continuous research. Therefore, Bruno Latour has invited the broader research community to feed into a database. The aim is to stimulate a new horizon for

researchers and investigators to understand and translate the actors through an interpretative scope (Amat, 2016).

Latour's work is presented as guidelines rather than a concrete theoretical framework that needs to be explored to see if we, as researchers, can observe such modes of existence in our research areas and how it can contribute to interpreting their meaning and their associations. The methodological procedure to explore and conduct research with AIME still remains obscure and ambiguous (Berliner, Legrain and van de Port, 2013) open to interpretation, depending on the researcher's aims, objectives, and the topic to be investigated. Therefore, the Modes of Existence approach has the possibility to understand sustainability governance applied to a real-life scenario to understand current and future environmental and social challenges further (Amat, 2016). The presented thesis will aim to contribute to the AIME project with the observation and understanding of sustainability governance in the Hammarby Sjöstad case.

1.2.3 Research Gap

The Hammarby Sjöstad case presents an alternative perspective on sustainability governing in an urban context with the "Hammarby Model" and "Eco-Governance" concepts. The project team with the 1.0 project has accomplished transforming an industrial area in Stockholm into an example of sustainable city development (The Economist, 2012, cited by ElectriCity Stockholm, 2019) with environmentally integrated design and solutions in governing water, waste, energy, transport and sustainable living. In addition, the Hammarby 2.0 project team has supported the initial 1.0 stage and evolved into a transformational governance involving the Hammarby community in further sustainability thinking and living. However, does the presented case contribute to a change? Moreover, if it does, what type of change is it? Is it a matter of changing wording or thinking (Czarniawska, 2019)? Or does it instead show a more profound change of thinking, which gives the possibility of an epistemological shift towards supporting "real change" (Latour, 2013a)?

However, when the implementation of sustainability is observed in city governance, it inevitably meets local ways of working (Adolfsson, Lindblad and Peacock, 2021) and is rejected or fit the local context (Czarniawska and Joerges, 1996; Czarniawska and Sevon, 2005). The idea of translating sustainability into a local context remains a minority within sustainability research; Adolfsson, Lindblad and Peacock (2021) explain that city governance is generally focus on a macro context, following the arguments of several academics to argue that metropolitan sustainability research is fallen on capitals, megacities (Hamdouch *et al.*, 2016; Puissant and Lacour, 2011) and shrinking cities (Herrmann *et al.*, 2016; Slach *et al.*, 2019). The translation of sustainability in city governance indicates two opposite processes: homogenising ideas and practices and local adaptation and multiplication of differences (Czarniawska, 2002a).

The Hammarby Sjöstad case represents sustainability governance in a local context where the adaptation of ideas and practices have been homogenised with the "Hammarby Model", but also the local adaptation and multiplication of differences into embracing Gaia provide a possible "solution" to the environmental problems and Climate change issues from a significant epistemological dimension. The case can provide an example of an epistemological shift into a "real" change and embracing Gaia through the sustainability governing the redevelopment project in Hammarby Sjöstad. The initial observation of the case presented shows that there might be a true epistemological shift from Hammarby 1.0 into Hammarby 2.0 stages from a project team level. From "something fashionable" into a true epistemological shift from a bottom-up practice into a possible foundation for changing and thinking differently.

Bruno Latour's AIME project (2013a) provides the alternative to "thinking differently" about sustainability, combining issues concerned with sustainable city governance practices. Latour's thinking and analysis about the "Moderns" and "Gaia" provide the possibility to understand the modern world and its mistakes regarding sustainability governance. In "We have never been Modern" (Latour and Porter, 1993), Latour questions the "Moderns" and what it means to be modern, the distinction between Nature and society, between human and thing and how to rethink these distinctions that our premodern ancestors never had. Latour offers an alternative explanation of science and recognises the connections between Nature and culture (Latour and Porter, 1993). Latour (2013a) argues that Nature is interconnected with human societies, representing a subsystem within Nature where process thinking and openness are crucial to rethinking our existence. Latour (1998) also uses the term "ecologizing" to argue the transition into an epistemological shift as an alternative to the modernisation of the current episteme and to overcome the sovereignty of the Moderns (Latour, 2013a). Latour (2017) raises the question of what will replace the old ways of looking at Nature, referring to Modern perceptions of the natural world and sustainability.

However, there is nothing in the social, said Latour, that is uniquely human and nothing in the technical, which excludes humans. Humans and non-humans – such as animals, artefacts and machines – have always existed and acted in collectives, dependent upon one another, inseparable (Czarniawska, 2022).

Therefore, the thesis will have one overall research question inspired by Latour (2013a) and focussing both on sustainability governance and the importance of epistemological change:

1. How does the Hammarby Sjöstad project manifest epistemological shifts in Sustainability Governing?

1.3 Aim and Expected Contribution

The thesis aims to understand city management and sustainability as an epistemological and practical form of governance at the project team level. The study introduces integral aspects to the urgent need to think differently about Gaia. It can open the way to discuss key epistemological shifts that have been taking shape in engaging in sustainability issues. There is a continuing commitment in sustainability and sustainability governance to grounding research in modern rational-based epistemologies in both environmental and social science fields. In the latter case, economic analyses seek to trade off sustainability goals against continuing growth, resulting in interplays of the economy with the myth of constant growth where nature/ecology are just elements in "the" economic equation. At the same time, there are radical alternatives within and beyond economics, new platforms that critique established modes of investigation and promote epistemological shifts. It is within this frame of investigation that Latour's work is to be found with his commitment to thinking beyond the patterns of the Moderns. Latour's Modes of Existence approach will get beyond the parameters of the thinking and acting of the Moderns with an articulation of epistemological possibilities that still need to be fully established. Here, the thesis finds inspiration for studying [urban] city sustainability governance in practice and tracking potential epistemological shifts.

The thesis will develop a further understanding of sustainability governance, the opportunities and mistakes within the complex process, and the possibility of transformation happening through the emerging episteme. The case analysis will be conducted from a multi-realist perspective, focusing on the sustainability transition governance process. An analytical emphasis is placed on observing the sustainability transformation process with Bruno Latour's Modes of Existence approach (2013a) as the study aims to research [urban] city sustainability in practice and track epistemological shifts within the Hammarby Sjöstad case.

The thesis will build a study to meet the presented aim and objective with the following research question:

1. How does the Hammarby Sjöstad project manifest epistemological shifts in Sustainability Governing?

The research question will analyse the concerns about sustainability city governance and the epistemological concerns raised in the research study, drawing on aspects of the AIME project and Latourian thoughts about "real change" into an epistemological shift into thinking and understanding sustainability. For this purpose, specific forms of the AIME project and the Modes of Existence approach (Latour, 2013a) have been conceptualised to research and analyse the Hammarby Sjöstad case to develop a rich and unfolding research in sustainability governance as part of a possible epistemological shift.

The collected empirical material for the Hammarby Sjöstad case and the analysis conducted with the AIME project aspects constitute a research contribution. The collected material gives excellent and detailed insight into possible forms of transformative sustainability and the workings of a complex project, taking aspects and concepts from Latour's AIME project as an inspiration. The study draws on relevant aspects of Latour's engagement with Gaia and his epistemological critique of the moderns, making possible the design and implementation of fieldwork through the analysis and interpretations of the findings through the conceptual approach adopted with the Modes of Existence (Latour, 2013a).

The primary outcome of the thesis is that the study contributes to the understanding of sustainability city governance from the Hammarby Sjöstad case but also has the possibility of making extrapolations or translations into initiatives undertaken in deprived areas of other cities, given how urban governance environmental problems in general are.

In that respect, the contribution to knowledge of this study remains the findings and insights generated through the case study undertaken at Hammarby Sjöstad. However, At the same time, the study also contributes through its acceptance of Latour's invitation to contribute to the discussion concerning the role of the Moderns in facing Gaia in the new climate regime. The invitation addresses Latour's question in the AIME project whether the experience can be shared within the research community and development.

1.4. Structure of the Thesis

The rest of the thesis is structured as follows:

Chapter 2. Literature Review: Sustainability Governing [of cities] and epistemological change(s)

The literature review will discuss the [urban] city management and sustainability governance to locate the characteristics of managing and governing with the general sustainability issues and their complexity. The main argument throughout the literature review will be thinking and acting differently in translating sustainability ideas and concepts in city management/governing to support the idea that the episteme opportunity and an emerging episteme are essential factors for sustainability governance transition in our current social, economic and environmental context. Also, Latour’s contribution to the AIME project and the Modes of Existence approach is introduced to support the possibility of rediscovering sustainability governing and transition through epistemic analysis to act and speak differently about sustainability.

Chapter 3. Key Concepts

Latour's thinking and acting differently has become an inspiration to discover how his pluralist ontology has sharpened and added perspectives on sustainability governing (of cities) and the concept of "ecologizing" come together as one thing. Chapter 3 will discuss the key aspects of AIME that the thesis will consider to transform a challenging approach with the Modes of Existence into a workable framework. The adapted key concepts, "MoE" concepts, will be presented to address the epistemological shift in the Hammarby Sjöstad project and its sustainability governance transition to develop close-up research and give the flexibility required for the empirical and analytical grounding for the thesis.

Chapter 4. Methods and Research Procedure

Chapter 4 will introduce the research procedure for building the study with the adapted AIME concepts, the "MoE" s. The research has taken on board the observation and interpretation of language as a key element to understanding what exists and acts in organising, translating and transforming reality. The data collection and analysis will require observation and interpretation of the vocabulary used to describe the "modes" to discuss the acting and thinking on sustainability and how the epistemological shift is manifested. The Grounded analysis process with the "constant comparative analysis" from the Grounded Theory approach (Glaser and Strauss, 1967; Charmaz, 2006) has been used for the analytical process to understand which "MoE"s emerge in the sustainability governance process and how they connect to deliver the sustainability transition.

Chapter 5. "MoE"s in the Hammarby Sjöstad Case

Chapter 5 will focus on the first stage of the sustainability governance process with the Hammarby Sjöstad 1.0 project. The emerging "MoEs" will be presented within the governing aspect of the project team and how sustainability thinking and acting manifest. The project team has translated sustainability thinking and acting to all the actors involved in the project and the community by designing, planning, and implementing a master plan to incorporate the needed urban aspects and technological solutions into the district.

Chapter 6. "MoE"s Associations and Crossings in the Hammarby Sjöstad Case

Chapter 6 explains the network in the sustainability governance process represented by the organisations that have been involved in the Hammarby Sjöstad project. Each network's role and involvement are explained through the literature review of each organisation and the informants' views and experiences throughout the interviews. The evidence shows that the network's role and involvement changes throughout the sustainability transition in Hammarby Sjöstad in two main stages: Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0.

Chapter 7. "MoE" s in Action in the Hammarby Sjöstad Case Analysis

Chapter 7 presents the “MoE”s in Action and the dominant “modes” driving the sustainability governing process in the Hammarby Sjöstad case. The Chapter will focus on how the governing aspect of the initial Hammarby Sjöstad project has evolved into a 2.0 project with the involvement of the residents and organisation in translating sustainability thinking and acting into another step and which aspects have been involved in delivering this transformation.

Chapter 8. Discussion and Conclusions

Chapter 8 argues that adapting and utilising key aspects of the AIME project can provide rich close-up research on sustainability governing transition processes. The empirical findings in Chapters 5, 6 and 7 provide informative insights into the broader aspects of urban sustainability governing in the Hammarby Sjöstad case and how sustainability thinking and acting has been translated into the district. The discussed “MoE”s have allowed the understanding of the possibilities of the Modes of Existence approach and its contribution to understanding sustainability governance observing Organisation [ORG], Attachment [ATT] and Morality [MOR] modes. The findings on the dominant modes enrich the AIME work and Latourian analysis as they open a new research area that is subject to further study and practice.

1.5 Final Remarks

Chapter 1 has presented the aims and objectives, and the initial research question to introduce the reader to the thesis. The study's main contribution will be observing sustainability governance by conducting a case study using Latourian analysis. The adapted ideas and concepts from the AIME project will incorporate alternative perspectives into observing sustainability governing acting and thinking differently, manifesting epistemological shifts.

CHAPTER 2 Literature review: Sustainability Governing [of cities] and epistemological change(s)

2.1 Introduction

Chapter 2 will contextualise the research question by locating the relevant literature contributing to sustainability city governance and the possibility of how epistemological changes can manifest. The chapter will discuss [urban] city sustainability and managing/governing sustainability to locate the specific characteristics of managing and governing general sustainability issues and their complexity. The main argument throughout the literature review will be thinking and acting differently in translating sustainability ideas and concepts in city management/governing. Contributions from Adolfsson, Lindblad and Peacock (2021) and Czarniawska (2004, 2009, 2014, 2019, 2022) will be discussed to explore the argument of the possibility of a different way of thinking and acting in sustainability governance and the possibility of an epistemological shift. The "possibility of knowledge" and the "emerging episteme" in sustainability city governing will be primarily inspired by Latour's (2013a) recognition of ontological plurality as the primary transformation in social sciences with contributions from Foucault (1971) and Birkin and Polesie (2012, 2013). Latour's AIME work will be an essential inspiration for introducing complex and interdependent relations (Birkin and Cam, 2016) within the transition into a new way of governing sustainability. The literature review will follow Latour's (2013c) argument that new ways of governing in organisational studies are necessary to embrace the emerging ecological civilisation away from the modern episteme and the mistakes of the Moderns. The perception and co-existence with "Gaia" (Nature) will be presented with James Lovelock's concept to address the complex and fragile system of nature and Latour's description of Anthropocene views on sustainability as a new climate regime (Latour, 2017) contributing to understanding the complexities of moving to a sustainable equilibrium and balanced way of living.

As the thesis is working on a local context with the Hammarby Sjöstad case in Stockholm, the chapter will focus on problematizing what is at stake in constructing interventions and transformations in governing through "zooming in" to concentrate on the thinking and acting of the Hammarby project team. More importantly, it can open the way to undertake a discussion of key epistemological shifts that have been taking place in engaging in sustainability issues.

2.2 Urban City Management/Governing and Sustainability: A matter of complexity in action and thinking?

Cities have become vital to developing human systems, energy and material flow and energy consumption; they account for more than two-thirds of the global primary energy consumption

(International Energy Agency, 2008; Keirstead and Schulz, 2010). The world is becoming more urbanised, with the prediction that 60% of the population will live in cities by 2030; urban areas will account for 70% of global carbon emissions and 60% of resource use (UN, 2022). The World Expo in Shanghai in 2010 sent across the message of "Better City- Better Life", and the Shanghai Declaration (UN, 2011) established the aspiration of building "Cities of Harmony": urban environments where people live in harmony with nature, society and community (UN, 2011). The "Cities of Harmony" concept is linked directly to using renewable energy resources, low-carbon eco-cities development, inclusive, balanced growth, and the optimal relationship between social equity and economic efficiency (De Jong *et al.*, 2015). The Shanghai Declaration included transforming the quality of life in urban environments with scientific and technological innovation: building a smart and accessible information society, promoting friendly and liveable communities and establishing a balanced urban-rural development (De Jong *et al.*, 2015).

Since the Shanghai Declaration and the UN Sustainable Development Goals, metropolitan areas worldwide have engaged in different initiatives and projects to renew and transform urban infrastructure and services (De Jong *et al.*, 2015). Better environmental, social and economic conditions to enhance cities' attractiveness and competitiveness have been created (Yigitcanlar, Velibeyoglu and Martinez-Fernandez, 2008; Caragliu, Del Bo and Nijkamp, 2011; Campbell, 2012; Joss, Cowley and Tomozeiu, 2013; Newton and Newman, 2013; Viitanen and Kingston, 2014; Shipp, 2014). A given urban metabolism can have global and regional impact, vulnerable to regional system limits and global change (Mörtberg *et al.*, 2013). Therefore, energy and resource-efficient management in cities adds particular pressures on spatial structure in urban systems, including urban form, land use and transport demands (Balfors *et al.*, 2005; Batty 2008; Deal and Pallathucheril 2009). These new urban developments have been categorised with different labels and policy discourse such as "sustainable cities", "green cities", "digital cities", "smart cities", "intelligent cities", "information cities", "knowledge cities", "resilient cities", "eco-cities", "low carbon cities", "liveable cities", "low carbon eco-cities" and "ubiquitous eco-cities" (De Jong *et al*., 2015, p. 25). Caprotti (2014) explains that several eco-cities have been proposed, planned and built across the world such as the eco-island developments in San Francisco Bay (Joss, 2011; Joss, Tomozeiu and Cowley, 2011), solar-powered eco-cities such as Masdar, Abu Dhabi (Caprotti and Romanowicz 2013; Cugurullo 2013), "smart cities" such as Songdo, South Korea (Kim 2010; Shwayri 2013), "sustainable city" projects such as Lavasa, India (Datta, 2012) and over 100 eco-city projects in China (Wu, 2012).

Caprotti (2014) argues that these initiatives and projects in sustainability city management have been focused mainly on technocratic lines as they have searched for "solutions" to climate change, focusing on engineering new urban environments with ecologically modernised technology. Eco-cities are referred to as experimental urban places with technologies and ways of organising the built environment to trial economic-environmental reforms to make the cities transition towards a "low

carbon" economy (Caprotti, 2014). The role of these urban areas is seen as a "technological fix" (p. 1287), a way of assembling the discourse around the desire to transition to green capitalism and make the cities adaptable to current environmental issues (Caprotti, 2014). Academics such as Curugullo (2018) describe these experimental urban environments as "Frankenstein urbanism" (p. 73) and argue that smart cities and Eco-Cities are far from the sustainability concept of balance between human societies and ecosystems. Curugullo (2018) argues that these urban areas are built to decrease energy production, distribution and consumption through urban design rather than behavioural change; new technology is used to reduce transport and waste management; and traditional urbanisation strategies are replicated and rarely innovated (Taylor Buck and While, 2015; Caprotti, 2015; Chang and Sheppard, 2013; Colding and Barthel, 2017; Cugurullo, 2013; Datta, 2015; March and Ribera-Fumaz, 2016; Rapoport and Hult, 2017; Rosol, Béal and Mössner, 2017; Wiig, 2016).

These new urban environmental developments have been categorised into different conceptual perspectives and are used interchangeably by policymakers, planners and developers (De Jong *et al.*, 2015). The conceptual perspectives are under three significant paradigms: Sustainable Development, Ecological Modernisation and Regenerative Development/Sustainability (De Jong *et al.*, 2015). Academics argue that the Sustainable Development paradigm has been the most critical change that shaped the thinking behind urban development and given high-level policy recognition globally (Barton, 2000; Wheeler and Beatley, 2009; Rydin, 2010; De Jong *et al.*, 2015). The knowledge and understanding of sustainable development and the triple bottom line concepts have been popularised in economic and social dimensions, research, policy and practice, and urban concepts. Ecological modernisation with green technological development has significantly developed new urban areas focusing on energy and resource efficiency (De Jong *et al.,* 2015). However, other academics defend that to integrate environmental sustainability within urban areas; there need to be more ambitious goals to preserve, restore and regenerate to find solutions for environmental pollution and degradation (du Plessis, 2012; Cole, 2012; Cole *et al.*, 2012; Mang and Reed, 2012; Girardet, 2013; De Jong *et al.*, 2015; Robinson and Cole, 2015). Diagram 3 shows the three main new urban development concepts that evolved since the 1980s:

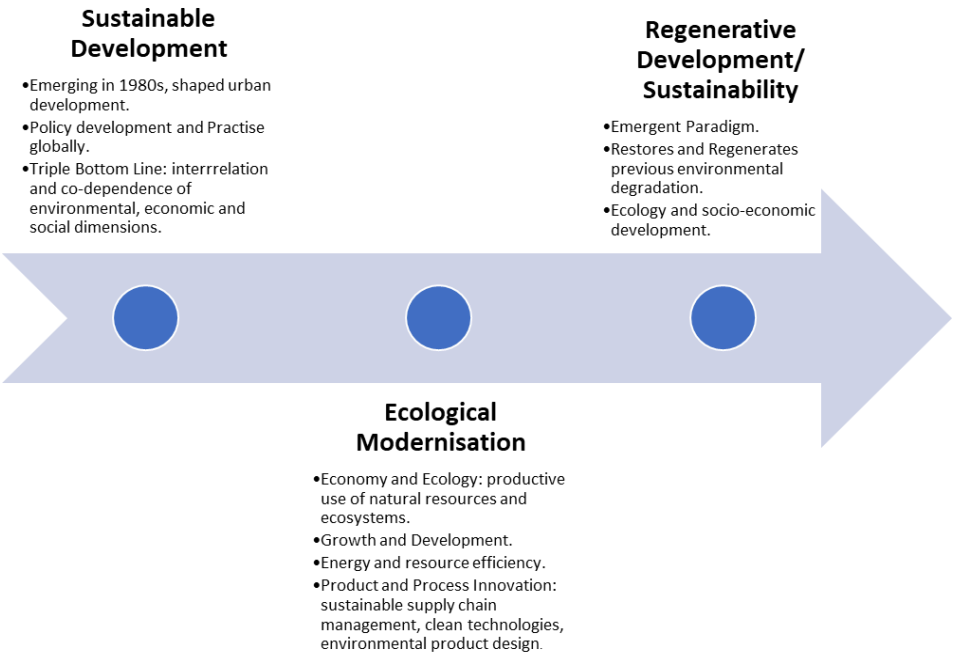


Diagram 3. Interpretation of New Urban Development Paradigms (De Jong *et al.*, 2015)

2.2.1 Organising in City Management

The sustainability concepts and descriptions translated in city management take form in a network of interrelated planning, where over time, concepts are constantly reused with other ideas translated into different times and settings (Adolfsson, Lindblad and Peacock, 2021). Translations of sustainability in city management can vary in manifestations influenced by internal urban planning policy development and external city administrations, with imitations of previous policies and planning documents (Adolfsson, Lindblad and Peacock, 2021).

Czarniawska (2004) follows this argument by arguing that big city management organising is related to understanding how they copy and imitate each other. Czarniawska (2004) introduces Gabriel Tarde's claims that imitation is the primary mode of binding people and things to one another, arguing that certain social realities once formed impose themselves into individuals, turning them into "sleepwalkers" (p. 119). Czarniawska (2004) reveals that the imitation in big city management and organising can be addressed in big European cities such as Warsaw (Poland), Stockholm (Sweden) and Rome (Italy). She argues that "a thick network of imitative radiations" (Czarniawska, 2004, p. 122) exists in organising big cities as city politicians, administrators, managers and technicians observe their counterparts in other cities. She argues that mediating organisations circulate models, patterns, and suggestions that replicate city management and organising in relation to another city. Adolfsson, Lindblad and Peacock (2021) agree that although there are a range of approaches and methods to implement sustainability within the city management context, the importance of

understanding how sustainability is translated is key in translating organising in practice with policy solutions and outcomes.

The translation and understanding of sustainability can be discussed in terms of how cities build and maintain connections with other cities with the concept of action nets, which refers to how ideas can travel between cities and build networks as a consequence (Czarniawska, 2004). Action nets in city management are conceptualised as complex and collective actions that connect one another through a perception of a given institutional order (Czarniawska, 2004). Czarniawska (2009) explains that city management accomplishes a set of actions within a web of inter-organizational networks that operate connected by the same activity (big city management) throughout different terrains dispersed worldwide. In this subject, organising the city refers to connecting actions to one another (action net). If the connection is prolonged in time and stabilises, the action net provides identity to the actors and builds into a network (Czarniawska, 2009). She adds that this network can gain power in time and try to pass as an actor-network introduced by Latour's actor-network theory (Latour, 1986).

Translating sustainability concepts and ideas through building networks follows the analytical framework presented by Czarniawska and Joerges in 1996 to describe how ideas travel in organisational settings (Adolfsson, Lindblad and Peacock, 2021). Czarniawska and Joerges (1996) suggest that translation is key for understanding how change happens through transportation and transformation of an idea following Latour's idea of the power of associations (Latour, 1986), which embraces both linguistic and material objects (Czarniawska, 2002a). Czarniawska (2009) explains that in city management, several translators, such as words, objects, and people, connect actions to organising the city. She adds that some of these action nets can have no effects, and others can have detrimental consequences.

Adolfsson, Lindblad and Peacock (2021) explain that imitating ideas is a creative process that can translate into identity formation as an organisation can imitate itself or its past self. This concept is described as an "automorphism" (Czaniawska, 2002). Adolfsson, Lindblad and Peacock (2021) argue that self-imitation is present in organising city management through self-referencing previous policies and approaches in the urban planning process alongside imitations from other cities actions and policies.

Adolfsson, Lindblad and Peacock (2021) also suggest that although the sustainability concept is continuously imitated through the action nets (Czarniawska, 2004); also the idea of sustainability is continually created, defined and negotiated throughout the city management organising process. They argue that due to institutional and cultural differences and the concept of automorphism (Czarniawska, 2002b), sustainability is translated in various forms in time and plans with previous urban plans and elaborating new policies.

However, when ideas, practices, or objects become widely imitated, they become unfashionable, and the established fashion becomes a custom or an institution. Czarniawska (2004) follows Tarde's argument that big cities are places where inventions occur. Furthermore, inventions are imitated in city management and marketed by different actors, such as consultants, journalists, and researchers, and are becoming widely imitated. Czarniawska (2004) argues that the translation of imitations and inventions in city management can radically change through additional outcomes such as the city's identity and alterity. "Identity construction" and "alterity construction" are two concepts interrelated in translating radical change into city management and organising (Czarniawska, 2004). While "identity construction" in organisation studies is related to knotting people together, things and actions are a mode of building associations through imitation, and "alterity construction" is to construct oneself as different and is interpreted as a failure in the "identity construction" process. Although Czarniawska (2004) argues that "identity construction" dominates the discourse in city management, she also reveals that in practice, the "alterity construction" is constantly present by people and by cities. The constant interplay between identity and alterity makes new cities objects of desire, and old objects obsolete.

The translation of sustainability governing in city management happens at different levels and between levels. Management occurs through many collective and interconnected actions (actions nets); however, these actions are not performed within specific organising boundaries (Czarniawska, 2002a). The action nets engage in many varied organisations (municipal, state, private, voluntary) as well as temporarily organised groups of people (Czarniawska, 2002a) that can be applied at the project team level organising process.

Latour defines the concept of "organizing" as "an ordering activity: assuring that appropriate people and objects arrive at an appropriate place and appropriate time" (Czarniawska, 2002a, p.115). Czarniawska (2002a) explains that organisational practice gives priority to "organizations" rather than to the complexity of organising; Latour (2013c) addresses "organizing" as a mode of existence that needs to take into account to distinguish between organisations and organising and overcome the constant misunderstanding between objects and processes. Latour (2013c) defines "organizations" as "the phantoms that appear when organising – the mode – disappears" (p. 7). Czarniawska (2002a) adds that organisations are seen as societal fictions to facilitate the foundation of accountability in modern society, and organising processes (such as planning, decision making and control) are dynamic, complex and often partially invisible because they are taken for granted.

2.3 Zooming out through Social-Ecological models. City management governing and sustainability re-visited

Zooming out from city management and organising on translating sustainability ideas and concepts, a more general issue of sustainability and its complexity must be considered. The sustainability of city management entails potential weaknesses of forms of modelling, the possibility of overcoming the problematic relations between nature and man, and our co-existence with Gaia.

The social-ecological models address the complexity and transformation of governance from the perspective of the complex adaptive system. This field has been researched by many academics such as Gunderson and Holling (2002), Gunderson, Allen and Holling (2010) and Matutinovic (2001, 2002), where "Resilience", "Potential", "Connectedness" and "Panarchy" play a vital role in explaining and transforming the current understanding of sustainability complexity governance. "Resilience" is a key aspect in transformation as it allows the new social-ecological system to emerge and develop through interactions within and across the different phases, focusing on three aspects: resilience as persistence, adaptability and transformability (Folke *et al*., 2010). "Resilience" is defined as "the tendency of a SES subject to change to remain within a stability domain, continually changing and adapting yet remaining within critical thresholds" and "Adaptability" is the capacity of a SES to adjust its responses to changing external drivers and internal processes" (Folke *et al.*, 2010, p. 6-7). Both aspects allow transformability and transformation of the system into a new development trajectory (Folke *et al.*, 2010). Transformation involves preparing for change, using a crisis as an opportunity, and building resilience (Olsson, Folke and Hahn, 2004; Chapin *et al.*, 2010). The established systems and structures would transform to build the resilience from the old to the new (Folke *et al.*, 2010). Folke, Carpenter, Walker, Scheffer, Chapin and Rockstrom (2010) maintain that resilience is a key factor driving transformation and change within the current economic, social and environmental context and contributes to the Earth System resilience through more flexible systems.

Within a complex adaptive system, Nature is constant and gives equilibrium to organisational change throughout multiple states to evolve and be resilient (Gunderson, Allen and Holling, 2010). The constant transformation in the social-ecological system argues that new systems need to emerge to make a new way of making a living (Walker *et al.*, 2006). The Adaptative Cycle (Holling, 1986, 2001; Walker *et al.*, 2006) in Figure 2 explains further how the system evolves due to internal dynamics and external changes to develop an adaptative and resilient structure model to overcome changes and transformations.

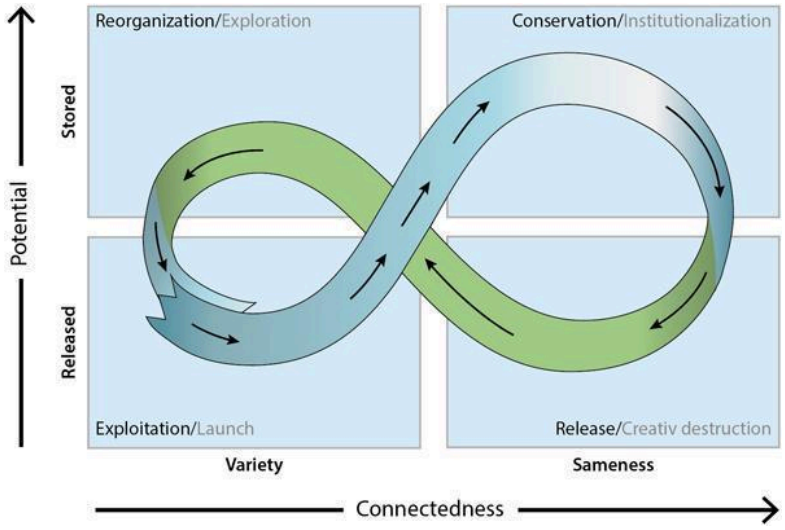


Figure 2. The adaptive cycle adapted from Holling, 1986 (Westley *et al*., 2013)

The adaptive cycle model is divided into four stages that explain the transformation and change in a given system: growth (r), conservation phase (K), release of bound-up resources (Ω), and reorganization (α) (Holling, 1986, 2001). The first growth phase (r) is characterised by the rapid growth of the available resources, accumulation and resilience (Walker *et al.*, 2006). The first phase allows the system to grow its structure and connections by exploiting more resources and energy, leading to the second phase: Conservation (K). The growth slows, and the system becomes less flexible and more vulnerable to external disturbances and changes. The constant disturbances lead to the third phase: Release (Ω). Things change rapidly, resources are "locked up", and the structure collapses, allowing the system to reorganise and innovate into the fourth phase: Reorganization (α). The final phase creates a new structure, leading to growth again.

A second model, a transformative extension of the Adaptative Cycle, is "A model of agency, context, and problem domain innovation and the shift to a new configuration of the social-ecological system" (Westley *et al.*,2013). This model introduces a further transformation of a structure or system through innovation in their internal dynamics to react to continuous external disturbances. Figure 3 below visualises how the model differs from the adaptive cycle, showcasing its potential to inspire new approaches and solutions:

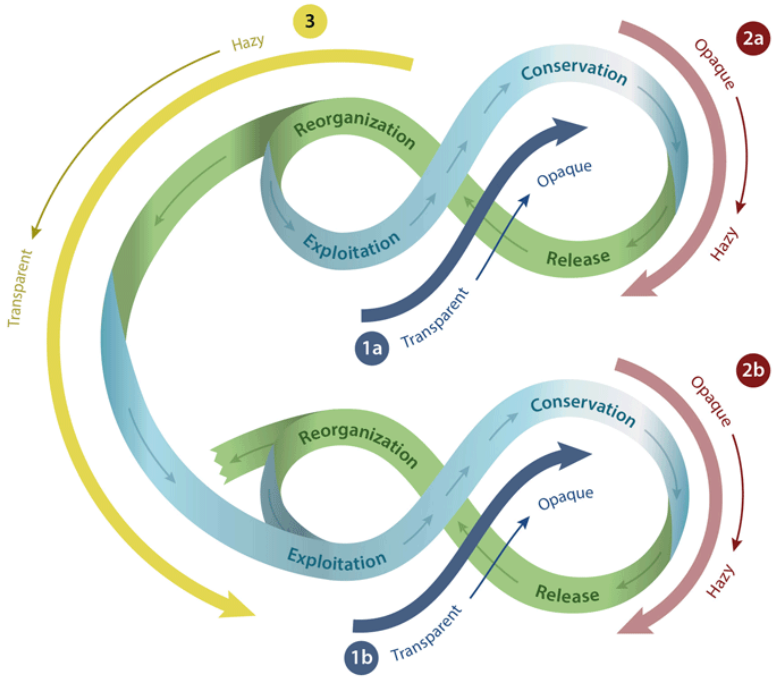


Figure 3. A model of agency, context, and problem domain innovation and the shift to a new configuration of the social-ecological system. 1a,b) Institutionalizing innovation. 2a,b) Releasing resources for innovation. 3) Stimulating emerging innovations and partnerships. (Chapin *et al.*, 2010, Westley *et al.,* 2011; by Westley *et al.*, 2013)

Innovation within this model is called "creative destruction" when old ideas and routines collapse, and new ones will develop through the exploration to create a new social-ecological system (Westley *et al.*, 2013). The adaptative system cycle is understood in two sections: "back loop" (turbulent change phase: release-creative destruction and reorganization- exploration) and "front loop" (Exploration-Launch and Conservation-Institutionalization). Academics argue that novelty and innovation can emerge in the "back loop", triggering a transformation into a new institutional system and a new social-ecological configuration in the "front loop" (Gunderson and Holling, 2002; Walker *et al.*, 2004; Folke *et al.,* 2010; Westley *et al.*, 2013). They also emphasise that the dynamics and changes that happened in the "front loop" will lead to a transformation towards ecosystem governance in a new "front loop", which will ultimately reconnect people to the biosphere (Westley *et al.*, 2013).

2.3.1 Sustainability Governing through Socio-Ecological Models

The potential challenges in the presented socio-ecological models, such as the "Adaptative Cycle", convey an abstract understanding of sustainability, which entails potential weaknesses in translating sustainability ideas and concepts in governing city management. The adaptative system does not address the problematic relationship between nature and human beings and how this can potentially be

resolved. The perception and co-existence with "Gaia" presented by James Lovelock addresses the complex and fragile system of nature, and Latour describes the coexisting relationship with Gaia as a new climate regime (Latour, 2017) contributing to understanding the complexities of moving to a sustainable equilibrium and balanced way of living.

As the thesis is working on a local context with the Hammarby Sjöstad case in Stockholm, the broader concepts presented by the socio-ecological models do not contribute to problematizing what is at stake in constructing interventions and transformations in governing the thinking and acting of the Hammarby project team. The system-level modelling, such as the "Adaptative Cycle", contributes to understanding change and transformation in a broader spectrum in the sustainability governance complexity through concepts such as "reorganization", "transformation through innovation", and "resilience". These three concepts are present in the literature on sustainability city management and how sustainability ideas are translated into the organising process. Adolfsson, Lindblad and Peacock (2021) explain that the translations of sustainability in city management can differ in manifestations. They are also influenced by previous internal and external planning processes, considering how imitation occurs in organising and thinking. The "reorganisation" and "transformation through innovation" concepts carry a level of imitation when organising sustainability thinking in city management. Czarniawska (2004) discusses that cities imitate each other by circulating models, patterns and procedures that are replicated and reorganised in an "automorphism" process (Czarniawska, 2002b). The self-imitation (present or past) that entails "automorphism" that is present in organising city management through policy development and planning processes also carries a creative and innovative process (Adolfsson, Lindblad and Peacock, 2021). Transformation through innovation can happen in these circumstances of imitation and translation of sustainability ideas. For example, although sustainability ideas can be translated into different forms and reorganised through the management process with constant imitation, transformation can arise due to the innovation of previous urban plans turning into new planning policies (Adolfsson, Lindblad and Peacock, 2021). Also, Czarniawska (2004) argues that the translation of imitations and innovations in city management can radically change the city's identity and alterity, as discussed in the previous section, "2.2.1 Organising in City Management" (p. 34). The "Identity construction" and "alterity construction" are interrelated in translating radical change into city management and organising (Czarniawska, 2004); the first builds associations through imitation by knotting together people and things, and the second constructs oneself differently to the other.

The "Reorganization" and "Innovation" concepts contribute to the change and transformation within a system, and the concept of "Resilience" will allow the new social-ecological system to emerge and develop (Folke *et al.*, 2010). The "Resilience" of a system enables the interactions and transformations within and across scales to become more flexible and adaptable to the changes (Folke *et al.*, 2010). Czarniawska (2009) discusses that recently, the idea of "Sustainability" has given way to

"Resilience" in translating sustainability practices such as sustainable waste management, sustainable relationships and sustainable cities. She describes "Resilience" as "the ability of a material to absorb energy when it is deformed elastically and to release that energy upon unloading" (2009, p. 213) and a "desirable trait of systems" (2009, p. 213) that is capable of recovering from crises, emergencies and accidents. Czarniawska (2009) states that "Resilience" requires accumulating more extensive resources such as organisational capacity, knowledge, wealth, energy and communication to solve unexpected problems. "Resilience" is understood as a process instead of a trait of an individual (Czarniawska, 2009) and takes an integral part in transforming social-ecological systems from a broader perspective, such as addressing social, economic and environmental issues.

However, in translating "sustainability" ideas and concepts in governing city management, the socio-ecological models presented do not contribute to observing transformation from an epistemological shift. The thesis requires alternative ways of thinking about sustainability and how the translation of ideas and concepts are illustrated in organising sustainability city management. Especially where the shifts in thinking happened through the collected accounts in Hammarby Sjöstad's case. The emphasis is placed on "doing" and "governing" at the project team level and observing how the decisions are implemented at the project team level to understand thinking in action.

2.4 From Modern to Emerging Episteme: An Overview

The idea of "sustainability" and "sustainability governance" research is grounded in the modern rationale based on epistemologies in environmental and social science fields. This section presents the "traditional" mode of knowing (The episteme of the Moderns) and the overly abstract approaches to sustainability thinking. Hence, the concepts "paradigm" and "episteme" come into play as integral constructs in this section.

The Modern episteme and Economic paradigm will be discussed to understand how they seek to trade off sustainability goals against continuing growth, interplaying with the myth of constant growth where nature/ecology are just elements in the economic equation. However, radical alternatives within and beyond economics and new platforms that critique the established modes of investigation and promote epistemological shifts will be presented. Latour's work will provide its commitment to thinking beyond the patterns of the modern episteme with "An Inquiry into the Modes of Existence" (Latour, 2013a), which provides a distinctive radical approach to challenge the Moderns. Diagram 4 presents the main concepts in the transformation process of sustainability thinking and acting from the Modern episteme to the Emerging episteme. It also highlights the role of the AIME project in this epistemological shift, demonstrating its contribution to sustainability governance.

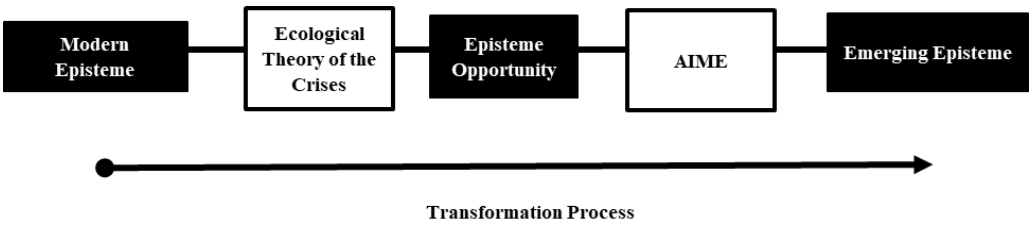


Diagram 4. Mind Map on Sustainability Complexity and Transformation Process

2.4.1 "Paradigm" and "Episteme" Concepts

"Paradigm" is described as "a historical situation in the evolution of science" and "Episteme" as "the dominant order of knowledge for an age in major respects, and it is not to be confined to a science" (Birkin and Polesie, 2013, p. 145). "Episteme" differs from "Paradigm" as "epistemes are not historic, and it is their consequences that create history" (Birkin and Polesie, 2013, p. 144) from taken-for-granted abstract conceptions that create "the conditions of possibility" for knowledge (Foucault, 1971) making knowledge possible (Birkin and Polesie, 2013).

Birkin and Polesie (2013) explain that an episteme may change a paradigm but not vice versa. They argue that "Nobody creates an episteme. They are not the result of deliberate intent to limit or structure knowledge in any particular way. Epistemes simply arise as thought develops and for those engaged in an emerging episteme, it is a new possibility of knowledge replete with opportunities" (Birkin and Polesie, 2013, p. 145). When observing the possibility of an epistemological shift in "sustainability" thinking, an "epistemic analysis" has the chance to provide an in-depth insight into the causes and potential remedies of unsustainable development within the modern rationale (Birkin and Polesie, 2013). Epistemological shifts and changes can be discovered and explained through history with Foucault's epistemic archaeology "The Order of Things: An Archaeology of the Human Sciences" (1971) (Birkin and Polesie, 2012, 2013):

1) **Renaissance Episteme.** God-given world where knowledge was obtained through religion and religious books such as The Bible.

2) **Classical Episteme.** Change of episteme happened when Rene Descartes equated God with a rational mind, and knowledge was obtained by systematically measuring and comparing the similarities and differences of things in the world from a human perspective.

3) **Modern Episteme.** Immanuel Kant, in 1787, questioned the limits of representations with his work "Critique of Pure Reason", arguing that "we can know a priori of things only what we ourselves put into them" (Birkin and Polesie, 2013, p. 145). A god-given world is replaced with a "man-made" epistemology where empirical science provides knowledge for the quest

of the human species' origins and the cosmos (Birkin and Polesie, 2013). Foucault (1971) argues that origins are sought but not found in human sciences, leading to a weak and unstable metaphysics for the modern human sciences. The weak metaphysical foundation derives into one major event: The knowledge is made "by" and for "man". The concept of "Epistemological Man" is introduced as a modern invention, and human beings have an epistemological role (Birkin and Polesie, 2013).

2.4.2 Modern Episteme and Economic Paradigm

The Modern Episteme is dominated by the "Epistemological man" concept within an Economic paradigm where the economy is central to human development. In pre-industrialised societies, myths were explained by natural phenomena and used to shape societies around their natural environment to manage individuals and collective decisions (Kallis, Martinez-Alier and Norgaard, 2009). Traditional societies co-evolve with the environment and develop their knowledge and meaning of life. However, after the Industrial Revolution, science became central to human development and modernisation; therefore, humanity transformed and co-evolved with scientific understanding, and the economy became the cosmos (Norgaard, 1994). Kallis, Martinez-Alier and Norgaard (2009) refer to this transition as "myths as economism" where economy "explains phenomena, facilitates individual and collective decisions, and gives meaning and coherence to our lives: "our economy is driven by, and co-evolves around economism" (p. 18-19). Birkin and Polesie (2013) argue that neoclassical economics is a modern invention of the "rational mode of being" and the "Epistemological Man" is the background for free market and growth ideologies. The anthropocentric focus of the modern episteme has led to weak sustainability (Baumgärtner and Quaas, 2010). Birkin and Polesie (2013) argue that weak metaphysical foundations have developed "deep-seated problems in the world today" (p. 146) directly linked to the current environmental, social and economic issues such as global warming, poverty, biodiversity loss and unsustainable development. Weak sustainability does not assess and incorporate social and environmental impacts when accounting for objectives, context and implications for organisational activity and decision-making; as traditional accounting is used to "assess the success or failure of an enterprise without regard to social and environmental evidence to the contrary" (Birkin and Polesie, 2013, p. 146).

The concepts of "man's finitude" and "short-term focus" bring forward the anthropocentric views in sustainable development as part of the weak sustainability, which are determinant in understanding sustainability in the modern episteme. Ericson, Kjønstad and Barstad (2014) explain that behavioural habits such as individual and collective goals, motives and desires can determine sustainability. They argue that sustainable behaviour and habits are not always a consequence of conscious decisions and actions; instead, they are ruled by automated unconscious responses influenced by everyday life (Neal, Wood and Quinn, 2006). Individuals experience the world through their knowledge and

cognitive skills, which are self-centred and conditioned to their prior nature (Brown, Ryan and Creswell, 2007; Brown and Cordon, 2009); and can lead to "superficial, incomplete, and biassed pictures of reality" (Ericson, Kjønstad and Barstad, 2014, p. 76). Much of human behaviour as consumers is automatic and influenced by unconscious choices reinforced by advertisements (Rosenberg, 2004). It suggests that "mindfulness and increased awareness of one's mental life can reduce emotional and cognitive habits, hence promoting a non-habitual/non-automatic mode of being that is more flexible and objectively informed" (Ericson, Kjønstad and Barstad, 2014, p. 76).

a) Ecological Theory of the Crises

The "Ecological Theory of the Crises" analyses the current prosperity and growth paradigm and the ecological impact and implications in the environment within the Modern Episteme with contributions from academics such as Victor (2008), Jackson (2009), Kallis, Martinez-Alier and Norgaard (2009); and Martinez-Alier (Kallis, Kerschner and Martinez-Alier, 2012). For the last decade, attention has been focused on the economic crises, and the public has engaged with its structural causes, such as capital accumulation and cyclical repetition (Kallis, Martinez-Alier and Norgaard, 2009). However, the environmental and ecological factors have not been appropriately assessed within the growth paradigm (Kallis, Martinez-Alier and Norgaard, 2009). Kallis, Martinez-Alier and Norgaard (2009) argue that growth in the industrial system is closely linked to production and consumption and implies extraction and destruction of natural resources. The causes of the ecological crises of our current economic and social system are defined in three dimensions: Growth and Prosperity, Financial Economy, and Environment and Ecology (Kallis, Martinez-Alier and Norgaard, 2009).

Academics such as Kallis, Kerschner and Martinez-Alier (2012), Victor (2008) and Jackson (2009) have been very critical of the continuous growth paradigm that traditional economists and business-as-usual have been defending since the Industrial Revolution. Some Academics, such as Speth (2012), have described the current system as "a multi-dimensional crisis of democracy, social mores and the environment" (Kallis, Kerschner and Martinez-Alier, 2012, p. 173); others like Daly (1974) as "Growthmania", "Growth Fetishism'" by Hamilton and Bond (2003) or "tyranny of growth" by Fournier (2008). Developed societies and economies are unable to overcome the need for continuous economic growth and pursue the necessary reorientation (Daly, 1974) from the depletion of natural resources, environmental impacts and pollution (Heingberg, 2011). Van Griethuysen (2010) also agrees that the economy is the primary driver of societies, and environmental and social issues are subordinated to the background.

However, the current prosperity model has been questioned, arguing that the economic growth as we have known it is over and done with (Heinberg, 2011). Individual prosperity, human progress, and society have been scrutinised and analysed by Jackson (2009), who introduced the vision that business as usual is not an option. He defends that prosperity has been determined by continuous ecological

destruction and the belief that progress is "based on the continual expansion of material wants" within our society (p. 2). Also, the definition of "Progress" is closely related to GDP (gross domestic product) indicators, which define production in each country, estimating the costs of market-related activities and economic growth (Bergh, 2009). Van den Bergh (2012) introduces the "GDP paradox" and Limits of GDP. The author explains that this is inaccurate in translating social welfare because it does not include the positive or negative effects of the production activities in the market, informal non-market activities, individual welfare or happiness factors, and the use of natural resources and environmental degradation. Therefore, the real welfare implications are not captured and should not be used as a progress indicator (Bergh, 2009).

Also, Kallis, Martinez-Alier and Norgaard (2009) defend that the root of the economic crises within the economic paradigm has been the expansion of credit without limits at a speed where the real economy has not been able to generate enough capital and wealth to repay the debt by organisations, institutions and governments. Therefore, there is a misunderstanding between financial credit expansion and the belief in continuous growth and real wealth creation, which are not proportionally linked (Martinez-Alier, 1990). Ecological economists defend that the economy should be measured by the "real-real economy", which is described as "the flows of energy and materials whose growth depends partly on economic factors (types of markets, prices) and in part from physical and biological limits" (Kallis, Martinez-Alier and Norgaard, 2009, p. 16). Kallis, Martinez-Alier, and Norgaard (2009) explained that biophysical factors limit real wealth and how it can increase, supporting the argument that planetary boundaries must be considered in wealth creation. The planetary boundaries have been studied by a group of researchers (Rockström *et al.*, 2009), where biophysical subsystems and processes were analysed to determine the safe operating space for humanity. Ten planetary boundaries were presented in their study. Their analysis concluded that human activities (including economic prosperity and growth) have led to the earth's system being potentially damaged due to fossil fuel resource depletion and industrialised agriculture pollution. They suggested that climate change, biodiversity loss and the nitrogen cycle have been considerably damaged. Furthermore, Kallis, Martinez-Alier and Norgaard (2009) indicate that the global population will need to reduce consumption by 25% to process their waste sustainably (Wackernagel *et al.*, 2002), reduce greenhouse gas emissions by 80% by 2050 to avoid catastrophic climate change (IPCC, 2007) and reduce the existing level of GHGs in the atmosphere (Hansen *et al*., 2008).

As a result, the main debate and question for 21st-century economics has become how to manage without growth (Victor, 2008; Kallis, Kerschner and Martinez-Alier, 2012) and within the ecological limits (Rockström *et al.*, 2009; Jackson, 2009; Victor, 2010).

2.4.3 Episteme Opportunity. The New Possibility of Knowledge

The perceptions on sustainability have started questioning the human beings' role with nature to overcome the Modern episteme, wondering to what extent do humans have responsibility and what role does nature play for the human being and the striving for a good life beyond survival (Becker, 2006). Latouche (2010) emphasises that overcoming the modern episteme will mean "the abandonment of a religion: the religion of the economic growth, progress and development" (p. 519). Bermejo (2011) adds that an epistemological revolution must adopt an interdisciplinary perspective in which the economy will be subordinate to nature. Furthermore, Folke and Gunderson (2012) describe this new period as a "Renaissance" of the meaning of development, where the key objective is reconnecting to the biosphere. This renaissance period is defined as a human realisation that "social-ecological systems are dynamic and connected, from the local to the global, in complex webs of interactions subject to gradual and abrupt changes" (Folke and Gunderson, 2012, p. 55). The social-ecological system is interdependent, and people and nature are integral actors. In the past, there had been two major transitions: hunter-gatherer to agrarian and transition to industrial society (Haberl *et al.*, 2011). A third great transition towards sustainability will require an epistemological revolution: the social metabolism of human societies with a new possibility of knowledge (Haberl *et al.*, 2011).

The new possibility of knowledge is presented in Bruno Latour's work "An Inquiry into Modes of Existence" (Latour, 2013a), opening a new perspective in transitioning into sustainability, where ecology needs to be understood as an alternative to modernisation, where it is integrated into everyday life, abandoning the concept of Nature as an external entity from humanity (Latour, 1998, 2013a). Latour (2013a) argues that ecology and environment are interconnected with human societies, representing a subsystem within nature where process thinking and openness are crucial to rethinking our existence. Latour (2013a) introduces the Modes of Existence approach with 15 interconnected modes by a complex network that continuously interacts with associations affecting and changing each other. The modes of being interact and evolve in different ways in two natures: First Nature (Ecology) and Second Nature (Economy). Latour (2013a) defends that second nature has become predominant in our society, and conducting the AIME research introduces the possibility of understanding the factors that allow transitioning into First Nature (Ecology). Latour (2013a), also, argues the hypotheses that three main modes have the transformative element: Attachments [ATT], Morality [MOR] and Organizations [ORG]. He believes that these three modes will fill the crucial gaps to overcome the Second Nature (Economy): [ATT] "will make it possible to do justice to the abrupt changes in temperature of passionate interests", [MOR] "will allow us to fill once again the place we had found empty" and [ORG] "will allow us to explore the astonishing immanence of organizations" (Latour, 2013a, p.389). Latour argues that if the research can identify and understand the contrasts brought out by these three modes, there is a possibility of being liberated from Second Nature (Economy). This transformation will allow reaching the "optimum" connectivity and engage

with Gaia moving to a sustainable equilibrium and balanced way of living. Furthermore, AIME will reveal the contradictions and issues stopping this transition from occurring in a given network (Latour, 2013a).

Latour (2021), in his latest work, "After Lockdown: Metamorphosis", reflects on what it means to transition towards the First Nature (Ecology) and what it could mean to human beings in this process towards sustainability. He argues that the transformation into sustainability thinking and acting as "return to earth" (p. 6) and the difficulties of the transition process as the society is being "pushed" to come back down to earth without giving appropriate guidance on "where to land so we don't crash, or what will happen to us" (p. 6-7). Latour (2021) reflects how humans make life impossible for themselves, as we are not grasping what enables living organisms to make the earth habitable. He defends that society intends to understand Nature through "technical devices, factories, hangars, ports and laboratories" (Latour, 2021, p.21). He adds that although humans are surrounded by life, they "consider themselves the only beings endowed with consciousness in the middle of inert things" (Latour, 2021, p. 21), and this makes them feel as if they are the only living things that count on earth instead of understanding Earth with full of beings with connections and associations overlapping and creating all sorts of combinations. Latour (2021) argues that the COVID-19 lockdown has given another perspective to our society in regards to our relationship with nature as we have undergone a metamorphosis where our understanding of the world has changed, contributing to a transition towards First Nature (Ecology). He argues that the pandemic has served as a model for familiarising the society with the restrictions imposed by the climate crisis:

> "Things are panning out as if the lockdown imposed by the virus could serve as a model for familiarising us slowly with the general lockdown imposed by what is called, in a mild euphemism, the 'environmental crisis'" (Latour, 2021, p. 38).

Latour (2021) emphasises that it is not an environmental crisis but a mutation driving human beings to a metamorphosis: arguing that "This is metamorphosis. This is our new freedom, once we're freed from the old one, the one from before lockdown" (Latour, 2021, p. 55). Lockdown has contributed to this change as society has become more suspicious of restarting again on the same path of progress as the pre-pandemic era, the Second Nature (Economy). Latour (2021) defends that the pandemic and Lockdown have had the effect of "freeing" the minds of individuals contributing further to the emerging episteme, as they were "rotting away" imprisoned in the "iron cage" of the "laws of economics" (p. 59).

The changes to transition to the First Nature (Ecology) require leaving the economy to one side and completely doing without it; arguing that improving, changing, greening, or revolutionising the economic system is insufficient to face environmental and climate crises (Latour, 2021). The transition to the First Nature (Ecology) involves imposing a new distribution of values and evolving

from an economic dimension to multiple dimensions such as social, moral, political, or ecological. It requires "abandoning" the economy as the main driver of the society and "to learn to exorcise it" (Latour, 2021, p. 64).

Latour (2021) also argues that society is already mutating without realising that the New Climate Regime is becoming a new political regime; society is transitioning into the First Nature (Ecology). Earth or Gaia is organising the horizon into multiple dimensions, exercising "an authority that thwarts, disrupts, contests the modes of sovereignty of the nation-states that organised the carving up of land in the modern era" (Latour, 2021, p. 124).

2.4.4 Emerging Episteme. Alternative Conception in Human Beings

Latour's (2013a, 2021) arguments on transitioning into First Nature (Ecology) with the new possibility of knowledge is strongly related to the "Emerging Episteme" defended by Birkin and Polesie (2012, 2013). They refer to the "Emerging Episteme" as "Primal" to reflect that origins have been or are being found for the human sciences with the episteme opportunity into the First Nature (Ecology) defended by Latour (2013a). They argue that the emerging epistemes have strong metaphysical and ontological foundations based on empirically grounded science, which reveals human beings' origins as an integral part of nature and their "return to earth" (Latour, 2021, p. 6) as explained by Birkin and Polesie (2013a):

> "The greatest significance of the emerging episteme- as with any episteme change- is a change in the views and understanding of ourselves. In the emerging episteme it appears that we become once more key informants in nature and we can refer to nature to better know ourselves" (p. 147).

The Modes of Existence approach contributes to explaining how to transition from the anthropocentric views on sustainability described as "weak sustainability" (Baumgärtner and Quaas, 2010, p. 2057) into a more holistic understanding of human beings where nature becomes central in human development (Constanza et al., 2009; Jackson, 2009; Bina and Vaz, 2011). Also, Bina and Vaz (2011) defend the idea of an alternative conception of human beings, interrelated and interdependent humanity with a new sense of responsibility and "the rising awareness that human beings share the planet among all people" for an ecologically sustainable future (Bina and Vaz, 2011, p. 170-171).

This alternative conception of the human being as part of an interrelated and interdependent humanity raises the awareness that planet Earth is shared among all people and beings dependent on Nature (Birkin and Polesie, 2013). The episteme opportunity with the possibility of knowledge allows the transitioning from the "Modern Episteme" into the "Emerging Episteme", which refers to the theory

of the human species moving and evolving from Homo Economicus to Homo Ecologicus through sustainable behaviour and knowledge.

a) Homo Economicus vs Homo Ecologicus

The human sense of responsibility is understood as the capacity to relate to nature, society, and community, and it is the main characteristic that contributes to implementing ecological sustainability (Bina and Vaz, 2011). Two main conceptions of human beings are identified: Homo Economicus (the narrow self) and Homo Ecologicus (the wider self) (Bina and Vaz, 2011).

The Homo Economicus is referred to as the economic man's theoretical construction and conception of economic actors where the human wellbeing is linked to material consumption; denying the bond to nature and benefiting growth at the expense of biosphere with a "reductionist view of human beings, with far reaching consequences" (Bina and Vaz, 2011, p. 173). On the other hand, Homo Ecologicus is the human relationship with Nature which includes the ecological economist contribution from Georgescu-Rogen (1979) and Daly (1980), biophysical limits (Arrow *et al.*, 1995; Corvalán *et al.*, 2005; Rockstrom *et al.*, 2009; UNDP, 2007) and Anand and Sen's (2000) human development concept. Homo Ecologicus links between nature and human needs; happiness and quality of life (Anand and Sen, 2000); and new meaning of progress and prosperity (Constanza *et al.*, 2009; Jackson, 2009). The academic contribution in this field shows the need to question the current socio-economic system. However, the authors argue that perspectives are still limited by combining the macro system (economy and biosphere) and the microsystem (who we are and how this shapes our behaviour with nature).

The academic contributions to a holistic understanding of human beings with virtue ethics reframe the individual within "reflective, relational and environmental terms"(Bina and Vaz, 2011, p. 172). Virtue ethics emphasises the holistic interpretation of human beings: the harmony between being, feeling, and acting, introducing a fundamental ethical dimension. Responsibility becomes a virtue "that enables individuals to find meaning in acting responsibly towards the environment" (Bina and Vaz, 2011, p. 173). Academics such as Beretti, Figuières and Grolleau (2013) argue that human behaviour significantly contributes to environmental problems and is a key component to regard behavioural innovation as the missing capital in sustainability. They introduce the concept of "behavioural capital" and the potential of behavioural change to improve environmental quality through behavioural innovations: "Behavioural innovations can overcome some of the limitations of technological innovations and offer new solutions" (p. 187). Ericson, Kjønstad and Barstad (2014) agree that subjective wellbeing can make an essential contribution to sustainability; they defend that "mindfulness contributes to subjective wellbeing by focusing the mind on the here and now, giving rise to stronger empathy and compassion, facilitating clarification of goals and values, and enabling

people to avoid the hedonic treadmill" with further empathy, compassion, and non-materialistic values associated with sustainable behaviour (p. 73).

b) Paradigm Shift into a New Ecological Civilisation

The following ideas and observations are signs of a paradigm shift to a new ecological civilisation. Kirilyuk (2005) follows the idea of a new development step into human beings, arguing that to achieve sustainability, a transition to another level of civilisation is essential due to changes in all aspects of life. Academics such as Gallopin (2002), Bermejo (2011) and Oswald (2014) introduce the concept of "Eco-Civilization", which represents a transformation to ecological mindfulness, where society has overcome the mindless and destructive industrial progress (Oswald, 2014). Eco-civilisation maximises the ability to absorb future impacts to sustain natural resources, strengthen social cohesion, and create a diverse, productive system adapted to regional social and ecological conditions (Gallopin, 2002; Bermejo, 2011). The "Eco-civilization" concept can transform the modern episteme (traditional economics and society with continuous growth paradigm) through empirical knowledge and experience about the environment, society and economy (Gallopin, 2002). It integrates living systems as cognitive systems (Maturana, Varela and Beer, 1980) that require natural balance and harmony between efficiency and adaptability to develop organised complexity (Matutinovic, 2002). Their interactions with their environment and intrinsic dynamics create the ability to respond to or ignore changes in "the reality of the world in which it lives" (Birkin and Polesie, 2013, p. 150). Latouche (2010) emphasises that overcoming the economic paradigm will mean "the abandonment of a religion: the religion of the economic growth, progress and development" (p. 519) and an epistemological revolution is necessary to adopt an interdisciplinary perspective (Bermejo, 2011). This new period is described by academics such as Folke and Gunderson (2012) as a "Renaissance" of the meaning of development, where the key objective is to reconnect to the biosphere. The Renaissance period involves the human realisation that people and Nature are integral actors within an interdependent social-ecological system that is "dynamic and connected, from the local to the global, in complex webs of interactions subject to both gradual and abrupt changes" (Folke and Gunderson., 2012, p. 55). Birkin and Polesie (2013) argue that this is strongly linked with the emerging episteme, which occurs due to "changes in the underlying assumptions and attitudes that make knowledge possible in a given age" (p. 147).

2.5 An Inquiry into [Urban] City Management/Governing and Sustainability as an Epistemological Issue

The Modern episteme and Economic paradigm discussed in the previous section have presented the understanding of the Moderns way of thinking on sustainability ideas and concepts with the myth of constant growth where nature/ecology are just elements in the economic equation. However, Latour's

AIME project with the Modes of Existence approach shines a light on radical alternatives within and beyond economics that critique the established mode of civilisation and promote epistemological shifts. Latour's work in AIME provides its commitment to thinking beyond the patterns of the modern episteme (Latour, 2013a), providing a distinctive form of radical approach to challenge the Moderns. The concepts and ideas from the AIME project can address sustainability city management and governing as an epistemological issue to investigate the "rational" and "objective" way of thinking and acting in the current environmental situation.

2.5.1 What is "An Inquiry into the Modes of Existence" (AIME)

AIME work (Latour, 2013a) with "An Inquiry into the Modes of Existence" is the highlight of Bruno Latour's research about the anthropology of the Moderns; a continuation of his previous work with "We have never been Modern" (Latour and Porter, 1993) and "Actor-Network Theory" (Latour, 1996, 2005). "An Inquiry into the Modes of Existence" work (Latour, 2013a) is a critique to the Moderns. It entails an anthropological research study that dates back to the 1960s, influenced by his personal and professional experiences. Latour (Latour and Porter, 1993) questions what it means to be Modern addressing the distinction between nature and society, between human and thing and how to rethink these distinctions that our premodern ancestors never had. Latour (Latour and Porter, 1993) offers an alternative explanation of science and recognises the connections between nature and culture with the intention of "bridging the abyss between, that separates what the Moderns say from what they do" (Latour, 2013a, p. 21-22). Through his work, Latour introduces a new division: "modernising" or "ecologizing". Latour (2013b) explains that the abyss between the modernist representation of history and real history (network between humans and non-humans) has opened up with the possibility of extending it to the entire planet to replace the overly anthropocentric term "society" for Nature. Latour (2013b) affirms that the "Others" (referring to our premodern ancestors) are not modern, and also "we" as a collective have never been modern, arguing that "ecology was about to force humans and non-humans to take into account" (p. 294).

Latour's biographical observations on his long-term project, AIME, discuss the steps that led to the Modes of Existence approach (Latour 2013b). Latour's relationship with religion and philosophy started with the annual pilgrimage to Orleans (France) to attend the Péguy fest every summer with his parents and later as a militant Catholic student at the University of Dijon. Latour was influenced by his philosophy professor, a Protestant minister, who encouraged questioning whether the resurrection narratives should be read as informational or transformational stories and how such stories manage to resuscitate the person addressed. Throughout his formative years in religion and philosophy, he emerged with the understanding that as texts or stories are interpreted, transformed and replayed each time differently, the truth within is more likely to manifest. However, Latour conditions this to know how to distinguish it from a different mode of truth, which entails pure and perfect information

(Latour, 2013b, p. 289). The mistakes in distinguishing these modes of truth will later be named and explained as “Double-Click” in the Modes of Existence approach at the AIME project.

Latour’s first fieldwork in French factories on the Ivory Coast in the 1970s (Czarniawska, 2022) faced him with the struggle between modernisation and archaism in neocolonial Africa. Latour (2013b) explains that it was his first direct experience of how the civilised implied the ideas of modernity and methods of investigation and how the contrast between moderns and premoderns was a consequence. Latour addresses the premoderns as “the others”, aiming to modernise them (Latour, 2013b, p. 289). He argues that while the “Whites” anthropologized the “Blacks” by educating them in technologies, economics, development and scientific reasoning, they were perpetuating the structure of the modern world. The “Whites” avoid being anthropolized by the “Blacks”, keeping themselves distant and only focusing on the archaic aspects such as festivals and meals. This was the beginning of observing the Moderns. Through his work in a scientific laboratory in California, he will develop a project to provide ethnographic research based on descriptions of the people who address themselves as rational and modern. Latour started to draw the first steps in comparing modes of truth using a journal, and the second step was building the AIME work. Throughout his experience developing this ethnographic research in California, he understood that the non-human actors, such as text, diagrams and formulas in the lab, had associations that could be tracked. Latour discovered that the illusion that non-human actors were ontologically different from human actors needed to be abandoned. The power to act of actors (human and non-human) needed a better place than subject and object, between words and things, to rediscover the mode of existence of scientific knowledge (Latour, 2013b).

When Latour returned to France in 1977 to work at the Science and Technological Research Centre (Direction Générale de la Recherche Scientifique et Technique), he was introduced to industrial field studies. He discovered that technology had its own world, including organisations, negotiations, calculations, metaphysics, and morality (Latour, 2013b). He argued that technology radically populated the collective of non-human actors that were brought into the human actors, and therefore, the technological infrastructure enabled the associations to extend the network into technological organisations (Callon, 1981; cited by Latour, 2013b). The associations and networks gave Latour the understanding that a single metalanguage of a text (a poem, a fable, a memoir) could always emerge following the actors themselves without any specific explanation (Latour, 2013b). It was important to follow the actors and connect them into a network: “The explanation would come later, if there was time” (Latour, 2013b, p. 294). This process allowed Latour to add “Technology” as a new mode included in the AIME work.

In 1979, the Actor-Network-Theory (ANT) was drafted to propose extending the social theory to absorb the associations between humans and non-humans and open the approach to empirical research in the sciences of economics, legislation and management (Latour, 2013b). “Actor-Network Theory”

(Latour, 1996, 2005) further explains how human and non-human actors interact, building and rebuilding connections and networks. ANT explores how social projects are accomplished, Tummons (2021) explains that networks can be traced in different ways (with stories, people, paperwork, computer simulations, routines, texts and voices): "It provides ways of thinking about how networks of people and things carry influence and influence each other and foregrounds how people and things are made to do things across boundaries of geography or time or institutions" (Tummons, 2021, p. 1314). The performativity of the society has been shifted to follow the associations to give more freedom to the analysis of empirical research and manoeuvre the informants' descriptions and experiences to follow the expanding networks (Latour, 2013b). Latour (2013b; Latour and Strum, 1986) confirmed that "what characterises humans is not the emergence of social, but detours, translations, the enfolding of all courses of action into more and more complicated- but not necessarily more complex" (Latour, 2013b, p. 294). He discovered that the association needs to be left to its own devices as a new mode, which will be included in the Modes of Existence approach at the AIME project later.

Although there were still a few modes to be discovered for the Modes of Existence approach, Latour (2013b) felt that the fundamental concepts were in place to analyse the metalanguage. "An Inquiry into the Modes of Existence" relies on a metalanguage vocabulary to understand the world and argues the pluralism of the moderns and their existence. Latour is seeking to forge an ontological pluralism to develop "An Inquiry into the Modes of Existence" book: "language has to be made capable of absorbing pluralism of values"… "this has to be done for real not only merely in words" (Latour, 2013a, p. 19). Latour follows Étienne Souriau's (2009 [1943]) argument that there are not several ways to talk about one world; instead, there are several ways for the world to be addressed (Latour, 2013b). Latour argues that using the modes discovered in AIME offers the Moderns a more realistic description of the plurality of the world, and each mode requires encountering distinct beings that need to be addressed in their own languages. He addresses how the Moderns approach these beings and in what modes or realities instead of conceiving the world based on two categories: object and subject (Latour, 2013b).

The key features of Latour's approach can be summarised in the close-up study and collection of accounts of doing and saying by the Moderns, taking into consideration the ontological pluralism of the metalanguage. The metalanguage allows moving back and forth between the collected accounts and the world. Latour (2013b) describes the constructions of places following the scientists in action, the things necessary for these accounts to exist and which are, therefore, the constructions of what the Moderns have closed and hidden. References in the accounts make it possible to retrace the journey through the associations and networks.

a) Introduction to the AIME Project

The AIME project (Latour, 2013a) opens a new perspective in understanding sustainability governance and the transition process. Bruno Latour (1998, 2013a) introduces the possibility of understanding Nature by embracing deeper thinking and acting on sustainability away from the modern episteme and the modernisation of the world (Latour, 2013a, 2017). AIME is defined as "the ontological features of the world" and "an empirical inquiry into the ontological and epistemological conditions of modernity"; supporting Latour's argument for a "radical shift in how 'truth' or 'meaning' is established within the world" (Tummons, 2021, p. 1313). Ricci, de Mourat, Leclercq and Latour (2015) define AIME as "a systematic description of the different ontological systems that co-exist to describe contemporary ways of being" (Tummons, 2020, p. 46). Latour (2013a) tries to "disentangle the typical ways of being that characterise various forms of collective life" (Decuyper and Simon, 2019, p. 229). AIME is taken as an "ontological toolkit ready at hand for continuously, in each new empirical as well as philosophical inquiry, reopening the question of what there is and what is important" (Hämäläinen and Lehtonen, 2016, p. 33).

Birkin and Polesie (2012, 2013) and Latour (2013a) defend the idea of an episteme opportunity for acting and thinking differently in our current social, economic and environmental situation. They argue that the emerging episteme has the possibility to answer the missing link to understand sustainability from a complex perspective. Birkin and Cam (2016) recognise Latour's ontological plurality within the emerging episteme as a significant transformation for social sciences. This radical reform lies in accepting a metaphysics of complex, interdependent and indeterminate relations. This is where associations and networks become indispensable in understanding an alternative way of thinking and acting within the sustainability governing through a change in the analytical approach to understand the epistemological shift.

Latour's work in "An Inquiry into the Modes of Existence" (2013a) introduces the possibility of an episteme change, transitioning into sustainability, taking the emerging episteme as a key transformative element to support "real" change and embrace Gaia through the understanding of the connections between the human activities and the natural world (Latour, 2017). Latour introduces the possibility of transitioning into the emerging episteme with the Modes of Existence approach, arguing that there are 15 main modes of being which are interconnected and interact with each other continually within a complex network (Latour, 2013a). He asserts that the modes of being interact and evolve in different ways in two natures: First Nature (Ecology) and Second Nature (Economy). The Second Nature (Economy) has become predominant in our society, and Latour's inquiry introduces the possibility of understanding the thinking and acting that allow transitioning into the First Nature (Ecology) (Latour, 2013a).

Each mode represents a different ontology connected and interrelated with different roles and ways of working (Latour, 2013a; Conway, 2016; Tummons, 2020). Latour (2013a) also claims that the 15 modes are not definitive; they are amendable, open to addition and subject to experience rather than a priori rationalisation. They must be encountered on their own terms and understood individually as equals (Latour, 2013a). Furthermore, Latour (2013a) suggests that three main modes have the transformative factor: Attachments [ATT], Morality [MOR] and Organizations [ORG]. Latour (2013a) argues that if AIME (An Inquiry into the Modes of Existence) can identify and understand these three modes, there is a possibility of being liberated from Second Nature (Economy) and transitioning to First Nature (Ecology).

2.5.2 Conducting empirical research in the Hammarby Sjöstad Case

Latour makes the point that the AIME project had run alongside his other work for at least 25 years (Latour, 2013a, p. xix). It is presented as an inquiry, a provisional report that provides an invitation for its readers to become co-investigators (Latour, 2013b). Latour (2013a) has aimed to extend the inquiry to the public using the research tools developed at the MODESOFEXISTENCE.ORG virtual platform (Latour, 2013a). Latour (2013a) asserts that what makes the AIME project so interesting (and challenging) is that the reader (co-investigator) will find themselves reading, exploring, and navigating through the work in an unfamiliar environment.

The thesis accepts Latour's invitation to pay close attention to the conflicts of interpreting the various truth values we are confronted with in everyday life. Latour introduces the hypotheses that it is possible to distinguish different modes that can be defined empirically and discovered, extending the work via new documents, new sources, new testimonies and new questions that can be modified depending on the study and results obtained (Latour, 2013a).

As Latour (2013a) encourages further research based on the AIME project, Latour's philosophical approach has become a huge inspiration for conducting empirical research in the Hammarby Sjöstad district. Utilising the aspects of the AIME project can reveal the contradictions and issues alienating the sustainability governing at the project level and the observation of sustainability from an epistemological perspective. Latour through his organisational studies (such as his field study in the Ivory Coast in French factories and his ethnographic research in a laboratory in California) (Czarniawska, 2022) and philosophical approach with "An Inquiry into Modes of Existence (Latour, 2013a), admits that organising is one of the modes of existence. Latour (2011) distinguishes organising and organisations. He argues that "when we stop organizing the organizations (the things) are the phantoms that appear making the mode [ORG] to disappear" (p.7) provoking constant misunderstanding in organisation studies between objects and processes (Weick, 1995). Latour (2011) argues that to define "organizing" as a mode, we need to observe how we speak of and in it, by telling

and retelling its story (Cooren, 2010). He introduces the idea that in the matter of organising, there is "an abyssal difference between speaking about an organization and talking or acting organizationally" (Latour, 2011, p. 2). Latour (2011) adds a twist, asserting that to organise means also to re-organise and it requires asserting the need to organise:

> "To act organizationally (horrible word I know) is to situate oneself at this growth point: that's where the obstacle lies over which the horse should learn to jump. Either you recognize it and you act as an organizer or you don't and then you simply talk "about" an organization" (Latour, 2011, p. 5)

As a result, the thesis will draw on sustainability governing [of cities] and on the concept of "ecologizing" of sustainability governance combined with an epistemological approach. The ontological pluralism of the metalanguage has been considered for the research study to discover the thinking and acting differently in the "organizing" mode [ORG] within the Hammarby project. The thesis observes how the [ORG] mode moves through the different truths and realities, making it possible to bridge the abyss between "modernising" and "ecologizing". Viewing and investigating sustainability governance differently by drawing on ideas from the AIME project can help address city sustainability management/governing as an epistemological issue.

The thesis will consider aspects of Latour's thinking, utilising and interpreting concepts and ideas of the AIME project due to practical constraints in setting up the research study; and develop a discussion of city sustainability governing at the project team level. This process will help identify thinking and acting differently in the Hammarby Sjöstad district, viewing and recording what the project team did, what they said about their experience translating decisions into actions, and what effects can be observed of their actions in practice and back in their response.

2.6 Resumé

The literature review in Chapter 2 has helped to draw boundaries to the research study in the Hammarby Sjöstad district, recognising that the thesis cannot "follow accounts to action and back" everywhere. Therefore, the study will focus on sustainability organising at the project team level and how alternative ways of thinking and acting have been developed in the Hammarby 1.0 and Hammarby 2.0 projects to observe possible epistemological shifts.

The literature review has given key insights and overall concepts of the AIME project and the Modes of Existence approach (Latour, 2013a) that will allow the operationalisation of the research question presented in Chapter 1: How does the Hammarby Sjöstad project manifest epistemological shifts in sustainability governance?

Latour's thinking and acting differently has become an inspiration to discover how his pluralist ontology has sharpened and added perspectives on sustainability governing (of cities) and how the process of "ecologizing" comes together as one thing. Rediscovering sustainability governing and transition through epistemic analysis to act and speak differently about sustainability.

Chapter 3 will discuss the key aspects of the AIME project that the thesis will consider to transform a challenging approach with the Modes of Existence approach into a workable framework. The insights developed through the literature review about the AIME project will enable the development of the necessary analytical tools for close-up research in Hammarby Sjöstad district and give the flexibility required for the empirical and analytical grounding for the thesis. Hence, emerging aspects of AIME concepts in metalanguage, modes, and associations will be formulated and discussed, and the analysis of city sustainability governance will be combined. This process will allow the conceptualisation of the Modes of Existence approach to conduct research and analyse the Hammarby district as a rich and unfolding case of sustainability governance and as part of a possible epistemological shift.

CHAPTER 3 Key Concepts

3.1 Introduction

The study of city sustainability governance focuses on the thinking and acting of the actors at the project level, and how the accounts collected translate sustainability governance into action and back. Thus, it pays particular attention to the dynamics and flows of movements, between accounts and doing, and then back; these are flows open to uncertainty, re-direction and transformation. Other ways of knowing can be developed, leading to the reconstruction of "doings", perhaps signalling the arrival of epistemological shifts. In these respects, the thesis has been hugely inspired by Latour and the AIME project. However, for practical reasons, the thesis draws on aspects of AIME work rather than following its path precisely. Therefore, while seeking to maintain the innovative spirit of Latour's thinking intact, aspects of a more traditional "social constructionist" approach have been incorporated.

Therefore, the concepts that rest on Chapter 3 have been developed from the AIME project are at the centre of this chapter. These unique modifications not only make them specific and workable for this thesis but also retain aspects of AIME work, offering a potential alternative that cannot be applied in full. In the following sections, I will elaborate on this distinctive approach and the essential ideas that underpin it.

3.2 From MoE as an approach to a "MoE" framework: Key adaptations

The essential translations that the study provides from the AIME project are based on the key aspects of the Modes of Existence approach (Latour, 2013a), which will allow the thesis to develop a workable framework of "MoE"s. These aspects are considered to conduct the research in the presented sustainability governance research:

- **Network** as actors.
- **Associations** for the connections.
- **Metalanguage vocabulary** to describe and register the vocabulary to make different modes visible.

One key term in the thesis is the network, understood as a network of organisations or actors. The term "actor" refers mainly to human actors and organisations. The associations (understood as a "net of", as per ANT) are restricted to associations that allow the network (organisations) to expand. The associations must first be followed by working from the accounts of key actors and through observation, images, and note-taking (more on this in Chapter 4). Although a key feature of Latourian analysis from the ANT work is the focus on the interplay between human and non-human actors, plus

a differentiation between actors and actants; the non-human actors are not part of the explicit vocabulary used in this thesis. If the thesis had focused on testing the AIME project as a significant concern for the research study, it would have required that AIME be fully embraced and follow the ANT approach with human and non-human actors to conduct the research study. This is not the case in the thesis. Due to the complexity of the Modes of Existence approach, the thesis focuses on Latour's main steps in his inquiry, which starts by concentrating on the Network [NET] mode (which is also the case in ANT) through the observation of the organisations involved in the case study presented. Table 1 below summarises the key adaptations from Latour's MoE to the "MoE" concepts used in the presented thesis:

	Latour's MoE	**Key Adaptations into "MoE" concepts**
Networks [NET]	Human and Non-Human actors Expanding open-ended net	Human actors- Organizations Net based in the Hammarby project
Associations	Follow the associations to build the network	Expanding associations between the organisations [NET]
Metalanguage	Critique of "language" as "essence", will depend on how each MoE is visible when the vocabulary in use by the Moderns is adopted in specific scenarios and situations. It considers the issue about what is "objective" and "subjective"	The use of language within the collected accounts in Hammarby Sjöstad Case Register the modes with the use of vocabulary through observation and interpretation

Table 1. Key Adaptations from MoE to "MoE"s

The conceptual approach developed in the thesis focuses only on human actors; hence, it does not include engagement with non-human actors. Finally, the [NET] is not applied as an open-ended, expanding net of associations across boundaries (with "net" therefore as the issue under inquiry) as it is in Latourian analysis. Instead, [NET] is analysed as coterminous with an organisation studied. Introducing the focus on the thesis in this way will enable a valuable contribution to the AIME project, both in terms of knowledge and the AIME project. Even if it is developing a modified version of the AIME, this will enable the thesis to use aspects of and ideas developed in the AIME project to preserve the spirit of Latour's thinking.

By adopting 'MoE's, this study provides a practical understanding of how the [NET] is connected through the actors represented by the selected organisations in the Hammarby Sjöstad case. It also explores how these interactions allow the modes to connect and reconnect with the expanding

associations between the organisations. The use of a metalanguage vocabulary to describe and register the contrasts between the modes is crucial for identifying these connections.

The thesis adopts Latour's approach and his critique of "language" as "essence". AIME takes on board the plural and hybrid character of language, the performative approach to language (Latour, 2013a). It claims that language is not only used to describe what exists but also to organise, translate and transform reality (Latour, 2013a). To be able to conduct research with the key aspects of AIME and the Modes of Existence approach, the investigator must first consider how the modes have been linguistically defined, how the modes of existence act in reality, how to spot them in the field and how to translate them into practice (Amat, 2016). Latour argues that AIME allows the possibility of exploring the metaphysics of actors and understanding the metalanguage of the modes of existence (Latour, 2013a). While the impression is that words carry essence, Latour does not follow this line of thought. Instead, it critiques it. Although accounts are central for Latour and in the presented thesis, they are also the starting point of the research study, focusing on the project team in Hammarby Sjöstad and the translation from the decision above to the actions and back. The metalanguage adopted in the collected accounts will depend on how each "MoE" is visible when the vocabulary used by the Moderns is adopted in specific scenarios and situations. Chapter 4 will explain how the content analysis will be applied through language within the collected accounts in the Hammarby Sjöstad Case. The thesis will consider the names and abbreviations specified by Latour in the AIME project to identify the "MoE" s through the metalanguage vocabulary and build the "MoE" s analysis.

3.3 "MoE"s an Overview

The AIME project defends the idea that the world comprises a diversity of beings (human and non-human) and maintains different forms of relations to multiple modes of existence (Latour, 2013a). The multiple relationships with the modes allow us to observe how the modes interact. These interactions allow an ontological plurality to consider the possibility of an epistemological shift into an emerging episteme. Latour (2013a), also with the AIME work, argues that the Modes of Existence approach can define what is true (or not) and allows one to identify what would be right or not (Latour, 2013a). For example, a legal procedure does not meet the same requirements as a scientific demonstration and does not unfold according to the same principles as a cinematographic script (Amat, 2016).

The AIME project is presented with 15 modes of being with a series of notations and abbreviations to identify them (Latour, 2013a), such as politics [POL], morality [MOR], technology [TEC] and networks [NET]. The modes are divided into five groups (3 modes in each group); they all have the same importance with different roles and ways of working (Tummons, 2021). The different modes of

being can work alongside any other mode when joined or crossed within a network (Tummons, 2021). However, although "all modes are ontological equals and must be encountered on their terms", they must first be understood individually (Conway, 2016, p. 48). Furthermore, "AIME's 15 modes are neither definitive nor exhaustive; Latour claims that they are derived from experience rather than a priori rationalisation and are therefore amendable and open to addition" (Conway, 2016, p. 48).

The thesis has taken the 15 modes of existence addressed by Latour (2013a) at the AIME project and divided them into five groups. The "MoE"s that the thesis introduces are inspired by Latour's explanations on each mode and abbreviations he has considered throughout the AIME project. The thesis will consider the names and abbreviations for the "MoE"s and facilitate the identification of the metalanguage vocabulary for the data analysis (Latour, 2013a, p. 488-489). Table 2 illustrates how the "MoE"s are divided into the five groups as interpreted for the thesis:

Group 5 Structure	**Group 1 Foundation**	**Group 2 [Quasi]-Objects**	**Group 3 [Quasi]-Subjects**	**Group 4 Transformative**
[NET]works	**[REP]**production	**[TEC]**nology	**[POL]**itics	**[ATT]**atchment
[PRE]position	**[MET]**amorphosis	**[FIC]**tion	**[LAW]**	**[ORG]**anization
[DC] Double Click	**[HAB]**it	**[REF]**erence	**[REL]**igion	[**MOR]**ality

Table 2. Interpretation of the "MoE"s in Groups (Latour, 2013a; Conway, 2016; Tummons, 2020)

- **Group 5. Structure.** It forms the start for building an AIME study; Networks [NET], Preposition [PRE] and Double-Click [DC] are key modes and must be understood before the other groups (Conway, 2016). The inquiry can begin by understanding and observing the crossings between these three modes (Amat, 2016). Latour (2013a) emphasises that each group represents different concepts and characteristics. For example, Group 5 provides "the empirical starting point for the inquiry as a whole" (Latour, 2013a, p. 488–489) and a structure to begin with AIME.

- **Group 1: Foundation.** The first group corresponds to the modes that completely "ignore *quasi* objects as well as *quasi* subjects" (Latour, 2013a, p. 378); it relates to how beings come into existence and interact with each other (Latour, 2013a). Conway (2016) refers to these first group of modes as the ideal "as the ideal, Prime Minister, first among equal" that give stability and a sort of foundation (p. 49).

- **Group 2: [Quasi]-Objects.** Includes tools, objects and other artefacts produced by humans and represent the creative associations with the "humanoids" (objects) (Latour, 2013a, p. 372; Conway, 2016, p. 50). Latour (2013a) describes the second group as "only *quasi* objects" with

an “still empty place of the subjects that might come later” (p. 372); referring to objects being associated with humans (subjects).

- **Group 3: [Quasi]-Subjects.** Latour (2013a) describes the [Quasi]-Subjects as “all regimes of enunciation sensitive to tonality”(p. 375), referring to group/organisational responsibilities and solidarities. The third group is described as beings offering subjectivity (Latour, 2013a, p. 372) with humans being capable of opinion, articulating positions in a collective (group or organisation) and becoming capable of continuity in time and space.

- **Group 4: Transformative.** It includes transformative modes that allow change (Latour, 2013a; Conway, 2016; Tummons, 2021). Latour (2013a) describes these modes as allowing a mutation (p. 426), and shift to "real" change as reaching the "optimum" with "optimal distribution of end and means" (p. 455); where the [Quasi]- Objects and [Quasi]-Subjects come together (p. 379).

The thesis takes on board the five groups of the “MoE” concepts as each “concept group” is helpful as an analytical tool to investigate the possibility of an epistemological shift in the sustainability governing process in the Hammarby Sjöstad Case. To determine the function and role of each “concept group” in the analysis to answer the research question, “How does the Hammarby Sjöstad project manifest epistemological shifts in Sustainability Governing?”. The thesis has determined that **Group 4** represents and does determinant functions that allow the development of the needed critical analysis within the Hammarby project team. The “MoE”s represented by the “concepts” in Group 4 introduce the possibility of addressing the understanding and observation needed to allow the transitioning from the Second Nature (Economy) to the First Nature (Ecology). The thesis follows Latour’s (2013a) hypothesis that the three “MoE”s in Group 4 (Attachment [ATT], Organization [ORG] and Morality [MOR]) have the transformative factor to manifest epistemological shifts. Latour (2013a) believes that these three modes will fill the crucial gaps to overcome the Second Nature (Economy): [ATT] “will make it possible to do justice to the abrupt changes in temperature of passionate interests”, [MOR] “will allow us to fill once again the place we had found empty” and [ORG] “will allow us to explore the astonishing immanence of organisations” (Latour, 2013a, p. 389). Furthermore, AIME will reveal the contradictions and issues stopping this transition in a given network (Latour, 2013a).

As the thesis is centred around “sustainability governing” in Hammarby Sjöstad, the Organization [ORG] mode will take the spotlight as the main “MoE” concept to be observed within the Hammarby project team. This choice is driven by the recognition of the “sustainability governing” concept as the main catalyst for innovative thinking and acting, a key aspect of the epistemological shift. To conduct research with the concept of Organization [ORG], it is crucial to follow Latour’s argument that the Modes of Existence approach needs to start with **Group 5** to structure the study. Therefore, the thesis

will consider the three “MoE” concepts, Networks [NET], Associations [PRE] and Double-Clicks [DC] to build the research around the transformative mode Organization [ORG]. Networks [NET] will observe the leading organisations involved within the Hammarby project team and how they build connections and associations with each other to drive the transformation in acting and thinking differently governing the Hammarby Sjöstad project. The Double-Click [DC] concept will provide further insight, revealing the contradictions and issues hindering the organising and governing of the Hammarby Sjöstad project and its team.

Group 2 [Quasi]-Object and **Group 3 [Quasi]-Subjects** will be present in the analysis. Group 2 will link with the objects and artefacts produced or facilitated by the organisations for the Hammarby project, such as technology and urban development. Group 3 will refer to the responsibilities and solidarities within the project team for the Hammarby Sjöstad project.

Last but not least, **Group 1** will represent how the ideas and concepts of sustainability are translated, reproduced and transformed in time within the Hammarby Sjöstad district.

Each “MoE” in the presented “concept groups” will be defined and presented with specific concepts linked to the Hammarby Sjöstad Case. This detailed approach in Chapter 4 will provide further insights into these concepts, enhancing the depth and thoroughness of the analysis.

3.4 “MoE”s the specifics

This section will describe what each "MoE" concept stands for and how it operates as part of the group of "MoE" s, as well as how they are the "same", taking into consideration Latour's MoE, but also "different". Keeping in mind that the study is working with an adaptation of AIME, "MoE" s, the descriptions and concepts used in the Hammarby Sjöstad Case will be linked to each "MoE" concept (Chapter 4 will give further explanations on how the "MoE" s will be used for the analysis of the accounts collected). The "concept groups" for the thesis have been taken into consideration in the following manner: start with Group 4 (Transformation) to identify [ORG] as Sustainability Governing and how [ORG] interacts with the other transformative modes allowing an epistemological shift; followed by Group 5 (Structure) to start researching the Sustainability Governing in Hammarby Sjöstad case; Group 2 ([Quasi]-Objects) and Group 3 ([Quasi]-Subjects) will identify how the created objects and responsibilities within the project team affect the sustainability governing; and finally, Group 1 (Foundation) will look into how sustainability ideas and concepts are translated, reproduced and changed in the Hammarby Sjöstad district.

3.4.1 Group 4 Transformative

Latour's AIME project suggests that through the interaction between these three modes, Attachments [ATT], Morality [MOR] and Organizations [ORG], a transformation into the emerging episteme is possible to overcome the Second Nature (Economy) and transition to the First Nature (Ecology) (Latour, 2013a). These three modes drive change and transformation into the Network [NET] and their associations [PRE]. The thesis takes the sustainability governing and organising in the Hammarby project team as the primary research focus to understand if the Hammarby Sjöstad Case contributes to an epistemological shift in thinking and acting differently in translating sustainability ideas and concepts.

[ORG]anisation. Governing the Project team

Organization [ORG] is described as the process of organising or being organised (Latour, 2013a); the [ORG] mode is understood as an association: "to ask what it means to act and to speak organizationally" (Latour, 2013a, p. 389). Latour emphasises that "organized beings" do not need to be taken for granted, as this will lead to the Network being studied incorrectly (Latour, 2013a, p. 390). Latour (2013a) argues that for the Moderns is almost impossible to register appropriately [ORG] as "We are constantly in the process or organizing or being organized ; paradoxical, because we always keep on imagining that, elsewhere, higher up, lower down, above or below, the experience would be totally different; that there would have to be a break in planes, in levels, thanks to which other beings, transcendent with respect to the first, would finally come along to organize everything" (Latour, 2013a, p. 389).

Latour (2013a) starts [ORG] as organising, arguing that "to ask what it means to act and to speak organizationally" (Latour, 2013a, p. 389); he emphasises that to be able to organise, one must disorganise to reorganise again. The thesis considers Latour's thinking on "organizing". It will focus mainly on identifying the sustainability governance in the project team through the observation of [ORG] and how this "MoE" expands and allows a specific network to be built to deliver the change in Hammarby Sjöstad district.

[MOR]ality. Sustainability Thinking

Latour (2013a) understands Morality [MOR] as values, sensitivity and the "incessant renewal of the optimum" (Latour, 2013a, p. 464). He argues that [MOR] mode needs to calculate the optimal distribution of means and ends continually to "calculate the incalculable in service of a 'civilization to come'" (Hache and Latour, 2010, p. 462).

The thesis considers Latour's thinking on Morality [MOR] as values and how these values can contribute to an epistemological shift. The Hammarby Sjöstad sustainability values and how these

values are contributing to building an eco-society through thinking and acting differently will also be taken into consideration when observing Morality "MoE" within the project team and the Hammarby community.

[ATT]achment. Organisations and Residents Involvement

Attachment [ATT] is described as "passionate interests" and "production of desires" (Conway, 2016, p. 52). These passions and desires do not form a "system" but a network; the researcher will understand the mode by understanding the relations and associations between emerging networks (Conway, 2016). Latour (2013a) describes [ATT] as part of economics and the "passionate interests" that this creates (Latour and Lépinay, 2009).

The thesis considers how [ATT] belongs to "passionate interests," considering the motivations of the organisations and residents to get involved in the Hammarby project. Are there sustainability ideas to promote change or individual/collective interests? The study will observe how the Attachment "MoE" affects the sustainability governing and contributes to the epistemological shift in the Hammarby Sjöstad Case.

3.4.2 Group 5 Structure. Starting point of the Inquiry

Group 5 determines the starting point for conducting research with the AIME project, which gives structure to the inquiry. The "MoE"s in this group allow a network and its associations to be studied, observing how the connections allow the net to expand. Furthermore, it contributes to identifying the issues and difficulties that emerge throughout these connections in the net. Latour argues that through the crossings between these three modes, the inquiry can begin (Latour, 2013a; Conway, 2016; Amat, 2016).

The thesis will follow Latour's argument to study sustainability governance with the organisation [ORG] mode. Therefore, it will take a specific type of network (organisations involved in the Hammarby project team) and observe how the [ORG] allows the organisations within the network to connect through the associations (sustainability ideas and concepts) if there are any emerging issues or difficulties in the network, and how they are resolved.

[NET]works. Organisations

[NET] is the starting point in the AIME project and leads the "way to trace the heterogeneous elements of those courses of action that, as researchers, we are interested in" (Tummons, 2021, p. 1316). [NET]work mode is the heart of the research; it allows the development of the AIME study and is an essential mode to identify the key elements of how the other modes are assembled (Tummons,

2021; Amat, 2016). Also, it defines the necessary metalanguage vocabulary to understand the modes and interpret their trajectories, movements and actions that the researcher is aiming to study (Latour, 2013a). [NET] is used to trace and assemble all the different associations and connections with the other modes as [NET] cannot live alone; it aims to achieve maximum connectivity being in danger of suffering "ontological anaemia" (Conway, 2016, p. 48).

Several points of view exist concerning the internal characteristics of Networks [NET]. There is no consensus in the literature; Conway (2016) and Tummons (2021) argue that [NET] mode is designated by the Actor-Network Theory (ANT) and remains "the same" as human and non-human actors characterise it, and the principle of symmetry which states that humans have no a priori difference in ontological status from non-humans. However, Amat (2016) objects to explaining that the different MoEs have an interest in observing a phenomenon whose knowledge and answers are to be built and are hybrid instead of relying on the human/non-human distinction.

Latour (2013a, p.38) argues that there are no ontological, institutional, or geographical barriers that restrict research with AIME as [NET] does not have any "'naturally occurring' boundaries" (Tummons, 2021, p. 1320). The barriers to developing a study with AIME are determined by the researcher's decisions and how far the study wishes to follow or build the inquiry (Tummons, 2021).

The thesis will consider Latour's argument about the [NET] as the starting point of the research. However, the [NET]work will be a defined net focused on observing Hammarby Sjöstad Case's sustainability governing. Also, the network to be studied will be the organisations involved in the Hammary project team to deliver the project. The thesis will have a defined network to research instead of expanding the open-ended net, and it will focus on human actors who will observe the organisations and residents involved in the Hammarby Sjöstad project.

[PRE]position. Sustainability

The [PRE] mode is the types of associations and connections that allow the [NET] to expand (Tummons, 2021) to identify and understand the different types of connections and movements of the modes and translate their actions, constructing a vocabulary, a metalanguage vocabulary (Amat, 2016). Latour (2013a) argues that for any scenario or phenomenon, the researcher aims to explain, the accounts arising from the study need to consider how to make sense of the outcomes. Each mode of being will have "its own distinctive ways of working, of talking, of establishing truthfulness, of how it is to be interpreted" (Tummons, 2021, p. 1316). The exploration, interpretation and explanation of the accounts collected with AIME need to be considered in how they will be understood, and this process of associating the meaning is described as the Preposition [PRE] mode (Latour, 2013a, p. 213). Also, Latour (2013a) explains that [PRE] is linked to the "course of action" that each MoE has taken and

needs to be followed to consider their trajectory. For example, we can look at the trajectory of the social phenomenon we are concerned with.

[PRE]position opens AIME to the pluralism of the metalanguage vocabulary, making it possible to detect and understand the different modes of being in a specific social situation (Amat, 2016). The [PRE] mode identifies and understands the different types of connections and movements of the different modes and translates their actions, constructing a vocabulary (Amat, 2016). Making the links in the Network [NET] to be studied, its interpretations, and the crossings and associations between the different modes (Latour, 2013a). Latour (2013a) explains this through the [NET]-[PRE] Crossing, arguing that "Whatever it is that we are interested in exploring – a text, a curriculum, a university department" needs to be first understood in [NET] mode, and then "we can trace the network of associations and connections of human and non-human actors as far as necessary" (Tummons, 2021, p. 1316-1317). The [PRE] mode will qualify the types of associations and connections that allow the [NET] to extend as a result (Tummons, 2021).

[NET-PRE] crossing can be used for describing how different modes work with each other when building the research accounts (Tummons, 2021) and create "rational accounts" (Tummons, 2019, p. 213) to interpret the network to be studied "in full colour" (Conway, 2016, p. 49). Furthermore, Latour (2013a) does not arrange the 15 modes in a hierarchy. He considers them all equal and asks "whether it is in the crossings rather than the modes that differing or even competing priorities might be ascertained" (Tummons, 2021, p. 1317).

The thesis considers Latour's argumentation about the [PRE]position mode that allows the associations to connect the different "MoE"s and build a network. However, as the network is defined by the organisations taking part in the Hammarby Sjöstad project team, the associations that make the project team's organising and governing will be focused on acting and thinking with the sustainability ideas and concepts. How does sustainability direct the associations in the presented network, considering the organisations involved in the Hammarby project? Also, it will differ from Latour's (2013a) hypothesis that considers the MoEs as equals as the thesis focuses on observing one specific "MoE", [ORG], that allows building the research around the Hammarby project team organising and governing.

[DC] Double Click. "Taken for Granted" Concepts

[DC] Double Click mode is a way of extending the research with further insights into the course of actions, trajectories and interpretations identified with the [NET]works and [PRE]position (Tummons, 2021). Latour (2013a) defines [DC] as Category Mistakes, ontological mistakes, a concept taken from Ryle (1949), that is understood as "when something that consists of one property is presented as consisting of a different property, then a category mistake in relation to that thing has been made"

(Tummons, 2021, p. 1317). By identifying, explaining and avoiding category mistakes, the research can be extended to the inquiry of the modes of existence (Tummons, 2021). Latour (2013a) is taking Ryle's category mistake as a key element in AIME to suggest that "significant numbers of category mistakes bear on the different modes of existence; but thanks to systematic empirical inquiry, we can resolve these and, by doing so, construct our accounts" (Latour, 2013a, p. 17–18). Latour (2013a) describes the category mistake as where the research begins with the perception that something is missing that prevents from doing the right thing, misjudging the knowledge gained. He describes [DC] mode as the "bad guy" in AIME. These are mistakes in the directions or trajectories taken in the "course of action" linked to "true" and "false"; Latour (2013a) argues that "is the case where we find ourselves confused about the very way which the question of true and false should be addressed"…. because "each mode possesses their own veridictions" (Latour, 2013a, p.47, 53-54).

The thesis takes Latour's arguments about how category mistakes are considered; however, the [DC] mode bears further complexity as it will require embracing AIME in full, and the present study only addresses key concepts from the Modes of Existence approach. The [DC] mode will be represented by "Taken for Granted" concepts, ideas and experiences from the collected accounts that provoke an issue, error or even a problem. Identifying the "MoE" in this matter will allow the study to identify the mistakes made along the project management process and the "taken for granted" concepts in sustainability. The study will take the understanding of the category mistakes in [DC] "alluding to the 'double click' of a computer mouse that produces information seemingly directly, instantaneously and without mediation" (Conway, 2016, p. 49). Also, the thesis follows Latour's (2013a) argument that "there are no such things as facts that speak for themselves" (p. 137) as [DC] is the "anti-mode" a "Cartesian 'evil genius' that attempts to short-circuit all modes by reducing them to the instantaneous, transcendent transfer of information" (p. 49).

3.4.3 Group 2 [Quasi] Objects

The "MoE"s in Group 2 reflect the tools, objects, and other artefacts that humans have created to make sense of their existence: "where 'humanoids' became humans' because of their creative associations with [TEC], [FIC] and [REF]" (Conway, 2016, p. 50); and they will be applied into understanding the Hammarby Sjöstad Case on how the technology, urban infrastructure and knowledge exchange have contributed to translate sustainability ideas and concepts.

[TEC]hnology. Technology Development

[TEC] mode is understood as the technological existence (Conway, 2016), creating the possibility of technological civilisation and human development (Simondon, 2018; Latour and Strum, 1986) with objects that have temporary continuity (Conway, 2016). Also, the [TEC]nology needs to be

understood considering the operational contributions and the functions of what technologies are doing and how they are doing it (Tummons, 2019). In order to construct a more faithful account, the researcher will need to follow [TEC-REF] crossing to build accounts "of the work that technologies do" (Tummons, 2019, p. 215). The crossing between Technology and Network, [TEC]-[NET], allows the researcher to "distinguish the technological from the 'merely' non-human", warning that category mistakes in [TEC] can occur at this point (Tummons, 2019, p. 215); assuming that while "technological objects" have been constructed and put into place, they can "hold up by themselves once they have been deployed" (Tummons, 2019, p. 215).

It is essential to understand how the characteristics of [TEC] come into existence and follow the network associations to avoid incurring a Category Mistake and Double-Click [DC], taking technology for granted (Latour, 2013a; Tummons, 2019). Academics such as Tummons (2019) argue that the [TEC] mode "can never be left alone" and avoid "making the category mistake of assuming that the [TEC] is now fully mastered, working smoothly, with no risks or hang-ups, no chance of a displacement or a breakdown" (p. 217).

The thesis considers the aspects of [TEC] as a "MoE" from the technological perspective. Hammarby Sjöstad district has been redeveloped through new clean technology for energy, waste, and water. The technology has been incorporated into the buildings, streets, energy production, transport and many other aspects of the Hammarby district. The [TEC] "MoE" will observe where the technology has been integrated, the reasons for the project team to incorporate such technological solutions, and how it is affecting the community.

[FIC]tion. Urban Development

[FIC] is explained as "what is fabricated, consistent, real" artefacts that humans create and build, such as clothing and architecture (Latour, 2013a, p. 238). [TEC] and [FIC] fold together, forming a [TEC][FIC] crossing (Conway, 2016).

The thesis takes the aspect of [FIC]tion as artefacts fabricated by humans following Latour's argument; the "MoE" will focus on the urban development in the Hammarby Sjöstad project through the observation of buildings, playgrounds, streets, and leisure opportunities the project team have created to incorporate sustainability living the district. Also, the [TEC] "MoE" will follow the "[TEC][FIC] crossing" concept as the technology has been integrated into the urban infrastructure in the Hammarby Sjöstad district.

[REF]erence. Information and Knowledge Exchange

Latour (2013a) refers to the Reference [REF] mode as knowledge and argues that "there is no limit to knowledge" (Latour, 2013a, p. 109). Reference [REF] can be understood how the chains of

information are created to allow the mode to move forward to develop objective knowledge (Tummons, 2019). Objective knowledge is created "when there is circulating, instrumented reference", as nobody is born a knowing being, and humans become subject to referential circuits to create subjectivised knowledge (Conway, 2016, p. 51). The "referential circuits" refer to the circulating knowledge that is in constant transformation at every stage (Conway, 2016), and Latour (1999) argues that when continuous [REF] within a Network [NET] is reached "truth circulates 'like electricity through a wire" (p. 69). Latour (2013a) describes this concept in AIME as putting “your finger on a map, a document, a screen, and you have in your hand for real, incontestably, a crater of the Moon, a cancerous cell deep within a liver, a model of the origin of the universe” that provides knowledge of the “world at your fingertips” (p. 109).

The thesis understands [REF] “MoE” as how information and knowledge is created, exchanged and distributed in the Hammarby project team, as well as between the [NET]work with the organisations and Hammarby community. The “MoE” will observe how knowledge about sustainability ideas and concepts are distributed, contributing to acting and thinking differently within the presented network.

3.4.4 Group 3 [Quasi] Subjects

Latour (2013a) argues that Group 3 entails [quasi] subjects that reflect responsibilities and solidarities collectively and organizationally subjectively created by humans.

[POL]itics. Decision Making

Latour (2013a) refers to [POL] mode as an autonomous unified group with a goal and can happen in "any collective situation" such as "a family, even an individual, a firm, a laboratory, a workshop, a planet, an organization, an institution: none have less need for this regime than a state or a nation, a rotary club, a jazz band or a gang of hooligans" (Latour 2013a, p. 149). But the author also remarks that it could fail to happen in the same way; "it is perfectly possible to talk of elections, of power struggles, of international relations, of influence, etc., without for all that saying these things politically" (Latour, 2003, p. 161). [POL] mode involves understanding the concept of 'We' to be "accepted or rejected by those it convokes" (Conway, 2016, p. 51); and it creates temporary associations to obtain unity from a multitude of people (Latour, 2013a, p. 133).

The thesis will take [POL] as an "MoE" to reflect the decision-making process involved in the Hammarby project team. Who and how were the decisions made throughout the project? Were the residents involved? How about the organisations that have set the network in organizing [ORG] the project? The collective aspect of addressing the decisions in the project team will be addressed, as will how it affects the organisations and residents.

[LAW]. Environmental Goals

Latour (2013a) argues that [LAW] mode has its separate place and can be isolated from the rest. He emphasises that "it has its own force" and "it has its own mode of veridiction, certainly different from that of Science, but universally acknowledged as capable of distinguishing truth from falsity in its own way" (Latour, 2013a, p. 358-359). The concepts of law and legal are associated with [LAW] mode as it "engages everything that follows in a specific mode that is both limited and assured" (Latour, 2013a, p. 359).

The LAW "MoE" will be addressed in the thesis as the environmental goals set for the Hammarby Sjöstad project. These are the main drivers of translating sustainability into the district, as they have been determinant to translating sustainability through technology and urban infrastructure in energy, water, and waste.

[REL]igion.

Latour (2013a) refers to [REL] mode with the concept of tradition; it considers the world around us and what becomes sacred in our "daily existence" (Latour, 2009, p. 462) without necessarily considering the information or facts needed to build it. [REL] enriches and complicates our existence (Latour, 2001).

The thesis has not taken into account [REL] as a "MoE" to avoid possible conflicts with the accounts to be collected. The study did not want to engage in sensitive topics with the selected organisations and informants. Therefore, the decision to remove [REL] from the study was a personal decision to avoid any possible moral conflicts.

3.4.5 Group 1 Foundation

Group 1 with the Reproduction [REP], Metamorphosis [MET] and Habit [HAB] modes give direction to the research and how the modes come into existence, being maintained by themselves or by other modes (Tummons, 2021). The thesis will take into consideration the three "MoE" s to observe how sustainability ideas and concepts are translated, reproduced and transformed in the Hammarby case, with the organising and governing aspects of the project team with the [ORG] "MoE".

[REP]roduction. Hammarby Sjöstad Future Development

Latour identifies [REP] as "the mode through which an entity maximises continuities in order to remain in existence a while longer" (Latour, 2013a, p. 91-92). Academics such as Conway (2016) explain [REP] mode with the concept of "lineages" as "lines of forces that achieve continuity through other creative means" (p. 49), and the main concern is to maintain itself through languages, bodies,

ideas or institutions. Latour (2009) adds that in [REP], "everything produces its own articulation, its own 'meaning'; there is 'creativity' all the way down" (p. 468–470).

[REP] mode brings out the ownership of existing, persisting, and continuing to exist (Amat, 2016). It makes a being, a structure, or a building continue to stand and continue on its trajectory, making the crossings between other modes of existence possible (Amat, 2016).

The thesis takes [REP] as a key "MoE" to understand how sustainability ideas and concepts are reproduced over time to act and think differently. How does the project team reproduce the Hammarby sustainability concepts over time and how have they been incorporated into the future development of the district?

[MET]amorphosis. Hammarby Model

The main characteristic of [MET] is "maximising transformations" (Conway, 2016, p. 49). The [MET] mode encourages change through creating and innovating to resume the course of action and adapt to the new process, taking a crisis as an opportunity to transform and continue their existence (Amat, 2016). Innovation, transformation, and adaptation are key in [MET]; they consider other beings that have been invisible until then, altering the course of action and trajectory (Amat, 2016). Latour (2013a) adds that Metamorphosis [MET] is closely associated with the Reproduction [REP] mode, as one can change the other and “form ‘a sort of matrix or kneading process from which the “human” can take nourishment [...] branch out, accelerate, be energised’; these modes are said to “precede the human, infinitely” (p. 203).

The [MET] "MoE" in the thesis will follow the transformative characteristic of the mode. How has transformation happened with an alternative concept of sustainability? The “Hammarby Model” will take the bearing of the "MoE" as it has been the central transformative aspect of thinking and acting in sustainability in the Hammarby Sjöstad Case and organising/governing the project team. The study will observe how the “Hammarby Model” has transformed sustainability ideas and concepts.

[HAB]it. Behavioural Change

The [HAB] mode allows the modes to settle into a structure and rhythm; it provides a constant rhythm that can be good, bad, or true or false (Conway, 2016). Latour (2013a) adds that “bad habits abandon [PRE]”, however “a good habit retains the ‘memory’ of [PRE] and can return to it as necessary” (p. 266–272).

The thesis will focus on behavioural change in the community as a result of thinking and acting differently about sustainability. Has the community engaged with the sustainability ideas and concepts that Hammarby Sjöstad has been built on? How far has the community changed into a sustainable

living and understanding? The [HAB] "MoE" will observe how the sustainability ideas and concepts have been translated into the community and their experiences in living in Hammarby Sjöstad district.

3.5 “MoE”s in action: steps in application and analysis

The thesis takes Latour’s AIME project and the Modes of Existence approach as an essential inspiration to build the study of sustainability thinking and acting in city management. The key aspects and “MoE”s presented in Chapter 3 enable the study to explore the dynamics and different forms of how sustainability ideas and concepts are translated into sustainability governing in the Hammarby Sjöstad case. Also, it opens the discussion of whether the dynamics observed manifest the possibility of an epistemological shift in thinking and acting on sustainability governing.

The steps and application of the AIME aspects presented in Chapter 3 differ from Latour’s steps to conduct AIME research. However, the aspects modified from Latour’s work can give in-depth accounts of sustainability governance. Latour’s (2013a) steps for conducting an AIME study are as follows:

1. NET (ANT has been folded into NET) is a construction of some sort, a fact, an event, a process, something you want to unpack. Follow the associations, humans and non-humans (Latour, 2013a, p. 477).
2. Look for category mistakes (crossings) (p. 52-55) in the NET extension.
3. Look for the trajectory of actions [PREP] (type of connections).
4. And the True and False/veridictions (critical part of the investigation).
5. Explore the beings in a given mode institutes (this also requires a diachronic analysis since beings need to be maintained).
6. One mode’s otherness from the other modes with help from the crossings.

Latour (2013a) presents [NET] as a starting point in conducting an inquiry about a fact, event, or process you want to unpack. To be able to observe and explore the net, associations with human and non-human actors need to be followed to explore how they are intertwined with each other. Observing how the associations allow the extension of [NET] as an open-ended network, these associations must be left alone. Latour argues that “association” has its mode of existence determined by the course of action and trajectory that allow types of connections in the extension of the [NET]. It also argues that the crossing between [NET] and [PRE] allows the net extension, essential for conducting research with AIME. The thesis differs from Latour’s initial steps to conduct the inquiry. The study has a determined “course of action” (trajectory) with acting and thinking differently in sustainability, and a given network has been established with the sustainability governing in the Hammarby Sjöstad case. Therefore, [NET] and [PRE] crossings are established within a set network, and it is essential for the

analysis as it will determine the crossings between the different “MoE”s. Also, the thesis focuses on human actors to observe and explore the [NET], considering the organisations involved in the Hammarby Sjöstad project. Observing the established [NET] [PRE] crossing in the sustainability governing in the Hammarby Sjöstad project allows exploring how the organising in acting and thinking occurs in the net. The organising aspect in the Hammarby Sjöstad case will be explored through [ORG] “MoE” observing how the project team translates sustainability ideas and concepts in the [NET]. Also, this process will allow for the identification of how [ORG] connects with the other “MoE” s, their crossings, and how recurrent certain “MoE” s are in action within the [NET] [PRE] network. The steps for conducting research taking as an inspiration Latour’s AIME work and utilising critical aspects of the Modes of Existence approach to conceptualise the framework are as follows:

1. The [PRE] “MoE” (course of action in the trajectory) has been defined as how sustainability ideas and concepts are translated into city management, taking into account the Hammarby Sjöstad case. The defined [PRE] will allow the study to observe a network with certain associations established with the net to define the “MoE” s.
2. As [PRE] has a defined trajectory, the next step is to identify how the organisation and governing are happening in the Hammarby project by observing the [ORG] “MoE” in the project team.
3. Observe the [NET] connected to [ORG] with human actors (Organisations) that have been established to allow [ORG] to expand.
4. Explore how other “MoE”s connect to [ORG] in the established [NET] and how the crossings are happening between them.
5. Observe recurrent emerging “MoE” s in the [NET] from the crossings.
6. Look for “Taken for granted” concepts as category mistakes in the [NET].
7. Observe how the category mistakes alienate the crossings between the “MoE” s in the established [NET].

Latour’s AIME project differs from these steps as he argues that the trajectory of actions in the [NET] needs to be followed with the associations in an open-ended network; therefore, following the associations will determine the [NET] [PRE] crossing. The [NET] [PRE] crossing allows us to expand the net and also explore the “MoE”s to consider how the modes establish “true” and “false” statements within a specific mode of being; the characteristics of each mode of being and the functions that play in the social phenomenon that the researcher is concerned with; and consider in which way one mode is different from the other to understand how they differ from each other. Latour is investigating the MoEs following the associations and the crossings in the network and looking for category mistakes in the crossings (Latour, 2013a). The thesis has modified the MoEs to adapt them to the Hammarby Sjöstad case, observe them in the given context and explore the crossings between the “MoE”s without taking the steps of establishing each mode of veridiction (“True” and “False”). The

“MoE”s have been established through the characteristics and functions that the possible modes play in the Hammarby Sjöstad case. The analysis of the crossings between the “MoE”s will establish if there are “Taken for Granted” aspects or concepts alienating the sustainability governing and how they influence acting and thinking differently in translating sustainability ideas and concepts. Table 3 summarises the differences and similarities between Latour’s steps in AIME and the steps the thesis has taken to conduct research in Hammarby Sjöstad.

	Differences	**Similarities**
[NET]	Only human actors (Organisations) Net based in the Hammarby Sjöstad Case not open ended.	Observe how the net expands Starting point of the inquiry
[PRE]	The associations are limited to the Hammary Sjöstad network	The associations within the [NET] will be observed
“MoE”	The “MoE” are an interpretation of the characteristics and factors that lay in the Hammarby Sjöstad case The study does not consider how the modes establish “true” and “false” statements within a specific mode of being The “MoE”s do not consider the “course of action” for each mode.	The “MoE”s consider the ontological plurality of the phenomenon to be investigated. The [ORG] mode has been observed through the organising of the project team in the Hammarby Sjöstad Case. Following the “course of action” on acting and thinking differently on translating sustainability ideas and concepts
Crossings	The crossings in the [NET] [PRE] will identify the “MoE” in action	The “MoE”s will interpret the different crossings within the [NET] and [PRE] network
Category Mistakes	Category mistakes will be “Taken for Granted” concepts in the “MoE”s crossings.	Category mistakes are identified in the extension of the net.

Table 3. Differences and similarities with Latour’s AIME

3.6 Resumé

Chapter 3 has introduced the key concepts from the AIME project that will be used to research sustainability governance in the Hammarby Sjöstad case. The study focuses on the thinking and acting of the Hammarby Sjöstad project in the translation of sustainability ideas and concepts. The adaptation of AIME with the “MoE”’s application and analysis has been introduced. The main concepts presented to clarify how [NET], [PRE] and [DC] will provide an exploration of a determined network and associations to observe organising with the [ORG] mode applied to the Hammarby Sjöstad project and its team. The interactions between the “MoE”s will be presented as crossings in the analysis and named as “MoE” s in action. The crossings between the “MoE”s will allow observing

the category mistakes with the “Taken for granted” concepts to identify which aspects alienate the sustainability governing in the Hammarby Sjöstad project. This process will allow the thesis to build the “MoE”s to explore and observe the language and vocabulary used to build a metalanguage as part of the analysis. Finally, through the interaction of the “MoE”s in Group 4 (Transformative), [ORG] [ATT] [MOR], the research will be able to discuss the research question: How does the Hammarby Sjöstad project manifest epistemological shifts in Sustainability Governing?

The “MoE”s application will determine the methodology needed to analyse the accounts collected through the data collection. Chapter 4 will give further insight into the methods and analytical procedure required to operationalise the research with the “MoE”s.

CHAPTER 4 Methods and Research Procedure

4.1 Introduction

Chapter 4 will present the philosophical considerations, research procedure, methods and analytical procedure to draft the appropriate research methods in line with the research question introduced previously. To build the study around the "MoE" application and analysis in the Hammarby Sjöstad case, the thesis has developed a qualitative interpretative study from a multi-realist ontological perspective with an abductive approach. The methodology presented will allow the "MoE"s application and analysis to be integrated into the thesis to explore and analyse the findings in sustainability governance and the possibility of an epistemological shift in the presented case study. Therefore, the data collection has been set: 1) first, with the literature review in the Hammarby Sjöstad project, 2) second, with in-depth semi-structured interviews with six key informants from organisations involved in the governance process, and 3) third, with an extensive photographic survey and observation notes. The data collected will be analysed using the Grounded Analysis procedure from the Grounded Theory to interpret the vocabulary used throughout the interview transcripts and identify the "MoE" concepts described in Chapter 3.

4.2 Philosophical Considerations

The research strategy and methodology used to develop the study depend on the researcher's philosophical positioning (Saunders, Lewis, and Thornhill, 2009). This positioning impacts the quality of a management study, one's understanding of one's values, and how the researcher views the world (Easterby-Smith, Thorpe, and Lowe, 1991; Guba and Lincoln, 1994; Saunders, Lewis, and Thornhill, 2009).

Through exploratory research, the thesis aims to understand city management and sustainability as an epistemological and practical form of governance at the project team level. This will facilitate finding out "what is happening", "seeking new insights", and "assessing phenomena in a new light" (Saunders, Lewis and Thornhill, 2009, p. 139) to integrate key concepts of the AIME project with the "MoE" s to explore the possibility of acting and thinking differently. Within this frame of investigation, the study takes an abductive approach to interpret the "MoE" s application and conceptualisation. The abductive approach combines inductive and deductive research, where the researcher moves from one to the other throughout the research process. The study moves between induction, where no or little previous theory exists (Saunders, Lewis and Thornhill, 2009; Edmonson and McManus, 2007), and deduction, where the existing theory is used to formulate the research questions, hypothesis, data collection and analysis to develop and test a theory (Suddaby, 2006; Saunders, Lewis and Thornhill, 2009). In this case, the thesis will move between the concepts related

to the AIME project and the interpretation of these key concepts with the "MoE" to theorise with the Modes of Existence approach. Understanding and observing change is part of the abductive strategy, and it refers to generating accounts of social actors and interpreting social life to discover the meanings or motives people give to their actions (Blaikie, 2000). Therefore, it will enable the thesis to understand the possibility of an epistemological shift in sustainability governing processes and to explore the collected accounts to observe the transition processes where transformation is critical to allow change.

The interpretation of language is essential in the thesis to consider reality as a social construction (Berger and Luckmann, 1990), contributing to understanding the Modes of Existence approach (Latour, 2013a). Latour (1986) claims that actors are formulating and reformulating constantly, and understanding a particular situation or action requires identifying the actors and their role in the network to capture the relationships between each other (Callon, 1986; Law, 1994). Latour analyses the hybrid and heterogeneous composition of different networks with human and non-human actors, and the AIME project contributes to further developing the plural and hybrid character of language (Amat, 2016). The interpretation and use of language requires a performative approach where language is used to describe what exists and to act in organising, translating and transforming as part of the metalanguage of the modes of existence (Amat, 2016). Therefore, the Modes of Existence approach (Latour, 2013a) and research practice build a pluralist metalanguage to describe each mode and open the social research to ontological and epistemological pluralism. The aim is to interpret the "MoE"s and how they emerge in certain situations to address their connections and movements.

4.2.1 Ontological and Epistemological Considerations

The exploratory nature of the research to work with the AIME concepts (Latour, 2013a) has required an interpretive philosophical foundation to interpret the key concepts in the Modes of Existence approach through the "MoE"s and structure a conceptualised framework to frame the study. The study has integrated key concepts from the AIME project (Latour, 2013a) and interpreted how the Modes of Existence approach can construct accounts on sustainability governance to observe the possibility of an epistemological shift. Therefore, the interpretive approach has allowed the research to develop a social enquiry to discover people's motivations for their actions and how mutual knowledge is "used and modified by social actors as they interact with each other; and it is produced and reproduced by them in the course of their lives together" (Blaikie, 2000, p. 115). The nature of social reality from an interpretive perspective in this thesis allows the discovery of how the presented "MoE"s can construct social reality by following the social actors involved in the Hammarby Sjöstad project, taking into consideration individual motivations but also group motivations, observing the sustainability governing process within the project team and organisational level. The interpretive approach considers what other philosophical positions, such as Positivism and Critical Rationalism, ignore: the

meanings and interpretations and the motivations and intentions people use in everyday life that direct their behaviour (Blaikie, 2000). The interpretivists are concerned with understanding the social world that people have produced and reproduced with everyday life reality with meanings, people's actions, and social situations with natural and human objects, putting them in a central place for social theory and research (Blaikie, 2000). Therefore, social reality is constituted of continuous negotiations between how we make sense of the world and how social actors interpret activities together with meanings embedded in language (Blaikie, 2000). The AIME project (Latour, 2013a) implies that reality has multiple beings that connect, reconnect and build continuously with the ontological assumption that the social reality is a construction of social actors. It does not exist independently of the social activities and interactions (Blaikie, 2000).

The interpretive foundation of the thesis enables the study to conceptualise key aspects of the AIME project with appropriate ontology (i.e. what is the truth) and epistemology (i.e. how do I find out what is the truth) considerations (Saunders, Lewis and Thornhill, 2009). Understanding the ontology and epistemology of research studies implies taking into consideration the researcher's view of the nature of the reality in the topic to be investigated and what the truth is (Saunders, Lewis and Thornhill, 2009). Epistemology is described as "the researcher's view regarding what constitutes acceptable knowledge", and ontology as "the researcher's view of the nature of the reality" (Saunders, Lewis and Thornhill, 2009, p. 119).

Latour (2013a) welcomes multiple truths and realities to construct and conduct research that permits the investigator to build accounts from different angles, being mindful of the claims made throughout the study (Law, 1994, 2004). To understand and develop a research study with Latour's concepts, complex ontological assumptions must be used to observe how the modes interact from a multi-realist ontology (Harvey and Marx, 2010; Harvey, 2010). To deepen into how the multi-realist ontology applies to the Modes of Existence approach, Edward (2016) explains that AIME (Latour, 2013a) brings forward the idea of considering the proposal of a pluralist ontology of 15 different coexisting modes of existence. AIME (Latour, 2013a) shifts towards an ontology of different modes of existence to introduce an additional analytical device to complement the "Actor-Network-Theory" (ANT) with a pluralist ontology to build a realistic social enquiry (Edward, 2016). The pluralist ontology goes beyond the view that only exists with human and non-human actors, and the modes of existence can exist independently of humans or our conceptions and interpretations (Edward, 2016). Therefore, the thesis incorporates a multi-realist ontology where social actors negotiate the meanings of actions and situations to generate complex socially constructed knowledge, meanings, cultural symbols and social institutions (Blaikie, 2000). This facilitates and structures the interpretation of the accounts collected from the "relativist" ontological assumption that rejects the idea that there is a single social reality. Furthermore, it supports the idea of multiple and changing social realities, implying that there is no

independent or neutral way to create the "truth" as "each social reality may be 'real' to its inhabitants" (Blaikie, 2000).

To be able to conduct the study with the Modes of Existence approach (Latour, 2013a), the understanding and knowledge of the social reality needs to be mutable, open to interpretation and research and never be fixed or absolute to construct rich and robust accounts around and across the world to acknowledge the uncertainties that are in the research process (Tummons, 2021). The interpretive foundation of the thesis implies taking into consideration social constructivist epistemology to focus on the ways that people make sense of the world through their experiences with the use of language. The observer becomes part of what is being observed to interpret the reality that is not objective and exterior from a social constructionism perspective (Easterby-Smith, Thorpe and Lowe, 1991). The social researcher is constantly faced with the "problem" of developing and understanding social realities (Blaikie, 2000). Therefore, the researcher should not look for external causes to explain different behaviours in the social context but rather understand individuals through their experiences (Easterby-Smith, Thorpe and Lowe, 1991). Research with the Modes of Existence approach requires considering emerging epistemology, incorporating multi-realist ontology, and interpreting the modes of existence (Latour, 2011; 2013a). This process is conducted explicitly pluralistically, requiring knowledge of each mode to emerge as the researcher develops and explores the reality to be investigated (Delchambre and Marquis, 2013). Each mode of existence has its own interpretive key and mode of veridiction through linguistic and semantic pluralism, which allows one to switch from one mode to another or mix things together (Delchambre and Marquis, 2013).

The thesis aims to consider to what extent the Modes of Existence approach introduces the possibility of understanding and exploring sustainability governance and its epistemological shift using interpretative and exploratory research. Therefore, it requires a qualitative research approach to build a methodology that enables applying and analysing the Hammarby Sjöstad case with the presented "MoE"s in Chapter 3 to conceptualise building research with key aspects from the AIME project. A qualitative study with the case study strategy has been developed to investigate the research question: How does the Hammarby Sjöstad project manifest epistemological shifts in Sustainability Governing?

The qualitative approach will give the flexibility and interpretation needed to allow the researcher to submerge into individuals' experiences and socially constructed realities to understand their perspectives and capture their experiences through detailed interviewing, observation and descriptions (Hallberg, 2006). Although, in the past, qualitative research has been undermined as unsystematic, impressionistic and unreliable (Halberg, 2006), qualitative studies can produce meaningful results and a deep understanding of the chosen research topic (Polkinhorne, 2006; Hallberg, 2006). Therefore, the qualitative approach allows us to go beyond the limitations of quantitative findings and facilitates the

possibility of explaining human thinking and acting differently in sustainability governing, as well as observing the possibility of an epistemological shift as a consequence.

Qualitative research has played a pivotal role in our thesis, allowing us to build understanding by conducting research with key aspects of the AIME projects. It has also been instrumental in interpreting and conceptualising the Modes of Existence approach for the research process.

4.3 Research design, procedures and methods

The case study strategy has been developed to make sense of the [urban] city governing sustainability at the project team level and how understanding the "MoE" with its application and analysis can identify what materials need to be collected for this study. The case study strategy has allowed the thesis to confront the key aspects used from the Modes of Existence approach, "MoE"s, to a real social, economical and environmental context in sustainability; enabling it to explore how organisations and residents experience sustainability governance within a transition process. The case study presented in the thesis has focused on the concept of sustainability and regenerative development (De Jong *et al*., 2015) discussed in Chapter 2.

The case study strategy will allow the researcher to confront Latour's concepts to an empirical example, to define the case and explore a setting in order to observe and understand it (Cousin, 2005). Although, there are discrepancies between the academics as to which methodology is best suited to build exploratory research (Makri and Neely, 2021). Academics such as Eisenhardt (1989) and Yin (2003) support the case study strategy as the most appropriate methodology to provide a possibility to develop an in-depth understanding of an individual, group or organisation (Gustafsson, 2017). A case study strategy can explore a single real-life situation or multiple situations with detailed and in-depth data collection from diverse sources (Creswell, 2013). Also, it allows building research with a single or multiple case studies depending on the context, research questions to be investigated, and the phenomenon to be understood (Yin, 20003; Gustafsson, 2017). Multiple case studies provide the possibility to understand the differences and the similarities between the cases (Stake, 1995; Baxter and Jack, 2008; Gustafsson, 2017) with the possibility of analysing the data in each situation and across situations (Yin, 2003; Gustafsson, 2017). However, single case studies allow more in-depth observation on a group of individuals within a specific context (Yin, 2003; Gustafsson, 2017) with deeper and careful understanding of a research subject and the opportunity to question theoretical relationships to explore further theorising (Dyer and Wilkins, 1991; Gustafsson, 2017). Furthermore, considering the limited application of Latour's thinking in existing literature with the Modes of Existence approach and its apparent complexity, opting for a single-case study offers a more practical

approach, especially when considering the resource constraints typically associated with a single thesis project.

a) The Choice of Hammarby Sjöstad Case

The present research has established a scope for an eco-urban development in Sweden, Hammarby Sjöstad district in Stockholm. The case provides an example of a unique environmental project in developing an urban area with integrated planning with a new concept of sustainability: the "Hammarby Model". This specific eco development has been chosen because it is a complex example of developing a new sustainability concept within a modern urban environment where the sustainability values and the community have come together. Hammarby Sjöstad represents a complex scenario with organisations, institutions, businesses, social groups, communities and individuals involved in the sustainability process. Furthermore, the Hammarby Sjöstad district has developed the initial sustainability agenda; regenerating and restoring the ecology and environment in the area, involving different organisations and institutions, and building community engagement to support these ongoing changes. As a doctoral researcher, I was granted the opportunity to study the area and meet the individuals, organisations and residents involved in the sustainability governance process.

The case will look into the organisations involved in this process and how the different actors have been involved in the Hammarby Sjöstad project to further understand how sustainability governance has developed and evolved through the "Hammarby Model" concept and the Hammarby community involvement. The involvement of Stockholm City Government has been imperative throughout the urban development to deliver the project as part of the sustainability transformation process (Suen, 2017). The City of Stockholm was involved in the planning, design and development process from 1996 to 2017, it was the initiator and coordinator of the project and the project team (China Development Bank, 2015). In 1996, the "Hammarby Model" environmental programme was developed and adopted by Stockholm City and incorporated infrastructure systems such as waste management, water treatment, heating and electricity (China Development Bank Capital, 2015; Stockholm Stad, 2024). Accordingly, a master plan was developed for the Hammarby area to redevelop the district with specific environmental goals to achieve "Twice as good" as anything built before on sustainable urban development. The City of Stockholm directed the project team to guide and influence all the public and private stakeholders to meet the environmental goals for the Hammarby Sjöstad project. All the actors involved in the project team were together responsible to meet the environmental objectives and implement the environmental programme. The aim was to build something unique with a new perspective on sustainability governing on [urban] management, a new way of thinking and acting with the "Eco-Governance" that brought together a project team through horizontal management and involved all the actors to make possible the development and implementation the "Hammarby Model" concept (ElectriCity Stockholm, 2019).

The sustainability governing at the project team level can be differentiated between Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0. Hammarby Sjöstad 1.0 has provided the district with a new urban design, technology and infrastructure based on environmental solutions with a sustainability vision (ElectriCity Stockholm, 2019). The “Eco-Governance” was integrated into the project team to develop a shared vision amongst all stakeholders and actors involved in the 1.0 project (ElectriCity Stockholm, 2019). The City of Stockholm, with the horizontal planning, directed the project team to guide and influence all the public and private stakeholders to meet the environmental goals for Hammarby Sjöstad 1.0 project. As the Hammarby Sjöstad district was due to be completed by 2025 and the City of Stockholm’s involvement was coming to an end; the Hammarby Community in 2015 started a new initiative called Hammarby Sjöstad 2.0. A group of residents created a new social initiative to discuss the district's environmental, social and economical issues to implement the Paris Climate Deal 2050 strategic goals in energy, building, mobility, and circular economy (ElectriCITY Stockholm, 2019). The residents believed that there was a need to keep developing the sustainability strategies and the environmental goals set initially for the Hammarby Sjöstad project (ElectriCity Stockholm, 2019). Since then, the initiative has involved residents, businesses and research organisations to implement smart and sustainable solutions, and support residents' involvement in the Hammarby Sjöstad area (ElectriCITY Stockholm, 2019). As part of the 2.0 initiative, ElectriCity Stockholm organisation has been created to follow on these initiatives in relation to the Agenda 2030 to define which measures and solutions are required for urban areas in energy efficiency, renewable energy sources and sustainable transport (Hammarby Sjöstad 2.0, 2022).

4.3.1 Data Collection Process

Given the research question and the discussion of it in Chapter 3, this section presents the qualitative methods that have been used to collect the material, guided and operationalised by addressing how the Hammarby Sjöstad project governing manifests an epistemological shift on translating sustainability through the “MoE”s application and analysis. Latour advises that to conduct AIME research human and non-human need to be followed in order to study a phenomenon or a topic that we are concerned with using the Actor-Network Theory. Czarniawska-Joerges (2014) explains that targeting “things” (non-human actors) diminishes the risk of only focusing on people (human actors) and neglecting other actants that are present in a network. The ANT theory (Callon and Latour, 1981) allows the observation of how actants move through the network, allowing new ones to be discovered and reveal how actions are connected to other actions with human and non-human actors.

While the thesis has not undertaken a full-blown ANT study, the objective of the data collection has been to identify the actors in the Hammarby Sjöstad project team and therefore helpful ANT procedures have been adopted to start off the data collection. The study started identifying the

organisations involved in the Hammarby Sjöstad project (human-actors) and then following the connections that were discovered through the collection of diverse material as I proceed step by step.

The data collection process has followed a mixed method (primary and secondary) qualitative approach with semi-structured interviews and textual and visual content of case material. The initial data collection was conducted with secondary data regarding academic literature review in sustainability; and case materials compilation with internet search, presentations and documents from different organisations regarding the Hammarby Sjöstad project. The primary data has been collected through the semi-structured interviews conducted with individual stakeholders and the observations during the site visits to identify which organisations were involved in the research case study. Two visits to Hammarby Sjöstad were conducted in 2019 to survey the area and explore the district. These site visits were crucial in providing an authentic and real-world perspective to the research, allowing the study to observe the infrastructure, visit different organisations, talk to people and understand how the residents in the area have perceived the change (as well as building my own experiences) regarding the sustainability governance in Hammarby Sjöstad. Table 4 shows the data collection tools that have been used to collect the necessary data for the study:

Method	Data Collection	Comments
Primary Data Collection	Interviews	Semi-Structured interview questions have been designed with open questions for the key informants to share their knowledge and experiences.
	Observation	Two site visits to Hammarby Sjöstad district have been done in June and October 2019 to observe the area and get immersed in the community doing long walks around the area, morning runs and visiting different areas of the district to gain the understanding of the sustainability values.
	Survey	A photographic survey has been carried out to gain understanding of the eco-urban development regarding building, transport, urban development, energy, water and sustainability values.
	Meetings	6 initial meetings have been conducted with the key informants before the interview to talk about the research.
	Internal Documents	The key informants gave presentations and shared documents regarding the Hammarby Sjöstad Project and their organisation.
	Fieldnotes	Notes collected in meetings, presentations and photographic survey of the area.
Secondary Data Collection	Internet Search	Internet search has been carried out prior to the visits and interviews regarding Hammarby Sjöstad urban transformation, Sustainability Model and the organisations involved in the transformation.
	External Documents	Presentations and Documents were collected using the internet search regarding Hammarby Sjöstad district.
	Literature Review	Academic literature review was carried out about Hammarby Sjöstad district, Hammarby Model and Sustainability

Table 4. Data Collection Tools in Hammarby Sjöstad Case Analysis

The data collection process has been divided into three main stages. Figure 4 gives an overview of the activities and objectives for identifying and following the actors (organisations) in the Hammarby Sjöstad project team:

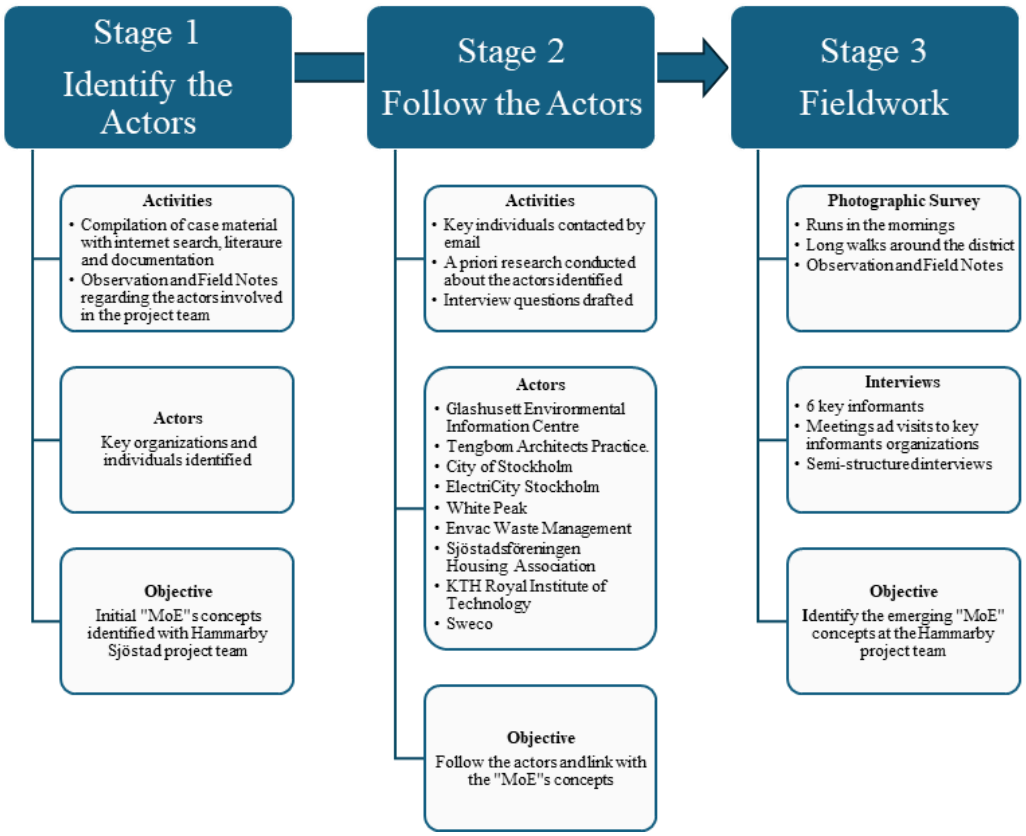


Figure 4. Fieldwork steps in the data collection process to follow the actors through activities

Stage 1. Identifying the actors: The first stage of the data collection process, following Charmaz and Belgrave's (2019) constructivist approach, viewed that "All is data", arguing that "whatever the source, whether interview, observations, documents, in whatever combination. It is not only what is being told, how it is being told and the conditions of its being told, but also all the data surrounding what is being told" (Glaser, 2001, p. 145; cited by Charmaz and Belgrave, 2019, p. 749). The Hammarby Sjöstad Case Study report by the China Development Bank (2015) served as the primary source for initiating the data collection procedure. This report, providing detailed information about the organisations involved, the project, the design, and the implementation process, was instrumental in establishing the urban and design characteristics of the district. It also allowed access to a detailed map of Hammarby Sjöstad district (non-human actor) translated by the City of Stockholm Hammarby project team. An additional literature review was conducted to understand and build knowledge regarding sustainability governance in the Hammarby Sjöstad project team. Secondary data was collected around the Hammarby Sjöstad project team and the organisations involved through an

internet search to compile information from websites and accessible documentation such as presentations, reports, journal articles and interviews. The outcome of the secondary data collection provided a comprehensive understanding of the actors involved in the Hammarby Sjöstad project team.

Stage 2. Following the actors: The second stage involved a meticulous process of contacting the identified organisations and individuals. This process aimed to recruit a small number of participants who are experts in the subject from organisations directly involved in the research problem (Easterby-Smith, Thorpe and Lowe, 1991; Edmondson and MaManus, 2007; Saunders, Lewis and Thornhill, 2009; Silverman, 2010; Makri and Neely, 2021).

The selection of participating organisations and individuals was driven by the need to include the most representative of the phenomenon to be investigated (Corbin and Strauss, 1990; Glaser, 1998; Starks and Brown Trinidad, 2007). Both primary and secondary data were used to address the research problem, and interviews and archival documents (such as internal reports or new reports) were used to supplement and compare information to select the most suitable candidates (Glaser, 1998; Makri and Neely, 2021). Therefore, the participants for the study were identified with one criterion in mind: individuals and organisations with an active role and involvement in the Hammarby Sjöstad district transformation. The following criteria have allowed the research to identify appropriate key informants with experience in Hammarby Sjöstad district urban and social transformation in the last 10 years. The people contacted were project managers, business managers, consultants, architects and researchers. 10 individuals were approached, and six expressed interest in participating in the study.

The number of key informants selected for the case study allowed the thesis to conduct an in-depth analysis of the interviews and gather data on specific topics within the Hammarby Sjöstad case analysis. Moreover, there is no agreed number of what counts as an acceptable number of key informants, which is guided by the individual study circumstances. Qualitative research enables and highlights the possibility of the richness of data from a small group of key informants and allows exploring the complexity of the chosen research topic without a set of patterns and trends (Mason, 2002; Xiao, 2016). Conducting research studies with a small group will allow in-depth exploration of the specific research topic without making theoretical generalisations (Manson, 2002).

The individuals identified were contacted by email, and an initial conversation about the research project was conducted to determine their involvement in the Hammarby Sjöstad project and whether they would be interested in participating in the study. Initially, from the list of organisations, ElectriCity Stockholm and GlashusEtt Centre were contacted as they were both involved in informing and engaging with international interest in the Hammarby Sjöstad project. Both organisations were contacted and showed interest in participating in the research study. GlashusEtt Centre agreed to participate, and Informant 1 was contacted as he was involved with the project team. He delivered a

role to inform and communicate about the Hammarby project to the visitors and engage with the Hammarby community, translating sustainability thinking and acting. While GlashusEtt did not provide further contacts, ElectriCity Stockholm, as well as agreeing to participate in the research study, allowed the possibility of contacting further individuals involved in the project and the project team. That was the case with Informant 2 (one of the architects in the project team), Informant 3 (co-founder of Hammarby Sjöstad 2.0 project and Hammarby resident), Informant 4 (consultant of the waste management system in the project team) and Informant 5 (resident and energy manager at the housing association in Hammarby Sjöstad). Informant 6 (researcher in urban planning and sustainability) was contacted through the KTH Royal Institute of Technology to discuss the Hammarby Sjöstad project and the "Hammarby Model" as a sustainability concept.

The key informants were linked to the identified actors in Stage 1 and their direct involvement with the project team. Previous meetings were arranged with the informants to explain the research study and meet them as individuals. Presentations and interviews were conducted with the key informants, who provided extensive and in-depth data regarding their knowledge, opinions, and experiences in the Hammarby Sjöstad governing process. Table 5 shows the key informants, their roles and the organisations linked within the Hammarby Sjöstad project team. The data collection, the initial meetings and the interviews were conducted from May 2019 to November 2019.

Informant	Meeting	Duration (mins)	Interviews	Duration (mins)	Professional Role	Identified Organisation
1	1	30	1	60	Communications Officer	Glashusett Environmental Information Centre.
2	1	30	1	60	Architect	Tengbom Architects Practice. City of Stockholm
3	1	30	1	60	CEO and Adviser	ElectriCity Stockholm
4	1	60	1	60	CEO and Consultant	White Peak ElectriCity Stockholm Envac Waste Management
5	1	20	1	60	Association Member	Sjöstadsföreningen Housing Association
6	1	20	1	60	Urban Planning and Environment Researcher	KTH Royal Institute of Technology

Table 5. Research key informants and Identified Organisations.

Stage 3. Fieldwork: The third stage involved collecting primary data through the fieldwork conducted during the two visits to Hammarby Sjöstad in June and October 2019. The aim was to observe, explore the area, and get immersed in the community. The Hammarby Sjöstad master plan map (Appendix I) guided the routes to be taken to orient myself and collect data while conducting different activities such as morning runs, long walks, registering main urban, environmental and social

aspects of the district, and meeting with the key informants. This process allowed taking photographs and observation notes of the urban and social aspects of the districts, such as cafes, restaurants, and parks.

The aim was to observe the urban aspects, visit different organisations, talk to people, and understand how the residents in the area have perceived the changes (as well as build my own experiences) regarding the sustainability governance in Hammarby Sjöstad. The last stage was concluded with semi-structured interviews with the key informants. The timeline below for visit 1 and visit 2 describes the activities taken on each day of the fieldwork activities:

a) Visit 1 to Hammarby Sjöstad (From Tuesday 11th to Friday 14th of June)

The fieldwork began with my arrival in Stockholm on Tuesday, the 11th of June, at 5:30 pm from Edinburgh. I stayed on the south side of the city centre in the Katarina-Sofia area, which provided a direct connection to the Hammarby Sjöstad district. On my first visit, I explored the north and south sides of the Hammarby Sjöstad district, gaining first-hand experience of the different areas.

Wednesday 12th of June

6 am. Morning run from Ersta Konferens & Hotel (Katarina-Sofia) along the north side of Hammarby Sjöstad (Norra HammarbyHamnen) to Tanto and back (10km). Photographs taken on route (Figure 5) of the district across the lake and first impressions of the district recorded.

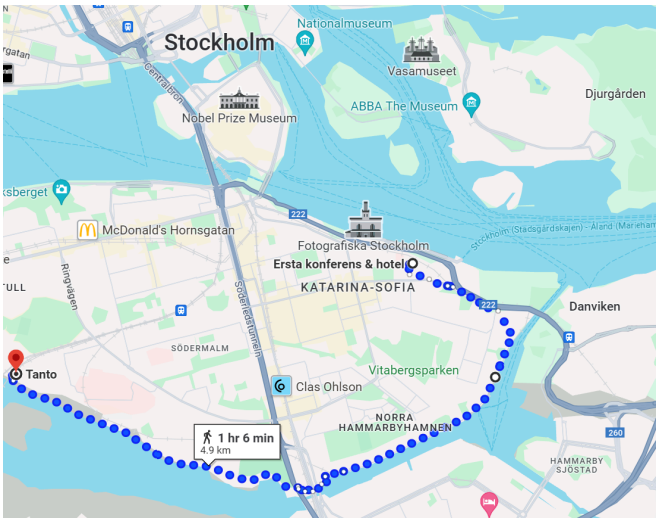


Figure 5. Running Route to Hammarby Sjöstad . Google maps (18/04/2024). [Ersta konferens & hotel to Tanto, Stockholm, Sweden - Google Maps]

9 am. Photographs taken of the urban design in transport, buildings, and green areas, including water, waste and energy aspects on sustainability governance. Figure 6 shows the walk around the district:

Figure 6. Walk around Hammarby Sjöstad . Google maps (18/04/2024). [Ersta konferens & hotel to Haga tårtcompani & bageri - Google Maps]

2 pm. Lunch at Luma Park (Lumaparken).

3 pm (2 hours). The first meeting and interview were conducted with Informant 3 at the SmartCity office in Hammarby Kaj (Hammarby Sjöstad). Informant 3 is the CEO of the **ElectriCity Stockholm** and adviser for the **Sjöstadsföreningen Association.** The initial meeting with Informant 3 was necessary to discuss the research study and set the interview. Informant 3 gave an insight into how these two actors are shaping the community into sustainability thinking and acting through the sustainability governing of the project team. They work with the residents on designing and building projects and give insight into how the residents connect with their environment, values, and responsibilities.

5 pm. Coffee at the Haga Cafe.

6pm. Walk from Hammarby Kaj to the Sikla Park and to Lugnets Terrass. Embarked on a stroll from Hammarby Kaj to the picturesque Sikla Park and further to the Lugnets Terrass. Figure 7 below illustrates the route:

Figure 7. Walk to the Sicla park and Lugnets Terrass . Google maps (19/04/2024). [Hammarby kaj, Stockholm, Sweden to Lugnets terrass - Google Maps]

Thursday, 13th of June

9 am (1 hour). **GlashusEtt Environmental Centre** meeting and presentation with Informant 1 to discuss Hammarby Sjöstad and the research study before the interview.

10 am. Tour from GlashusEtt Environmental Centre (Lugnets Alle 39) through the Sjöstadsparterren and finish at the Lumabryggan. Figure 8 below shows the route:

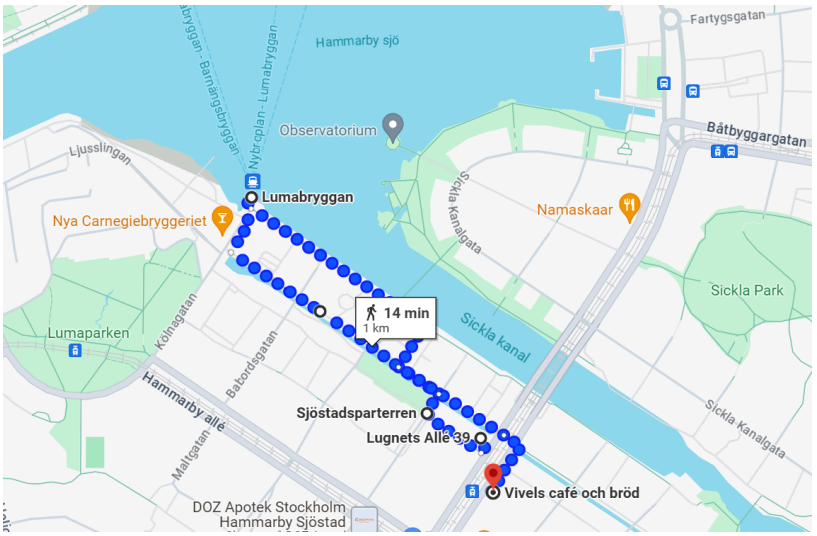


Figure 8. Walk to the Sjöstadsparterren and Lumabryggan. Google maps (19/04/2024). [Lugnets Allé 39 to Vivels café och bröd - Google Maps]

11 am (1 hour). Meeting with Informant 1, a Communications Officer at GlashusEtt Centre. His perspective on the centre's advice to the residents is aligned with environmental standards and sustainability objectives for Hammarby. The main objective is to understand how they support the

community and their level of involvement. The main outcomes of this are reflected in environmental sustainability and behavioural change, shaping ecologically minded communities.

12 pm. Lunch at the Vivels Cafe, Lugnets Allé 38, Hammarby Sjöstad.

1pm (2 hours). Meeting with Informant 2 at **Tengbom Architectural Practice**. Informant 2 provides a deep insight into the reasons and objectives behind the construction of Hammarby Sjöstad, and the environmental sustainability standards followed. The interview then delves into the involvement of **Stockholm City** and the sustainability governing process with the project team. The discussion also focuses on the transition into sustainability in the residents and community, and the significant changes observed. Has the governing process made a considerable impact on the community's behaviour, encouraging them to think and act sustainably?

4pm (1 hour). Meeting and interview with Informant 6, a **KTH Royal Institute of Technology researcher.** Informant 6, with her extensive knowledge of sustainable landscape and architecture, provides a critical perspective on Hammarby. The initial meeting is to discuss the research study and how Hammarby Sjöstad can be an example of sustainable urban development. The interview addresses questions on how Hammarby Sjöstad compares to other examples in Sweden and evaluates if the changes in the Hammarby community are as advanced. How do they relate to environmental sustainability and ecologically minded communities?

5 pm to 8 pm. Visit the old part of Stockholm centre to do some tourism and shopping.

Friday 14th of June

09:20 am. Flight to Edinburgh. Back home.

b) Visit 2 to Hammarby Sjöstad (From Thursday 17th to Saturday 19th of October)

On the second visit, I stayed in Hammarby Sjöstad district in an apartment (ApartDirect Hammarby Sjöstad) to conduct the last two interviews with Informants 4 and 5. I also took further walks to the observatory, Sickla Canal and the boat across Hammarby lake.

Thursday 17th of October

6:30 pm (2 hours). Initial Meeting with Informant 5, Energy Manager for the Housing Cooperative in Bostadsrättsföreningen Sjöstadsudden (www.Sjöstadsudden.se) at the Kulturama, Virkesvägen in Hammarby Sjöstad. The cooperative is part of **the Sjöstadsföreningen Association,** and the Energy Manager is in charge of water, sewer, heat and electricity. The interview discusses how the housing

association takes part in the ongoing transformation in Hammarby Sjöstad with the Stockholm City project team and its governance, how the residents feel about the changes and where they see the future going.

Friday 18th of October

10 am. Walk from the accommodation (ApartDirect) to the Sickla Canal to the observatorium and back to Luma part for lunch. Figure 9 below shows the route taken:

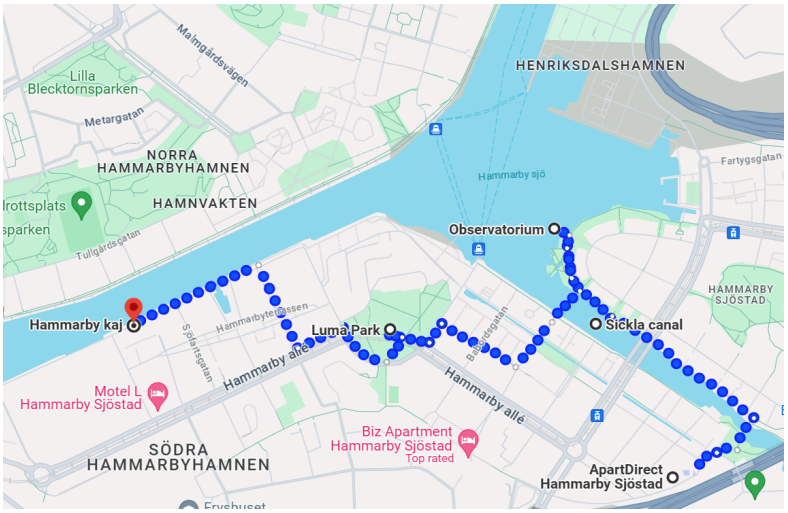


Figure 9. Walk to the Observatorium and Luma park. Google maps (19/04/2024). [ApartDirect Hammarby Sjöstad to Hammarby kaj, Stockholm, Sweden - Google Maps]

3 pm (2 hours). Meeting at the SmartCity office (Hammarby Kaj) with Informant 4, adviser to **White Peak** organisation involved in the Yantai-Hammarby project in China, member of the board of **ElectriCITY Stockholm** and former CEO of **Envac group.** We have agreed to have an initial meeting to discuss the sustainability governing process of the Hammarby Sjöstad project and how the actors were involved in the process. The interview discusses further the sustainability governing of the Hammarby project, how ElectriCITY Stockholm, Envac Group and Whitepeak are involved, and how they have contributed to acting and thinking differently on sustainability.

5 pm. Walk to Lumabryggan to take the boat to Barnängsbryggan and Henriksdal, and head to Vassparken and Slussparken. Figure 10 below shows the route:

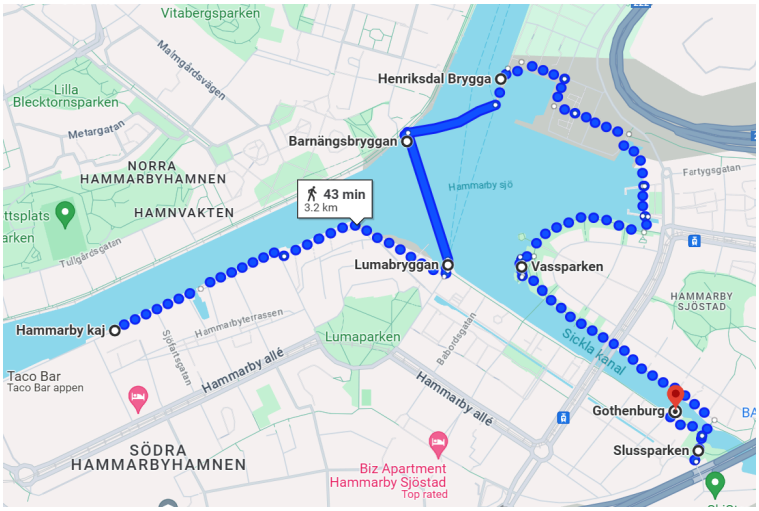


Figure 10. Route on boat from Lummabryggan to Henriksdal and cal to Slussparken. Google maps (19/04/2024). [Hammarby kaj, Stockholm, Sweden to Restaurang Göteborg - Google Maps]

8 pm. Dinner at the Gothenburg restaurant.

4.3.2 Further specification of the collected material

A combination of photography and interviews was conducted to build the data collection. The semi-structured interviews and the collection of textual and visual content of case material have been essential for the application and analysis of the "MoE" s in the Hammarby Sjöstad case. The in-depth interviewing has built on understanding different perspectives, meanings, behaviours and descriptions from a small group of key informants to explore the complexity of sustainability in the selected case study (Manson, 2002; Hennink, Hutter and Bailey, 2011). At the same time, the photographs taken were visual material to support the empirical findings in the case study. By employing the presented qualitative methods, the study gained insight into how the [urban] development and the sustainability governing of the project team made sense of acting and thinking differently.

Moreover, this is reflected in the Hammarby community, making sense of the sustainability idea translated into the district. Studies suggest that mixing photography and interviews can bring in-depth and rich data compilation (Moore *et al.*, 2008; Packard, 2008) to generate information on how social and cultural values are connected to sustainability (Sjölander-Lindqvist and Adolfsson, 2015). The combination of photographic material and interviews will allow the thesis to elaborate on the actors and actions involved in the sustainability governing of the Hammarby Sjöstad project team that otherwise might be complex and contradictory in everyday situations. Although different methods can be utilised to describe and interpret how individuals experience understanding places, the visual method, such as photography, is used as a tool for mapping to gain orientation and visually introduce the reader to the research (Czarniawska-Joerges, 2014). Also, it will complement other qualitative

methods, such as observation and interviews, to grasp the different ways of thinking and acting (Sjölander-Lindqvist and Adolfsson, 2015) to provide a "thick description" (Geertz, 1973, p. 1073) of sustainability governing applied to the local context.

a) Photographic Survey

The photographic survey enabled the study to collect visual material regarding the urban aspect of the Hammarby Sjöstad district, adding an additional dimension to the research as they represent the objects and actions of the city and its landscape. The idea was for the researcher to experience sustainability in the local context from the urban aspect. Sjölander-Lindqvist and Adolfsson (2015) argue that photography helps researchers uncover the seen and unseen aspects and values connected to sustainability in the daily lives of local actors. They argue that ideas and models on how to act and think about sustainability spread rapidly, specifically on how planning decisions may entail a governing process of restructuring places within a local context. The research study has used photography to understand the place, Hammarby Sjöstad, the landscape, and how the governing process has been linked to thinking and acting differently on sustainability.

Photos were taken throughout the Hammarby Sjöstad district following the urban master plan (see Appendix I and Appendix II), and the following urban and technological aspects of what makes Hammarby unique in sustainability governance were observed and captured. The following areas have been captured for the data collection:

- Green spaces such as parks, woodlands and wildlife areas.
- Infrastructure for leisure and healthy living.
- Transport.
- GlashusEtt environmental information centre.
- Buildings and housing with environmental adaptation and solutions.
- Water supply and management.
- Energy production and distribution.
- Waste and recycling management.

These aspects of urban development and technology have been identified as "MoE"s in Chapter 3 (p. 68-69) as Fiction [FIC] and Technology [TEC], respectively. Chapter 5 will expand on how the sustainability governing is reproduced through these "MoE" s of urban development and integrated technology.

b) Interviews

The interviews were conducted through in-depth interviews and exploration, allowing the key informants to describe their experiences. The interviewer actively listened and encouraged the participants to talk and clarify details. The interviews were informal, audio recorded and lasted approximately an hour to discuss economic, social, and environmental topics related to the Hammarby Sjöstad case. The data was collected with the key informants' consent, discussed, and used only for research purposes. The interviews were conducted in English to avoid cultural and linguistic differences between language meaning and "word-to-word" translation afterwards. The transcriptions were conducted afterwards with a professional transcriber; however, as we (myself and the transcriber) were not Swedish speakers, a small number of Swedish words said by the key informant were registered as "non-identified". However, due to their small number, the "non-identified" words did not interfere with the transcription and interview analysis. Data collection through interviewing the key informants allows the researcher to "uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience" (Burgess, 1982, p. 107). Depending on the context and research questions, they help observe experiences and opinions about specific topics with structured, semi-structured or unstructured questioning (Easterby-Smith, Thorpe and Lowe, 1991; Saunders, Lewis and Thornhill, 2009). Academics such as Leavy (2014) argue that semi-structured interviews are a middle way to collect data. They allow flexibility in asking open-ended questions with a pre-identified guide, and new themes can be introduced as the interview progresses (Jamshed, 2014). Semi-structured interviews allow a deeper understanding of the chosen case study (Saunders, Lewis and Thornhill, 2009). They can further reveal emerging concepts and their relationship not previously considered (Silverman, 2010; Makri and Neely, 2021).

The semi-structured interviews allowed the study to collect data and develop an understanding of the Hammarby Sjöstad case and the sustainability transition process with informal and open-ended questions. The interview questions were open-ended to stimulate discussion and explanation of new perspectives and understanding of the existing knowledge (Charmaz, 2006). Key questions were drafted for the key informants to elicit the information collected about their involvement in implementing sustainability governing decisions from the Stockholm City project team. The key informants were encouraged to give further details and explanations, making constant reflections such as "tell me more about …" and asking sub-questions such as "what" and "why" throughout the interview process (Charmaz, 2006) to enrich the discussion.

The interview questions were drawn around the transformative "MoE" aspects (Group 4) described in Chapter 3 to observe organising with the [ORG] mode, involvement of residents and organisations with the [ATT] mode and translating sustainability thinking with the [MOR] mode. The interviews

allowed the study to observe the language and vocabulary used by the interviewees around the other "MoE" s in Group 4, applied to the Hammarby Sjöstad project and its team. Also, the questions encouraged to identify the actors (organisations) involved in organising [ORG] the project to follow the actors and observe how the network [NET] expanded to allow the "MoE" s to connect in different ways. Therefore, the interview questions were drawn to follow specific topics connected to the transformative "MoE" s, [ORG], [ATT] and [MOR]:

- **Actors [NET] in Organizing [ORG].** Identifying organisations and social initiatives involved in the project team, making changes within the community and how the transformation is driven through the sustainability governing with the project team. These questions allow the study to observe the sustainability governance as the "MoE" aspect of [ORG] with the project team to identify the actors involved, how these actors are expanding through their interactions, and their activities to observe the network with the "MoE" aspect of [NET] explained in Chapter 3 (p. 63-64).

  - ➢ What has been your involvement in Hammarby Sjöstad and what is the role you had in this project? [ORG]
  - ➢ How many organisations were involved in the Hammarby Sjöstad project and what was ElectriCity Stockholm's involvement? [ORG]
  - ➢ What is the current involvement of ElectriCity Stockholm in Hammarby Sjöstad? [ORG]
  - ➢ How are different organisations involved with the Hammarby Sjöstad 2.0 project at the moment? [ORG]
  - ➢ How are different organisations involved with each other? Example: ElectriCity and Sjöstadforeningen Association. [ORG]
  - ➢ What was the involvement with the City of Stockholm in Hammarby Sjöstad 1.0 project? And with Hammarby Sjöstad 2.0 Project? [ORG]
  - ➢ What is ElectriCity and Envac's current involvement with the Hammarby Sjöstad 2.0 project?

- **Actors [NET] Involvement [ATT] in Organizing [ORG].** Hammarby Sjöstad residents and organisations are involved in the Hammarby Sjöstad project team. Observing how the project has impacted the community and the relationship between the identified actors and the residents is essential to observe the aspect of Attachment [ATT] explained in Chapter 3 (p. 65) to observe the interests behind the community and organisations' engagement with the Hammarby project.

  - ➢ What was the involvement of the residents in the Hammarby Sjöstad 1.0 project and what is their current involvement in Hammarby Sjöstad 2.0 Project? [ATT]

- ➢ How are their views assessed and incorporated into 1.0 and 2.0 projects? [ATT]
- ➢ Do ElectriCity and Envac Group involve residents into the decision making process? [ATT]
- ➢ Do they meet with representatives of different organisations and businesses? [ATT]
- ➢ Describe different ways (direct or indirect) of involving the residents and organisations. [ATT]
- ➢ Do you think the Hammarby residents's views are being transferred into policy development in government institutions? [ATT]
- ➢ How do you think the residents should be involved in Hammarby Sjöstad's changes and how should they participate in creating solutions and new opportunities? [ATT]

- **Sustainability Thinking [MOR] in Organizing [ORG].** What is the "Hammarby Model", and how does the sustainability thinking within the Hammarby Sjöstad district as a model of ethics and citizen responsibility drive environmental sustainability within the community? The last set of questions will gather answers to understand the "Hammarby Model" as the vital transformational aspect for change with the "MoE" aspect of Metamorphosis [MET] (Chapter 3, p. 72) and how it influences the sustainability thinking in the Hammarby community as well as the actors (organisations) involved in the project team with the "MoE" aspect of Morality [MOR] (Chapter 3, p. 64).

- ➢ How important is the Hammarby Model for ElectriCity Stockholm and Envac Group? [MOR]
- ➢ How has the Hammarby Model evolved into the Hammarby Sjöstad 2.0 Project? What are the differences? [MOR]
- ➢ How do you think the residents have changed their behaviour into the Hammarby Model? [MOR]
- ➢ How much do you think that the "Eco-Governance" and Hammarby Model has affected the resident's general views, values and knowledge? [MOR]
- ➢ Do you think the Hammarby Model has been embedded in the residents? [MOR]
- ➢ What are the resident's location motivations: environmental, economic, social? Why? [MOR]

These three topics will facilitate the study to collect data from the interviews in the main transformative "MoE" aspects in Group 4, Organization [ORG], Attachment [ATT] and Morality [MOR], as explained in Chapter 3. The "MoE" s will shine a light on discussing the research question to observe how the Hammarby Sjöstad project manifests epistemological shifts in Sustainability Governing through the project team [ORG], their involvement with residents and organisations [ATT], and how this process contributes to acting differently on sustainability thinking [MOR] through the integration of the "Hammarby Model" as a transformative key aspect [MET].

c) Observation and Fieldnotes

Fieldnotes have been recorded through observation to interpret the emerging "MoE"s in the Hammarby Sjöstad case and record a vocabulary linked to the presented concepts in Chapter 3 concerning the sustainability governing of the Hammarby project team. Also, fieldnotes have been taken through the primary data collection process in the semi-structured interviews, meetings and presentations with the key informants, and photographic survey, and also through the secondary data collection.

The observation carried out in this research has been non-participative observation with the interest of not interfering in the key informants' understanding and experiences regarding sustainability in Hammarby Sjöstad district. The research observation has focused on getting an overview of the physical contextual setting to immerse in the new urban development, facilities, transport, lifestyle, and how people live sustainability in the district. To record these elements, observation notes have been taken throughout the photographic survey of Hammarby Sjöstad district on urban planning, building development and technology incorporated in the area.

Observation has been used to complement the semi-structured interviews and other primary collection data to gain different perspectives on human behaviour (Walshe, Ewing and Griffiths, 2012). Observation is often used as a data collection tool to gain further knowledge in a real-life situation and understanding of people's behaviour through non-participative and participative observation (Hennink, Hutter and Bailey, 2011). During the observation process, the researcher is advised to take fieldnotes that can be used as personal thoughts and as an additional layer of data (Phillippi and Lauderdale, 2018). Fieldnotes are essential to identify the concept used for the data analysis procedure; therefore, they are key during the data collection when identifying concepts for later analysis (Holton and Walsh, 2017).

4.4 GT Data Analysis: at the desk

The case study on the Hammarby Sjöstad project has given the study the basis for observing sustainability thinking and acting in action. The case provides insight into the sustainability governing process in the project team and how Stockholm City's decision-making was translated through the interactions between all actors (organisations) involved in the project and the Hammarby community.

The Grounded Analysis has provided a systematic structure and methods to analyse the collected data on the case to interpret how the "MoE" s could be identified in the sustainability governing process and how sustainability thinking and acting is translated from the actors to the Hammarby community and back. The qualitative data collected for analysis was based on a photographic survey, recorded

interviews with the key informants, and observation notes. The photos and observations were included when identifying the "MoE" s, and the interviews were transcribed and analysed using a comparative analysis process with methods from the grounded theory approach. The content analysis of the interview transcripts with the memo-writing has been essential in this process to identify the emerging "MoE"s and understand their crossings, taking into consideration the informants' knowledge, experience and opinions.

4.4.1 Using Grounded Theory (GT) in theorising "MoE"

The content analysis followed the "constant comparative analysis" of the grounded theory method. The grounded theory methodological approach was developed by Glaser and Strauss (1966, 1967) as a qualitative research method to research social facts and explore the field without pre-formed predictions (Glaser and Strauss, 2017). The method allows the concepts and models to emerge from interpreting the collected data. It gives qualitative studies a systematic strategy to research the key informant's main concern to analyse how they intend to resolve these issues (Charmaz, 2006). As Charmaz and Belgrave (2019) explain, the Grounded Theory approach is based on data and how the researcher constructs, positions, analyses, and represents the data depending on the version of the Grounded Theory method they adopt.

The thesis will follow Kathy Charmaz's (2006) Grounded analysis process instead of the traditional Grounded Theory approach by Glaser and Strauss (1967). Although the traditional grounded theory offers "philosophical flexibility" (Holton and Walsh, 2017, p. 13), it requires removing the focus from time, place and individuals during the coding process in order to identify emerging concepts to arise (Glaser 2003). The idea is to remain open to data collection without preconceived ideas, to the sole knowledge to emerge and describe social behaviour within the chosen research area (Holton and Walsh, 2017; Walsh *et al.*, 2015).

Therefore, the thesis will use a further variation to the Grounded Theory approach developed by Kathy Charmaz (2006) who proposes a constructivist approach to take into consideration the interaction between researcher and key informants, interpretative understanding and how key informants create meaning of reality to develop data analysis (Hallberg, 2006). This allows the researcher to create a story to reflect the social processes happening in a set situation with a group of people (Gray, 2020). The guidelines for analysis need to remain open and flexible (Bryant, 2007) with the codes being simple and precise to compare data with data and move quickly (Charmaz, 2006). The grounded analysis process is cyclical and untidy; it should begin by studying the interview transcripts for emerging themes and concepts, constantly comparing and updating them (Makri and Neely, 2021).

Exploring the Hammarby Sjöstad case with the Grounded analysis has made theorising possible with the "MoE"s. The findings from the case analysis have provided an in-depth study that can be applied

to an individual, group or unit (Makri and Neely, 2021; Gustafsson, 2017) that enables the exploration of social relationships with the grounded analysis process (Mfinanga, Mrosso and Bishibura, 2019). Also, through the presented analysis process, the research study has been able to build a Metalanguage vocabulary to identify the "MoE" by observing the collected qualitative data to identify the vocabulary used by the key informants in governing and translating sustainability thinking and acting in the Hammarby Sjöstad project team.

a) Constant Comparative Analysis Procedure

The Constant Comparative Analysis approach has allowed theorising with the "MoE"s to identify these aspects of the sustainability governing process at the Hammarby Sjöstad project team to allow the analysis of the interviews and record the language used as a metalanguage vocabulary in translating sustainability thinking and acting.

The constant comparative analysis is a key stage in the Grounded analysis procedure, which includes emerging codes, categories, properties, dimensions and different parts of the data being constantly compared to explore variations, similarities and differences (Hallberg, 2006). The analysis process consists of using a coding system with a memo-writing technique (Glaser and Strauss, 2017) to identify the "MoE" in the Hammarby Sjöstad project team described in Chapter 3. The "constant comparative analysis" through its cyclical comparative process has allowed the study to go back and forth throughout the analysis to identify how these "MoE"s build associations and which ones emerge more than others within the sustainability governing of the Hammarby Sjöstad project. This process is common when the researcher theorises (Saunders, Lewis and Thornhill, 2009); furthermore, Makri and Neeli (2021, p. 3) describe the data and analysis process with Creswelll's (2012) words as "zigzagging" to explore "clues" or "underdeveloped categories". The analysis procedure continues until it saturates each emerging category and concepts, and the data analysed does not add new information (Hallberg, 2006). Charmaz (2006) argues that the saturation process makes the codes, concepts and categories interact and repeat at different stages of the data analysis through memo-writing. For this purpose, a set of codes, concepts, and categories have been created with the "MoE"s described in Chapter 3 to analyse the content of the photographic survey, interview transcripts, and observation notes taken throughout the data collection process. The "MoE" codes and categories have been interpreted through Latour's work in AIME (Latour, 2013a, p. 488-489) and identified through the initial data collection and literature review in Stage 1 (data collection process). Table 6 below summarises the "MoE" Codes and Categories:

"MoE"	"MoE" Coding	"MoE" Category
Networks	[NET]	Organisations
Preposition	[PRE]	Sustainability
Double Click	[DC]	"Taken for Granted"
Reproduction	[REP]	Future development
Metamorphosis	[MET]	Transformation
Habit	[HAB]	Behavioural Change
Technology	[TEC]	Technology development
Fiction	[FIC]	Urban development
Reference	[REF]	Knowledge
Politics	[POL]	Decision making
Law	[LAW]	Environmental goals
Attachment	[ATT]	Involvement
Organization	[ORG]	Governing
Morality	[MOR]	Sustainability thinking

Table 6. "MoE"s Codes and Categories.

The codes and categories in Table 6 determine which "MoE"s are emerging through the content analysis of the interview transcripts, observing the key informants' use of language and vocabulary, the photographs taken in the survey, and the observation notes taken throughout the data collection process. The content analysis started with an initial scanning of the "MoE" codes and categories to identify the general concepts emerging from the sustainability governing in the Hammarby Sjöstad project team. These concepts were linked with the "MoE" codes and categories, and the interview transcripts were analysed line by line to identify the emerging modes with these codes, categories, and concepts. This process is followed by carefully reading each transcript and highlighting the relevant text. The highlighted text was turned into quotes, which were then re-read to identify the concepts emerging from each quote. This process was repeated continually, and the wording used by the key informants to refer to the concepts was logged with the "MoE" coding. Additional emerging concepts from the key informants' opinions, expressions and knowledge were recorded and logged to clarify the relationship between the emerging concepts and the "MoE"s. The analysis followed a "zigzagging" process, going back and forth to interpret which modes existed and which new modes might emerge to keep theorising with the "MoE"s.

4.4.2 Methodological Difficulties and Limitations

The methodological procedure became a challenge throughout the study to develop a research design, methods and an analysis procedure to incorporate aspects from Latour's work in the AIME project with the "MoE"s presented in Chapter 3. The methodology required subjectivity, interpretation, flexibility, and adaptability to conduct research in sustainability governance and matters on epistemological shift through the theorising and application of the "MoE"s. Latour's Modes of Existence approach and its work in AIME complements and provides essential ground to conduct the research, and it has become the central pillar to observe the possibility of an epistemological shift to understand the transitioning on how sustainability thinking and acting has been translated in the case study. Transition research entails the replacement and restructuring of the existent regime, where the transition processes influence ongoing and future transitions; "this requires appropriate theories, concepts and methods for proactive and participatory management and governance" (Halbe *et al.*, 2015, p. 196) to observe the possibility of an epistemological shift. A broader scope, long time horizon and intrinsic complexity to understand transitions make it difficult to get a complete picture with a single simulation model (Halbe *et al.*, 2015). Model to model analysis approach is required to comprise different aspects with comparison, replication and reimplementation (Rouchier *et al.*, 2008). The main challenges in understanding the transition modelling are identifying the variables and the appropriate abstraction level, addressing uncertainties, addressing the role of co-evolutionary processes, and understanding the links between micro-scale drivers and macro-scale outcomes (Schlüter *et al.*, 2012). The thesis has considered the challenges and difficulties of understanding and exploring the possibility of an epistemological shift in sustainability governance through the transition perspective. The Modes of Existence approach (Latour, 2013a) added complexity to the research; therefore, the study needed a methodology that supported and allowed the required interpretation and subjectivity to apply aspects of the Modes of Existence approach. The research design procedure required a non-linear, intrinsic procedure with open and uncertain trajectories of search and exploration (Grin. Rotmans and Schot, 2010).

The interpretive foundation has provided the research study with critical steps to collect data with the "MoE" aspects and a systematic analytical process to include the interpretation, abstraction and subjectivity needed to understand Latour's thinking behind the Modes of Existence approach and AIME project. The case study strategy has been essential to develop the research with qualitative research methods to explore the acting and thinking on sustainability from an epistemological perspective. Researchers face challenges when questioning reliability and validity in qualitative research and whether findings are defensible, as subjectivity, reflexivity, and social interactions are emphasised (Manson, 2002; Golafshani, 2003). The reliability and validity of qualitative research go hand in hand with the ability to design the research, analyse data and judge results from the researcher's perspective (Patton, 1990). Testing the reliability and validity of qualitative research

studies involves methodological coherence and developing a dynamic relationship between data collection, analysis, and theorising (Morse *et al.*, 2002). To ensure further reliability and validity of this research with the "MoE"s, a real-life case was identified with the governing of the Hammarby Sjöstad project to explore how sustainability acting and thinking is translated into an epistemological shift. Moreover, the case study strategy and the grounded analysis process have given the needed understanding, exploration, rigour and validity to this qualitative study; as well as the contribution to social sciences and future research projects.

The grounded analysis provided a systematic analytical process with coding, memo-writing, and theorising to overcome the difficulties of identifying the "MoE" aspects in the Hammarby Sjöstad project, its governing and understanding of their associations. The "MoE" set the main aspects, categories and codes with the grounded analysis, providing an essential insight to make possible building a research study around the epistemological shift in sustainability governance and utilising aspects of Latour's work with AIME (2013a). However, researchers are often unsure how to implement this analytical method as multiple variations have been found in the academic literature (Makri and Neely, 2021). The use of grounded analysis is becoming more popular in management research. It is often mixed with a case study approach, which can provide a better understanding of real-world events (McCutcheon and Meredith, 1993). The main challenge with grounded analysis has been understanding the methodological process and the application required to work with the Modes of Existence approach. The analytical process has needed to tolerate many hours of confusion applying the constant comparative analysis and deciding how the "MoE"s can be identified using the data collected. A flexible approach with frequent re-coding cycles to facilitate the development of categories is recommended to allow the concepts to emerge from the key informants' interview transcripts (Makri and Neely, 2021). The criteria for analysing the content should be considered, including the researcher's capabilities, time, and type of data (John and Johnson, 2000). Also, it is advised to use CAQDAS with NVivo software for content analysis due to the complex and iterative process that the grounded analysis process requires (Makri and Neely, 2021). Nevertheless, the analysis in this research study with the codes, categories and emerging concepts has been manually done using the interview transcripts due to the subjectivity of identifying the "MoE"s and how they build connections. This personal decision has been made due to the need to interpret the meaning of each emerging concept. Sometimes, the concepts and categories related to each aspect have been hidden in sentences and how each key informant talks about different topics. Therefore, the content analysis process has identified the "MoEs" with codes, concepts, and use of language in the collected data.

4.5 Emerging concepts with the "MoE"s

The constant comparative analysis (Charmaz, 2006) has allowed the identify emerging concepts in each "MoE" aspect by going back and forth with the identified categories and codes using the interview transcripts, constantly comparing the language used by the key informants and allowing enough flexibility on the analysis to the researcher (Makri and Neely, 2021). The emerging concepts can be identified and compared, and new concepts emerge at the same time (Glaser and Holton, 2004; Glaser and Strauss, 1967; Hallberg, 2006; Holton and Walsh, 2017); this process can inform of the need for further additional data collection to keep developing the emerging concepts (Glaser and Holton, 2004). However, the purpose is not to increase the number of key informants or data collection but to saturate each identified emerging category and concept (Hallberg, 2006). Diagram 5 illustrates how the emerging concepts have been recorded through the analysis process to identify the "MoE" aspects and their associations with the sustainability governing in the Hammarby Sjöstad project:

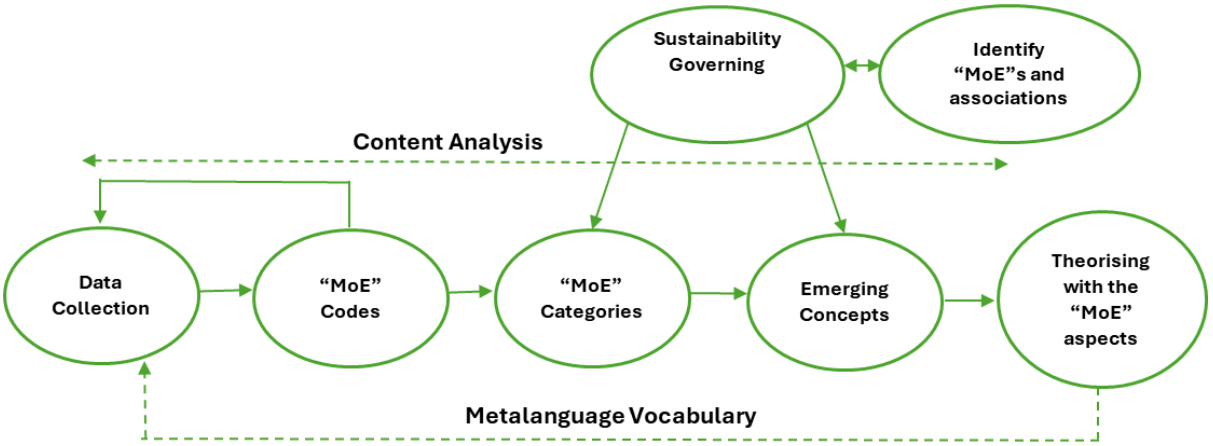


Diagram 5. Grounded Analysis Procedure applied to the Thesis (Adaptation from Makri and Neely, 2021)

The emerging concepts in each "MoE" have been identified through the use of language of the key informants and recorded as metalanguage vocabulary. The repetition of concepts and categories within the interviews has allowed the research study to understand which "MoE"s are emerging more than others within the sustainability governing process and identify their associations with each other in the "MoE" codes and categories. Table 7 gives an example of identifying emerging concepts in the interview transcripts:

Quote	**Informant 2. What was the involvement of different organisations in Hammarby Sjöstad?**	**Emerging Concepts**
(156)	" the project (Hammarby Sjöstad)(3) is organised by the City of Stockholm(2), and they used a number of consultants in their organisations(1), "Bessen Protic" (inauds) organisation for Hammarby Sjöstad. So I (Tengbom)(6) was asked to join this team(5) (City of Stockholm)(2)	**(1)Organisational Involvement** **(2)Actor**

	1997, and I'd been working with the project under a number of years. But if I count every hour and put it together, it would be close to 10 years full time, but it spread over a longer time. So I have been one of the of the planning architects(4) for the project(3) to take part in the coordinated coordination of the project(3), but basically from the planning architects(4) point of view.". Informant 2 interview, Pg 1.	**(3)Projects** Hammarby Sjöstad 1.0 **(4)Architectural Planning** **(5)Group Planning**

Table 7. Example of Emerging concepts. Informant 2 Interview

The identified emerging concepts have been linked to the "MoE" aspects described in Chapter 3 through the categories and codes. The emerging concepts are phrases and words used to summarise meanings of sentences spoken by the key informants, and associated concepts are broader concepts of the words and phrases to link with the concepts and categories in Hammarby Sjöstad.

The memo-writing has interacted at this stage to interpret the "MoE"s further with the emerging concepts and identify how they interact to build an understanding of the sustainability governance process through the analysis of the key informants' interviews. The memo-writing technique has allowed the analysis process to understand the associations between the identified "MoE"s. The memo-writing allows users to move quickly through the data to analyse and identify the relationships between categories and concepts (Glaser, 1998; Bryant, 2017; Charmaz, 2006). Although this process can be similar to taking fieldnotes, memo-writing can support researchers in interpreting the abstraction from the raw data and explaining the context in which it is being examined (Birks, Chapman and Francis, 2008). Any format can be used during the memo-writing process: diagrams, short notes, and bullet points (Glaser, 1998). During the process, emerging concepts will arise with the analytical coding, allowing the codes to be incorporated into the interview transcript quotes (Glaser, 1998). The memo-writing process allows ideas, interpretations and vocabulary to start developing and becomes essential to note the variables (Glaser, 1998). The described process has allowed the study to link the emerging concepts with the codes and categories and, therefore, observe how the identified "MoE"s emerge throughout the sustainability governing process in the Hammarby Sjöstad project. The memo-writing focused on recording the use of language of the key informants in the interview transcripts on each "MoE" aspect, focusing on the key informants' knowledge, understanding, and experiences. Box 1 below shows an example of the memo-writing process from the Informant 2 memo-writing extract of the actors involvement in the Hammarby Sjöstad project team with [NET].

Informant 2 Memo-Writing. Understanding of the [NET] crossings.
Informant 2 was involved in designing Hammarby Sjöstad district in the architectural planning group; he represented [NET]2 (Tengbom Architectural Practice) in this project. Informant 2 was asked in the interview about the involvement of [NET]2 in the Hammarby Sjöstad district and how the other organisations were involved throughout the project. When Informant 2 was asked how Tengbom and the City of Stockholm were involved in the Hammarby Sjöstad project, the answers show different actors (Emerging concept 2) interacting together. Informant 2 explains that the Hammarby Sjöstad project was organised

by the City of Stockholm and they used a number of consultants and organisations to build a team to develop the Hammarby Sjöstad project. City of Stockholm is represented by [NET]7.

- "**the project (Hammarby Sjöstad)**[3] is organised by the City of Stockholm, and they used a number of consultants in their **organisations**[1]" (Quote 156, Informant 2 Interview, p.1)

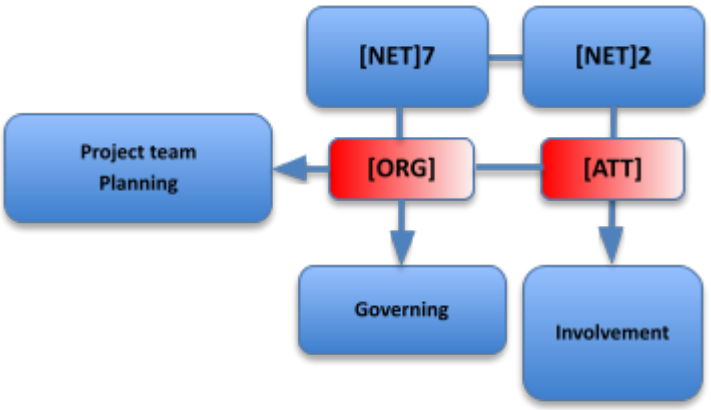
- "I (Tengbom) was asked to join this **team**[5] (City of Stockholm) 1997, and I'd been working with the project under a number of years." (Quote 156, Informant 2 Interview, p.1)

- "So I have been one of the **planning architects**[4] for the **project**[3] to take part in the **coordination of the project**[3], but basically from the **planning architects**[4] point of view." (Quote 156, Informant 2 Interview, p.1)

Informant 2's explanation about how [NET]2 was involved in Hammarby Sjöstad district shows a cross between two Networks [NET]2 and [NET]7.

- "the project is organised by the City of Stockholm" **[NET 7]**
- "I was asked to join this team" **[NET]2**

The [NET] crossing registered between [NET]2 [NET]7 with [ORG] and [ATT] is visible in this Mind Map:



*Red Modes: Symbolise the Main Modes driving the interaction between the "MoE"s.

Box 1. Informant 2 Memo-Writing extract

The identified emerging concepts have been registered into the quotes and linked to the "MoE"s. The phrases and words summarising the meanings of the key informants' sentences have been recorded in the metalanguage vocabulary on each "MoE" aspect. Also, the results from the memo-writing analysis have uncovered the associations between the "MoE"s that will provide findings on how these aspects interact within the sustainability governance in the Hammarby Sjöstad project team. and their associations have been registered into the quotes of the interview transcripts. Tables 8 and 9 below show an analysis example of Informant 2 interview transcript (quote 156). The tables show how the emerging concepts have been registered and linked to the "MoE" aspects and how the findings are recorded with "MoE" codes in the interview transcript quote:

Emerging Concepts	"MoE" Aspects	"MoE" Codes
(1)Organisational Involvement	Involvement	[ATT]
(2) Actor	Organisation	[NET7] City of Stockholm [NET]2 Tengbom Architects
(3)Projects (5)Group planning	Governing	[ORG]
(4)Architectural Planning	Urban development	[FIC]

Table. 8. Example: "MoE"s identified in quote 156 (Informant 2 Interview)

Quote	Informant 2. What was the involvement of different organisations in Hammarby Sjöstad?
(156)	" the project (Hammarby Sjöstad)(3) **[ORG]** is organised by the City of Stockholm, **[NET 7]** and they used a number of consultants in their organisations(1) **[ATT]** "Bessen Protic" (inauds) organisation for Hammarby Sjöstad. So I (Tengbom) **[NET 2]** was asked to join this team(5) **[ORG]** (City of Stockholm) **[NET 7]** 1997, and I'd been working with the project under a number of years. But if I count every hour and put it together, it would be close to 10 years full time, but it spread over a longer time. So I have been one of the of the planning architects(4) **[FIC]** for the project(3) to take part in the coordinated coordination of the project(3)**[ORG]**, but basically from the planning architects(4) **[FIC]** point of view.". Informant 2 interview, Pg 1.

Table 9. Example of Emerging "MoE"s with codes. Informant 2 Interview.

4.6 Ethical Considerations

Ethical approval was obtained in 2019 prior to the primary research data collection stage; the "Information Sheet for key informants" and "UREC Consent form" (See Appendix III) were designed and approved by the University of Sheffield Ethics Committee. The key informants taking part in the research were over 18; they agreed to participate in the interviews and initial meetings after they had read and signed the information sheet and consent form before their involvement in the research. As a researcher, I communicated to the key informants that their involvement was voluntary and that they could withdraw at any time if they decided so. Therefore, the importance of understanding why the research was being conducted and what it would involve was translated to the participants. The key informants acknowledged that the research aimed to look at examples of sustainability in Sweden, and the study involved observing how different organisations were involved in sustainability governing the Hammarby Sjöstad project. The information sheet informed the participants that interviews would be conducted with organisations, project managers, consultants, architects, and researchers involved in the redevelopment of Hammarby Sjöstad. The interviews were informal, lasting approximately an hour, and were audio recorded with the key informant's consent. The data was discussed beforehand for research purposes.

The semi-structured interviews were designed with questions related to Hammarby Sjöstad district regarding the project development, different organisations' involvement, community involvement and the sustainability transformation concept in the area. As a researcher, I ensured that the potential for

physical and/or psychological harm and/or distress to the key informants was minimal; therefore, questions that referred to sensitive subjects such as religion and personal beliefs were not included in the interview questions. The research was conducted with people who had professional and personal expertise in Hammarby Sjöstad, and the main objective of the informal semi-structured interviews was to share experiences and build knowledge regarding the Hammarby Sjöstad project and sustainability values in the district. No criticism or pointing out faults were made throughout the visits and interviews; open-mindedness and open-ended questions for dialogue were conducted with the key informants. No sensitive personal data (such as racial or ethnic origin, political opinions, religion and criminal records) classed as "Special Category" under the General Data Protection Regulation (applicable in the UK and EU from 25th May 2018) was collected during the study and participation in the research was anonymous and non remunerated.

The key informants were informed that the data collected from the interviews would be kept strictly confidential and only accessible to research team members with their authorisation. The key informants have been treated anonymously and have not been identified in any reports or publications unless explicit consent has been given. Personal details and the collected data have been stored following the data protection legislation condition: the use of these data is "necessary to scientific or historical research purposes under the General Data Protection Regulation (applicable in the UK and EU from 25th May 2018) the appropriate legal basis for research purposes will be a task in the public interest" (Article 6(1)(e). All the confidential and personal data has been kept in a confidential file securely locked, and the digital copy is stored on the University of Sheffield System following the University of Sheffield protection data policy, UK-EU protection data, and confidentiality laws. The data generated at each stage of the research has been securely stored at the University of Sheffield system and has been shared with the research supervisors, Prof. Frank Birkin, Dr. Lien Monkhouse and Dr. Olga Cam. The University of Sheffield has acted as the data controller for this study, looking after the information and using it appropriately.

The key informants were made aware of the possibility of raising a complaint regarding the research procedure and the researcher's involvement in the study while the research was conducted. They were also aware of how to communicate a serious adverse event to the Head of the Department, who would then escalate the complaint through the appropriate channels. A section regarding how to raise a complaint was included in the "Information Sheet for the key informants" form.

4.7 Presenting and structuring an account

Chapter 4 has introduced the methodology and research procedure to introduce interpretive qualitative research with a case study strategy and a grounded analysis procedure. The thesis has built an

exploratory research in sustainability governance with the Hammarby Sjöstad project and how sustainability thinking and acting is transferred into the community and back. The presented methodology has allowed the study to observe and discuss whether, throughout this process, an epistemological shift of acting and thinking differently can be observed in the governance of the Hammarby project and its translation into the community.

The following chapters (5, 6 and 7) will introduce the empirical findings. The accounts have been structured and presented in three chapters to introduce how the "MoE" aspects emerge in the case study, how the associations between the "MoE"s allow the crossings between each other to expand the network in the sustainability governing of the project, and how specific "MoE"s contribute to an epistemological shift in thinking and acting differently in sustainability. The collected material, including photographs, key informant accounts, and observation notes, will be active narrative shapers, becoming performative participants in presenting the research findings. The centre of the findings will be guided by the interviewees' (key informants) accounts. At the same time, the photographs and notes will enable the findings to be presented more visually and support the discussion on theorising with the "MoE" aspects.

Chapter 5 first presents an overview of the Hammarby Sjöstad case and aligns the "MoE"s with the outcomes of the analysis of the interviews and the accounts collected with the interviewees' quotes, pictures and observation notes. Structuring and presenting the accounts this way will help the reader to understand where the "MoE" aspects are individually in the case and the emerging "MoE" s in the sustainability governing at the Hammarby Sjöstad project team. The chapter is essential to follow the later findings presented in Chapters 6 and 7.

Chapter 6 builds on the previous chapter, introducing the identified actors represented by the organisations involved throughout the case analysis. This chapter visualises the networks that will allow the active "MoE" s to emerge within the Hammarby Sjöstad sustainability governance process and contribute to an epistemological shift in acting and thinking differently.

CHAPTER 5 “MoE”s in the Hammarby Sjöstad Case

5.1 Introduction

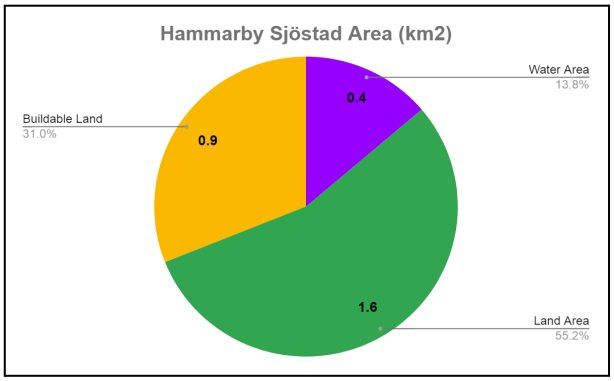
Chapter 5 presents the Hammarby Sjöstad case and how the findings centred around the interviews, photographs and observation notes make an argument for the “MoE”s identified in the sustainability governing of the project team. The “MoE”s explained in Chapter 3 have been identified throughout the initial analysis and linked to the “MoE”s codes and categories presented in the previous chapter. The key informants’ phrases, expressions and opinions have been registered within the interview transcripts to observe and introduce the emerging “MoE”s in the case presented.

5.2 Hammarby Sjöstad Case Review

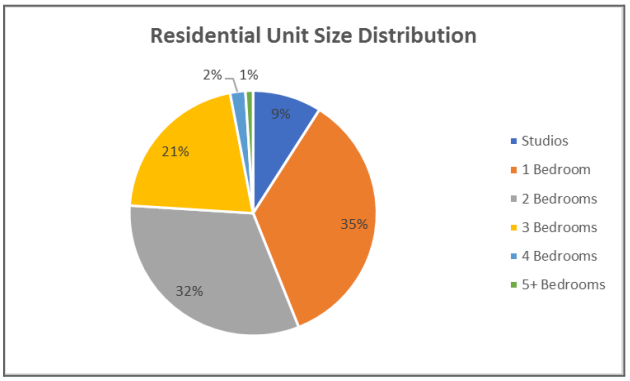
The Hammarby Sjöstad is a district built on an industrial area on the south side of Stockholm city (China Development Bank Capital, 2015). In the 1990s, it was a run-down industrial area, and it has been transformed into an extension of the Stockholm city centre, becoming one of the world’s highest-profile examples of Sustainable City Development in 2012 by The Economist (ElectriCity Stockholm, 2019). Since the 1990s, Stockholm City has been committed to building its reputation by integrating the sustainable development concept into its institutions and governance (City of Stockholm, 2017; cited by Suen, 2017). Stockholm City has developed an integrated administrative system that guarantees that environmental aspects are considered in budgets, operational planning, reporting, and monitoring (City of Stockholm, 2017; cited by Suen, 2017). It has integrated into the city governance environmental policies that have allowed to cut carbon dioxide emissions by %25 per inhabitant to be fossil fuel-free by 2050 (City of Stockholm, 2017; cited by Suen, 2017). Stockholm City has developed eco-district development projects such as Hammarby Sjöstad district and Stockholm Royal Seaport as part of this sustainability transformation. These projects are pioneering examples of regeneration and sustainability (Suen, 2017).

The Hammarby Sjöstad project has provided the district with a new eco-development project with urban design, technology, and infrastructure based on environmental solutions with a sustainability vision (ElectriCity Stockholm, 2019). The critical success factors of the project have been a strong political commitment by the authorities in Stockholm with the aim of “twice as good as anything built before”, a pioneering planning and design development using a new concept for city development with the “Eco-Governance” and horizontal planning with all the parties involved working together and collaborating (ElectriCity Stockholm, 2019). The “Eco-Governance” planning process was integrated into the Hammarby Sjöstad project team to develop a new city development concept with sustainability targets to build a shared vision amongst all stakeholders and actors involved in the 1.0

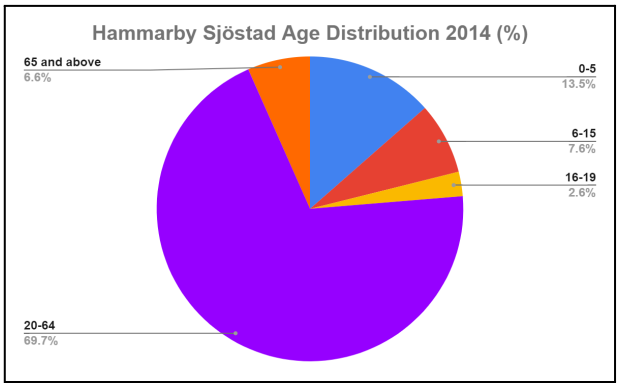
project phase (ElectriCity Stockholm, 2019). Also, the Hammarby Sjöstad project has added a new layer of sustainability into the city's urban redevelopment strategy (mixing the modern and semi-open zones with the traditional inner-city buildings) with an environmentally integrated design with a new environmental programme called the "Hammarby Model". The district is expected to be fully developed by 2025, with a projected population of 35,000 residents living and working in the area (City of Stockholm, 2015; cited by China Development Bank Capital, 2015). The Hammarby Sjöstad apartments are privately owned by 68% and rented by 32%, with the average rental and purchasing prices higher than the city's average. Graphs 1, 2, 3 and 4 present the main facts about Hammarby Sjöstad (City of Stockholm, 2015; cited China Development Bank Capital, 2015):



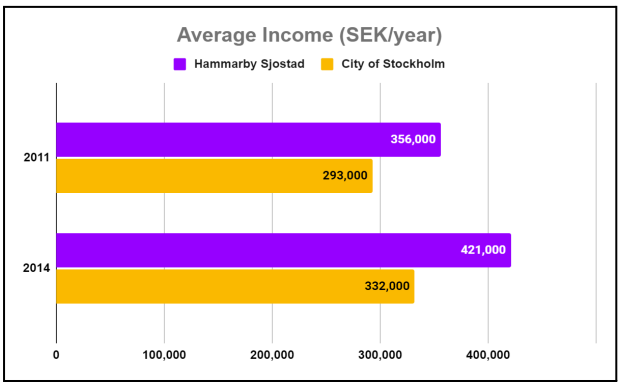
Graph 1. Hammarby Sjöstad Area



Graph 2. Residential Unit Size Distribution



Graph 3. Hammarby Sjöstad Age Distribution



Graph 4. Average Income

Graphs 3 and 4 reveal a significant aspect of Hammarby Sjöstad, which is the average income of its residents. This income level surpasses that of the City of Stockholm, indicating the project's economic success and its potential for attracting high-income residents. Additionally, 69% of the population are young professionals between 20 and 64 years old, further highlighting the project's appeal to this demographic (City of Stockholm, 2015; cited by China Development Bank Capital, 2015).

5.2.1 The Project Team

The City of Stockholm was the initiator and coordinator of the Hammarby Sjöstad project (1996-2017) and the project team with the district's planning, design and development process (China Development Bank, 2015). Stockholm City created the Hammarby project team to manage the first stage of Hammarby Sjöstad transformation: Hammarby Sjöstad 1.0. The City of Stockholm composed the project team with people from two organisations, the City Planning Administration and the Development Administration of Stockholm. Diagram 6 shows the project team's structure (Nilsson and Magnusson, 2012; cited by China Development Bank Capital, 2015):

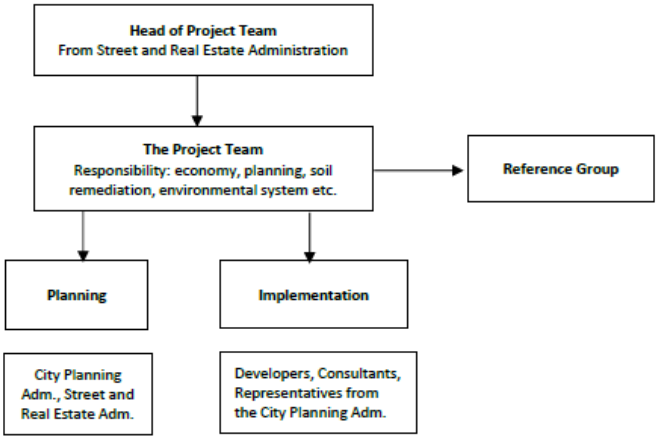


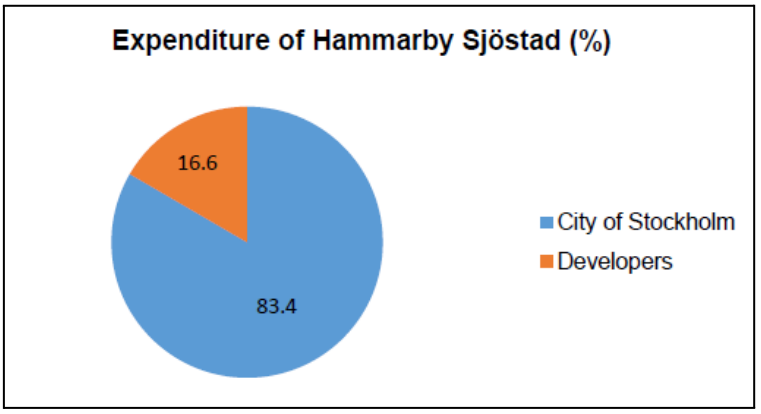
Diagram 6. Organisation of the Project Team for Hammarby Sjöstad (Nilsson and Magnusson, 2012; cited by China Development Bank Capital, 2015)

The project team allowed collaboration with developers, architects, public sector stakeholders and Stockholm residents (Svane, 2002; cited by China Development Bank Capital, 2015). The City of Stockholm's planning department coordinated the team with regular meetings, workshops and reports to involve the different actors as an exceptionally dedicated group to plan Hammarby Sjöstad 1.0 (Sweco, 2012).

The City of Stockholm, Stockholm Transport, the National Road Administration, and other private sources strategically funded the initial project. The City of Stockholm secured funding from the national government through the Local Investment Program (LIP) subsidy (Stockholm LIP, 2003, cited by the China Development Bank Capital, 2015). The LIP aimed to enhance ecological sustainability and energy efficiency, increase renewable energy, biodiversity, and residents' well-being within the district, and ensure adequate air and water emission treatment solutions (China Development Bank Capital, 2015). The subsidy was exclusively available locally (China Development Bank Capital, 2015) to encourage municipalities to strive towards an ecologically

sustainable society (Gaffney *et al.,* 2007). The LIP was guided by the principles of Habitat II (the United Nations Conference on Human Settlements in Istanbul 1996) and the Local Agenda 21.

The City of Stockholm allocated about SEK 200 million (16 million pounds) for Hammarby Sjöstad to develop the district as a pilot project with effective and comprehensive solutions for sustainable and eco-friendly urban development (LIP Stockholm, 2004; cited by China Development Bank Capital, 2015). The total investment in the Hammarby Sjöstad 1.0 Project has been SEK 5.7 billion (461 million pounds) (Gaffney *et al*., 2007). Graph 5 below shows how expenditure in the Hammarby Sjöstad 1.0 stage has been distributed:



Graph 5. Investment in Hammarby by City versus Developers (China Development Bank Capital, 2015)

The City of Stockholm acquired most of the land in Hammarby Sjöstad, taking leadership at all the urban master plan development stages, targeting decontamination, use of brownfield land, and provision of public transportation (to discourage car use, energy consumption), water conservation and recycling (Folleta, 2011). Table 10 summarises the development process stages and actors involved in Hammarby 1.0:

Stage	Actors	Responsibilities
1	**City of Government**	Land ownership and master planning
2	**City of Government**	Financing and managing infrastructure
3	**Developers**	Pay for land and pay fees for planning, building permits, and ability to connect to infrastructure
4	**Residents**	Buy apartments, pay rent, or pay for access to a condominium and rent to a private housing association

Table 10. Process from Land Development to Property Ownership in Hammarby (China Development Bank Capital, 2015)

The City of Stockholm, along with various administrations, companies, municipal and private developers, contractors and consultants, embarked on a collective journey to meet the objectives and environmental goals for the Hammarby Sjöstad 1.0 project (Gaffney *et al*., 2007).

5.2.2 Decision Making at the Project Team

The "Eco-Governance" and horizontal planning incorporated all parties' collaboration and involvement in the City of Stockholm project team (ElectriCity Stockholm, 2019). The "Eco-Governance" approach allowed the involvement of different actors in the decision-making, design, development and implementation of the Hammarby Sjöstad 1.0 project (Svane *et al.*, 2011; cited by China Development Bank Capital, 2015):

1) Design development and implementation with city administrations.

2) Municipal companies for water, waste and energy.

3) The regional public transport company Storstockholms Lokaltrafik (SL).

The success of the Hammarby Sjöstad 1.0 project was not just the result of the City of Stockholm's efforts. It was a collective achievement, with significant contributions from private developers, municipal housing companies, architects and other consultants (China Development Bank Capital, 2015). The different actors were involved throughout the project phases to better understand the process and how it affected each other's interests (China Development Bank Capital, 2015). Initially, the project team was based near the construction site in Hammarby Sjöstad to be 'neutral' when managing different contracts with other companies and departments (Gaffney *et al.*, 2007). However, in 1998, the project team was relocated to the City of Stockholm Streets and Real Estate Administration department in Stockholm to have better access and control over public investment with direct influence from political interests (Johansson, 2002; cited by Gaffney *et al*., 2007).

The City of Stockholm divided the urban master plan into 12 sub-neighborhoods to be developed in phases with a process called "parallel sketches". The City planning and design team prepared a design code for each sub-neighbourhood, which provided an overview of each block's layout, form, structure, public spaces and pedestrian routes (Folleta, 2011). The City of Stockholm selected three to four architects/planners in the private sector to draw proposals for each sub-neighbourhood to work on each designated plot or individual building according to the design code (Folleta, 2011). The city planning and design team evaluated the proposals, and the combination of the best features was incorporated into the master plan (Folleta, 2011). Figure 11 shows the sub-districts for the planning and design process in Hammarby Sjöstad:

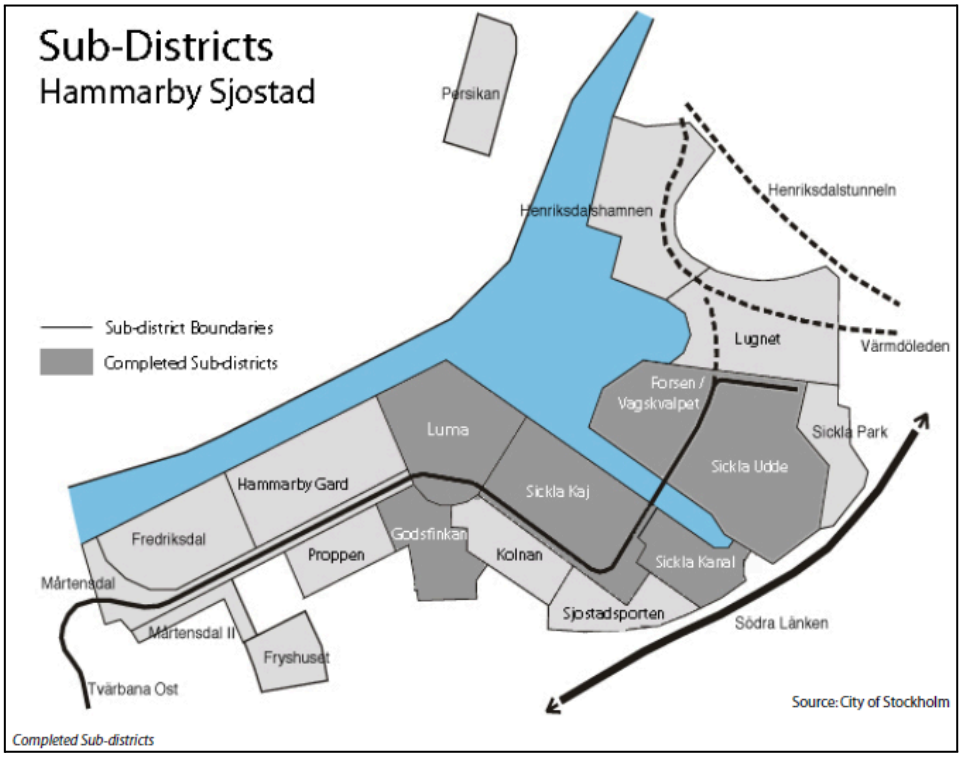


Figure 11. Hammarby Sjöstad Case Study (City of Stockholm, 2007; cited by Gaffney *et al.*, 2007)

5.2.3 The Hammarby Model

An environmental programme called the "Hammarby Model" was developed in 1996 to meet the City of Stockholm's political commitment to achieving the "twice as good as anything built before" aim, the Local Investment Program (LIP) funding requirements and build an eco-district with strict environmental goals. The new sustainability concept, the "Hammarby Model", was integrated into the Hammarby Sjöstad project with the aim of delivering an eco-district development project. The "Hammarby Model", with its objective to minimise energy use and optimise resources, using 80% of the recoverable energy content of waste and wastewater (KTH, 2014a), has been successful and has fostered a sense of unity and collaboration. Sophie Pandis Iveroth, one of the KTH researchers who evaluated Hammarby Sjöstad's environmental profile, highlights the role of the "Hammarby Model" in unifying all the actors in new city developments and the importance of the environmental programme in bringing all the actors together with the vision "twice as good" (KTH, 2014b).

The "Hammarby Model" is based on three aspects: Energy, Waste, and Water and Sewage (China Development Bank, 2015). The environmental programme has aimed to develop an Eco-Cycle adaptation model in sustainability urban management to create a living environment based on sound and sustainable use of resources to minimise energy consumption and maximise recycling and conservation (Sweco, 2012). The supply systems were environmentally engineered based on

renewable energy, recycling, and a closed-loop system with environmentally solid sustainability goals at each level (Sweco, 2012). Diagram 7 and Table 11 below show the "Hammarby Model" and description of each stage:

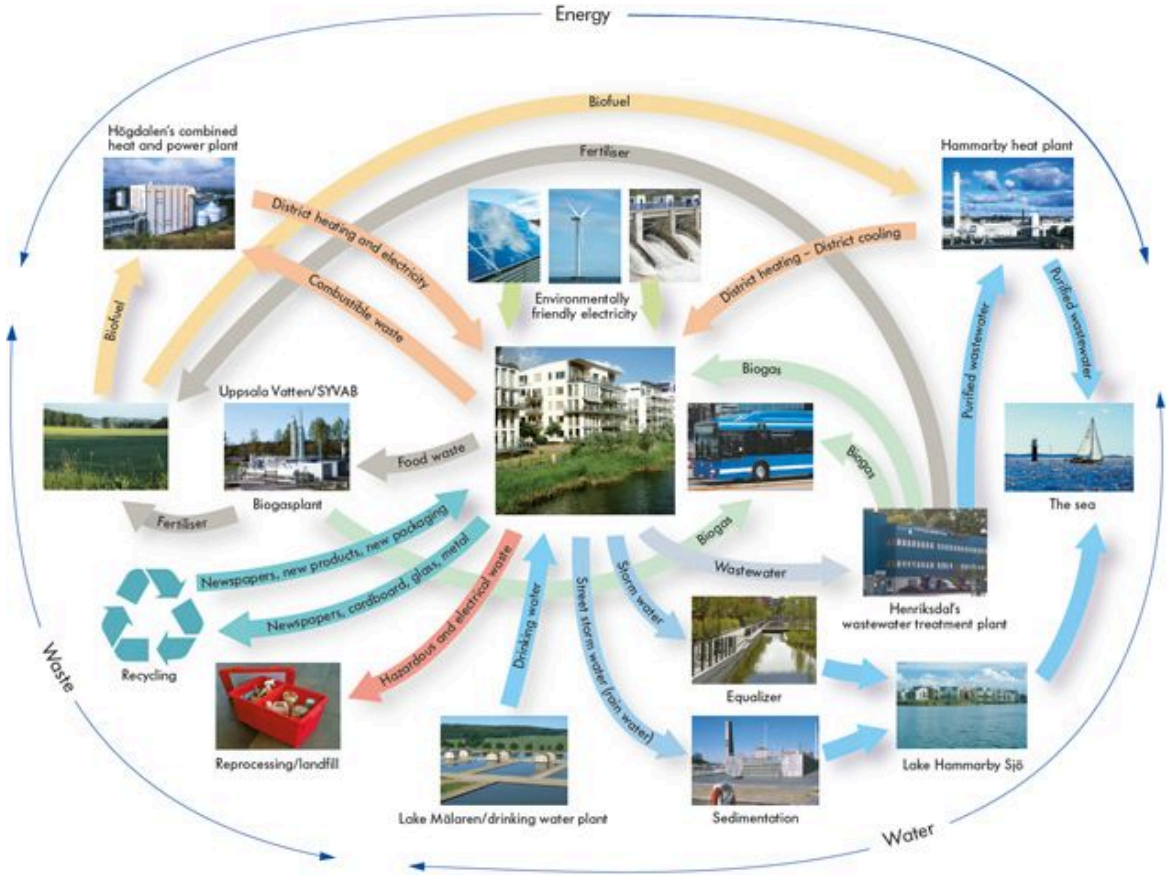


Diagram 7. Eco-Cycle- Hammarby Model (Envac Group, 2019)

Energy	Combustible waste is used to generate district heating and electricity. Biofuels are used to generate district heating and electricity. district heating and cooling are both produced using purified wastewater. Solar energy is converted into electricity or used to heat water. Electricity should bear the Good Environmental Choice label or equivalent. Biogas is extracted from sewage sludge and food waste.
Waste	Combustible waste is converted into district heating and electricity. Food waste is biodegraded to produce biogas that fuels vehicles, while the sludge becomes nutrient-rich fertiliser. All recyclable materials are sent for recycling: newspapers, cardboard, glass, metal, etc. Hazardous waste and electrical waste are recycled or taken care of.
Water and Sewage	Rainwater from the streets is treated locally and does not strain the wastewater treatment plan. Rainwater from courtyards and roofs is led into Hammarby Lake. Wastewater is treated and then used to produce district heating and cooling. Biogas is extracted from biodegraded sewage sludge, which is used as fertiliser.

Table 11. Summary of the Hammarby Model Stages (China Development Bank, 2015)

5.2.4 The Master Plan and the Environmental Goals

To achieve the district's environmental goals, new technology solutions were incorporated into the design and planning of the district to incorporate the "Hammarby Model" concept (China Development Bank, 2015). As a result, a master plan was developed for the area to include the following strategies: 1) minimise the development impact, 2) use eco-friendly technologies, 3) respect ecology and the natural systems, 4) energy efficiency, 5) minimise the use of non-renewable resources, 6) increase local production, 7) increase walking and 8) reduce car ownership and mobility (Gaffney *et al.*, 2007).

The City of Stockholm set ambitious environmental goals, aiming to reduce the environmental impact by 50% compared to 1990's urban development projects. This was not a task for one entity but a collective responsibility shared by administrations, companies, municipal and private developers, contractors, and consultants (Svane, 2002; cited by China Development Bank Capital, 2015). Together, they integrated the "Hammarby Model" into all urban planning and development aspects, with strict environmental requirements on buildings, technical installations, and traffic environment (Folleta, 2011). Table 12 below summarises the City of Stockholm's environmental goals for the Hammarby Sjöstad 1.0 project (City of Stockholm, 1996; cited by China Development Bank Capital, 2015):

Category	Environmental Goal
Energy	The total requirement of supplied energy is not to exceed 60kWh/m2 of which electricity is not to exceed 20 kWh/m2 and the total being the sum of all residential energy consumption that includes energy from solar cell/collectors. 80% of extractable energy from waste and waste water is to be reused and priority will be given to recycling, re-using materials and reclaiming the energy expended from the household unit.
Transportation	80% of all commuters are using public transport, cycling or walking.
Waste and Recycling Material	The total amount of recyclable and waste material, both of which are the responsibility of municipal authorities and various commercial interests, is reduced by 20% in weight.
Water and Waste Management	Water consumption (excluding re-circulated water) per person is reduced by 60% compared with the average supply to new housing in the inner city area. All stormwater needs to be treated locally. Waste is to be sorted in practical systems, with material and energy recycling maximised. Waste Categories: organic material, textiles, environmentally harmful waste and hazardous waste. Residual Waste reduced by 60%. Also the total amount of generated waste should be reduced by 20%. Waste collection traffic in the area should be reduced.
Building materials	Materials: healthy and environmentally sound. Recoverable materials are to be used as far as is technologically and economically possible. Mixed-use: inner city architecture; 10,000 apartments for 25,000 inhabitants living and working in Hammarby.
Land use	100% of all developed land is to be re-developed and adapted for the district. Public Green space: 100% of the residents live within 500m of public accessible space, with 25 m2 of public green space and 15 m2 of private courtyard space per apartment unit.

Contaminated Soil	Areas of contaminated soil are to be sanitised prior to development, to such an extent that they no longer represent at risk to either public health or the environment.
Lake Restoration	All stormwater from roads and parking areas is to be purified.
Emissions/ Disturbances	All housing is to have a noise-free side, where the equivalent noise level outside the windows does not exceed 40 dB.

Table 12. Environmental goals summary (China Development Bank Capital, 2015)

The project team's development of the Environmental Load Profile (ELP) tool was a significant step towards meeting the environmental goals and assessing the results in the Hammarby Sjöstad district. The ELP, a life-cycle assessment tool, defines relevant activities from an environmental perspective and quantifies the environmental loads from these activities, such as emissions, soil pollutants, waste, and the use of water and nonrenewable energy resources. It takes into account individual activities (cooking, laundry), buildings (materials, heating), unbuilt real estate areas, and material and transport (materials, personal transports, transport of goods). Combining these activities estimates the environmental load for Hammarby Sjöstad as a whole district. Urban planners and developers use this assessment tool to provide feedback on the environmental performance of the urban development proposed to the City of Stockholm (China Development Bank Capital, 2015).

5.3 The Emerging "MoE"s at the Hammarby Sjöstad Project Team

The emerging "MoE"s at the Hammarby Sjöstad case can be identified at the project team level through the "organizing" aspect of the "Eco-Governance" approach (horizontal planning) and decision-making process at the Hammarby Sjöstad 1.0 project. As explained in Chapter 3 (p. 64), the [ORG] "MoE" relates to organising and how the sustainability governing at the project team facilitates translating the sustainability concept internally and externally into the project. The "Hammarby Model" facilitates the organising and governing of the project, incorporating a transformative aspect with [MET]. The "Hammarby Model" is a specific sustainability concept created by the City of Stockholm project team that will be implemented in the project. Also, the transformational aspects of the Hammarby Sjöstad project are centred on the master plan for urban development [FIC] and the technological solutions incorporated [TEC] in the project to meet the environmental goals [LAW] set by the City of Stockholm. These "MoE" s belong to the first stage of the project: Hammarby Sjöstad 1.0. Diagram 8 shows the summary of the emerging "MoE"s within the sustainability governance process in the case analysis:

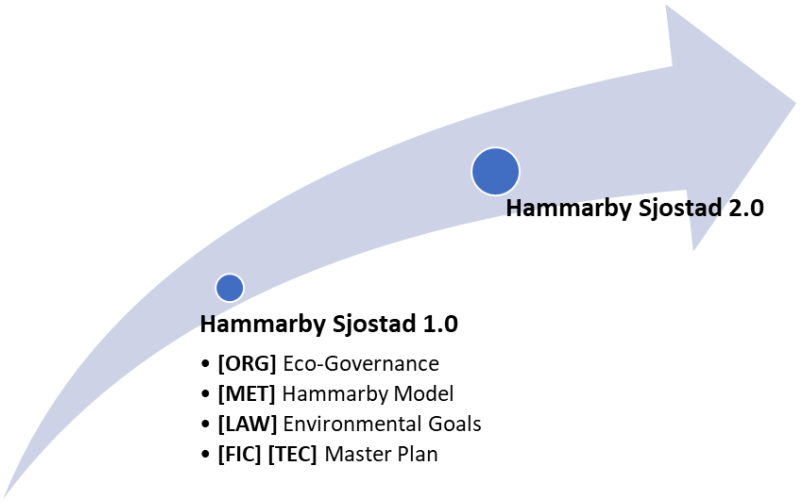


Diagram 8. Emerging "MoE"s in Hammarby Sjöstad 1.0.

5.3.1 Sustainability Governing in the Hammarby Sjöstad project team [ORG]

The City of Stockholm directed the project team to guide and influence all the public and private stakeholders to meet the environmental goals for the Hammarby Sjöstad 1.0 project. All the actors involved in the project team were together responsible for meeting the environmental objectives (Svane, 2002; cited by the China Development Bank Capital, 2015), implementing the master plan design, planning, finances, land decontamination, and the construction of the infrastructure needed such as bridges, streets and parks (Bäckström, 2015; cited by China Development Bank Capital, 2015). The architect Jan Inghe-Hagström at the Stockholm City Planning Bureau led the planning process and development of the strategic masterplan for Hammarby Sjöstad at the project team (Folleta, 2011). Informant 1 reflects on the project team:

> The City Planning Department has been involved from the beginning, creating an office for the project team *"where you have people from different departments and they (City of Stockholm) sit them in the same office building office area"*. Informant 1 explains their involvement in finding and distributing as much information about Hammarby Sjöstad for the residents and visitors, *"we have been working very closely together"* (Quote 188).

Box 2. Informant 1. [ORG] Mode Memo-Writing Results

The "Eco-Governance" planning process was integrated into the Hammarby Sjöstad project team to develop a new city development concept with sustainability targets to build a shared vision amongst all stakeholders and actors involved in the 1.0 project process (ElectriCity Stockholm, 2019).

Informant 4 shared his knowledge throughout the interview regarding the "Eco-Governance" and collaboration between the different actors:

The success of the Hammarby Sjöstad project has been the collaboration over so many years amongst so many actors in such a major project in Stockholm: *"it takes collaboration, it takes different types of entities within the City and also private actors and architects to understand the benefits and collaborate to make this happen"* (Quote 135). The "Eco-Governance" has been an essential planning and coordination tool to manage the project with the organisational know-how and the ability to adapt to it from all the different actors (Quote 135).

Box 3. Informant 4 [ORG] Mode Memo-Writing Results

Informant 4 explains that Hammarby Sjöstad transformation has had an enormous acknowledgement around the world to replicate "Eco-Governance", organisational know-how and horizontal management between all actors and remarks that from Hammarby 1.0 project [ORG]: *"there were a number of things that were taken over and made more or less standard for other projects"* (Quote 129). Informant 4 also adds that from the Hammarby 1.0 project, there is an acknowledgement of the necessity of needing more horizontal collaboration: *"There are so many other areas that we need to find ways of developing synergies and learning from each other and cooperation and this is a good example"* (Quote 144).

Box 4. Informant 4 [ORG] Memo-Writing Result

The Hammarby Sjöstad 1.0 Project was characterised by the cooperation, collaboration and transparency between all the actors involved in the process (Sweco, 2012). Throughout the process of design, planning, development and implementation, cooperation between all the actors was crucial: "people were engaged in the project from the start until the end and had a better understanding of why things were done and how affected their interest" (Sweco, 2012, p. 7). The "twice as good" environmental goal pushed the project team to use innovative methods, tools and solutions to meet the objectives (Svane, 2002; cited by China Development Bank Capital, 2015). Informants 3 and 5 also reflect on how important has been the collaboration between all parties and how the "Eco-Governance" has affected the process:

Hammarby community gets the "Eco-Governance" through the Hammarby Sjöstad project with "inputs and ideas" and in general is an important concept: *"Hammarby Sjöstad was built around the idea that we need to make this together in the whole neighbourhood"* (Quote 89).

Box 5. Informant 5 [ORG] Mode Memo-Writing Result

Informant 3 explains the knowledge transfer into the international interest regarding the "Eco-Governance" as part of the "Hammarby Model": *"We try to explain for China's visits, this is Eco-Governance, so this is not government in terms of City of Stockholm, it's government and business and there is the eco perspective on sustainability perspective on it"* (Quote 52).

Box 6. Informant 3 [ORG] Memo-Writing Result

5.3.2 The Hammary Model as a Transformative Concept [MET] and the Environmental Goals [LAW]

The transformative aspect of the Metamorphosis [MET] "MoE" is identified with the "Hammarby Model" concept, which incorporates an alternative concept of translating sustainability city development. It is the central transformative aspect of thinking and acting in sustainability in Hammarby Sjöstad's case, as well as directing the project team on how to meet the environmental goals set by the City of Stockholm. The "Hammarby Model" has provided an innovative system that minimises energy use and optimises energy, water, and waste resources. The "Hammarby Model" has been critical in transforming the Hammarby Sjöstad district and transforming sustainability ideas and concepts. Informant 3 reflects on the "Hammarby Model"'s relevance in transforming the district.

- *"So it was just a way for the City of Stockholm to build the city"* (Quote 50).
- *"it's the infrastructure around citizens and they come here and live it, rather than thinking about it, knowing, thinking ...So this is for the planning of a city"* (Quote 53).

Box 7. Informant 3 [MET] Interview quotes

Also, Informant 4 reflects on how the waste management system has had an impact on the Hammarby community and how they understand the "Hammarby Model" concept:

Informant 4 discusses the awareness of the "Hammarby Model" within the community, saying that *"if you ask someone here about the Hammarby Model on the street I don't know"* but also adds that

"if you ask them about the vacuum waste system probably 98% would know what you talking about ... they know that the treated wastewater is being used for heating the building" (Quote 147)

Box 8. Informant 4 [MET] Memo-Writing Result

The environmental goals set for the Hammarby Sjöstad 1.0 determined how to translate sustainable living into the urban infrastructure and incorporate the environmental solutions needed for energy, water, and waste. The transformative aspect of Metamorphosis [MET] meets with [LAW] as the "Hammarby Model" concept translates into an environmental programme with strict environmental goals to be met by the district, the actors involved in the project, and the community. Informant 1 emphasised the achievements of the Hammarby Sjöstad district and the City of Stockholm project team's role in developing the area from a polluted shipyard to an example of sustainable city development. The "Hammarby Model" concept is present in the transformation process; he emphasises the importance of the concept and how it provides a system and structure for energy, water and waste to meet environmental goals.

Also, Informants 1 and 5 explain how the environmental goals are integrated within the residential infrastructure to monitor the outcomes and how they affect the community:

Informant 1 explains that the buildings and the infrastructure have set targets for energy efficiency, and meeting the environmental goals is subject to the resident's involvement: *"... we have set up targets for instance the supplied energy for heating up the places the apartments. About the garbage about water consumption etcetera etcetera. And most of those targets is actually that you can actually do in the buildings and in the infrastructure. Some of it when it comes to garbage or instance you then you have to rely on the people that they are sorting out all these different fractions because that is what we are doing in Stockholm and Sweden"* (Quote 202).

Box 9. Informant 1 [LAW] Memo-Writing Result

Informant 5 reflects on the changes that have occurred within its residential area to meet the environmental goals and targets (Quote 91):

- *"First we wanted to cut the energy, reduce the amount of energy that is needed for heating and the buildings, and also for the hot water. ...in general that was also triggered by economical reasons".*
- *"our next step is probably looking at the lighting of the housing and maybe adding more car chargers".*

> ➢ *"Of course we measure from that how we are reducing that energy consumption. ... but there is also triggered by law as well".*

Box 10. Informant 5 [LAW] Memo-Writing Results

5.3.3 "Empirical" Journey through the Hammarby Sjöstad Urban Development Plan [FIC] [TEC]

The City of Stockholm project team organised the 1.0 project [ORG] around the "Hammarby Model" [MET] and the environmental goals [LAW] to transform the district with the design, planning and implementation of an urban master plan that incorporated urban planning with technological solutions to integrate the natural environment of the lake, woodlands and biodiversity in the district. The aspects of urban development and technological solutions have been observed as Fiction [FIC] and Technology [TEC] (See Chapter 3, p. 68-69). My two visits to Hammarby Sjöstad district gave me insight into what type of buildings, playgrounds, streets, and leisure facilities the project team incorporated in the master plan to translate sustainable living in the district as well as the technological solutions integrated in the urban design and management of resources (energy, water and waste) and how sustainability is translated into the community.

Throughout my two visits to the Hammarby Sjöstad district, I had the opportunity to immerse myself in the district. I gained an understanding of the area's characteristics following the urban master plan (see Appendix I). I observed how the "Hammarby Model" was integrated into the infrastructure and where environmental solutions were incorporated. The master plan gives a common understanding of the Hammarby Sjöstad 1.0 project design development in urban form, architectural style, building design and public space. At the same time, the "Hammarby Model" concept integrates the energy, waste and water infrastructure technology and management. Both aspects (master plan and Hammarby Model) allow the heating, transport, and waste collection systems to work together to reduce the long-term usage of energy and resources (China Development Bank, 2015).

My exploration of the district, documented through photographs and observation notes, provided a detailed insight into integrating the "Hammarby Model" within the district's energy, waste, and water management systems. I specifically focused on how the natural green spaces, the visibility of environmental solutions in urban design, and the transfer of sustainability principles have been incorporated through the "Hammarby Model" in urban master planning.

My first visit in June 2019 allowed me to immerse myself in the urban area to observe the architecture and the contemporary sustainability technologies integrated within the infrastructure as part of the

"Hammarby Model". The "Hammarby Model" was integrated into the design, planning and management of the master plan (China Development Bank, 2015). The master plan involved the architectural design of buildings such as residential housings, schools and offices; construction design for roads, streets, quays and parks; landscape design with parks and courtyards; and infrastructure for transport (China Development Bank, 2015). Hammarby Sjöstad's specifications were to combine traditional European city characteristics with modern urban architecture, keeping the natural environment integrated with the urban design (China Development Bank Capital, 2015). The project meets high environmental standards by implementing environmental solutions and technology, an urban master plan, high investment in infrastructure, and a high-quality living environment (China Development Bank Capital, 2015). As a network of parks, green spaces, quays, plazas, and walkways have been prioritised in the design process to provide space for outdoor activities (Folleta, 2011), I decided to start visiting the public green spaces.

a) Public Green Spaces

Several natural green spaces have been incorporated into the urban landscape in Hammarby Sjöstad: Anders Franzens park, Sikla park, Luma park and the Lugnet Terrace connected to the reed park (Vassparken) around the lake with oiled wooden footbridges with rest points and a viewing point called the observatorium. Figure 12 below shows the green areas described during my visit to the district:

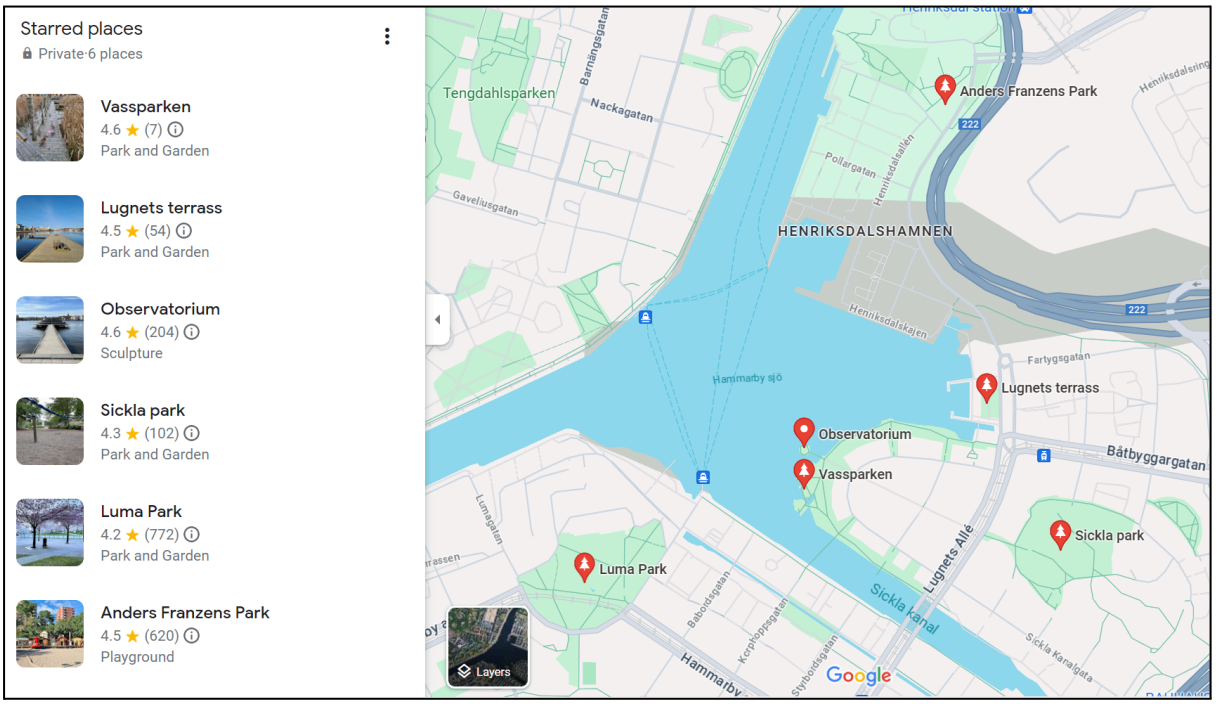


Figure 12. Green areas visited during the fieldwork in Hammarby Sjöstad. Google Maps

These green spaces are integral to the community, featuring gardens, benches, playgrounds, and walking paths. Sickla Park and Vassparken (reed park) are not just green and natural spaces, but they also embody the community's commitment to integrating natural biodiversity aspects within the Hammarby Sjöstad project, a testament to the City of Stockholm's compromise on environmental sustainability.

While Luma Park has incorporated green hills and Japanese cherry trees, Sickla Park is home to 150-year-old oak trees preserved in the district and is one of the finest specimens in the southern part of the City of Stockholm. Also, the Vassparken (reed park) is home to nesting seabirds that provide nesting rafts and wooden walkways along the reeds to incorporate the natural biodiversity along the lake. The reed park also incorporates preserved riparian woodlands with birch and alder. Figures 13, 14, 15 and 16 show some of these natural areas:

Figure 13. Preserved oak trees Sickla Park

Figure 14. Nesting rafts for seabirds

Figure 15. Reef Park with wooden footbridges

Figure 16. Luma Park

b) Communications and Transport

The communication and transport have been designed and integrated into the district to have a low environmental impact with the electric tram (Tvarbanan), cycle routes, green crossings (ecoducts), footpaths and car-pooling stations. The aim is to reduce the use of private car ownership and the emissions of fossil-fueled vehicles, promoting healthy living and paths away from noise and pollution. The restoration of the old quays in Hammarby Sjöstad, pleasure boat mooring, and the Sickla lock with the salmon ladder promote healthy living and leisure, which are incorporated into the urban form. Figures 17, 18, 19 and 20 show the electric tram, the ecoduct, the restored quay and the salmon ladder to facilitate transport and communication, as well as leisure facilities for healthy living:

Figure 17. Tvarbanan- Electric Tram

Figure 18. Ecoduct: green crossing for Nacka nature reserve

Figure 19. Restored quay to form a footpath and cycle route

Figure 20. Salmon ladder and lock

c) GlashusEtt Environmental Information Centre

GlashusEtt Environmental Information Centre delivers information and communication about the Hammarby Sjöstad project. It is the central meeting point for residents and visitors who want to know

more about how to think and act on sustainability in the area. During my visit to the district, I visited the centre and met the communications officer (Informant 1), who welcomed me. He was happy to show me the building, technology and how some areas have been designed to contribute to energy production, water supply and waste management. Figure 21 shows the photographs taken from outside the building:

Figure 21. GlashusEtt Centre from the front and side of the building

GlashusEtt Information Centre has been built with cutting-edge technology and eco-friendly adaptations to achieve a good indoor climate with low energy consumption (Freudenthal, 2019). The integrated eco-technology in the GlashusEtt Centre is a vital element of the building for understanding how they have designed the building to be self-energy sufficient and efficient. Informant 1 reflects on the self-sufficiency of the building and integrated eco-technology:

Informant 1 is asked about the self-sufficiency of the building; he explains that GlashusEtt Centre is between 75% to 80% self-sufficient: *"we have some solar cells, they really trying to re-use the heat in the building, and so we don't need that much district heating"* (Quote 189).

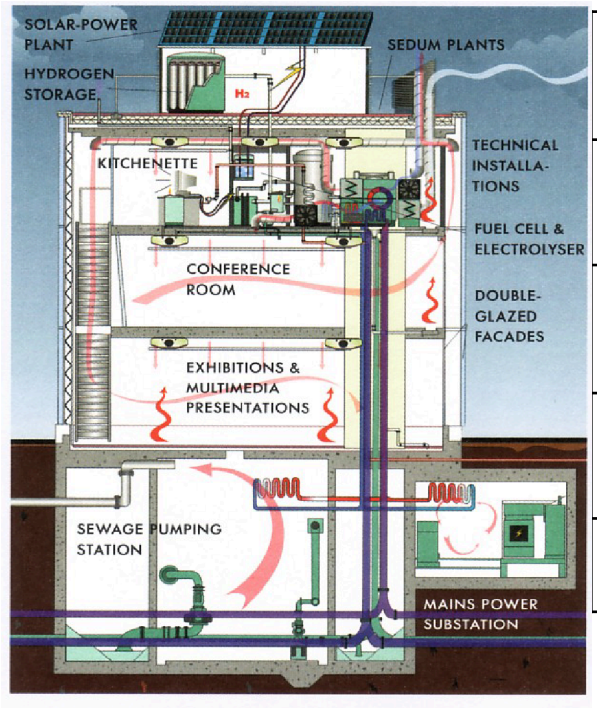
Box 11. Informant 1 [NET]1 Memo-Writing Result

The main design characteristics and integrated technology are as follows (Freudenthal, 2019):

- The building's **double-glazed facades and smart-house technology** significantly reduce the need for artificial light. This energy-saving feature and an advanced control system for heating, cooling, and ventilation adjusts lighting and ventilation requirements based on the building's activity, daylight, and air quality.

- **Advanced Heating** is achieved through a heat pump that harnesses energy from the waste heat produced by the mains power installation. Also, a fuel cell, an advanced energy converter, has been installed to generate electricity and heat from hydrogen and oxygen, further enhancing the building's energy efficiency.
- **Solar Panels** have been installed on the roof of the building to supply the fuel cell with energy to break the water into hydrogen and oxygen in an electrolyser.
- **A boiler and a stove use Biogas Energy** in the kitchenette to meet heating requirements at peak times.

Eco-technology has been integrated into the building on different floors as part of the eco-cycle solution and self-sufficient building development. Diagram 9 explains the technology integrated into every floor and how the eco-cycle produces energy and reduces energy consumption (Freudenthal, 2019).



The Roof: "Sedum Plants have been planted to act as a compensation basin during heavy rainfall. A solar power plant, a weather station and a tank containing hydrogen for fuel cell are also here"
The Upper Floor: "Most of the building's technical installations, such as a fuel cell and its associated equipment, heat pumps and control system. A small meeting room with a kitchenette, equipped with a biogas-powered stove, are also on this floor."
The Middle Floor: "is a conference facility where interested parties can learn more about Stockholm Water Company, Fortum and the City of Stockholm's environmental work"
On the Ground Floor: "is open to the public, visitors can see how the unique Hammarby Model works. This floor will also house a wide range of exhibitions and models showing Sjöstad's technical infrastructure".
The Basement: "contains a sewage pumping station, a vacuum-based refuse collection installation and a mains power substation."

Diagram 9. GlashusEtt Technology (Freudenthal, 2019)

Also, Informant 1, during the visit to GlashusEtt, explained that residents and visitors can assess the information on how the environmental goals are met and the ELP assessment results in the district. The centre can access and distribute his information to the public.

d) Water Supply and Management

Following my comprehensive visit to GlashusEtt, I explored the district further, keen to observe how the water supply and sewage system were managed. The water and sewage system in Hammarby Sjöstad is a prime example of an integrated system which maximises the use of rainwater, wastewater, and sewage (China Development Bank Capital, 2015). I traversed from GlashusEtt Centre, down through the Sjöstadsparterren, to the Lumabryggan ferry point, documenting my route in Figure 22.

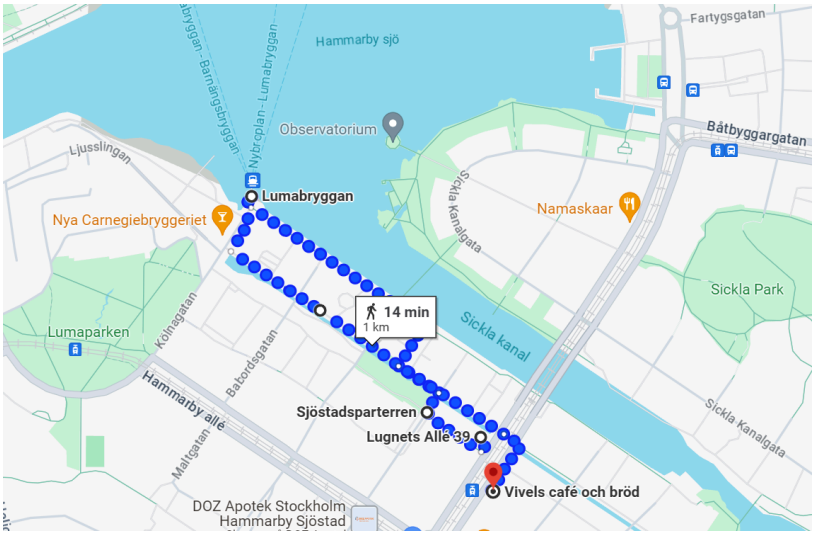


Figure 22. Walk to the Sjöstadsparterren and Lumabryggan. Google maps

Sjöstadsparterren combines channels and basins that collect the rainwater from the streets to be filtered and drained into the Hammary Lake with integrated green roofs and yards in the building design (Figures 23, 24, 25 and 26).

Figure 23 and 24. Green roofs and yards to collect rainwater; and channel to collect stormwater

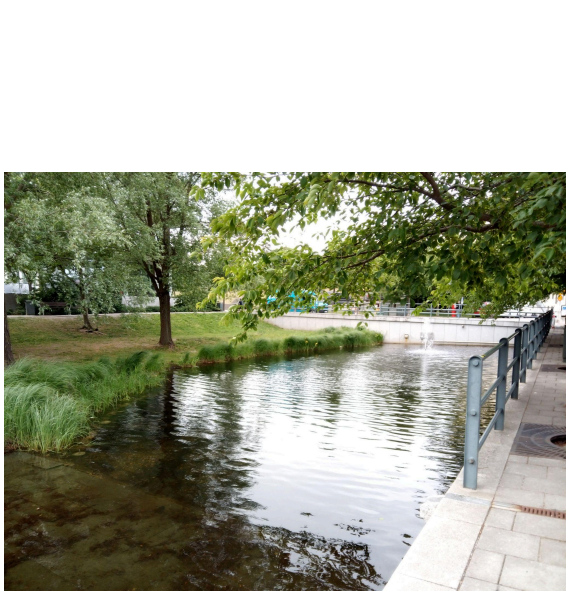



Figure 25 and 26. Storm water basin and channel with filtration to the Hammarby Lake

e) Energy Production and Distribution

During my visit to Hammarby Sjöstad, I observed how the energy production and distribution in the district are provided with a citywide district heating and cooling system. The electricity supply is generated from nuclear (50%), hydropower, wind and solar power (Svane, 2014; cited by the China Development Bank Capital, 2015). Also, other environmentally friendly sources such as biogas, biofuels and wastewater have been utilised in the district for energy production. The biogas and electricity are produced in the Hammarby Sjöstad district from the residential organic waste, combustible waste and wastewater collected from the waste management system (China Development Bank, 2015). The energy production in Hammarby Sjöstad district is generated mainly from the wastewater treatment plant and the heat and power treatment plant (China Development Bank Capital, 2015). On my visit to Hammarby Sjöstad, I took photographs of the Henriksdal treatment plant (Figure 27), where they treat wastewater and the Hammarby Heat plant (Figure 28), which produces biogas for the district.

In addition, Högdalenverket power plant generates electricity from the combustible waste collected through the waste management system in Hammarby Sjöstad. Also, the Uppsala Vatten/ SYVAB Biogas Plant produces biogas for the district using organic food waste from the district. These energy plants use biofuels to generate district heating and cooling electricity to generate further electricity for the area (Envac Group, 2019), and the solar cells integrated in Hammarby Sjöstad residential buildings (Figure 29) provide further solar power electricity for the communal areas (Figure 30).

Figure 27 and 28. Henriksdal Treatment Plant and Hammarby Heat Plant

Figure 29 and 30. Solar cells on the roof provide electricity to buildings and Electric Fuel stations for vehicles

f) Waste and Recycling Management

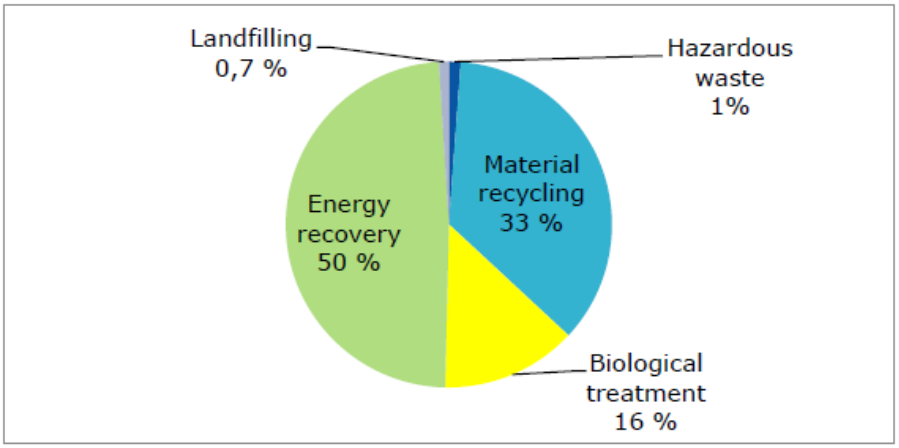
During my visit to the district, I observed the recycling points in the residential and public spaces as part of the waste management system. I discovered that the waste is mainly handled in three fractions (Envac Group, 2019): Organic waste (food), paper, cardboard, glass and metal, and combustible waste (other waste).

The source separation and recycling is made by inlets (Figure 31) installed in readily accessible and visible locations in central courtyards, playgrounds, bike sheds and gardens. The residents use the facilities, and the system provides a social checkpoint on how the system is performing (Envac Group,

2019). Figure 31 below shows the recycling inlets across the district for the residents to provide recycling facilities.

Figure 31. Recycling Inletts

The recycling system has contributed to reducing at least 15% of the household waste generated between 2005 and 2010 in Hammarby Sjöstad. It has reduced the waste taken to disposal sites, and 80% of food waste is sent to biological treatment plants to recover nutrients and energy (Envac Group, 2019). Graph 6 shows the breakdown of waste processing in Hammarby Sjöstad:



Graph 6. Breakdown of Waste Processing in Hammarby" (China Development Bank Capita, 2015)

The recycling inlets are connected to an underground waste collection system with 12,700 apartments connected to the underground system with 770 inlets (Envac Group, 2022). Figure 32 shows the underground waste collection system in Hammarby Sjöstad district

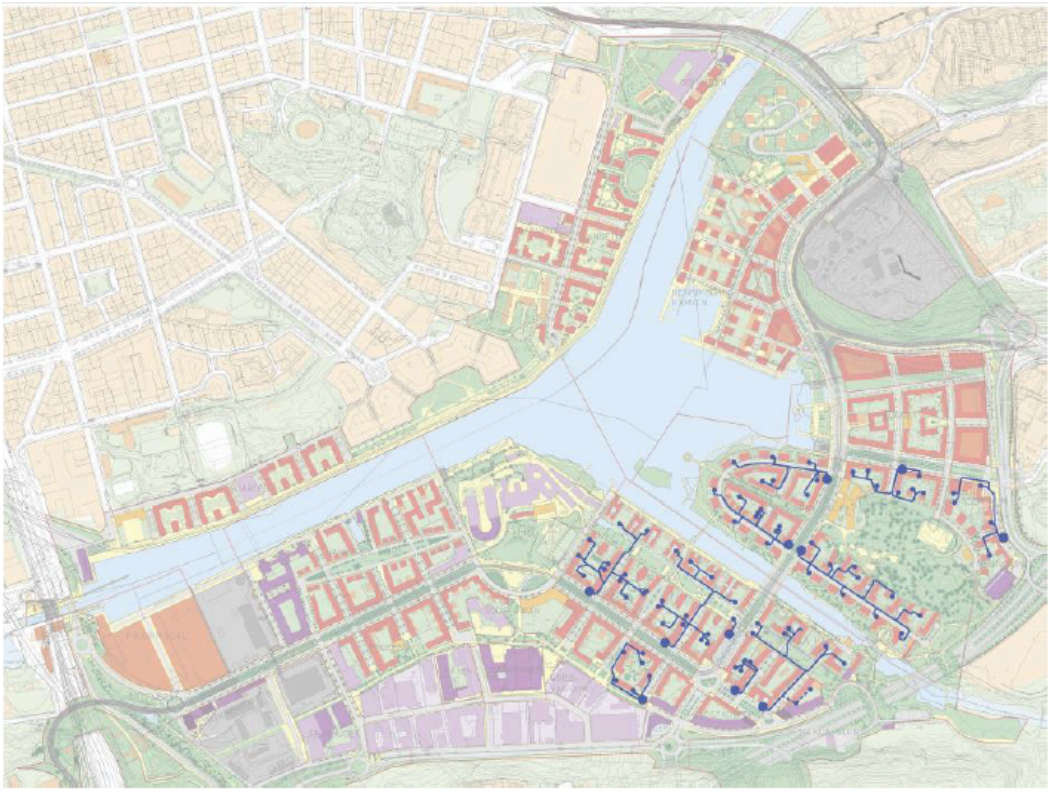


Figure 32. Map over mobile vacuum system in Hammarby Sjöstad (China Development Bank Capital, 2015)

During my second visit to Hammarby Sjöstad, Informant 4, during our meeting and interview, explained that the underground management system uses underground pipes to transport waste using airflow under the streets with two different methods: The Stationary System and the Mobile System (Envac Group, 2019). The waste management system has brought a long-term commitment to environmental benefits with reduced noise and carbon dioxide emissions, reduced transport for waste handling and waste minimisation with recycling facilities. Furthermore, waste management costs have been reduced, with lower operational and maintenance expenses benefiting contractors and residents (Envac Group, 2019). The system has brought technological advantages, as the inlet design is flexible to upgrade or retrofitted to be adapted to future project development and design. Also, social benefits have been observed within the waste management system. The inlet placements have created natural meeting points for residents and neighbourhoods to watch over waste disposal, with less exposure to waste for residents and waste collection operative staff with a hermetically sealed system (China Development Bank Capital, 2015). Informant 4 discusses the waste management system and the benefits that the infrastructure has brought to the district and the community:

Informant 4 explains that the Envac system has three different waste collection streams: residual, energy and residual waste water (Quote 114). Informat 4 reflects on the benefits that waste

management system has brought to the community: **"...** *ENVAC is not only a transport and waste underground, its also freeing up space that you can have for green and you can have different do different things because you don't have to have the bins and the trucks on the road, waste trucks on the road. Improve the safety of the area"* (Quote 136).

Box 12. Informant 4 [MET] Memo-Writing Results

5.3.4 Sustainability Thinking [MOR]

To be able to bring the discussion further forward on how the epistemological shift is manifesting in the sustainability governing of the Hammarby Sjöstad project following Latour's (2013a) argument that Morality [MOR] is a key aspect to fill the empty spaces in the interaction between [ATT] and [ORG]. It is necessary to bring forward the [MOR] aspect to observe how the sustainability thinking is being translated into the district to appreciate how the episteme opportunity is emerging in the Hammarby Sjöstad case.

Three main aspects of building sustainability thinking in the district can be observed: transitioning into environmental sustainability, residents' motivation for moving to Hammarby Sjöstad district, and environmental awareness amongst the residents.

a) Transitioning into environmental sustainability

The key informants discussed their perspectives on sustainability transition and Hammarby Sjöstad's role in sustainability governance and building an eco-society. From all the interviews, Informant 6 reflects on this aspect and explains that the understanding of the transition belongs to a situated practice. A connection between transition and policy on a large scale and how it is situated into people's lives (Informant 6, Quote 217), with environmental regulations as the main driver for change in organisations and developers' perspectives. Also, Informant 6 emphasises that Sweden is moving from a social and economic transformation into environmental sustainability and puts as an example Hammarby Sjöstad (Quote 285). Informant 6 emphasises that the sustainability transition is very "techno-centred, eco-modern framed" (Quote 286), as explained in Box 13:

Informant 6 agrees that regarding design and urban development *"what's being built is better than it was before"* and *"when it comes to energy efficiency"* (Quote 233) as it has been driven by legislative and industry shifts.

Box 13. Informant 6 [MOR] Memo-Writing Result

Informant 6 also explains that Sweden could be a good place for social transformation as other cultural aspects contribute to the change into environmental sustainability, such as the connection to nature and social trust (Quote 287). However, there are other factors involved in sustainability governance that influence the transition process, such as people's roles and practices, as discussed in Box 14 and 15 below:

"the fact that you have someone who's very driven in the company. And that's why I get into the different roles, because people are always in different roles. Even within the market sector" (Quote 226).

Box 14. Informant 6 [MOR] Memo-Writing Result

Informant 6 also discusses how people are being involved in this transition, remarking that *"people are creating different types of practises despite these structures"* (Quote 261), practises such as gardening and travelling less beyond the design and urban development projects (Quote 233). Informant 6 is aware that there are *"much larger issues that are like beyond the building performance"* (Quote 261); however, she remarks that the initiatives that residents in Hammarby Sjöstad are building are interesting (Quote 261).

Box 15. Informant 6 [MOR] Memo-Writing Result

Informant 6 believes that the transition movement in Sweden is happening through engagement in self-sufficiency practises and the relationship with nature as the driving motivations for re-establishing a connection to nature and understanding humans in relation to an ecosystem, "understanding a different type of socio-ecological relationship" (Quote 289). Informant 6 finalises the discussion, explaining that there is a transformation happening from an economic paradigm into an ecological paradigm in Sweden: "I think that's where I'm most optimistic in the recent years, only because now the public debate is shifting" (Quote 288).

b) Residents motivation to move to Hammarby Sjöstad district

The key informants throughout the interviews were asked about the Hammarby Sjöstad residents' environmental, social, and economic motivations for moving into the district. When the informants are asked about the motivations for people to move into Hammarby Sjöstad, the general answer is: "Because it is a nice place to live". Informant 5 and 3 reflect on this:

Informant 5 explains that there are lots of facilities in Hammarby Sjöstad, and it is very accessible to the city centre: *"It's quite scenic. It's a lot of water and it is very close to the nature reserves that we have, is close by and we have this skiing slope"* (Quote 95).

Box 16. Informant 5 [MOR] Memo-Writing Result

Informant 3 supports this when he adds that people generally think about a good living place. They can see that when they ask the residents, *"Would you recommend a friend to move to Hammarby Sjöstad?"* The results show 90% of positive answers (Quote 60).

Box 17. Informant 3 [MOR] Memo-Writing Result

Urban architecture plays a crucial role in the people's motivation to move into the district. Informant 4 and 2 discuss the urban design and infrastructure in Hammarby Sjöstad:

Informant 4 explains that it is a very nice combination of good architecture, urban design and infrastructure: *"the tram is popular, the boat is extremely popular, the closeness to both water and the forest and the close proximity to the city centre"* (Quote 148).

Box 18. Informant 4 [MOR] Memo-Writing Result

Informant 2 explains that it is a well-designed urban area.

- *"The speed limits is 30 km/h for cars and so many people down the street and most of the blocks have the building has two sides and the bedrooms are faced to the quiet courtyard outside"* (Quote 176).
- *"Hammarby Sjöstad is quite a dense area, well designed"* (Quote 171).
- *"streets, parks, etc, it has been very carefully designed and also put a lot of money into this"* (Quote 174).

Box 19. Informant 2 [MOR] Memo-Writing Result

The key informants' opinions and expressions throughout the interviews show Hammarby residents' environmental, social and economic motivations. Tables 13, 14 and 15 summarise the results:

	Informant 3	Informant 5
Environmental Motivation	"improved substantially on energy" (Quote 54) "there is an improvement of 30-40% of the footprints in Hammarby Sjöstad" (Quote 55) "personally decided to move to the area because of the sustainability idea being the new development" (Quote 1) "a lot of people moved to the area that were interested in environmental issues" (Quote 86) "you got that sort of information when you moved here, like this is an eco-friendly city" (Quote 86)	"the area attracts residents from the eco-friendly way of thinking" (Quote 93)

Table 13. Environmental Motivations in Hammarby Sjöstad

	Informant 2	Informant 4	Informant 5
Social Motivation	"you have a feeling for the other families and those children" (Quote 176) "nice, good looking, decent, safe area for families" (Quote 176) "Hammarby Sjöstad is quite a dense area, well designed and with a "public realm" (Quote 171) "the people that lives in Hammarby Sjöstad they feeling that they improve socially their lives" (Quote 167).	"people feel that they know each other in the district" (Quote 150)	"people are more into actually wanting to participate more in the local life here" (Quote 93) "I think it is important to build the feeling that this is a welcoming part of the City of Stockholm and I think that is also triggering people to move into this place and having sort of a positive influence when people choose to live here" (Quote 93)

Table 14. Social Motivations in Hammarby Sjöstad

	Informant 2	Informant 3	Informant 4	Informant 5
Economic Motivation	"the apartments average price in Hammarby Sjöstad is 15% or 20% higher on the market compared to other areas in Stockholm" (Quote 169) "it's a good business to be involved" (Quote 169) "It's a good branding for the project" (Quote 169) "little bit more expensive there, maybe more complicated takes more time, but the profit is maybe better" (Quote 169)	"poverty is not an issue" (Quote 56)	"people that could pay high price of the development it was central" and "economically definitely had an effect beyond Hammarby" (Quote 146) "the economic value development in the area and also of course the social status" (Quote 150)	"a lot of these houses attract people with quite high incomes" (Quote 93)

Table 15. Economic Motivations in Hammarby Sjöstad

The findings in Tables 13, 14 and 15 show that more economic and social reasons motivate people to move into Hammarby Sjöstad district than environmental motivations. While only Informants 3 and 5 discuss the environmental motivations as the main factor in discussing how the environmental footprint and energy consumption have improved being part of the eco-thinking community, the key informants discuss further social and economic aspects of the district. The interview transcripts show that the primary social motivation among the residents is the status, infrastructure facilities and participatory local life. The economic motivations further influence the decision to move into the area as the district attracts high-income residents who can afford 15% to 20% more expensive properties than other Stockholm areas.

c) Environmental Awareness

Environmental awareness amongst the Hammarby community is present, and new initiatives and projects have been introduced. Informants 4 and 5 reflect on the environmental awareness amongst the residents in the district:

Informant 4 explains that the annual questionnaire results, made by ElectriCity Stockholm organisation, show there is a higher level of environmental consciousness in Hammarby Sjöstad district from the measurements done in the use of private cars, number of car sharing, number of

trips in public transportation and volume of waste recycling: *"there is a higher level of environmental consciousness in a reality, not only what people say but it's a reality"* (Quote 141).

Box 20. Informant 4 [MOR] Memo-Writing Result

Informant 5 adds that building awareness regarding the environment is key for residents' involvement (Quote 100), and the residents have environmental awareness in Hammarby Sjöstad:

- *"the bigger critical mass, I think that would be a way to try to spread this and keep alive the whole idea"* (Quote 100).
- *"so people in general they are I guess little bit pro, I think there are more people here interested in environmental issues than maybe in the society in general"* (Quote 86).
- *"the ground is a bit more fertile to these ideas"* (Quote 86).

Box 21. Informant 6 [MOR] Memo-Writing Result

5.4 Resumé

The chapter contributes to answering the research question in the thesis as it observes how sustainability governing is happening within the Hammarby Sjöstad 1.0 project through the project team. The emerging "MoE"s contribute to identifying the Organization [ORG] and how it connects with other aspects to understand how the epistemological shift in sustainability thinking and acting in governing is manifesting. The emerging "MoE"s can be summarised within the governing aspect of the project team with Organization [ORG], "Hammarby Model" concept as the transformative factor to translate sustainability thinking with Metamorphosis [MET] and the environmental goals to measuring acting on sustainability with [LAW]. At this stage, the project team has translated the sustainability thinking and acting to all the actors involved in the project and the community through designing, planning, and implementing a master plan to incorporate the needed urban aspects and technological solutions into the district. These aspects have been presented with Fiction [FIC] and Technology [TEC], which direct how sustainability is translated and perceived in the district.

CHAPTER 6 “MoE”'s Associations and Crossings in the Hammarby Sjöstad Case

6.1 Introduction

Chapter 6 will discuss the associations and crossings between the “MoE” in the Hammarby Sjöstad Case. Chapter 3 has introduced previously the associations and crossings with two specific “modes”: Networks [NET] and Preposition [PRE]. These two “modes” are considered to be the starting point in structuring an AIME study to observe how the connections between the different “MoE”s expand in a given research scenario. Furthermore, it contributes to identifying strengths and weaknesses that can emerge from these crossings in the Network. The thesis follows the argument of studying sustainability governance from the organising “mode” [ORG] to address how the Network [NET] expands by identifying the organisations involved in the Hammarby Sjöstad project team. This chapter will discuss how governing the project team allows the organisations within the Network to connect through their associations [PRE] with sustainability ideas and concepts, and if there are any emerging issues or difficulties in the Network, and how they are resolved. The thesis takes into consideration Latour’s argument that the [PRE] mode allows the associations to connect with different “MoE”s to build a network [NET]. As the Network is defined by the organisations taking part in the Hammarby Sjöstad project team, the associations that make possible the organising and governing of the project team will be focused on acting and thinking with the sustainability ideas and concepts and the [PRE] “mode” will facilitate the connections and associations to build the Network [NET].

Therefore, Chapter 6 will explain how the Network is present in the Hammarby Sjöstad case and how the identified organisations play different roles in the two main stages: Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0. The key informants shared their experiences and knowledge concerning the different organisations and how they associate with other organisations, businesses, projects, initiatives, and public authorities.

6.2 Networks [NET] in Hammarby Sjöstad Sustainability Governing

[NET]work mode has been used to trace and assemble the organisations involved in the Hammarby Sjöstad case analysis. The identified organisations represent the different actors involved in the sustainability governance process in the case analysis. This is a crucial mode to identify how these networks allow connectivity and associations with other “MoE” within the presented Network. As Latour does not arrange the modes in a hierarchy rather than connectivity (Latour, 2013a; Tummons, 2021), [NET] will facilitate understanding the different characteristics of the human social actors involved in the presented case analysis. This process allows the building of research accounts on how

“the character or nature of the [NET]” emerges and can become a focus for the investigator (Tummons, 2021, p. 1321).

The key informants were asked the following questions to understand and build the Network in the Hammarby Sjöstad case:

- How many organisations and enterprises were involved in the Hammarby Sjöstad project, and what was their organisation’s involvement in this process?
- What was the current involvement of these organisations in Hammarby Sjöstad?

Table 16 below shows the identified Networks [NET] throughout the interview transcripts:

Identified Networks [NET]
[NET]1- GlashusEtt Environmental Centre
[NET]2- Tengbom Architectural practise
[NET]3- ElectriCity Stockholm
[NET]4- Envac Group
[NET]5- Sjöstadsföreningen Association
[NET]6- KTH Royal Institute of Technology
[NET]7- City of Stockholm
[NET]8- Other Actors involved in Hammarby Sjöstad Transformation.

Table 16. Identified Networks [NET] in Hammarby Sjöstad Case Analysis.

The organisations listed in Table 16 have collaborated with the project team initially in the 1.0 project or later in the 2.0 project. The City of Stockholm and the project team incorporated different organisations in the district’s planning, design, and development process (China Development Bank, 2015). Although the City of Stockholm composed the project team with people from two organisations (the City Planning Administration and Development Administration of Stockholm), the identified organisations in Table 16 have been involved directly or indirectly in the sustainability governing process collaboration with developers, architects, public sector stakeholders and Stockholm residents.

The thesis requires observing alternative ways of thinking and acting about sustainability, how the translation of ideas and concepts are illustrated in organising sustainability city management and where the shifts in thinking happened through the accounts collected in the Hammarby Sjöstad case at the project team level. Czarniawska (2004) and Adolfsson, Lindblad and Peacock (2021) argue that the translation and understanding of sustainability build and maintain connections at different levels of governing city management. Also, Czarniawska (2009) explains that in city management, several

translators, such as words, objects, and people, connect actions to contribute to the innovative process of organising the city and translating sustainability ideas and concepts. In this case, the transformation in Hammarby Sjöstad has connected "identity construction" and "alterity construction", as argued by Czarniawska (2004), with the possibility of translating radical change into city management and organising. Hammarby Sjöstad 1.0 has built associations by knotting organisations with the project team; however, the translation of sustainability ideas and concepts has developed an unexpected association with the residents who have transformed the thinking and acting on sustainability into the next level, 2.0 project. They have constructed a project different from the original, emerging the possibility of an epistemological shift through innovative thinking and acting on sustainability. Throughout the interviews, all key informants discussed different associations, organisations, businesses, and projects that have supported sustainability governance in Hammarby Sjöstad and have been part of the 1.0 and 2.0 stages.

6.2.1 Hammarby Sjöstad 1.0 Network [NET]

The leading network driving the change within the Hammarby Sjöstad 1.0 is [NET]7- City of Stockholm. [NET]7 dedicated a project team to develop an urban area with a new concept in environmental sustainability: the "Hammarby Model". This section will focus on how certain Networks [NET] shown in Table 16 (p. 141) are involved in actively connecting with [NET]7 to design, develop and implement the Hammarby Sjöstad 1.0 project.

The City of Stockholm [NET]7 has been involved in the sustainability transition in Hammarby Sjöstad, collaborating with different actors in the 1.0 project. Throughout the interviews, the key informants reflected on [NET]7- City of Stockholm's role with the Hammarby Sjöstad 1.0 project. The informants explained that the City Planning Department in the City of Stockholm [NET]7 was involved from the beginning, and all the actors worked together and made decisions about how to build the area. Informant 3 shared her knowledge about the collaborative work between the actors:

> Informant 3 agrees that the City of Stockholm has been involved from the beginning. He added that the mayor of Stockholm played an important role in developing Hammarby Sjöstad as an Olympic Village: *"Stockholm applied for hosting the Olympic games 2004 and the mayor and his team had the idea we should offer the greenest Olympic games ever"* (Quote 21).

Box 22. Informant 3 [NET]7 Memo Writing Result

As a result, a unique environmental programme (Hammarby Model) was designed and developed for the Hammarby Sjöstad project to cut the environmental footprint by half compared with other urban

areas. Strict environmental goals were imposed in land use, transportation, building materials, energy, water, sewage and waste, and an urban masterplan and a conceptual approach (Hammarby Model) based on sustainable resource use (Folleta, 2011). Informant 3 reflects on the environmental goals for the Hammarby 1.0 project:

Informant 3 explains that the City of Stockholm had ambitious goals for Hammarby Sjöstad district for transport system, waste management and energy efficiency to create an environmentally sustainable Olympic village. The role of the City of Stockholm [NET]7 has been from the urban development side in the Hammarby Sjöstad 1.0 project. Although a couple of the areas in Hammarby are still under construction; the City of Stockholm's political strategy is that they have finished with the 1.0 project and are focusing on other housing districts with even higher environmental standards. (Quote 22 and 23)

Box 23. Informant 3 [NET]7 Memo Writing Result

a) [NET]6- KTH Royal Institute of Technology

[NET]6 The Royal Institute of Technology (KTH), one of Europe's leading technical and engineering universities in Stockholm and one of Sweden's largest technical research organisations, developed the "Hammarby Model" concept. KTH works on sustainable solutions in climate change, future energy supply, urbanisation and quality of life at the industry and social level (KTH, 2022), and it has been involved in the Hammarby Sjöstad project since the beginning, closely working with [NET]7-City of Stockholm in the Hammarby 1.0. The City of Stockholm assigned the Department of Industrial Ecology at the Royal Institute of Technology (KTH) an evaluation of the environmental profile of the Hammarby Sjöstad area as a starting point for designing the environmental programme (KTH, 2011). In 1996, KTH carried out research and evaluation of the Hammarby area using a case study strategy (based on literature review, interviews, focus groups and documentation) to gather findings and experiences about the environmental profile needed for a new city district development in Stockholm (KTH, 2011). Prof. Ulf Ranhangen, Chief Architect at Sweco and Professor at KTH, researched and evaluated the possibilities of what new urban development should bring to the area (KTH, 2008; Sweco, 2012). Prof. Ranhangen was one of the leading individuals in designing the "Hammarby Model" concept as part of the 1.0 project (KTH, 2008; Sweco, 2012). KTH and the City of Stockholm have been involved in developing further the "Hammarby Model" into the "Eco-model 2.0"; the aim is to explore further the possibilities of the sustainability governance for the Stockholm Royal Seaport City district Project (Ranhagen and Frostell, 2014).

b) [NET]4- Envac Group

[NET]4- Envac Group designed and installed the waste management system as part of the environmental programme (Hammarby Model) in the 1.0 project (Envac Group, 2019). An innovative waste management system was installed to meet the City of Stockholm's environmental goal of reducing recyclable waste by 20% in weight and landfill waste by 60% in weight. Also, the source-sorting waste needed to be extended to organic material, textiles, environmentally harmful waste and hazardous waste (Pandish and Brandt, 2011, cited by China Development Bank Capital, 2015).

The waste management system was financed and built by developers (Sweco, 2012) through a joint-property association, and the construction process was coordinated by the City of Stockholm (China Development Bank Capital, 2015). The operation and maintenance of the waste system are outsourced to property owners and the system supplier, Envac Group. The City of Stockholm has invested in waste handling facilities (collection of household waste, treatment, recycling centres, recycling stations and mobile collection stations), administration and information about waste management (China Development Bank Capital, 2015).

The Envac waste management system is built with an underground automated waste management system that uses underground pipes to transport waste using airflow, using two different methods: the stationary system and the mobile system (Envac, 2019). Figure 33 shows how the stationary system transports the waste directly to a reception centre on the outskirts of Hammarby Sjöstad:

Figure 33. Stationary System (Envac Group, 2019)

1. Waste is disposed using the inlets that divide the waste.
2. The waste is stored for a short time on a valve until the emptying process starts controlled by a computer system.
3. All waste is transported through the same pipe system at a speed of 70 km/h.
4. Fans create the vacuum effect that sucks the waste.
5. The waste is collected in the correct container.

6. The transport air is cleaned with filters.
7. The waste is separated and compressed.

Figure 34 shows how the mobile system collects the waste in underground tanks emptied by suction vehicles (Figure 35).

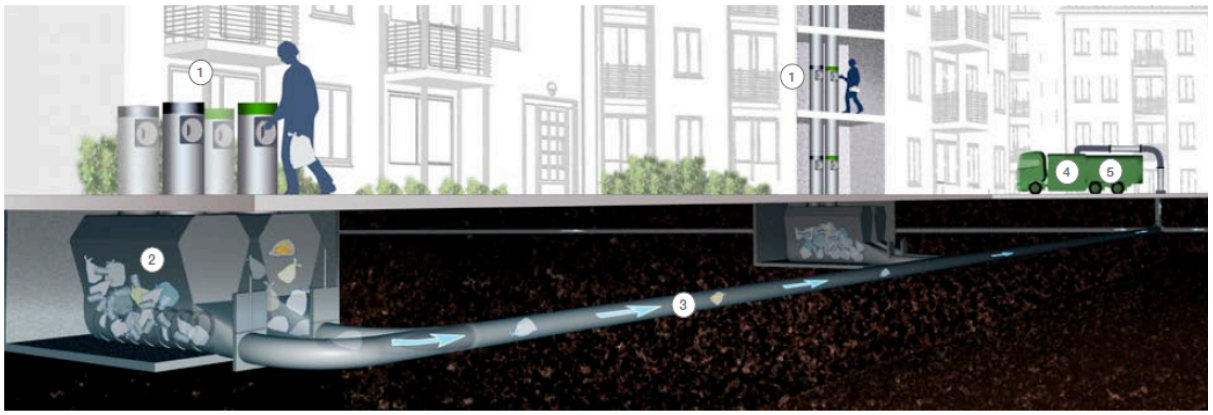


Figure 34. Mobile System (Envac Group, 2019)

1. The waste is disposed using the inlets that separate the waste.
2. The containers are emptied once a week and the process is computer controlled.
3. The waste is sucked using airflow through the pipes at a speed of 90 km/h.
4. A vacuum pump creates the pressure that transports the waste to the vehicle.
5. The air is filtered before being released outside the vehicle.

Figure 35. One of the docking points in Hammarby Sjöstad where the refuse collection lorry connects to the waste disposal unit

Envac [NET]4, with the automated waste system, has contributed to the sustainability transition in Hammarby Sjöstad. The Envac system has reduced household waste collection and collection traffic and introduced further source separation (Envac Group, 2019).

- The total amount of recyclable waste has been reduced to 20% in weight.
- Landfill waste has been reduced to 60% in weight.
- Source-sorting waste has been extended to organic material, textiles, and environmentally harmful and hazardous waste.

[NET]4-Envac Group and [NET]7-City of Stockholm collaborated and worked together to support the technology needed for Hammarby Sjöstad district planning, design and development as part of the waste management system. Informant 4 was actively involved in developing the Envac system for the Hammarby Sjöstad 1.0 project and advising the City of Stockholm about its development:

Informant 4 explains that for the first couple of years, he was in charge of developing the business supplier network for the Hammarby Sjöstad 1.0 project with Envac and the City of Stockholm to try new innovative solutions and technology for the waste management system: *"we need to cooperate with the City because the City is responsible for the collection of that waste stream and recycling of it"* (Quote 110).

Box 24. Informant 4 [NET]4 [NET]7 Crossing Memo-Writing Result

Informant 4 emphasises that the City of Stockholm has had an important role in collaborating with Envac.

- ➢ *"to have politicians and City officials supporting the technology being able to show up it was important"* (Quote 103).
- ➢ *"The City is more like a facilitator or a discussion partner"* (Quote 110).
- ➢ *"So there is always discussions when a new idea is coming up or we would like to test this new technology, there has to be discussions sometimes with the City also, and that way are involved"* (Quote 112).

Box 25. Informant 4 [NET]4 [NET]7 Crossing Memo-Writing Result

c) [NET] 2-Tengbom Architectural Practice

The City of Stockholm [NET]7 involved architects and developers with the urban design and planning of the Hammarby Sjöstad 1.0 project. The architects and developers were part of the project team from the beginning; Tengbom [NET]2 was one of the architectural practices to develop different urban areas of the Hammarby Sjöstad district (Tengbom, 2019). Figure 36 shows the list of developers and architects involved with [NET]2 in the project:

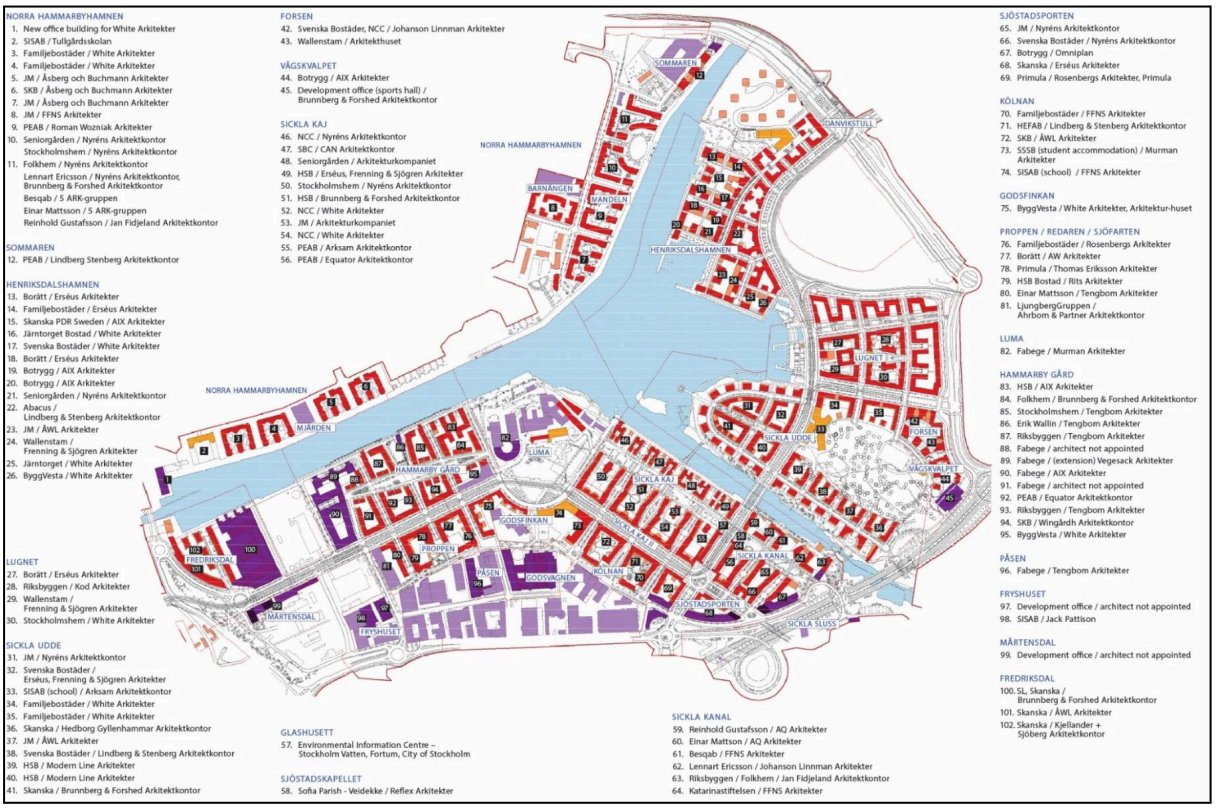


Figure 36. The list of developers and architects involved in Hammarby Sjöstad 1.0 Project (China Development Bank Capital, 2015)

Tengbom [NET]2 offered cutting-edge expertise in project planning. It has provided sustainability services in urban, residential, and landscape project planning, as well as coordinating building design, urban construction, energy calculation, construction materials, and indoor environment (Tengbom 2022b, 2022c). [NET]2 has been involved actively in the urban and technological development of the Hammarby Sjöstad 1.0 project since 1990, developing the master plan for the environmental programme. It has integrated ecological, social and economic functions in the urban design to develop a holistic approach. The following aspects have been taken into consideration (Tengbom, 2022a):

- Traffic and transport.
- Landscape and biodiversity.
- Building design.

- Energy generation, distribution and consumption.
- Waste, water and sewage treatment.
- ICT infrastructure.
- Lifestyle and smart living.
- Administrative methodologies.

[NET]2 has designed and planned several areas, public spaces, workplaces and other district amenities, and 2,400 apartments (Tengbom, 2022a). Figure 37 shows an example of an urban area designed by Tengbom (Tengbom, 2019).

Figure 37. Example of urban development in Hammarby Sjöstad. Hammarby Gard (Tengbom, 2019).

Informant 2 was actively involved in this process as part of [NET]2, shares the knowledge about the design process in the 1.0 project and how it was involved with [NET]7- City of Stockholm:

Informant 2 explains that became part of the Hammarby Sjöstad team in 1997 as a planning architect consultant representing Tengbom for the design and architectural work needed for Hammarby Sjöstad district and to collaborate with other organisations: *"I've been working with the project under a number of years. But if I count every hour and put it together, it will be close to 10 years full time, but it spreads over a longer time"* (Quote 156).

Box 26. Informant 2 [NET]2 Memo-Writing Result

Informant 2 discusses how Tengbom Practice and the City of Stockholm were involved together as part of the Hammarby Sjöstad project team to deliver the 1.0 stage. [NET]2 has been crucial in the transformation of Hammarby Sjöstad with over 100 other organisations involved in the project:

- ➢ *"Tenbom has designed 8 to 9 of the buildings in the area and I'm the architect at the visitor centre GlashusEtt"* (Quote 157).
- ➢ *"we were working with all those building design projects and maybe it has been designed and constructed 50 to 60 different buildings"* (Quote 158).

Box 26. Informant 2 [NET]7 [NET]2 Crossing Memo-Writing Result

d) [NET]1- GlashusEtt Environmental Centre

As part of the 1.0 project, Tengbom [NET]2 designed the GlashusEtt Environmental Centre for the Hammarby Sjöstad district. The centre, a showroom for cutting-edge technology and eco-friendly adaptations (Freudenthal, 2019), provided residents with information about sustainability and the Hammarby project. Informant 2 discussed the design and the technology integrated into building GlashusEtt Centre:

Informant 2 was involved in designing the GlashusEtt Centre, and he emphasises the new technology integrated into the building: *"So there is a machine that can divide water into oxygen and hydrogen and there is heat pumps. And it's partly but only part of the house functioning into this. And there is a computer which is running the technique, which makes it, it's not a passive house, but it has supported passive house technique in itself. So it's also an experiment building. And for it's 2002, it was very much done and it's still interesting"* (Quote 163).

Box 27. Informant 2 [NET]1 Memo-Writing Result

Informant 1 explained that as well as a showroom, the environmental centre was built in 2002 for residents' information and communication purposes and as part of the Hammarby Sjöstad 1.0 project. He explained that GlashusEtt has been primarily a knowledge centre that provides Stockholm with a hub to demonstrate how modern technology and the environment are linked together and how environmental goals have been monitored in the district (Freudenthal, 2019). The centre provides Stockholm with a knowledge hub for residents and a showroom for new environmental technology (Freudenthal, 2019). GlashusEtt Environmental Centre was a project initiative from the City of Stockholm to build a common place for people and residents to ask questions and access information about how to participate in the sustainability concept: the "Hammarby Model". Informant 1 explained that GlashusEtt played an essential role for the residents because it represented "where people can come in and say how are we participating, and how the project itself could also be, how you can do

this and how you should live and so on" (Quote 190). The environmental centre aims to participate in the residents' day-to-day lives, demonstrating that advanced technology and the residents' involvement can contribute to long-term environmental improvements (Freudenthal, 2019). The residents can access information and monitor the environmental results in the area by visiting the GlashusEtt Environmental Centre (Freudenthal, 2019). Informant 1 emphasised the importance of the GlashusEtt Environmental Information Centre in informing, educating, and involving residents and visitors with the "Hammarby Model" eco-cycle concept.

Informant 1 explains that the international interest is driven by the "Hammarby Model" and how it has been implemented: *"we started to get more and more visitors from abroad who would like to come and see what have you done here in this area because of this environmental programme"* (Quote 183).

Box 28. Informant 1 [REF] Memo-Writing Result

Also, the environmental centre has a visitor centre role to accommodate international interest in learning about the Hammarby Sjöstad experience. GlashusEtt is vital in showcasing the Hammarby Sjöstad 1.0 project, its achievements and the integrated eco-technology in the original urban master plan (Freudenthal, 2019). Informants 1 and 3, throughout the interviews, emphasised the important role of GlashusEtt as a visitor centre to promote Hammarby Sjöstad's achievements.

- *"throughout these years now ... 17 years actually, we have about 130,000 visitors only in GlashusEtt"* (Quote 183)
- *"... I think roughly about 25,000 Chinese visitors have come to Hammarby Sjöstad. So more Chinese people have visited Hammarby Sjöstad that the people who lives here"* (Quote 184).

Box 29. Informant 1 [REF] Memo-Writing Result

Informant 3 emphasises the international interest to be involved from different business organisations to learn about the Hammarby experience: *"... next week we have 80 CEO's from big chinese companies coming in a group to learn about this, 80 CEO's from big companies that is a big thing. So that is an international interest in it, and we have collected interest to Europe to United States, New York, China and other places"* (Quote 70).

Box 30. Informant 3 [REF] Memo-Writing Result

6.2.2 Hammarby Sjöstad 2.0 Network [NET]

The Hammarby Sjöstad 1.0 planning and implementation has been completed by the project team and the City of Stockholm [NET]7. The Hammarby residents are taking the lead on sustainability thinking and acting, taking on board the "Hammarby Model" concept and transforming further the ideas and concepts around sustainability. The leading organisations driving the change into the Hammarby Sjöstad 2.0 stage are [NET]3- ElectriCity Stockholm and [NET]5- Sjöstadsföreningen Housing Association. Both organisations interact with the City of Stockholm [NET]7 to plan and implement different projects into the original 1.0 projects.

a) [NET]3- ElectriCity Stockholm

[NET]3-ElectriCITY Stockholm was created in 2014 as an economic association from the initial Hammarby Sjöstad 2.0 residents initiative. [NET]3- ElectriCity Stockholm is a citizenship-driven innovation platform to develop the district further environmentally, socially and economically through project development (Hammarby Sjöstad 2.0, 2022). The platform was formed in 2014 by Allan Larsson, a Hammarby resident and founder of ElectriCity Stockholm (Larsson, 2022). Informants 3 and 4 reflect on how ElectriCity Stockholm was created and why:

Informant 3 explains that ElectriCity Stockholm has been crucial in taking the lead on developing further sustainability in the Hammarby Sjöstad district (Quote 12, 14).

Box 31. Informant 3 [NET]3 Memo-Writing Result

Informant 4 explained that citizens created this bottom-up organisation, ElectriCity Stockholm: *"making this a platform for innovation and collaboration" and spread the knowledge to engage citizens, organisations and businesses to reshape and develop the infrastructure with Hammarby Sjöstad 2.0 initiative with "new developed technologies and engage people"* (Quote 139).

Box 32. Informant 4 [NET]3 Memo-Writing Result

KTH [NET]6 is involved with ElectriCITY Stockholm [NET]3 with the Hammarby Sjöstad 2.0 initiative. Together, they are taking Hammarby Sjöstad as a test bed to develop new projects and initiatives such as Viable Cities, Sharing Economies and IntegrCity EU project (ERA-NET Smart Cities and Communities Programme) (KTH, 2016; Hammarby Sjöstad 2.0, 2022). ElectriCity Stockholm delivers The Hammarby Sjöstad 2.0 initiative with two main projects: "Energy at Home" and "Charge at Home" (Hammarby Sjöstad 2.0, 2022):

“Energy at Home” Project

“Energy at Home” aims to increase the knowledge of energy systems to fix problems, encourage money-saving investments and reduce energy consumption. Each housing association in Hammarby Sjöstad has a specially appointed energy manager to deliver and manage the different projects. The energy manager compiles and submits power efficiency assessment reports and recommendations to the management board. Its responsibilities are establishing an energy map for the property with the Sjöstadsföreningen Association and ElectriCity Stockholm to set environmental goals to reduce energy consumption and improve energy efficiency. The energy manager needs to keep the management board informed and advised about the technologies available to be installed at the property for solutions to energy recovery. Sjöstadsföreningen Housing Association and ElectriCity Stockholm hold regular meetings to involve and inform energy managers regarding new technologies and methods of energy solutions to meet the environmental goals set for the properties and associations.

“Charge at Home” Project

“Charge at Home” has been developed to increase the number of electric cars in Hammarby Sjöstad district and reduce carbon emissions by installing electric charging stations in underground residential car parks. The project has provided Hammarby Sjöstad properties with 350 electric charging stations supported by the “Klimatklivet” (Climate Shift) initiative from the Swedish Government. The housing associations receive a grant of 50% of installation costs for a single charging station as part of the “Klimatklivet” initiative. Other initiatives have also been created to encourage residents to reduce fossil-fuelled vehicle use, such as the “CarPool at Home” initiative. It provides each housing association with a small electric car with its charging point and electric bikes for free for housing association members to be shared as part of a pool agreement between neighbours.

[NET]3-ElectriCity Stockholm has built a network of partners and members from different industries, businesses, government institutions and research organisations to deliver the Hammarby Sjöstad 2.0 project and finance the project development to be at the forefront of smart energy, sustainable transport, sharing economy/recycling and research (Hammarby Sjöstad 2.0, 2022). Informants 3 and 4 reflect on the network of partners in [NET]3 and their collaborations:

Informant 3 has been actively involved in ElectriCity Stockholm and has shared his experience in developing the network and projects for the Hammarby Sjöstad 2.0 initiative: *“I was a chairman for*

four years and a year ago I left, I'm now the senior advisor… I'm taking part and working almost everyday with projects, contacts and things around this" (Quote 15).

Box 33. Informant 3 [NET]3 Memo-Writing Result

Informant 3 explains that ElectriCity Stockholm has 38 paying companies and 20 partners from big and small businesses, academia and government institutions such as City of Stockholm (Quote 9): *"... we needed some funding and there was no funding available locally. So we had to draw it by bringing in Volvo, ABP and other companies we could get that funding… we have had a growth rate of 50% a year in terms of turnover in revenues"* (Quote 10).

Box 34. Informant 3 [NET]3 Memo-Writing Result

Informant 4 explains that ElectriCity Stockholm involves more than 40 sustainability and environmental projects involving residents and collaborations with companies, research organisations, and universities (Quote 140).

Box 35. Informant 4 [NET]3 Memo-Writing Results

Also, the interview analysis shows constant communication between the residents and [NET]3 to inform the community about the achievements, opinions, issues, and future projects linked to the Hammarby Sjöstad 2.0. Informant 3 shares his experience with engaging and involving the Hammarby residents:

Informant 3 explains that [NET]3-ElectriCity Stockholm communicates with the residents through Facebook and information booklets about "energy at home" and "charging at home", which are sent to all the citizens to allow people to ask questions and seek further information about *"what are we doing, what can we do better"* and he adds that *"is the way to build support, interest and engagement"* (Quote 28).

Informant 3 explains that [NET]3 is engaging with residents and exchanging information about the Hammarby Sjöstad 2.0 initiative through opinion polls every spring to understand the views of the residents about sustainability with the following concepts (Quote 42):

- *"what do you think about sharing"*
- *"what do you think about electric cars"*
- *"have you considered the change to electric cars"*

Box 36. Informant 3 [NET]3 Memo-Writing Results

b) [NET]5- Sjöstadsföreningen Housing Association

Sjöstadsföreningen is a non-profit organisation created in 2003 to incorporate the tenant-owner housing associations in the Hammarby Sjöstad district. 56 associations, 2 SKB (Stockholms Cooperative Housing Association), and neighbourhood members are included as housing association members in Sjöstadsföreningen. They cover more than 5,100 apartments and 13,900 residents. The housing association works actively with its members to address the residents' interests and issues (Sjöstadsforeningen, 2022a). Figure 38 shows the housing association members and cooperative associations in Hammarby Sjöstad district:

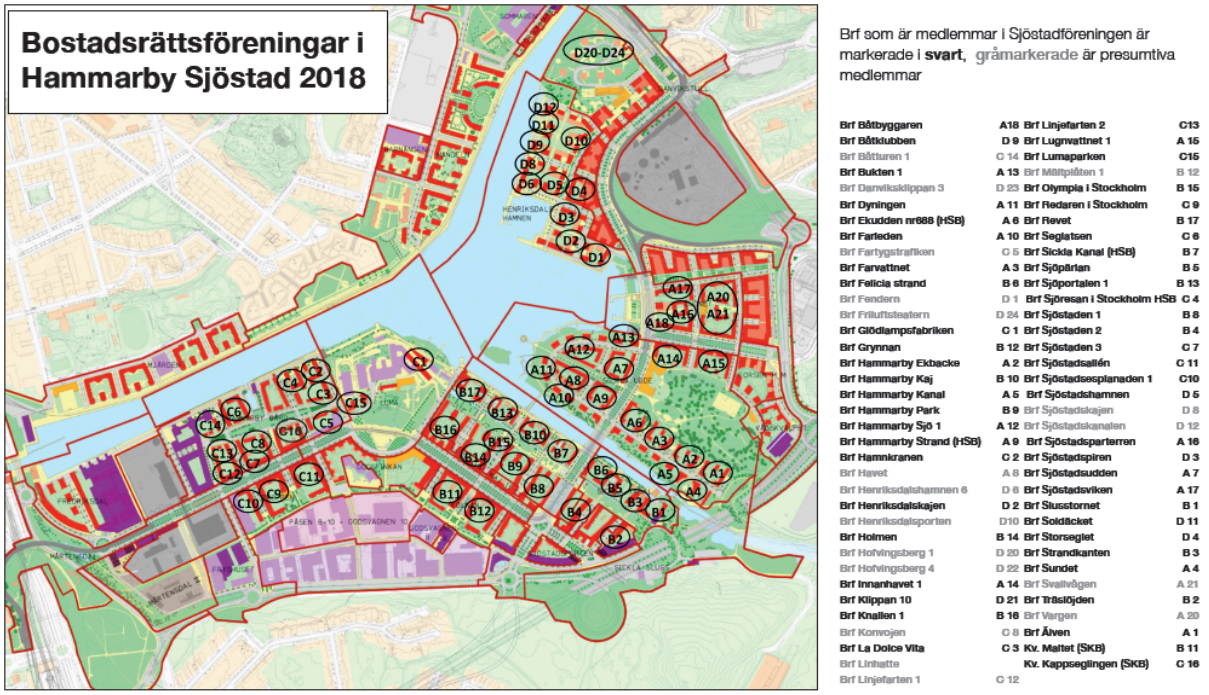


Figure 38. Housing Associations in Hammarby Sjöstad (Sjöstadsföreningen Hammarby Sjöstad Report, 2018)

A management board governs each housing association member, elected to run daily operations with a chairperson and board members responsible for different areas such as energy, water, ventilation, and waste management. Informant 5 reflects on the initiatives and the reason why his housing association has been involved in making improvements:

Informant 5, throughout the interview, has shared the initiatives that his housing association has taken on board as part of Hammarby Sjöstad 2.0 (Quote 91):

- Reduce the energy consumption for heating the building and water.

- Develop sharing facilities with other housing associations to co-own equipment and develop further "Grow your own veg" initiative to *"get a bigger critical mass of people interested"*.
- 12 electric car chargers in the garages and upgrade the energy system in the building to use the heat from the ventilation system with a heat exchanger.
- Geothermal and solar energy to heat water in the buildings as the energy system is integrated into one.
- Further changes proposed introducing an LED system for lighting and more electric car charges installation.

Box 37. Informant 5 [NET]5 Memo-Writing Result

The first change that Informant 5's housing association took on board from the Hammarby Sjöstad 2.0 was to reduce the energy consumption for heating the building and water, mainly triggered by economic reasons and by law. Informant 5 feels that it was a big step for them; they are just seeing the results from the investment that the housing association and the residents have made on this matter: *"So that is also by law that we do that kind of audits but of course we would like to see we get the money or payback from our investment. So of course we would like to measure how we come down in energy consumption"* (Quote 91).

Box 38. Informant 5 [NET]5 Memo-Writing Result

The board is run by volunteers who take responsibility in different areas depending on their previous knowledge and skills and take on board housing issues that need to be resolved or improved in the following areas (Sjöstadsforeningen, 2022a):

- **Recycling and sanitation:** improve and upgrade the waste management system in Hammarby Sjöstad.
- **Traffic and road safety:** Improve road safety to reduce accident risks and incidents.
- **Smart and renewable energy:** improve energy efficiency and reduce energy consumption with smart and renewable energy with the appointed Energy Managers and with a "targeted energy management" strategy.
- **"Nice and Safe"** The initiative aims to maintain the public space.
- **Cultural and association life:** Develop premises for cultural and association life for residents to encourage further involvement with the area.

- **Hammarbybacken skiing:** The project aims to create year-round activities on the ski slope using new technology on solar energy and climate control. This project involves the cooperation of the Sports Council, Skistar and Swedish Ski Association.
- **Bathing place** with new water technology: The association is involved in future water purification technology (as part of Vinnova-funded projects) to establish a bath in Hammarby Sjöstad, equipped with a swimming pool for leisure and learning purposes.
- **Sjöstaden in the mobile:** It is an initiative implemented in 2013 to develop the local mobile communication system with the support of Vinnova and the collaboration of KTH.
- **Hammarby Sjöstad Festival-** Sjöstadsdagen: The association organises a large public event in Hammarby Sjöstad every year in September for all the residents to celebrate and be proud of their district. The aim is to encourage residents' involvement in activities such as cultural and music programs, markets, library book buses, children's activities, food trucks, and other events and programs organised by partner organisations.

6.2.3 Other Networks [NET]8 in the Hammarby Sjöstad Case

Throughout the interviews, all key informants talked about other associations, organisations, businesses and projects supporting the sustainability governance in Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0 project stages. Diagram 10 below presents the mind map from the memo-writing results on [NET]8 actors registered throughout the interviews.

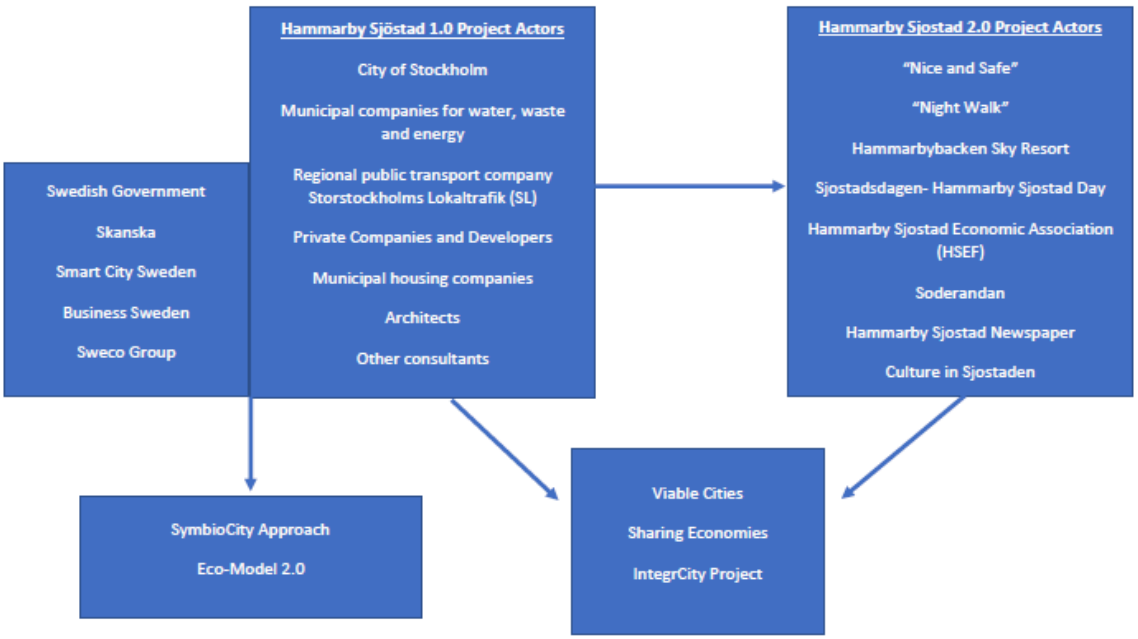


Diagram 10. Mind Map Results. [NET]8- Other Actors involved in Hammarby Sjöstad Case Analysis

Key informants explained throughout the interviews that many organisations, private companies and developers were involved in the Hammarby Sjöstad 1.0 project. The different actors communicated consistently throughout the whole process about their responsibilities and the services to be provided. Examples from the key informants' knowledge regarding [NET]8 actors are registered below.

a) Smart City Sweden

Informant 1 explains that Smart City Sweden, an organisation to promote Swedish urban development, has been created to talk to delegations to promote environmentally friendly companies and their products internationally as a consequence (Quote 192).

Box 39. Informant 1 [NET]8 Memo-Writing Result

b) Skanska

Informant 2 gives an example about a developer involved in the Hammarby Sjöstad 1.0 project, Skanska. Skanska is a big construction company that informed the project team that it was only 5% more cost to develop the Hammarby Sjöstad district with the "Hammarby Model" specifications compared to other current development in the area without the eco-technology: ➢ *"it's a good business to be involved if it's a good branding for the project"*(Quote 169). ➢ *"it's not a question of all that little bit more expensive there, maybe more complicated takes more time, but the profit is maybe better"* (Quote 169).

Box 40. Informant 2 [NET]8 Memo-Writing Result

c) SymbioCity

The main actor that all the key informants mentioned is the "SymbioCity Approach" as part of the Hammarby Sjöstad 1.0 stage. SymbioCity Approach is a platform and organisation that promotes Swedish environmental technology from a commercial and institutional perspective. KTH [NET]6 with Prof. Ranhangen has taken The "Hammarby Model" concept into an international context with the "SymbioCity Approach" method, which is a generic sustainability model for energy, water and waste management in urban subsystems (Sweco, 2012). He explains in an interview (Sweco, 2012) that the "SymbioCity approach" is an extension of the "Hammarby Model", which "is further developed to become a generic model for energy, water and waste and their relation to other urban subsystems" (Sweco, 2012, p. 14). Informant 1 discusses how important both concepts are for the Hammarby Sjöstad:

Informant 1 discusses that the "Hammarby Model" and SymbioCity Approach are key elements of Hammarby Sjöstad 1.0 project, as SymbioCity is built on the "Hammarby Model" and it is about integrated planning "Eco-Governance": *"The SymbioCity is actually has been the concept which the Swedish Government has tried to tell delegations and so on, and also when the Swedish Government or the politicians from Stockholm has gone out talking about Hammarby Sjöstad they talk about also about the SymbioCity because that is the thinking really how you should make these sustainable city"* (Quote 199).

Box 41. Informant 1 [NET]8 Memo-Writing Result

Furthermore, "SymbioCity Approach" has become a commercial and institutional platform for Swedish Environmental Technology as part of the Swedish Partnership Initiative. This platform aims to promote Swedish technology and sustainability concepts with a holistic approach to planning, governance and environmental solutions for countries transitioning into environmental sustainability (Sweco, 2012). Informant 6 reflects on how SymbioCity has provided an understanding of sustainability and an alternative approach to business:

Informant 6 explains that SymbioCity provides business, explores the strategy and focuses on cleantech technology at a consultancy level and gives a package surrounding the idea and assumptions of sustainability and certain approaches: *"I think it mixes up that's the interesting thing, that it can be both more of a process and an approach and a very kind of concrete business idea that's being sold"* (Quote 274).

Box 42. Informant 6 [NET]8 Memo-Writing Result

It is part of the Swedish Partnership Initiative of the Swedish Government, which involves different organisations. They focus on countries transitioning into environmental sustainability and implementing holistic planning, governance, and environmental system solutions (Sweco, 2012). Informant 4 reflects on his involvement with the SymbioCity concept:

Informant 4 explains throughout the interview their involvement with the SymbioCity concept as he was chairing the committee for Swedish bio-metal technology export. Informant 4 was involved in developing the SymbioCity concept. It was an assignment from the Swedish Government involving Envac Group, KTH, and the City of Stockholm, managed later by another organisation called Business Sweden (Quotes 105 and 106).

Box 43. Informant 4 [NET]8 Memo-Writing Result

d) Hammarby Sjöstad Day Festival

Also, key informants have reflected on social initiatives such as the Hammarby Sjöstad Day Festival, where all the residents meet to celebrate their district. It is an initiative where organisations, schools and different societies can participate in the "Hammarby Model" environmental programme. Informants 1 and 5 reflect on Hammarby Sjöstad Day and what it means for the residents:

Informant 1 explains how the Hammarby Sjöstad 1.0 Projects has evolved into the Hammarby Sjöstad 2.0 Project with the increase of residents' participation in the sustainability transition: *"it was actually to show the environment and how people was participating with Hammarby Sjöstad Day just behind GlashusEtt for several years, but now it has become more like a festival day for the whole area"* (Quote 182).

Box 44. Informant 1 [NET]8 Memo-Writing Result

Informant 5 explains that Hammarby Sjöstad Day plays an important role in involving people and showing the district's achievements: *"that together we have reached this jointly, and they could build this sort of general awareness that Hammarby is on the forefront"* (Quote 100).

Box 45. Informant 5 [NET]8 Memo-Writing Result

e) "Night Walk" Initiative

Another initiative registered throughout the interviews as [NET]8 has been the "Night Walk" as part of the Hammarby Sjöstad 2.0 Project. Informant 3 explains further on this initiative:

Informant 3 explains that on Saturday nights a team of people goes for a night walk around the streets. The residents are building a social safety net to collaborate with the police, social authorities and parents to sort out issues such as vandalism and drugs: *"to see what our youngsters are doing and if there is something happening we should know it"* (Quote 39).

Box 46. Informant 3 [NET]8 Memo-Writing Result

6.3 "MoE" crossings [PRE] in Hammarby Sjöstad Case Analysis

The case analysis process with the memo-writing concludes that the presented Networks [NET] expand in different ways, connecting and creating networks in two main phases: Hammarby Sjöstad 1.0 and 2.0. Throughout the interviews, the key informants discussed how different actors have been involved in the sustainability governance process and their involvement. Diagram 11 below shows the

mind map to summarise the findings from the interview analysis on the Networks [NET] crossings in the Hammarby Sjöstad case:

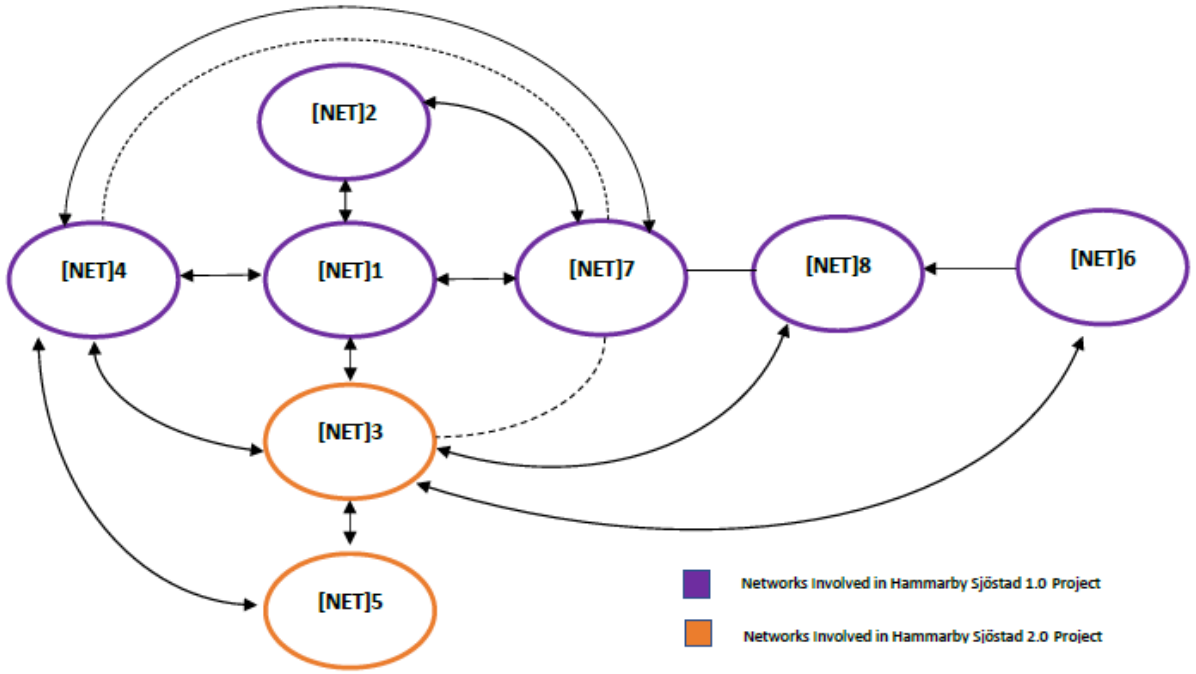


Diagram 11. Mind Map Results. Networks [NET] expanding in Hammarby Sjöstad Case Analysis

Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0 build different Networks [NET] that connect and cross. The City of Stockholm [NET]7 and ElectriCity Stockholm [NET]3 have been the main active networks managing the projects and governing the involvement of the different actors in stages 1.0 and 2.0. The actors involved in the Hammarby Sjöstad case connect building networks in different ways in each stage: Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0. The Hammarby 1.0 project refers to the initial urban infrastructure and design development with the redevelopment of the old industrial estate in the Hammarby area, and the Hammarby 2.0 refers to the residents' initiative. The primary mode in both is Organisation [ORG] with the governing process of the project team with horizontal management called "Eco-Governance". The difference is that [NET]7 has had a top-down approach with the 1.0 project. Alternatively, the 2.0 project has been developed from the bottom up with the Hammarby residents creating [NET]3 ElectriCity Stockholm platform. The interview results show that the crossings between the different networks in the sustainability governance process are happening constantly in the Hammarby Sjöstad 1.0 Project and the Hammarby Sjöstad 2.0 Project.

6.3.1 [NET]7 [NET] 3 Crossing

Diagram 11 shows that the crossing between [NET] City of Stockholm and [NET]3 ElectriCity Stockholm cross together in a supportive but non-active role. Informant 4 gives further insights as he explains that when Hammarby Sjöstad was developing, it was the major project in Stockholm, and the City of Stockholm was involved. However, now *"the City has no time"* to devote to Hammarby Sjöstad district and *"they are taking a step back letting the private developers do more of the job"* (Quote 142). He emphasises that the City of Stockholm is more focused on other similar projects and *"can't spend so much time on one project"* (Quote 142). [NET]7 is no longer involved in the transformation in Hammarby Sjöstad. Diagram 11 shows that although [NET]7 is supportive, it has not had an active role in the 2.0 project.

This weakness in [NET]7 has allowed the initial project to evolve into Hammarby Sjöstad 2.0. ElectriCity Stockholm [NET]3 is the leading actor in developing the Hammarby Sjöstad 2.0 project. The social platform has been driving forward the second stage of the sustainability transition in Hammarby Sjöstad with the Hammarby Sjöstad 2.0 project. Informant 3 has been involved from the beginning in developing the 2.0 project and involving the residents to create further sustainability change in the district. Informant 3 explains his motivations to push forward for further transition in Hammarby Sjöstad as he explains that when he moved into the district, *"there was a void"*, *"an empty room"*, and *"I didn't see it"* regarding the sustainability concept (Quote 5). This weakness provided a new opportunity. Informant 3 explains that, as a consequence, he started writing suggestions for the district, and that was the beginning of ElectriCity Stockholm [NET]3:

> *"I started writing about electric cars and other things. And people reacted on it and they supported my ideas and then I invited them to my kitchen table and we discussed and then I said, now well we are now a citizen initiative, and so we called us HS2020 Hammarby Sjöstad 2020"* (Quote 5)

Informant 3 also adds that [NET]3 do not address individual consumption in residents rather than the system; he argues that *"we must fix the system, if the system is using too much energy we have to fix that before we start telling people they should change their lifestyle"* (Quote 64) showing a dichotomy between behavioural change in residents and the urban infrastructure and technology. Informant 2 supports the argument of system change when he explains that one of the challenges for Hammarby Sjöstad is improving the energy use in some buildings (Quote 179). He adds, "*some of the buildings are quite good and others are not"* (Quote 179). Technically advanced buildings need appropriate management to keep the system up to date and improve them if needed: *"There's a lot of technical things that I don't think that people really care about … and I think energy is important"* (Quote 179).

Informant 3 explains how [NET]3 with the Hammarby Sjöstad 2.0 initiative is improving the aspects that do not work from the Hammarby Sjöstad 1.0 Project:

> *"The target for Stockholm City was to have 80% not using cars for commuting and that has failed. So we do it, we use the system buses and trams and then we take the underground stations … water consumption came down from 200 litres down to 150 litres, should go down to 100, so we have more to do, on energy there is more to do but we are working on that"* (Quote 35).

When Informant 4 is asked about what is the view of Government Institutions about the Hammarby 2.0 Project and how it affects policy development, he explains that he thinks that they are observing how Hammarby Sjöstad 2.0 is developing and progressing, but: *"they don't know what to do with it, I think they all think it's interesting but they don't know how to handle it, because it doesn't fall into one responsibility of the government"* (Quote 127). He also addresses that *"the government system is not compatible with this type of network collaboration"* (Quote 128), explaining that the Hammarby Sjöstad 2.0 project affects many different areas such as energy, waste, transport and education and adds to the confusion of how to divide responsibilities.

As a result, there is a weak connection between [NET]3 ElectriCity Stockholm and [NET]7 City of Stockholm. Informant 3 explains that [NET]3 has no interaction and input from [NET]7 regarding the residents' involvement and the Hammarby Sjöstad 2.0 initiative: *"we have no real support from the political level, we have done it ourselves"* (Quote 24). Informant 3 adds that *"City of Stockholm … I can't see that they have taken on board what we are doing"* (Quote 33), explaining that [NET]7 sees Hammarby Sjöstad as Hammarby Sjöstad 1.0 and [NET]3 has gone a step further with Hammarby Sjöstad 2.0 initiative involving residents and different organisations (Quote 34).

> *"I don't feel a strong support from the City of Stockholm regardless of the majority, and they see it as a very local activity, and they have picked it different local districts in Stockholm, so they can't just focus on one. This is how I interpret them"* (Informant 3, Quote 34).

Informant 4 supports this when he says that *"it is disregarded from the City doesn't have any role"* (Quote 107) and *"the City is a partner in discussing this but the responsibility for development city does not have any longer"* (Quote 109).

6.3.2 [NET]5 [NET]7 Crossing

[NET]5- Sjöstadsföreningen Housing Association is the contact between the [NET]7- City of Stockholm and other authorities with the Hammarby residents. The network establishes the required

communication exchange between [NET]5 and [NET]7 regarding housing issues, services, information, experience and knowledge necessary for the housing associations. It strengthens the area's profile as a neighbourhood for sustainable development (Sjöstadsforeningen, 2022a). [NET]5 seeks to strengthen Hammarby Sjöstad's brand and attractiveness to create added value for residents and collaborates with different organisations and partners to develop new initiatives and projects to improve the district (Heie, 2022).

Informant 5 reflects on how Hammarby Sjöstad 2.0 initiative influences this process:

"you can also improve from where you are. I mean it's not defined when you build the houses, you can always take another step" (Quote 88).

Box 47. Informant 5 [NET]5 Memo-Writing Result

The housing association's aim aligns with the Hammarby Sjöstad 2.0 initiative to further develop Hammarby Sjöstad's sustainable development profile (Quote 86).

Box 48. Informant 5 [NET]5 Memo-Writing Result

The residents get involved in the housing associations to collaborate and stay informed regarding the present and future housing issues and project developments, as well as to have an interest in the area and stay informed about what is happening. [NET]5 has a rich association with contact areas to promote collaboration and togetherness to tackle different issues (Heie, 2022). [NET]5 Sjöstadsföreningen Associations also works with other partners to deliver their objectives, such as ElectriCITY Stockholm [NET]3, GlashusEtt Environmental Information Centre [NET]1, Hammarby Sjöstad Economic Association (HSEF), Culture in Sjöstaden, Soderandan (Local crime prevention council) and Hammarby Sjöstad Newspaper (Sjöstadsforeningen, 2022b).

6.3.3 [NET]3 [NET]5 Crossing

[NET]3 ElectriCity Stockholm has cooperated with [NET]5 Sjöstadsföreningen Housing Association to deliver the Hammarby Sjöstad 2.0 Initiative. The two organisations have actively engaged the housing associations and residents in Hammarby Sjöstad, delivering projects and research initiatives in smart energy, sustainable transport, sharing economies, and recycling. Informants 3 and 5 explain [NET]3-ElectriCity Stockholm's and [NET]5-Sjöstadsföreningen Association's relationship in Hammarby Sjöstad.

[NET]3 has defined its role in [NET]5 mainly in energy with an initiative called "charge at home" to equip the garages with electric vehicle charging stations for residents and motivate them to shift to electric cars. Informant 3 explains that when ElectriCity Stockholm makes energy reviews in the building the housing association appoints an Energy Manager from the board: *"we call them climate heroes because they've done so much"* (Quote 26).

Box 49. Informant 3 [NET]3 [NET]5 Crossing Memo-Writing Result

Informant 5 explains that ElectriCity Stockholm is a parallel organisation that is an innovation platform for [NET]5-Sjöstadsföreningen Housing Association . It is financed by the revenues from the housing association members' fees, which help fund projects, initiatives,and energy reviews in each building (Quote 88).

Box 50. Informant 5 [NET]3 [NET]5 Crossing Memo-Writing Result.

[NET]5 Sjöstadsföreningen Housing Association members implement different projects and initiatives in collaboration with their partners to deliver the Hammarby Sjöstad 2.0 initiative. Informant 3 reflects on how important is Hammarby Sjöstad 2.0 to collaborate with the different partners:

Informant 3 explains that Hammarby Sjöstad 2.0 is the link between the two networks: [NET]3-ElectriCity Stockholm is a tester for companies and [NET]5-Sjöstadsföreningen Housing Association is where they run the projects: *"we have close link between the two, we see it not as two but as one route"* (Quote 21).

Box 51. Informant 3 [NET]3 [NET]5 Crossing Memo-Writing Result

6.3.4 [NET]8 [NET]3 Crossing

Other actors [NET]8 enrich and expand the connections and crossings within the Hammarby Sjöstad 2.0 project networks and how sustainability is translated into the community with [NET]3 Electricity Stockholm. The central sustainability concept transferred from the Hammarby Sjöstad 1.0 into the 2.0 project is the "Hammarby Model" concept and the "SymbioCity Approach". Informant 6 explains that the sustainability idea implemented in Hammarby Sjöstad is connected to the technological development of environmental solutions. Informant 6 makes the following remarks (Quote 254):

- *"the whole idea of SymbioCity is to sell Swedish cleantech products"* .
- *"It is the Swedish brand of sustainability" with the eco modern idea that*

- ➢ *" we can have it as we so or even better through the use of these technological developments that will use less energy resources".*

Informant 6 addresses that SymbioCity provides more business, explores the strategy and focuses on cleantech technology as a consultancy idea. She says that *"it's a package surrounding these ideas"* (Quote 274), adding that *"with that comes certain assumptions of sustainability and certain approaches"* (Quote 274). However, Informant 6 also explains, "*I honestly think that the ambition is to this cohesive social environmental. And I think there's a lot of it"* (Quote 279). However, being a transformative actor in translating sustainability is not there, and she explains that *"what is actually done is not in line with that"* (Quote 279) with the assumptions in sustainability that technology will give solutions to current environmental problems.

6.4 Final Remarks

Chapter 6 has introduced the identified Networks [NET] and the crossings that allow the Hammarby Sjöstad 1.0 project to evolve into the Hammarby Sjöstad 2.0 project. The findings in this chapter have identified that there are specific Networks [NET] driving the sustainability governance in each stage: [NET]7- City of Stockholm in Hammarby 1.0 and [NET]3- Electricity Stockholm in Hammarby 2.0. Although the crossing between these two networks is supportive but non-active, the weakness of the crossing brings an opportunity for the 1.0 project to evolve into a 2.0 project as [NET]3 ElectriCity Stockholm is created to keep transferring the sustainability concept into the community and has allowed the creation of further crossings with the listed networks in Chapter 6. However, the association with SymbioCity Approach [NET]8 brings a possible problematization of the sustainability concept behind the "Hammarby Model" as it relates to transferring sustainability governance through technological development rather than a meaningful change. Chapter 7 will address how the epistemological shift manifests in the sustainability governing, presenting the findings on how sustainability thinking and acting is translated into the Hammarby community and the taken-for-granted concepts alienating this process.

CHAPTER 7 “MoE”s in Action in the Hammarby Sjöstad Case Analysis

7.1 Introduction

Chapter 7 presents the “MoE”s in Action in the Hammarby Sjöstad case to understand how the crossings between the Networks [NET] presented in Chapter 6 and the emerging “MoE”s presented in Chapter 5 extend the associations between other “MoE”s introduced in Chapter 3. This will enable the study to understand the complexity of sustainability thinking and acting in the presented case, introducing which “modes” emerge more than others. Therefore, Chapter 7 will analyse what dominant “modes” drive the sustainability governing process, how they are produced, and if any contradictions alienate these dynamic relations. The Chapter will focus on how the governing aspect of the initial Hammarby Sjöstad project has evolved into a 2.0 project with the involvement of the residents and organisation in translating sustainability thinking and acting into another step and which aspects have been involved in delivering this transformation.

7.2 Sustainability Governing Transition in the Hammarby Sjöstad Case

The [ORG] “MoE” is the primary dominant mode in the sustainability governing process in the initial 1.0 project at the project level team and in the second stage of the transformation with the 2.0 project. Table 17 shows the collected emerging vocabulary through the analysis process:

“MoE”	“MoE” Coding	“MoE” Category	Associated Concepts	Emerging Vocabulary
Organization	[ORG]	Governing	Hammarby Sjöstad 1.0 Hammarby Sjöstad 2.0 Project Team	Organisations Business System Management Planning Way of working Initiatives Promote Practises Agents

Table 17. Organization [ORG] “MoE” Metalanguage Vocabulary in Hammarby Sjöstad Case Analysis

Various Networks [NET] have connected with [ORG] to implement sustainability governance in the Hammarby Sjöstad case analysis. Numerous associations, organisations, businesses, and projects have supported sustainability governance in Hammarby Sjöstad, playing crucial roles in the 1.0 and 2.0 stages. The City of Stockholm [NET]7 and ElectriCity Stockholm [NET]3 have been the main strategic networks, managing the projects and governing the involvement of various actors in stages 1.0 and 2.0.

Diagram 12 below shows the mind map summarising the actors and organisations involved in Hammarby Sjöstad sustainability governing transition in two phases, the main Networks [NET], which are the key communication channels and platforms for collaboration, and the main "modes" with the primary concepts registered:

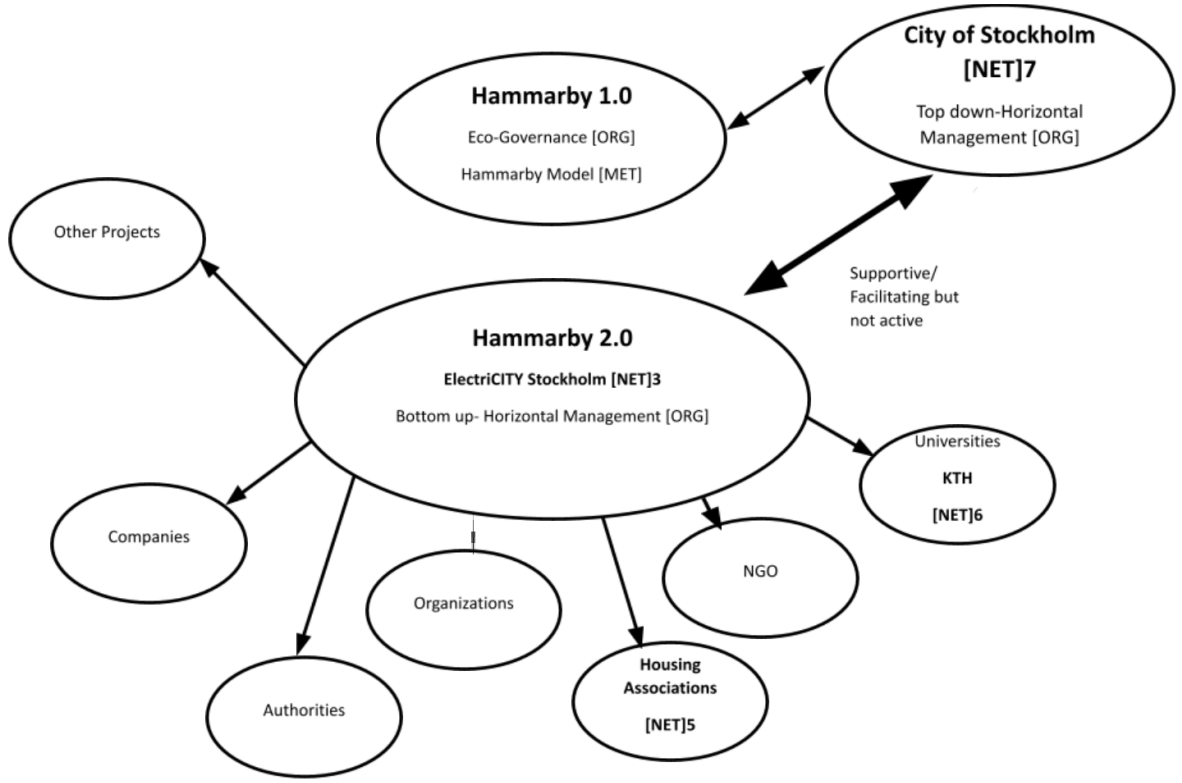


Diagram 12. Mind Map from Fieldnotes. Actors in Hammarby Sjöstad Sustainability Governance Process

The actors involved in the Hammarby Sjöstad case build networks in different ways at each stage: Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0. The Hammarby 1.0 project refers to the initial urban infrastructure and design development with the redevelopment of the old industrial estate in the Hammarby area, and the Hammarby 2.0 refers to the residents' initiative. The primary mode in both is Organisation [ORG]. The crossings between the different networks in the sustainability governance process are happening constantly in the Hammarby Sjöstad 1.0 Project and the Hammarby Sjöstad 2.0 Project. To illustrate this, the memo-writing extract from Informant 4 provides concrete examples of these interactions:

Informant 4 explains that Hammarby Sjöstad's transformation has had an enormous acknowledgement around the world to replicate "Eco-Governance", organisational know-how and horizontal management between all actors and remarks that from Hammarby 1.0 project [ORG]:

"there were a number of things that were taken over and made more or less standard for other projects" (Quote 129).

Informant 4 also adds that from the Hammarby 1.0 project, there is an acknowledgement of the necessity of needing more horizontal collaboration: "*There are so many other areas that we need to find ways of developing synergies and learning from each other and cooperation and this is a good example"* (Quote 144).

Box 52. Informant 4 [ORG] Memo-Writing Result

[ORG] with the governing of the sustainability transition in the Hammarby Sjöstad case is linked to the involvement of the community and the involvement of the actors in the 1.0 project with the Attachment [ATT] aspects. The crossing between these two "MoE" dominates the thinking and acting differently on sustainability, manifesting a possible epistemological shift. This aligns with Latour's (2013a) argument that the interaction between these modes brings an opportunity for an episteme change in society and allows a transition into the First Nature (Ecology), as explained in Chapter 2. Latour (2013a) hypothesises that three main modes have a transformative factor, Organization [ORG], Attachment [ATT] and Morality [MOR], which the interactions between them can fill the gaps to overcome and be liberated from Second Nature (Economy). The thesis has attempted to identify and understand the contrasts brought out by these three modes in the Hammarby Sjöstad case following the "MoE" aspects of "organizing" the sustainability governance of the project as [ORG], the involvement of residents and actors as [ATT] and the sustainability thinking translated into the community as [MOR]. These three aspects must be observed in the case presented as the "organizing" aspect dominates the governing of the Hammarby Sjöstad projects in both stages 1.0 and 2.0. The interaction between [ORG] and the Networks [NET] explained in Chapter 6 makes it possible for the 1.0 project to evolve into a new stage with the Hammarby Sjöstad 2.0 initiative. The transition to the 2.0 project is possible because of the involvement of residents and organisations in the sustainability governance of the project and how sustainability thinking and acting is happening in the district.

The project's organising and governing are initially taken by the [NET]7 City of Stockholm with the creation of the project team for the 1.0 project, as explained in Chapter 6. However, the weaknesses perceived by the Hammarby community in translating sustainability into the district encouraged the residents to start thinking and acting differently. As a result, the original 1.0 project evolved into the Hammarby Sjöstad 2.0 initiative with a different aim led by the Hammarby residents and community to "renew a new city". Informant 3 discussed the main sustainability goals behind the 2.0 project:

The idea behind the Hammarby Sjöstad 2.0 initiative has been to make Hammarby Sjöstad district in the future *"attractive even in 2020"* (Quote 6) to achieve *"the next level of innovation in sustainable development"* (Quote 11).
ElectriCity Stockholm platform has been actively involved in delivering the Hammarby 2.0 initiative with the main goal of "*Innovation build in innovation in a City"* (Quote 7) and *"To renew a new City"* (Quote 139).

Box 53. Informant 3 [REP] Memo-Writing Result

In this process, [NET]3-ElectriCity Stockholm has been actively involved in taking the Hammarby Sjöstad 2.0 initiative on board to bring businesses and innovation projects together to the next step on sustainability. Informant 3 makes the following remarks:

- *"the model is there from the beginning and then it is used in other places but we are working in a similar way, say we take the model to a next level"* (Quote 47).
- *"then the question is now will they change in the next step what we are doing?"* (Quote 36).

[NET]3 has had an essential role in transforming and directing the Hammarby Sjöstad district to holistically translate sustainability to the community with the Hammarby 2.0 initiative. Informant 1 and 5 share their opinions on [NET]3 involvement in this process:

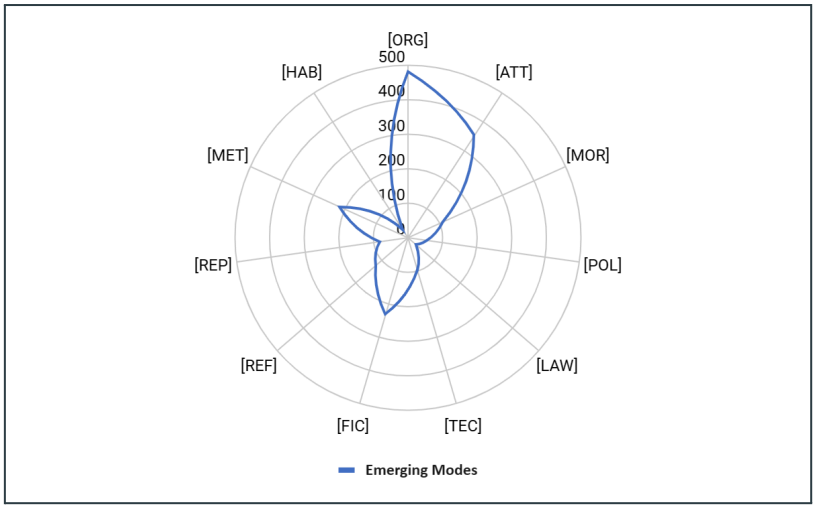
Informant 1 explains the importance of [NET]3 delivering the change: *"And also what they are doing now here, How to Renew a City, you are going to hear more about that at ElectriCITY that you can actually change"* (Quote 203).

Box 54. Informant 1 [NET]3 [MET] Memo Result

Informant 5 supports this when he explains that the initiative of ElectriCity Stockholm gives a perspective that Hammarby Sjöstad should be a cutting-edge eco-friendly city and the need of taking another step to improve more on sustainability: *"some other projects are put initially … is to do, either to reach that first level or to take the 2.0 approach … maybe also to reach what you are already sort of wanted to reach from the start"* (Quote 86).

Box 55. Informant 5 [NET] 3 [MET] Memo Result

Also, different "MoE" play a crucial role in the transformation process of acting and thinking differently in the sustainability governing process in the Hammarby Sjöstad case. Graph 7 and Table 18 give further results on the dominant modes throughout the analysis process:



Graph 7. Total Results of Dominant "MoE"s in Hammarby Sjöstad Case Analysis.

	"MoE"	**"MoE" Codes**	**"MoE" Category**	**Associated Concepts**
Group 1 Direction	Metamorphosis	[MET]	Transformation	Hammarby Model
Group 2 Quasi-Objects	Fiction	[FIC]	Urban Development	Master Plan
Group 4 Transformative	Attachment	[ATT]	Involvement	Residents Involvement Organisations Involvement
	Organization	[ORG]	Governing	Hammarby Sjöstad Project Management Eco-Governance Project Team

Table 18. Dominant "MoE"s in Hammarby Sjöstad Case Analysis

The results in Graph 7 reveal a process where [ORG] and [ATT] take the lead, and Fiction [FIC] and Metamorphosis [MET] play crucial roles in the transformation process. The master plan and the "Hammarby Model" concept have been implemented through a series of interconnected "MoE"s, all working together to deliver sustainability in the Hammarby Sjöstad case, with the governing of the project [ORG] at its core. The active involvement of residents and organisations in the project has led to the evolution and transformation of the initial 1.0 with the "Hammarby Model" concept from an urban development perspective. This process has significantly influenced how sustainability thinking

is translated into the district and how behavioural change has occurred, bringing about positive outcomes. The following sections will elaborate on these aspects.

7.3 Hammarby Sjöstad Community Involvement and Participation [ATT]

The transformation and translation of sustainability have been propelled by the active involvement and participation of the Hammarby Community, mainly through the 2.0 initiative. This initiative, a significant step forward from the original project, has been initiated and managed by the Hammarby Community since 2015. A group of residents in Hammarby Sjöstad came together to create this new social initiative, aiming to address the district's environmental, social, and economic issues. Informant 3 highlights that Hammarby Sjöstad 2.0 fosters participation from a holistic approach, encompassing all aspects of sustainability and community development:

Informant 3 explains the holistic approach behind Hammarby Sjöstad 2.0 is to include and promote participation from people and residents to be mutually supportive beyond technological development: *"This is also what we are doing with Hammarby Sjöstad 2.0 because this is a holistic approach now the city is built, people are living here. But we have to have all of the things together and this is what we are doing. We are not doing just electric cars, not doing just energy or waste management. We are all doing all of these things and see them as mutually supportive"* (Quote 46).

Box 56. Informant 3 [ATT] Memo-Writing Result

The residents believed that the Hammarby Sjöstad 1.0 project was ending, and there was a need to keep developing the sustainability strategies and the environmental goals set for the Hammarby Sjöstad district (ElectriCity Stockholm, 2019). Informants 4 and 5 reflect on how Hammarby 2.0 links with the original 1.0 project and the main contribution from the 2.0 initiative:

Informant 4 explains that as part of the Hammarby Sjöstad 2.0 initiative new ambitious projects are coming up that tie with the original Hammarby Sjöstad 1.0 project. With further improvements in understanding and technology to further progress and support transformation into cultural and behavioural changes into sustainability. Such as new ways of improving recycling, separating textiles for shops and looking at how to reduce packaging and consumption (Quote 151).

Box 57. Informant 4 [ATT] Memo-Writing Result

Some projects are put initially to reach the Hammarby Sjöstad 1.0 stage, and others are for Hammarby 2.0 to take another step toward sustainability and achieve the "Carbon Neutral by 2030" goal: *"given that this was supposed to be a cutting edge eco-friendly city and and to take another step to improve more and reach what you already sort of wanted to reach from start "*(Quote 86)

Box 58. Informant 5 [ATT] Memo-Writing Result

The Hammarby Sjöstad 2.0 initiative was created to become the most climate-friendly district in Sweden and reach the Paris Agreement Goals by 2030, further transforming Hammarby Sjöstad (Hammarby Sjöstad 2.0, 2022). The initiative aims to incorporate and implement the Paris Climate Deal 2050 strategic goals in energy, building, mobility, and circular economy (ElectriCITY Stockholm, 2019). Allan Larsson (Hammarby Sjöstad resident) led this initiative and platform to involve residents, businesses and research organisations to implement smart and sustainable solutions and support residents' involvement in the Hammarby Sjöstad area (ElectriCITY Stockholm, 2019). As part of the 2.0 initiative, organisations such as ElectriCity Stockholm and the Royal Institute of Technology (KTH) are following the Agenda 2030 to define which measures and solutions are required for urban areas in energy efficiency, renewable energy sources and sustainable transport (Hammarby Sjöstad 2.0, 2022). Informant 2 emphasises Hammarby Sjöstad's 2.0 role in transforming the district:

It has played an important role in improving the infrastructure and developing projects for the Hammarby residents to keep maintaining the district's sustainability concept: *"So everything has been very much better, but you have to maintain that to keep on developing the district"* (Quote 151).

Box 59. Informant 2 [ATT] Memo-Writing Result

The Hammarby residents have been involved in the Hammarby Sjöstad 1.0 and 2.0 stages with the following concepts: "Resident involvement" and "organisational involvement". Table 19 below shows the emerging vocabulary identified with these two main concepts:

"MoE"	"MoE" Coding	"MoE" Category	Associated Concepts	Emerging Vocabulary
Attachment	[ATT]	Involvement	Hammarby Community Organisational Involvement	Behaviour Citizens Cooperation Critical Mass Participate Willingness Engaged Involvement Everyday Life Society

Table 19 Attachment [ATT] Metalanguage Vocabulary in Hammarby Sjöstad Case Analysis

7.3.1 Hammarby Residents Involvement [ATT]

The Hammarby residents' involvement in the sustainability governance process was not significant in the Hammarby Sjöstad 1.0 stage. This was because Hammarby was an old industrial estate at the beginning of the planning process, and no residents lived in the area. However, the institutions played a crucial role during this period, being responsible for communicating the changes in the area. Informant 1 elaborates on this vital function:

> Informant 1 explains that by Swedish law, when a detailed plan for an area is proposed, the council have to have an open meeting so the residents can ask questions and put forward their opinions and objections: *"So that is the participating of the people either lives in the area or from outside that they can actually influence how this design of new areas"* (Quote 194).
>
> Informant 1 also remarks that no objections in Hammarby Sjöstad 1.0 stage ever happened, *"although they have to have these open meetings for the people every time they have a detailed plan ready and say this is going to happen"* (Quote 194). If the residents disagree with the plans, they can object and the council will have to manage the objections and reorganise the project if they don't get into an agreement. Informant 1 adds that this is the process for the participation of residents in the area to influence the design and planning process.

Box 60. Informant 1 [ATT] Memo Writing Result

The engagement within the community is linked with "trust" in the system and participation process in the institutions. This perspective on participation and involvement happens at different levels, depending on each individual's role, whether in the community or organisation. Enforcing the idea of

how people can engage within a participatory process and how the developers see this involvement within the planning, development and management stages. Informant 6 describes this process:

Informant 6 discusses when engagement happens in residents and how that is sustained in time in a new development or redevelopment like Hammarby Sjöstad (Quote 237).

Informant 6 explains that people inhabit different roles *"they are part of an organisation. They might be a sustainability manager but they are also neighbours. They are also parents"*(Quote 216).

Box 61. Informant 6 [ATT] Memo Writing Result

Informant 6 describes citizen engagement in Sweden with high trust in authorities: *"...within the Swedish system, there's a high trust in authorities and so on. So there's a high trust in participating as well"* (Quote 235).

However Informant 6 also explains that the trust in participation enforces the idea on how people is engaged and how the developers want residents participation in the process: *"the developers that build rental apartments that actually have a longer term commitment also tend to emphasise, of course, quite naturally that they want engagement with their tenants. So then it might also be different, but then it's more this tenant property owner relationship"* (Quote 244).

Box 62. Informant 6 [ATT]Memo Writing Result

In the Hammarby Sjöstad 2.0 stage, participation and involvement happen through the Hammarby community to implement the initiatives and projects linked to the 2.0 initiative. The analysis shows that the involvement of the residents in the community is high, although top-down management directs the initiatives and projects. Informant 5 reflects on this:

Informant 5 explains that when new projects and ideas are presented to the Hammarby residents as part of the Hammarby Sjöstad 2.0 initiative, it's generally positive feedback and the residents in Hammarby are willing to try new things such as car sharing, bike sharing and tool sharing. Describes Hammarby residents as "early adopters" with the following remarks:

- *"This sounds like a great thing and we would like to be part of it"* (Quote 86).
- *"Is well accepted that we would like to have Hammarby as an example, good example for being fossil-free early"* (Quote 86).

- ➢ *"I think it's a balance that people who want to be eco-friendly, but you adopt sort of the general direction maybe quicker"* (Quote 86).

Informant 5 also shares that the residents take on board initiatives quite easily in Hammarby Sjöstad district, however ultimately, the initiatives are coming from top-down as the aim and direction of Hammarby Sjöstad is defined by the targets that are set by the Government to be Carbon Neutral by 2030 (Quote 86).

Box 63. Informant 5 [ATT] Memo Writing Result

7.3.2 Networks [NET] Involvement

The different Networks [NET] have facilitated the participation and engagement of the Hammarby residents throughout the sustainability governance process. There are different Networks [NET] that cross with Attachment [ATT] mode at this point, allowing participation and involvement between the Hammarby residents and the actors involved.

a) [NET]1- GlashusEtt Environmental Centre and the Hammarby Residents [NET]1 [ATT]

GlashusEtt Environmental Centre, as part of the Hammarby Sjöstad 1.0 project, plays an important role in facilitating resident engagement. It serves as a community hub, providing a platform for the residents to not just get involved, but also to participate in the "Hammarby Model" concept. It also serves as an information hub, offering insights into sustainability and the technology integrated within the urban development in Hammarby Sjöstad. Informant 1 further elaborates on the role of GlashusEtt Environmental Centre [NET]1 in facilitating the residents' engagement and participation:

Informant 1 describes the role that GlashusEtt Centre has in the Hammarby community:

- ➢ *"... people can come and ask questions to us and to the people who works down here how they can participate, how they should do etcetera especially with the waste"* (Quote 185).
- ➢ *"a central role, a platform, a meeting point"* (Quote 175).
- ➢ *"a forum of discussion and the implementation for sustainability ideas"* (Quote 161).
- ➢ *"how people here was going to participate"* (Quote 181).

Box 64. Informant 1 [NET]1 [ATT] Memo Writing Result

[NET]1- GlashusEtt Environmental Centre provides an educational and learning service for the community and the visitors in Hammarby Sjöstad district. The findings of the analysis show that the

centre has an essential role in continuing the sustainability values with current and new residents and in their behavioural change into environmentally minded habits. Informants 1 and 2 reflect on [NET]1 role promoting sustainability within the community:

Informant 2 explains that since GlashusEtt Environmental Information Centre was opened in 2002, the environmental centre has been important in introducing and advising the new residents on how they could participate in the district with the "Hammarby Model" environmental programme (Quote 161, 193). Informant 2 believes that GlashusEtt is necessary for the sustainability process: *"it makes the process more decent and smoother and better"* (Quote 175).

Box 65. Informant 2 [NET]1 [ATT] Memo Writing Results

Informant 1 explains that as part of Hammarby Sjöstad 1.0 project [NET]1-GlashusEtt Environmental Centre has had an educational and learning role to inform and educate the residents with seminars in the evenings, newspaper for residents and advertising (Quote 181), emphasising that it is very important to change people's behaviour (Quote 207): *"... in the beginning we actually tried these seminars and so on and tried to educate, well yes we can call it educate even though we did it in a nice way, and we still are in most of our company doing this to school children and so on. Because one thing I think is very important really to change people's behaviour"* (Quote 207).

Box 66. Informant 1 [NET]1 [ATT] Memo Writing Result

b) [NET]4- Envac Group [NET]4 [ATT]

[NET]4- Envac Group was the mastermind behind the design and installation of the waste management system in Hammarby Sjöstad district, a crucial element of the "Hammarby Model" Environmental Programme. This system, integrated with the urban structure, harnesses innovative technology and engineering to optimise waste collection and recycling while minimising non-recyclable waste. The residents are not just informed but actively engaged with the waste recycling system, including the identification of inlets for segregating rubbish. The interview analysis highlights the successful community engagement efforts of [NET]4, which has effectively involved the Hammarby community in understanding the system's technology and the energy production for residential areas from the recycling system. A concrete example of this is shared by Informant 4:

Informant 4 explains that [NET]4-Envac Group has engaged with the residents in the area, co-sponsoring a grid party to inform and communicate with the residents about the results of the waste management system and show the residents how the system worked. They organised two

hour meetings with each housing association to do this and it was highly appreciated by the residents (Quote 116).

Box 67. Informant 4 [NET]4 [ATT] Memo Writing Result

The engagement with the residents has improved the waste management system as [NET]4-Envac Group and the Hammarby Community have exchanged views and opinions regarding specific issues and concerns. This has contributed to a continuous improvement of the system as part of the involvement and participation between [NET]4 and the residents. Informant 4 explains how the communication exchange has improved the waste management system:

Informant 4 explains that the [NET]4 involvement with the community has been important in improving the waste management system. It has taken into consideration residents feedback; and Envac has been providing information packs, locks for the inlets and improving the velocity of the collection as a result (Quotes 117 and 118). Further technical solutions and adaptations of the waste management system have been considered for other projects: *"in order to be able to sell these technical solutions you need to have the ability to adapt it and it takes collaboration from different types of entities within the city and also private actors and architects to understand the benefits and collaborate to make this happen"* (Quote 135).

Box 68. Informant 4 [NET]4 [ATT] Memo Writing Result

c) [NET]3- ElectriCity Stockholm and [NET]5- Sjöstadsföreningen Housing Association [NET] 3 [NET]5 [ATT]

[NET]3- ElectriCity Stockholm and [NET]5- Sjöstadsföreningen Association are the main networks that drive Hammarby residents involvement and participation within the Hammarby Sjöstad case. The [ATT] mode emerges within the association of these two networks: [NET]3 and [NET]5. Informant 5 explains how these networks promote participation in the Hammarby Sjöstad district:

Informant 5 acknowledges the importance of the close relationship between ElectriCity Stockholm [NET]3 and Sjöstadsföreningen Association [NET]5: *"It's extremely strong to have this association to gather and you see that you can learn from cooperatives and you can get support and so I think it's very important"* (Quote 89).

Box 69. Informant 5 [NET]3 [NET]5 Memo Writing Result

Informant 5 shares his opinion regarding the professional insight and knowledge that [NET]3 gives to support a critical mass of knowledge within the housing associations [NET]5 to run the properties and build partnerships with external parties such as businesses, industry and new technologies.

- ➢ *"I mean we are not professionals running the housing cooperative, and no one of the members of the board are sort of building engineers"* (Quote 78).
- ➢ *"It's extremely strong to have this association ([NET]3) to gather and you see that you can learn from cooperatives and you can get support and so I think it's very important"* (Quote 89).
- ➢ *"They have jointly teamed up to choose the most environmentally friendly suppliers and building management or gone through training for saving energy and these type of things"* (Quote 122).

Box 70. Informant 5 [NET]3 [NET]5 [ATT] Memo Writing Result

The Hammarby residents' involvement and participation, a key element of the sustainability governance, is largely influenced by the interaction between [NET]3-ElectriCity Stockholm and [NET]5-Sjöstadsföreningen Association within the Hammarby Sjöstad 2.0 initiative. The second stage of sustainability governance in Hammarby has significantly enhanced the involvement, participation, and communication exchange with the residents and different actors, as well as among the residents themselves. Informant 4 provides a positive example of this:

Informant 4 explains throughout the interview that when changes happen and affect the residents, the residents are part of the discussions through their housing associations, "so they are definitely very much involved in that" (Quote 124): *"if there is an initiative coming like one company wants to try new technology or new process etcetera, if it affects the residents then ElectriCity is doing via the housing associations who turn then engage their members. So everybody gets involved."* (Quote 125).

Box 71. Informant 4 [NET]3 [NET]5 [ATT] Memo Writing Result

[NET]3-ElectriCity Stockholm and [NET]5-Sjöstadsföreningen Housing Association work together to involve the residents and organisations in promoting communication exchange and project development. [NET]3-ElectriCity Stockholm provides knowledge and a network of partners for [NET]5 to develop projects and initiatives. The housing association board invites their member organisations and residents to attend and participate in seminars and meetings. Informant 3 explains how [NET]3 and [NET]5 provide knowledge to the Hammarby residents:

Informant 3 explains that the main connection with residents happens through [NET]5, explaining that [NET]3 works through the boards of the housing associations and board members to be invited to attend and participate in seminars and meetings that are organised by [NET]3-ElectriCity Stockholm: *"we have what you call energy meetings, energy seminars and then people from the boards are coming to these meetings to meet other colleagues from other associations and to learn from them"* (Quote 25).

Box 72. Informant 3 [NET]3 [NET]5 [ATT] Memo Writing Result

The interview analysis reflects on the decision-making and participatory process within [NET]5-Sjöstadsföreningen Housing Association to put initiatives forward and engage with the residents. Informants 3 and 5 explain the decision-making process in [NET]5:

Informant 3 emphasises that the decision makers in the housing associations are the key people for agreeing on initiatives and projects:*"what are we doing, what can we do better"* and *"it's the way to build support, interest and engagement"* (Quote 28).

Box 73. Informant 3 [NET]5 [ATT] Memo Writing Result

Informant 5 explains that [NET]5- Sjöstadsföreningen Housing Associations have an annual general meeting to review their economic and environmental results, discuss proposals or future projects, and elect the new board with new members for the upcoming year. The general meeting has to take place by law, and the housing associations need to send a report to the authorities with the results to be monitored and audited. All the members are encouraged to send proposals to be discussed in the board meetings, for example: *"we need more sand in the sand pit, or it could be we need to look into a new energy system"* (Quote 84).

When the proposal is discussed and the project is agreed, the board will supervise and deliver the project. The board deals with informing the residents in the housing association at the board meeting, assesses the reaction of the other members and answers the questions and objections: *"if there is a lot of scepticism then we okay that is the feedback and then we could reassess or we can sort of just say okay then maybe we need to re-evaluate and then tweak the project or scrap the project"* (Quote 84).

Box 74. Informant 5 [NET]5 [ATT] Memo Writing Result

Also, the information and communication exchange between the residents in the housing association is happening via different methods such as internal meetings, websites, Facebook and external meetings in communal spaces. Informant 5 explains this further:

Informant 5 explains that new members are invited for a meeting at the beginning of each year to greet them into the cooperative and give them more in-depth information about the housing association and how the board works, giving the new members (residents) an opportunity to meet people and ask questions. They post news and information through their website about practicalities such as where to get the parking space or who to contact if something breaks; "the first point of contact" to send emails, enquiries and complaints, which are answered by the chairman of the board (Quote 83).

Although the communication goes through the board meetings and website, residents tend to meet up in the courtyard to interact and socialise with each other as they work in their vegetable patch, an initiative from the housing association to "grow your own veg" in the courtyard. Informant 5 explains that they have 18 to 20 vegetable plots, and the interaction between the residents is a bit more frequent (Quote 83).

Box 75. Informant 5 [NET]5 [ATT] Memo Writing Result

7.4 Sustainability Acting with the Hammarby Model [MET]

To be able to understand how sustainability thinking and acting is happening in Hammarby Sjöstad, it is essential to observe the Metamorphosis [MET] "MoE" as it is driving the transformation in the district with the "Hammarby Model" concept with the governing of the project [ORG] and the involvement of the Hammarby community [ATT]. The Metamorphosis [MET] "mode" has been registered throughout with the following vocabulary shown in Table 20:

"MoE"	"MoE" Coding	Category	Associated Concepts	Emerging Vocabulary
Metamorphosis	[MET]	Transformation	Hammarby Model	Next Step/ New Ideas Improve Transition Develop Opportunities Innovation Alternative Modern Opportunities

Table 20. Metamorphosis [MET] Vocabulary in Hammarby Sjöstad.

The general perspective on how important the "Hammarby Model" is linked to how embedded it is in the Hammarby Sjöstad district. The informants have shared the following views about what the "Hammarby Model" concept means for the district:

- ➢ *"this is an extremely important concept"* (Informant 3, Quote 44).
- ➢ *"we are living in a time where things have to change and sustainability means that we have to do a lot of things"* (Informant 3, Quote 4).
- ➢ *"it's a general idea that we sort of be an eco-friendly part of Stockholm and for me it's a general guidelines or general idea"* (Informant 5, Quote 87).
- ➢ *"Elementary"* (Informant 4, Quote 132).

There is a "togetherness" between the residents and organisations with the "Hammarby Model". Informants 3 and 5 reflect on the importance of the "Hammarby Model" concept and its influence on residents:

- ➢ *"Hammarby Sjöstad was built around the idea that we need to make this together in the whole neighbourhood"* (Informant 5 Interview, Quote 89).
- ➢ *"bringing together everyone, find out how you can build a City twice as good as anything before"* (Informant 3 Interview, Quote 48).

The Hammarby Sjöstad 2.0 initiative has been built around the "Hammarby Model" to drive the change further into sustainability. The following quotes register how the "Hammarby Model" and 2.0 initiative and the "Hammarby Model" are linked together to drive the change forward:

- ➢ *"this is a holistic approach now the City is built people are living here. But we have to have all of the things together and this is what we are doing, we are not doing just electric cars, not doing just energy or waste management"* (Informant 3, Quote 46).
- ➢ *"they are going side by side"* (Informant 1, Quote 198).
- ➢ *"is a key element"* (Informant 1, Quote 199).

7.4.1 Hammarby Model and Behavioural Change [MET] [HAB]

The Hammarby Sjöstad 2.0 initiative engages and involves the Hammarby community with the "Hammarby Model", encouraging participation through information exchange and building proposals for further project development. This process has influenced the resident's behavioural change into sustainability values and habits. It's important to note that the 2.0 initiative has been a key driver in this transformation, crossing over with [HAB] mode to further influence behavioural change. Informant 4 sheds more light on this:

Informant 4 explains that the "Hammarby Model" [MET] and Hammarby Sjöstad 2.0 initiative [ATT] are influencing the residents into a cultural change in sustainability [HAB] with new initiatives in waste management, new ways of improving the recycling and reducing the packaging consumption (Quote 151): *"there are new ambitious initiatives coming up that tie in with the original but there are improvements in understanding and technology"* (Quote 151).

Box 76. Informant 4 [MET] [ATT] [HAB] Memo Result

The residents' behavioural change towards sustainable thinking and acting has been observed in their experiences with the urban aspect of the Hammarby Sjöstad district. The key informants talk about electric cars, the infrastructure, waste management and sustainable transport that have affected the residents' behaviour.

Informant 2 expressions regarding the behavioural change in residents (Quote 180):

- *"... you could maintain it in a good way, so you're not losing the embedded possibilities".*
- *"The buses should be electrical and not at least polluting the air, ... use the public transportation and maybe not have a car of your own".*
- *"... you should run the right kind of car and the possibility to charge an electric car in the garage".*

Box 77. Informant 2 [HAB] Memo Writing Result

Informant 3 explains the change is happening as a system change and adds that they try to influence the system and the infrastructure rather than individual behaviour with the belief that individual behaviour will come as a consequence of change and improvements in the infrastructure (Quote 67): *"so we focus on system change and that is that we equip the parking doors with electric chargers so now you can change to electric cars"* (Quote 66).

Box 78. Informant 3 [HAB] Memo-Writing Result

Informant 4 describes behavioural change as a consequence of the infrastructure and "Hammarby Model": *"they all change behaviour because of it"* (Quote 141). Explains that, as a result, the district has lower private car ownership and higher levels of people using public transport, cycling and walking compared to other areas in Stockholm.

Informant 4 is aware that although residents in Hammarby Sjöstad are living with the "Hammarby Model" and Hammarby urban infrastructure, there is a need for constant engagement with the residents regarding sustainability issues.

ElectriCity Stockholm platform has done environmental measurements in behavioural change through annual questionnaires asking people about the immediate behavioural change and the results have reflected that residents have changed their behaviour as a result of living in Hammarby Sjöstad: *"they ask people their opinion on how, but I think you can see from some of the measurements that like for example, the use of private cars or the number of car sharing in here, the number of trips you know with public transportation. Or also other areas waste volumes, waste recycling that there is a higher level of environmental consciousness in as a reality not only what people say but it's a reality"* (Quote 141).

Box 79. Informant 4 [HAB] Memo-Writing Result

The behavioural change in the district is affected and influenced by the "Hammarby Model" and how it has been embedded culturally. The key informants opinions regarding the "Hammarby Model" and behavioural change identifying the crossing between the [MET] and [HAB] modes reflect on how the "Hammarby Model" is influencing the behavioural change within the community:

Informant 2 explains that the residents are slowly embracing the sustainability vision with the "Hammarby Model" (Quote 178). Informant 2 gives an example of how residents have engaged with the waste management system in Hammarby Sjöstad (Quote 173) and remarks that behavioural change "is *a slow process"* (Quote 178).

Box 80. Informant 2 [MET] [HAB] Memo Result

Informant 5 discussed how the "Hammarby Model" is embedded culturally within the district and explained that the "Hammarby Model" lives through the housing association and it is an important way of working to draw a lot of learning: *"This is how you keep it alive and also find people that are more engaged in this sort of thinking"* (Quote 96).

Box 81. Informant 5 [MET] [HAB] Memo Result

Informant 6 goes further explaining behavioural change and makes the remark that people are evolving into environmentally minded individuals and communities within new developments such

as Hammarby Sjöstad: *"I think it is really this framing of environmental citizens rather than this which has been before more of this like eco-consumer thing"* (Quote 291).

Informant 6 explains that there is an important shift in practices starting to change as a result, such as *"I'm going to go on a more eco friendly trip"* and *"I'm going to buy my towel that I bring to the beach slightly better than the towel I had before"* (Quote 291). Informant 6 also talks about the shift towards a more environmental citizenship through the political demands and activists questioning the role that people have in the sustainability transition as understanding people as co-agents: *"That's a different way of framing it"* (Quote 292).

Box 82. Informant 6 [MET] [HAB] Memo Result

The urban design and development in Hammarby Sjöstad district play a crucial role in the residents' understanding of sustainability, making the crossing between [MET] and [FIC] modes. Informants 1 and 3 reflect on this:

Informant 3 explains that the "Hammarby Model" [MET] was *"just a way for the City of Stockholm to build a City"* [FIC] (Quote 50) as it was integrated into the planning and building process, and it was extremely important to work with different authorities, developers and organisations to develop the district with the "Twice as good" goal: *"to do that you need to have all the developers and all the City authorities to sit down around the same table and agree to the basic concept. Agree to core sustainability and then you have very strong manager who could drive it through"* (Quote 43).

Box 83. Informant 3 [MET] [FIC] Memo Result

Informant 1 discusses the transformation of Hammarby Sjöstad district from being an old area into a new development, explaining that the new eco-development felt like it was a new vibrant city area where people could live and be involved with the environment: *"because of these green stretches we have made I think this area has been more pleasant to live in because you have trees outside"* (Quote 204).

Box 84. Informant 1 [MET] [FIC] Memo Result

The key informants agree that the "Hammarby Model" and the transformation process affecting the residents have been mainly from the urban perspective. Informant 3 explains that [NET]3-ElectriCity Stockholm and Hammarby Sjöstad 2.0 initiative are addressing how to fix the system to reduce energy consumption before *"we start telling people that they should change their lifestyle"* (Quote 64). They

focus on the housing associations, the boards, the energy managers and technological innovation to address the changes needed (Informant 3, Quote 65) to focus on the system change and infrastructure rather than individual behaviour (Informant 3, Quote 67). The informants believe that individual behaviour will result from changes and improvements in the urban infrastructure, leading to a more sustainable and livable urban environment as registered in the quotes below:

- ➢ *"and that is why we equip the parking doors with electric chargers so now you can change to electric cars"* (Informant 3, Quote 66).
- ➢ *"people here are a little bit more early adopters when it comes to these kind of ideas, so I think it's easier to launch those kind of tests here and then you can try them out"* (Informant 5, Quote 92).
- ➢ *"it's easier to live eco-friendly"* (Informant 5, Quote 94).

The interviews reveal that technological and urban development is essential for sustainability governance in the Hammarby case, which requires the residents to engage with their urban environment and understand the new technologies. Informants 1, 4 and 6 opinions give examples of how the urban perspective and technology development are embedded within the sustainability transformation.

Informant 4 discusses the opportunities for the future in Hammarby Sjöstad from the technological and urban development perspective, he explains that more new technologies will be coming in and the opportunity of being a zero waste community and engaging people to try new technologies will be essential. Adding that the engagement and involvement of residents is crucial: *"If you have the platform that they have here where everybody is, you know you can reach out quite easily. People are open for testing and contributing and actively participating. It is much easier to do these types of new testing of new concepts and new ideas"* (Quote 154).

Box 85. Informant 4 [MET] [FIC] [TEC] Memo Result

Informant 1 also supports the idea of technological development as the key for future opportunities as they have the experience in Hammarby Sjöstad with the integrated planning and "Eco-Governance": *"you can use this to other projects to really, and also use the technology which has been now new technology instead of using the old technology"* (Quote 196).

Informant 1 adds that the experience in Hammarby Sjöstad can be reproduced in other projects and new area developments: *"they can make the leap, don't have to make all the mistakes we have done, they can take the leap and skip those twenty years and be here instead"* (Quote 197).

Box 86. Informant 1 [MET] [FIC] [TEC] Memo Result

Informant 6 goes further in discussing the future opportunities in Hammarby Sjöstad and explains that if we are really serious about reaching the climate target in Sweden by 2050 and the 1.5 degree target, a combination of strategies are required for energy efficiency measures, switching to a fossil free energy mix and more importantly looking at building processes. Informant 6 believes that Hammarby Sjöstad is a good example, targeting and "minimising the embedded emissions and also looking at building materials" (Quote 265).

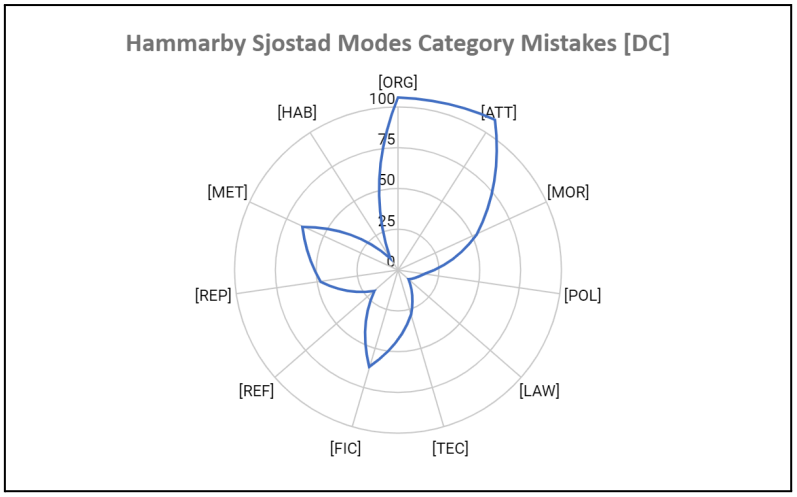
Box 87. Informant 6 [MET] [FIC] [TEC] Memo Result

7.5 Category Mistakes in the Sustainability Governing Transition

The observation of the dominant modes with [ORG] and [ATT] has identified the contrasts between the transformative "modes" that belong to different aspects in the Hammarby Sjöstad case, manifesting an epistemological shift in thinking and acting differently in the sustainability governing transition. Latour (2013a), through his AIME project, argues that in any given network, some contradictions and issues can stop or alienate the transition into an emerging episteme, revealing these contradictions are necessary to overcome the mistakes. Latour (2013a) refers to these contradictions as Double-Clicks [DC], a term he uses to describe category mistakes or "ontological mistakes" that are "presented as consisting of a different property" (Tummons, 2021, p. 1317). To help understand this concept, Conway (2016) compares the [DC] to the 'double click' of a computer mouse. Just as a double click on a computer mouse produces information seemingly directly, instantaneously and without mediation, [DC] is not a mode at all but an "anti-mode", a Cartesian "evil genius" that attempts to short-circuit all modes by reducing them to the instantaneous, transcendent transfer of information (Conway, 2016, p. 49).

Understanding and identifying the pivotal Category Mistakes [DC] is a crucial aspect of this thesis. It allows the study to extend the case analysis on the issues and contradictions to be overcome by sustainability thinking and acting in the Hammarby case and follow Latour's idea that "there are no such things as facts that speak for themselves" (Latour, 2013a, p. 137). Therefore, this chapter will explore the Hammarby Sjöstad sustainability governance challenges by looking at the Category

Mistakes [DC] registered throughout the interview analysis. Graph 8 shows where the Category Mistakes [DC] have been registered in regard to the Hammarby Sjöstad case analysis.



Graph 8. Hammarby Sjöstad Category Mistakes [DC]

The Category Mistakes have been identified and registered with the concepts of "Taken for Granted", "Assumptions", and "Interpretations" of the sustainability governance in Hammarby Sjöstad case analysis. Table 21 shows the key informants words that have been registered to identify the Category Mistakes [DC] in the analysis process:

"MoE"	"MoE" Coding	"MoE" Category	Associated Concepts	Emerging Vocabulary
Double Click	[DC]	"Taken for Granted"	Mistakes Assumptions Interpretations	Unsustainable Problems/Problematic Challenge

Table 21. Double-Click [DC] Mode Metalanguage Vocabulary in Hammarby Sjöstad Case Analysis

The main Category Mistakes [DC] in the case analysis have been linked to the following modes: Organization [ORG], Attachment [ATT], Fiction [FIC] and Metamorphosis [MET]. Table 22 shows the case analysis findings regarding the category mistakes that alienate the sustainability governance process within the dominant "MoE"s.

Dominant "MoE"	Hammarby Concepts	"Taken for Granted" Concepts [DC]
Organization [ORG]	**Hammarby Sjöstad 1.0 Project**	"One-off project" "Lack of sustainability awareness amongst all actors"
	Eco-Governance	"Not aware of the concept"

Attachment [ATT]	**Residents Involvement**	"Lack of residents participation and engagement"
Fiction [FIC]	**Master Plan**	"People live and adapt to the urban infrastructure easily" "People doing the right thing" "Living eco-friendly without having less" "Do not need to change their behaviour"
Metamorphosis [MET]	**Hammarby Model**	"Residents unaware of the concept" "Not affecting residents behaviour" "Reproduces unsustainable assumptions and practises" "Seeing people as consumers"

Table 22. Emerging Modes and the Identified Category Mistakes [DC] Concepts.

7.5.1 Lack of Awareness of "Eco-Governance" process

The Category Mistake [DC] is registered with the assumption that the "Eco-Governance planning process" has not affected the behaviour of the residents and the fact that residents do not have to think about their behaviour as is "taken for granted". Informants 3, 4 and 6 reflect on how the "Eco-Governance" planning process and Hammarby project management are not affecting the residents' behaviour.

Informant 3 explains that when they moved to Hammarby Sjöstad, they were not aware of "Eco-Governance" as part of the Hammarby Sjöstad 1.0 Project: *"we didn't know that it was called Eco-Governance and I think that not even those who did it at that time used the phrase Eco-Governance"* (Quote 51).

Informant 3 explains further, saying that "Eco-Governance" is not based on citizens; it's the infrastructure around the citizens in Hammarby Sjöstad district with the Hammarby Sjöstad 1.0 Project: *"they come here and live it rather than thinking about it, knowing, thinking. You can't go in the street and ask people what do you think about Eco-Governance. If you do that they think what is that, I never heard. So this is for the planning of a city"* (Quote 53).

Informant 3 adds that when he moved into Hammarby Sjöstad district *"discovered that everything was not as good as we had thought. Energy performance for example. And we also, I questioned about who will take care of further development"* (Quote 2).

Box 88. Informant 3 [ORG] [DC] Memo Result

Informant 4 explains that the "Eco-Governance" regards to the planning and the execution of Hammarby Sjöstad 1.0 Project before residents moved in and he goes further saying that *"it's not affecting people's behaviour"* (Quote 151).

Box 89. Informant 4 [ORG] [DC] Memo Result

Informant 6 explains that the Hammarby Sjöstad concept reproduces and exports assumptions and practises in Sustainability (Quote 273), seeing people and organisations as consumers and not understanding them as actors and co-agents with multiple roles in their multiple situated practices (Quote 252). She makes the following remarks:

- *"who is sustainable. Is it the person that can afford an apartment in Hammarby Sjöstad?* (Quote 273).
- *"Does living in an apartment like that , whether it's in Sweden or China, automatically make you sustainable?"* (Quote 273).

Informant 6 refers to these assumptions as "problematic", showing the complexity of sustainability and the sustainability transition applied to Hammarby Sjöstad district within Hammarby 1.0 and 2.0 projects. Describes Hammarby Sjöstad as "one-off projects" as this type of new developments is celebrated and then is not clear how the experiences and knowledge created through this process can be reproduced and transferred into the different organisations and the communities (Quote 233).

Box 90. Informant 6 [ATT] [DC] Memo Result

The Hammarby Sjöstad 1.0 is perceived as completed from the planning and development perspective; therefore, the key informants question if the sustainability governance and management process in Hammarby Sjöstad has been underestimated as cities play a more significant role in climate work. Informants 2 and 3 reflect on this:

- *"Hammarby maybe it's a piece in this discussion as undergoes the transformation"* (Informant 2, Quote 172).
- *"if you build a City a traditional way of City building is that you build it and then you hand it over to someone to manage it… but that doesn't mean development"* (Informant 3, Quote 3).

7.5.2 Lack of Engagement

The residents' and organisations' lack of participation and engagement can be observed in the sustainability governance process, especially in the Hammarby Sjöstad 2.0 project. The following

assumptions have been registered with Informants 3, 4, 5 and 6 questioning how residents are participating and have participated in the past:

Informant 4 explains that involvement and awareness of the residents could be more in 2.0:

- ➢ *"these type of things there are voluntary, a few people doing a lot and most people doing nothing"* (Quote 120).
- ➢ *"often depends on a few peoples engagement and these people will eventually retire or they die and has to be constantly new people coming in"* (Quote 153).

Box 91. Informant 4 [ATT] [DC] Memo Result

Informant 3 discusses that they would like to see more involvement and engagement from the citizens; however adds that *"they are rather occupied with to get things putting together. So they have not a lot of time to spend on activities outside the home"* and he also says that *"it might change when people are growing up"* (Quote 71).

Informant 3 emphasises that *"we are trying to involve them in different things which are connected to sustainability"* (Quote 71), such as small-scale initiatives like growing their own vegetables.

Box 92. Informant 3 [ATT] [DC] Memo Result

Informant 5 supports the idea of needing more resident involvement and engagement in the future and sees this as an opportunity for the future in Hammarby Sjöstad; he explains that *"people are quite willing to try to take part in that sort of transition"* and regards to share economy as the next big step for residents in Hammarby: *"I think this sharing economy, I think it will be the next big step trying to really get that into normal everyday life, because it's a lot of initiatives and you can see that in many parts of the world but I have not seen anything that is really sort of working on a daily basis"* (Quote 99).

Box 93. Informant 5 [ATT] [DC] Memo Result

Informant 6 refers to the participation and involvement of the residents in the Swedish System as having high trust in authorities and the participation process (Quote 235); however, she explains that *"if you are more critical, you could say that this is more like placating. It's not actually a true participation"* (Quote 236). Informant 6 refers to Einstein's ladder of participation to explain the argument: *"it keeps within these very lower steps of participation, which means that residents or*

citizens, they can engage during the planning process but then it's quite limited actually what their engagement is throughout" (Quote 236).

Informant 6 explains further that in the Hammarby Sjöstad 1.0 Project, small businesses and small organisations were relocated from the formal harbour area and were not part of the participatory process: *"it was still a democratic planning process, so some level of participation was enabled"* (Quote 239).

However, Informant 6 questions, *"who is seen as being able to participate"* and *"at what stage and to what degree participation happens"* (Quote 239), referring to the planning process in Hammarby Sjöstad 1.0 Project. Urban development planning needs to take into consideration how the developers, architects, and other actors involved view the residents and how they frame them as consumers: *"it's this framing of people as consumers. ... their means of participating is through their consumption"* (Quote 240).

Informant 6 also adds that there are specific participatory events throughout this process to be inclusive with the organisation and residents; however, *"they tend to be one-off things"* and *"the processes are not so focussed on people outside of the role as consumers"* (Quote 245).

Although there is an *"affluent group of people"* that *"they might be more environmentally conscious"* (Quote 259), they are still reproducing certain patterns of consumption and lifestyle as they are living in an efficient high-tech building (Quote 260) which might be energy efficient "but is not sustainable" (Quote 267). Informant 6 makes the following remarks:

- *"it's an awareness, of course, amongst all actors that is not necessarily there"* (Quote 263).
- *"it's rather reproducing unsustainable practices"* (Quote 262).
- *"as a whole, this doesn't exist anywhere"* (Quote 268).

Box 94. Informant 6 [ATT] [DC] Memo result

7.5.3 "Taken for Granted" Environmental Profile

The urban design and planning with the Hammarby Sjöstad master plan have contributed to the residents' motivations and behavioural change into sustainability, incorporating solutions for waste, water and transport to lower energy, water consumption and air pollution. However, the residents have "taken for granted" their environmental profile. The residents' motivations and further behavioural change into sustainability registers assumptions such as "they do not need to change their behaviour". This reproduces certain behaviours repeatedly about sustainability. It's crucial to acknowledge the

challenges in promoting sustainable practices. The key informants share their views and opinions in regard to this subject:

Informant 3 explains the residents' expectations to take the tram instead of driving the car and use the waste management system, saying that *"people adapt easily to that"* (Quote 35) and adding: *"Citizens that moved here have to live with the concept that was built. They couldn't come here and change it a lot or they just, I think, took it for granted"* (Quote 35).

Box 95. Informant 3 [FIC] [DC] Memo Result

Informant 5 talks about the urban infrastructure in Hammarby Sjöstad and explains that the district has more facilities for waste management and transport, which allows *"doing the right thing"*; however, beyond that, it doesn't think that the residents have changed their behaviour further into sustainability. Informant 5 makes the following remarks (Quote 90):

- *"we have a lot more electric cars than maybe in general in Stockholm but from a consumer way of looking at it"*.
- *"I don't see any behaviours that are distinctly more eco-friendly than you find in any other parts of Stockholm"*.
- *"you could live more eco-friendly without having less ... you could live more eco-friendly without lowering your living standards"*.

Informant 5 explains that this was one important message that was delivered through the Hammarby Sjöstad project regarding living eco-friendly without having less, and he remarks that in general doesn't think that residents are more eco-friendly: *"it's maybe easier to live eco-friendly here, it's easier to do the sort of right thing"* (Quote 94).

Box 96. Informant 5 [FIC] [DC] Memo Result

Informant 4 puts an example regarding *"not changing the behaviour"* or *"not living with less"* explaining that the infrastructure in Hammarby is part of the solution, such as the water-saving equipment to save water consumption or the use of biogas for heating or transport. Informant 4 makes the following remarks (Quote 149):

- *"nobody knows that the biogas is used for heating or buses"*
- *"you don't need to go to the toilet differently"*
- *"or lower your energy consumption ... they tried to build it into the buildings as much as possible"*

Box 97. Informant 4 [FIC] [DC] Memo Result

Informant 1 explains that different solutions in the infrastructure and the buildings have been incorporated for the residents to be eco-friendly and doesn't think that the "Hammarby Model" has been embedded in Hammarby Sjöstad culturally and socially within the residents with the following remarks:

- *"people don't have to change their behaviour because it's already solved but some of it has to be taken care of"* (Quote 200).
- *"those people who move in here, they don't move in here because of the environmental programme and that approach, they are moving in here because it's a nice city area"* (Quote 206).

Box 98. Informant 1 [FIC] [DC] Memo Result

Informant 6 explains how problematic it is to understand sustainability with technological innovation: *"technologies don't exist in isolation. So if you have the socio technical perspective then it will always come with social implications and practices, how technology is embedded in the context"* (Quote 272).

Informant 6 continues explaining that the focus in Hammarby Sjöstad has been technical innovation and building performance with certain assumptions and reproductions of understanding of homes that still are repeated throughout time. However, Hammarby Sjöstad 2.0 is challenging that. Puts the example from the housing associations that have created vegetable growing plots within the courtyards in the buildings for residents' engagement: *"it's been such a long process it's interesting because it's also challenging that in certain ways"* (Quote 257).

Box 99. Informant 6 [FIC] [DC] Memo Result

7.5.4 Lack of Awareness of the Hammarby Model concept

The Hammarby residents need more awareness about the "Hammarby Model" to reflect on how embedded the concept is in the community. The key informants reflect on the "Hammarby Model" concept and the awareness in the district:

- *"if you ask someone here about the Hammarby Model on the street, I don't know, but if you ask them about the vacuum waste system probably 98% would know what you are talking about"* (Informant 4, Quote 147).
- *"you can find people who know a little bit about environmental standards and sustainability"* (Informant 3, Quote 59).

Informant 5 explains further the awareness of the "Hammarby Model" in the community:

Informant 5 remarks that people generally are not aware of the "Hammarby Model", instead they are aware of the idea. Remarks that it is quite hard to keep a general awareness *"keep them on top of every citizens mind"* (Quote 96); and explains that from his perspective, "Hammarby Model" lives through the housing associations building awareness in residents:

- *"there are influx of new people and people leaving, so it's quite hard to have this model because they need to teach newcomers all the time about what it is and then you must be quite concrete"* (Quote 96).
- *"it's like a general sense of this is an eco-friendly place"* (Quote 87).
- *"to be very honest, I don't know what the Hammarby Model is"* (Quote 87).

Box 100. Informant 5 [MET] [DC] Memo Result

The key informants were also asked how embedded they thought the "Hammarby Model" was within the residents and if they changed their behaviour. The results show that there is no behavioural change within the residents. Informants 1 and 4 reflect on this:

Informant 4 explains that the idea from the beginning in Hammarby Sjöstad was that "you don't need to change your behaviour" (Quote 149).

Box 101. Informant 4 [MET] [HAB] [DC] Memo Result

Informant 1 explains that some people when they moved into the Hammarby Sjöstad district, realised about the "Hammarby Model" and the possibility of participating in the environmental programme, building awareness on sustainability (Quote 206). However, remarks that informing and educating the residents can be difficult: *"you are doing it this way, but you can also do it in this way and this way and that is a little bit better for the environment"* rather than *"you are doing wrong, you have to do it this way"* (Quote 201).

Box 102. Informant 1 [MET] [HAB] [DC] Memo Result

7.6 Final Remarks

The findings in Chapter 5 presented which "modes" are emerging in the Hammarby Sjöstad 1.0 project team. The "Eco-Governance" process in the management process has been a key element involving all the actors in developing the master plan and mixing the urban aspect and the

technological aspects to introduce the environmental solutions needed to meet the environmental goals in the district. The City of Stockholm is the leading organisation driving the change in the district at this point. Chapter 6 further presents the networks active in the sustainability governing process of the Hammarby Sjöstad 1.0 project. Observing the networks involved in delivering the project has allowed the thesis to register how the associations and crossing between the network have affected the governing and organising aspect of the project team and how it has evolved into the Hammarby Sjöstad 2.0 initiative, a significant step in the project's development. In this context, ElectriCity Stockholm was formed because of the translation of sustainability thinking and acting into the community. Diagram 13 explains how the analysis of the engagement of the Hammarby Community with the Attachment "MoE" will complement the findings presented in Chapters 5 and 6:

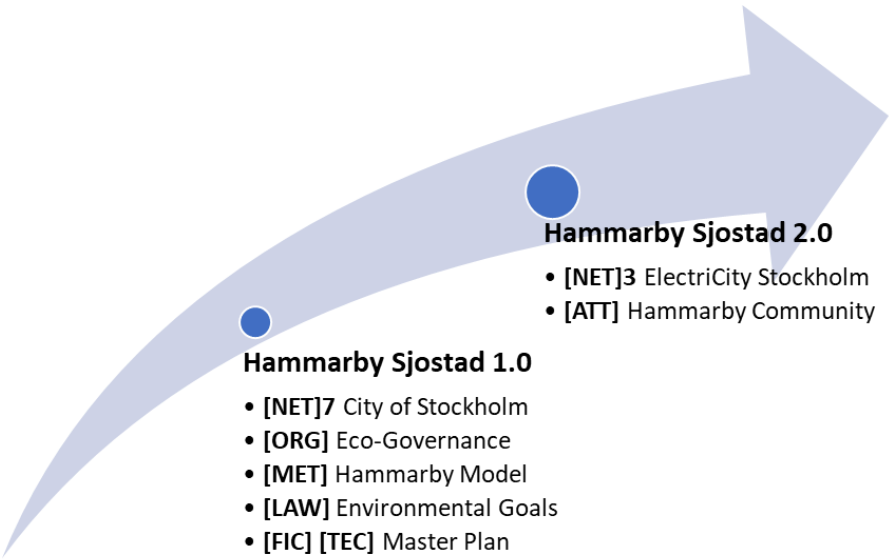


Diagram 13. Emerging "MoE"s in Hammarby Sjöstad Case Analysis

Chapter 7 further explains how the involvement of the residents and organisations in translating sustainability thinking and acting in the Hammarby Sjöstad district has evolved from the initial 1.0 project to the next stage: the 2.0 project. The crossing of different "MoE" has developed dynamic relations with [ORG] dominating the process and [ATT] with the involvement of the residents and organisations, resulting in a further shift in thinking and acting differently on sustainability. The Hammarby Community with the Hammarby Sjöstad 2.0 initiative connects with the dominant mode [ORG] to drive the sustainability governing transition in Hammarby Sjöstad. Community involvement and participation are crucial to translating thinking and acting differently on sustainability. However, the Double-Clicks [DC] show that the "taken for granted" concepts are alienating this process with specific assumptions on sustainability that have been translated as the "residents do not have to change their behaviour", which prevents any further behavioural change outside the urban

infrastructure. The urban design and integrated technology have allowed certain sustainability habits; however, the category mistake lies with [FIC], [TEC] and [HAB] as the residents' environmental profile is taken for granted.

CHAPTER 8 Discussion and Conclusions

8.1 Introduction

Chapter 8 argues that conducting the thesis with aspects of the AIME project and utilising the Modes of Existence approach can provide a rich closeup on sustainability governing transition processes. The empirical findings in Chapters 5, 6 and 7 provide informative insights into the wider aspects of urban sustainability governing in the Hammarby Sjöstad case and how sustainability thinking and acting has been translated into the district. The discussed "MoE"s have not only allowed the understanding of the possibilities of the Modes of Existence approach but also about its potential and its contribution to understanding sustainability governance observing Organisation [ORG], Attachment [ATT] and Morality [MOR] modes.

Also, the discussion will consider how specific modes dominate Hammarby Sjöstad's case analysis and how the Category Mistakes [DC] influence the sustainability process. The findings on the dominant modes enrich the AIME work, opening a new research area subject to further study and practice.

Chapter 8 will conclude how the emerging "MoE"s, dominant "modes", and category mistakes enrich the Modes of Existence approach practice in understanding and assessing governance transition processes and thinking and acting differently on sustainability.

8.2 Overview of the Thesis.

The thesis aims to understand city management and sustainability governance to introduce the integral aspect of thinking and acting on sustainability from an epistemological point of view. The study introduces the need for an epistemological shift in translating sustainability thinking in relation to Gaia to undertake a discussion of key epistemological shifts that have been taking shape in the Hammarby Sjöstad case. The thesis incorporates the argument that the modern rationale needs to be reassessed, as it is based on epistemologies that rely on the myth of continuous growth, where sustainability is just an element of the economic equation. Therefore, this study introduces the possibility of an alternative perspective on sustainability thinking and acting to move beyond economics and promote research on epistemological shifts. As a result, it has been essential to observe how [urban] city sustainability governing translates sustainability ideas and concepts in practice to track potential epistemological shifts. Therefore, the thesis has researched [urban] city sustainability governing in practice, taking a real-life example of groundbreaking sustainability thinking and acting.

The Hammarby Sjöstad district in Stockholm (Sweden) has been selected as it represents an example of a sustainable development urban district that has been awarded as "The Economist" describes it as one of the world's highest profile examples of sustainable city development (ElectriCity Stockholm, 2019). The Hammarby Sjöstad case represents a project that has been running for more than 20 years that has transformed a run-down polluted industrial area into an eco-district with an environmentally integrated design in water, air, energy, waste, transportation and sustainable living. Moreover, it introduced new ideas on sustainability thinking with the "Hammarby Model" concept and "Eco-Governance" concepts, which made it possible to involve all the actors in the initial 1.0 project with the City of Stockholm project team. Also, where most urban projects finish when the urban infrastructure has been completed, the Hammarby Sjöstad project has evolved into a new stage: Hammarby Sjöstad 2.0. The Hammarby community has further transformed the initial project to think and act differently on translating sustainability with the 2.0 initiative and the ElectriCity Stockholm social platform to encourage the involvement and participation of residents and organisations in developing and implementing sustainability initiatives and projects in the district. The Hammarby Sjöstad case manifests the possibility of an epistemological shift into thinking and acting differently in sustainability governing transition. Therefore, the thesis has focused on developing a study around the following research question:

1. How does the Hammarby Sjöstad project manifest epistemological shifts in sustainability governance?

The research question has analysed the concerns about sustainability city governance and the epistemological concerns raised in the research study. For this purpose, aspects of the AIME project have been drawn to incorporate Latourian thoughts about "real change" and how epistemological shifts into thinking and acting on sustainability can be addressed. Specific forms of the AIME project and the Modes of Existence approach (Latour, 2013a) have been conceptualised to conduct the research study and analyse the Hammarby Sjöstad case. The study has developed a significant research contribution to sustainability governance through the possibility of an epistemological shift in thinking and acting differently in translating and engaging with sustainability.

Chapter 2, through the literature review, introduces the argument about the complexity of action and thinking in sustainability governing concerning city management, as academics such as Czarniawska (2004) argue that cities translate specific ideas and concepts that imitate each other. However, she also observes that they differentiate through innovation and raises the question of what kind of innovation it is. Does it incur a new form of change, or is it a "fashionable" change of thinking? (Czarniawska, 2019). Czarniawska's arguments introduce the possibility of a deeper change of thinking, a kind of epistemological shift towards supporting "real" change like Latour has been investigating since the

1960s. Within this frame of investigation, Latour's work with the AIME project has been a huge inspiration for conducting the thesis as he defends his commitment to thinking beyond the patterns of the Moderns with a distinctive radical approach (Latour, 2013a). The Modes of Existence approach provides a possible interplay between beings that can go beyond the parameters of the thinking and acting of the Moderns with the possibility of an epistemological shift into putting Gaia in the centre rather than referring to nature as an external entity. The literature review argues that episteme opportunity and emerging episteme are essential factors that should be incorporated into sustainability governance to observe the possibility of epistemological shifts in acting and thinking differently in our current social, economic, and environmental context.

Moreover, Latour's approach to the Modes of Existence can contribute to investigating the sustainability governing issues by drawing on AIME ideas that can help address city management as an epistemological issue. AIME project provides aspects to sharpen and add perspectives on sustainability governing combined with an epistemological approach where Latour (2013a) defends that to be able to be liberated from the second nature (Economy) is imperative to understand the interplay between the key modes of being described as Organization [ORG], Attachment [ATT] and Morality [MOR]. Understanding these transformative modes makes it possible to transition to first nature (Ecology) and the possibility of understanding Gaia as an integral and interrelated element, which requires moving away from the rational perspective of the Moderns. Latour introduces a new division: choosing between "modernising" or "ecologizing". Latour (2013b) affirms that "we" as a collective have never been modern, arguing that "ecology was about to force humans and nonhumans to take into account" for their actions (Latour, 2013b, p. 294). This is where sustainability governing cities and the concept of "ecologizing" come together to discover acting and thinking differently.

Due to practical constraints in setting the thesis up, the study has adopted and adapted AIME ideas to sharpen and specify key aspects of the critique of city sustainability governing to open up the enquiry at the team/project level. Chapter 3 introduces the aspects of AIME that have been transformed and adapted from a challenging approach to a workable framework. The insights from AIME have enabled the development of the necessary data collection and analytical tools for this close-up research. At the same time, it has given the study the needed flexibility to observe the epistemological shifts manifested in the sustainability governing process in the Hammarby Sjöstad case. The adopted key aspects from AIME have been named as "MoE"s to identify them as the modified version of Latour's Modes of Existence approach. Each "MoE" has been presented and described to explain what each concept stands for concerning the presented case, and the steps in application and analysis to be followed have been drawn as a result. Adapting these key aspects and structuring the analysis procedure has allowed the "MoE" to come "alive" into action with the possibility of observing their

dynamic relations to understand different forms of thinking and acting in sustainability governance in the Hammarby Sjöstad case.

Accordingly, Chapter 4 introduces the research design, procedures, and methods needed to incorporate the "MoE" in the action steps for application and analysis. For this reason, the thesis follows a qualitative study using an interpretative approach. The interpretive approach has allowed the study to discover people's motivations for their actions on how mutual knowledge is "used and modified by social actors as they interact with each other, and it is produced and reproduced by them in the course of their lives together" (Blaikie, 2000, p. 115). The research has taken on board the observation and interpretation of language as a key element to understanding what exists and acts in organising, translating and transforming reality. Close-up fieldwork on the sustainability governance in the Hammarby Sjöstad project was conducted during two different visits to Stockholm. Pictures, observations, and notes were taken while visiting the Hammarby Sjöstad district, taking long walks to understand the different aspects of the area in contrast to the design and planning incorporated by the project team. Also, six key informants were selected who were directly involved in the organisations that have taken part in the sustainability transition in the Hammarby Sjöstad case. In-depth semi-structured interviews, presentations, and meetings were conducted with the informants to collect rich data regarding their involvement with the City of Stockholm project team. The interview questions were linked to the "MoE" concepts described in Chapter 3 to facilitate the analysis procedure and observe which "modes" emerged more than others throughout the interviews. The Grounded Theory with the "constant comparative analysis" (Glaser and Strauss, 1967; Charmaz, 2006) has been used to identify the "MoE" s in action at this stage. The grounded analysis allowed the study to observe and interpret each "MoE" and its associations by coding and categorising the elements at the governance level. The memo-writing technique has been vital in interpreting the language used by the informants in their interview transcripts. As a result, the case analysis has built a metalanguage vocabulary to identify each "MoE" with words, expressions and opinions. This analytical process has enabled the "MoE" s to emerge, observe their associations and connections, and consider how key informants create understanding and meaning of reality in a set situation (Hallberg, 2006; Gray, 2020).

The empirical findings have been organised into three chapters to present the evidence, analysis and conclusion of the research inquiry following the sustainability governance process of the Hammarby Sjöstad project. The chapters complement each other to describe how the initial 1.0 project has evolved to a 2.0 project, what the main concepts built around the Hammarby Sjöstad case, how the actors involved in the project team have collaborated planned and implemented the project, and how the sustainability concept has been translated into the community acting and thinking differently as a

result. Chapter 5 describes the concepts around the Hammarby Sjöstad 1.0 project and how the project team conducted the planning and design of the district. The concepts have been linked to the "MoE"s described in Chapter 3, and the main aspects have been described, such as governance, the "Hammarby Model", the master plan and the sustainability thinking translated into the district. Chapter 5 is focused mainly on the governing and organising aspect of the Organization [ORG] "MoE" to discuss how the urban master plan has been implemented in the district. For that reason, incorporating the photographic survey with the observation notes and pictures has described the empirical journey that, as an investigator, I have had throughout the fieldwork process. The findings conclude that there are several "MoE"s that emerge at this stage from the governing aspect [ORG], which are the "Hammarby Model" with Metamorphosis [MET], the environmental goals with [LAW], the master plan and the integrated environmental solutions with [FIC] and [TEC]; and also the sustainability thinking translated into the district with Morality [MOR].

Moving on and continuing the line of argument developed in Chapter 5 with the sustainability governing at the project team level, Chapter 6 has discussed and analysed how the actors involved in this process have collaborated, creating associations and crossings to develop a network to deliver the 1.0 project. The Network [NET] and Preposition [PRE] "MoE"s have facilitated the observation of how the organisations involved interact with each other. Chapter 6 explains the Networks involved in the Hammarby Sjöstad sustainability transition and each network's role and involvement. The evidence shows that their role and involvement evolve throughout the sustainability transition process. The network is extended to create a new organisation called the ElectriCity Stockholm social platform [NET]3. At this point, the question to be answered is why and how this [NET] has been created.

Chapter 7 presents the analysis of what has triggered the change into the new 2.0 project with the ElectriCity Stockholm platform driving the sustainability governance in the district. Specific dominant "MoE" drive this transition, producing dynamic relations between them. The "MoE"s in action are dominated by two main aspects: sustainability governing of the district with [ORG] and the involvement of the residents and organisations in this process with [ATT]. Attachment [ATT] is introduced as it has triggered a transition from the original 1.0 project into developing a 2.0 initiative to act and think about sustainability differently. The residents have questioned what it means to be sustainable, what they need to keep moving forward to deliver further steps into sustainability and how the sustainability thinking of the district is translated into the community. The findings contribute to understanding the difficulties and complexity of the transition in Hammarby Sjöstad, presenting the contradictions that emerged throughout the process with the assumptions on acting and thinking differently. The lack of participation, lack of awareness of the sustainability concept and the "taken for granted" environmental profile in the community have been logged with the Double-Click [DC] as

Category Mistakes to observe where the challenges lay in the sustainability governance in the Hammarby Sjöstad case and how they represent an opportunity to overcome and create new opportunities.

The three chapters have introduced the three main aspects with [ORG] through the organising of the project, [ATT] through the passionate interests of the community and [MOR] through the sustainability thinking to analyse how these "MoE"s are driving an epistemological shift in acting and thinking differently in the Hammarby Sjöstad case. Latour's hypothesis (2013a) is that these three "modes" contribute to transitioning to the first nature, positioning Gaia in the centre of our epistemological reality.

8.3 Theorising and Conceptualising with the "MoE"s

Chapter 3 outlines Latour's AIME project (Latour, 2013a) and the theorising and conceptualising of key aspects of AIME to outline the essential steps to be taken to apply and analyse the "MoE"s in Action. The AIME research involves understanding and identifying the 15 modes of being and their associations described by Latour (2013a). Chapter 3 explains that Latour's work in "An Inquiry into the Modes of Existence" (2013a) is about guidelines rather than set rules; the modes are subject to interpretation and adaptability being observed in specific scenarios. Research studies with the Modes of Existence approach are very few (Conway, 2016; Amat, 2016; Tummons, 2020, 2021) and theorising with AIME is rare throughout the literature review. The application and analysis of the Modes of Existence approach remains obscure as there is no clear methodology, or it is not outlined with a structured theoretical framework (Berliner, Legrain and van de Port, 2013). Conducting research with AIME and the applicability of the Modes of Existence approach is open for further development in social sciences research. Therefore, Latourian concepts need to be conceptualised in order to theorise with aspects of the AIME project to be applied to specific situations and scenarios to describe new ways of talking about the plurality of the world, ways of linking and networking, and coexisting. The different modes described by Latour (2013a) are interested in observing a phenomenon whose knowledge and answers are still to be built (Amat, 2016). Therefore, it is necessary to confront the Modes of Existence approach with real-life situations, adapting the key aspects to be articulated to empirical situations to be understood, and its application needs to be understood beyond the guidelines presented by Latour (2013a).

Chapter 3 explains that Latour (2013a) emphasises two main concepts to start building an inquiry with the Modes of Existence: 1) **Understand** the Modes of Being and 2) **Observe** the vocabulary used in each mode to be able to build a Metalanguage vocabulary to register the modes.

8.3.1 Identifying the “MoE”s.

Chapter 3 describes the identification of the 15 MoEs, following Latour’s (2013a) explanation for each within the AIME project. It also adapts the concepts to a situated research scenario within the Hammarby Sjöstad case. Latour (2013a) describes each mode with a general idea of what it represents; however, how do we identify the MoEs in a specific research scenario? Which methodological procedure can be used to identify and register these modes? At this point, I had to overcome confusion about identifying these concepts and their vocabulary.

The research required a subjective and interpretive methodology to allow the data analysis to be applied to a real-life scenario. The AIME virtual research community (http://modesofexistence.org/) has been researching and interpreting the Modes of Existence approach to developing the AIME project further. However, researchers still feel that the hypothesis around the approach is too ambiguous (Delchambre and Marquis, 2013; Tummons, 2019, 2020, 2021; Hämäläinen and Lehtonen, 2016). Also, academics agree that there is no methodology or concrete method to explore the Modes of Existence approach, which remains too obscure and open to many interpretations (Edward, 2016; Berliner, Legrain and van de Port, 2013).

Therefore, Latour’s key aspects and concepts from the AIME project have been adapted to the research to develop the study in sustainability governance for an epistemological shift analysis. The main challenge has been developing a suitable analytical process to understand how to identify these “MoE”s and how they connect through their associations. The key elements of observation and interpretation were the key informant’s vocabulary, expressions, and phrases throughout the interview transcripts. The Grounded Theory analysis process has made it possible to understand and identify the different “modes” by observing and exploring the vocabulary used regarding the Hammarby Sjöstad case. The content analysis with the grounded analysis process has allowed the thesis to interpret the vocabulary and identify the concepts and categories linked to each “MoE” s. This process has allowed the study to build a metalanguage vocabulary (Latour, 2013a) for each “mode” in the Hammarby Sjöstad sustainability governance process.

At this stage, Latour’s initial guidelines for each mode’s category and code were followed to draft the data collection with the “MoE”s in the Hammarby Sjöstad case. The “MoE” categories were linked to the Hammarby Sjöstad concepts that emerged through the initial data collection with the compilation of documents of the Hammarby Sjöstad case. The main concepts concerning the sustainability governance process were identified and linked to the “MoE”s categories and codes. Setting the coding system to interpret and register the “modes” has been essential to log the vocabulary in the key

informant's interview transcripts. This analysis procedure has allowed the researchers to understand how to register the "MoE" s within the Hammarby Sjöstad case. As the research evolved, I played backwards and forwards with the concepts and categories, making the complexity of understanding and identifying the "modes" more visible. The process has been time-consuming and iterative, and choosing the adequate methodology has been crucial to supporting the subjectivity, ambiguity, and interpretation needed to develop the research process. Building a study using the analytical process presented has developed my understanding of applying the Modes of Existence approach and how the "modes" could emerge from the interview transcripts.

8.3.2 Metalanguage Vocabulary

Chapter 4 introduces the process of how the Metalanguage vocabulary was built with the Grounded Theory procedure with the constant comparative analysis and how the "MoE"s codes, categories, and concepts have been used to identify the emerging "modes" to observe how they come "alive" and come into Action to observe how they emerge in different situations. The process has been extended, complex, and cyclical; it involved using the codes and concepts backwards and forwards to identify and register the vocabulary. Compiling the vocabulary required high levels of subjectivity and interpretation of the concepts to which they were linked. Initially, a great number of words were registered as part of the analysis, and later on, they were refined. The vocabulary has been subject to phrases and quotes that the key informants used to explain their knowledge, opinions and experiences regarding Hammarby Sjöstad's sustainability governance process. As part of the analytical process, the memo-writing has been essential. It has made it possible to reflect on the meaning of the informants' opinions and expressions regarding different aspects of the sustainability process in the Hammarby Sjöstad case. As a result, the Metalanguage Vocabulary has logged different words, expressions, and opinions about each "MoE".

8.3.3 "MoE"s in Action: application and analysis

Chapter 3 and Chapter 4 provide a comprehensive guide on how to conduct a study, incorporating key steps for application and analysis with the Grounded Theory. The "MoE"s are not just theoretical constructs but practical tools for interpreting and identifying them in a real-life scenario. The conceptualised framework, inspired by the AIME project, is a critical element in structuring the research study. As Latour did not develop a structured theoretical framework to conduct research studies using the Modes of Existence approach, the observation and interpretation of the language and vocabulary are essential within this study to understand how they can relate to sustainability

governance in a real-life scenario. The thesis has drawn on key aspects and concepts to make them useful for the study; in particular, aspects of AIME have been translated and adapted to assess how epistemological shifts manifest in the Hammarby Sjöstad case. The Network [NET] concept has been vital to observing the thinking and acting of the "actors" involved in the sustainability governance process throughout different stages, such as design, planning, development and implementation, as it has allowed to trace manifestations of the epistemological shifts. Further important aspects such as Preposition [PRE] that allow to observe the different associations and crossings between the "MoE"s and the Double-Clicks [DC] have been transformed from challenging concepts into incorporating them into a workable framework to conduct social sciences research.

The framework has presented the 15 "MoE"s interconnected in 5 groups; the "modes" in each group have a role in developing the observation of the epistemological shift. These 15 "modes" are divided into five groups: 1)Foundation, 2)[Quasi]-Objects, 3)[Quasi]-Subjects, 4)Transformation and 5)Structure. The first group gives direction and objective to the "modes"; human-made objects and subjective knowledge represent the second and third groups; the fourth group involves the "modes" that can have a transformative effect to evolve and change the previous three groups. The last group represents the "modes" that set a structure to begin the inquiry (Latour, 2013a; Conway, 2016; Amat, 2016).

Latour (2013a), Conway (2016), Amat (2016) and Tummons (2020) stress the primacy of understanding Group 5 before delving into the others. This is a crucial step in the research process, as it sets the foundation for the Networks [NET], Preposition [PRE] and Double-Click [DC]. They argue that this process allows the Networks [NET] to be followed, and the modes emerge as a result. Diagram 14 and Table 2 provide a concise summary of the "MoE"s in groups and their connections:

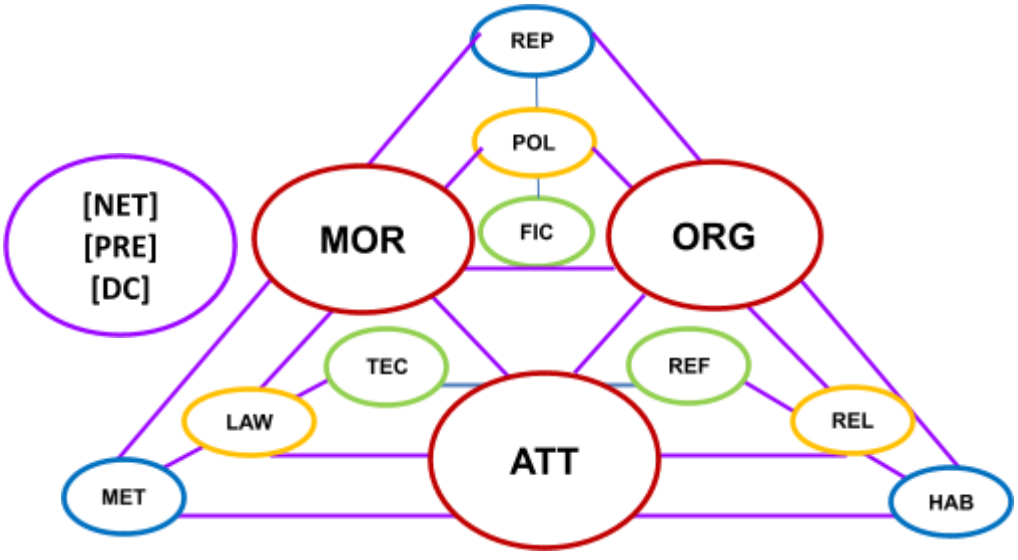


Diagram 14. Interpretation of the AIME Concepts

Group 5 Structure	Group 1 Foundation	Group2 [Quasi]-Objects	Group 3 [Quasi]-Subjects	Group 4. Transformation
[NET]works	**[REP]**production	**[TEC]**nology	**[POL]**itics	**[ATT]**atchment
[PRE]position	**[MET]**amorphosis	**[FIC]**tion	**[LAW]**	**[ORG]**anization
[DC] Double Click	**[HAB]**it	**[REF]**erence	**[REL]**igion	[**MOR]**ality

Table 2. Interpretation of the "MoE"s (Latour, 2013a; Conway, 2016; Tummons, 2020)

However, as Latour (2013a) has yet to develop a structured theoretical framework to conduct AIME research, identifying the modes and how to follow the Networks entails great flexibility. Therefore, the Hammarby Sjöstad case analysis starts by first identifying how each "MoE" is aligned, followed by identifying the Networks [NET] and how other "modes" emerge as a result. Last, the research identifies the Double-Clicks [DC] to observe if any concepts alienate the sustainability governance process in the Hammarby Sjöstad case.

8.4 Understanding Sustainability Governance as a matter of Epistemological Shift

The empirical findings in Chapters 5, 6 and 7 provide a rich closeup of the sustainability governing process of urban city management in the Hammarby Sjöstad case analysis. Sustainability governance in urban management remains a major global issue of concern, and it will only become more significant, as explained in Chapters 1 and 2. Half of the world's population lives in urban areas; as a result, the direct and indirect impact on sustainability and the increased global environmental issues with climate change have transformed urban infrastructures and services (Grimm *et al.*, 2008; De Jong *et al*., 2015). The world is becoming more urbanised, with the prediction that 60% of the world's population will live in cities by 2030, accounting for 70% of global carbon emissions and 60% of resource use (UN, 2022). Cities are becoming central to understanding the sustainability governing energy systems shifts towards renewable energy, biodiversity and safekeeping of ecosystems (Mörtberg *et al.,* 2013).

The case of Stockholm's Hammarby Sjöstad district is an example of metropolitan areas worldwide that have engaged in different initiatives and projects (De Jong *et al.*, 2015) to transform into sustainability governance. The findings have contributed to understanding the different aspects involved in the sustainability governance process, how they are interconnected, and how sustainability acting and thinking are altered through the concepts and ideas translated into these urban areas. This contributes to challenging the current "Sustainable Development" concept, which focuses primarily on human development (anthropocentric), and looking for alternative perspectives that translate the

"Sustainability" concept to consider all species as equals to balance nature and human development (Borland *et al.*, 2016). The thesis follows this argument to introduce the idea of understanding sustainability from an alternative perspective to pursue a more in-depth discussion about the concepts and ideas translated into action. Czarniawska (2009, 2019) argues that the use of wording and concepts can translate sustainability thinking and acting to deliver a more profound change, following Latour's argument that "real" change through an epistemological shift is possible. Latour (1998, 2013a) introduces the possibility of understanding nature, embracing a deeper understanding and thinking about sustainability away from the modern episteme and the modernisation of the world (Latour, 2013a, 2017).

The empirical findings vividly illustrate how sustainability thinking has been translated into action in the Hammarby Sjöstad district, first through the 1.0 project and then through the 2.0 project. The sustainability governance in the case analysis has been spearheaded by the City of Stockholm and the Hammarby community, guiding the thinking and acting on sustainability. The Hammarby Sjöstad case is a testament to the project's evolution, transitioning from an urban perspective with the master plan to a holistic perspective of the Hammarby Community. This shift signifies a profound change in the sustainability governance process, involving various aspects and demonstrating a shift in thinking and acting on sustainability.

8.4.1 The Emerging "MoE"s in Hammarby Sjöstad Case

The sustainability governance process has been explained through the emerging "MoE" concepts in the Hammarby Sjöstad case analysis. Chapter 3 introduced the "MoE"; later, Chapter 5 explained the concepts that emerged in the Hammarby Sjöstad project. The "MoE" that emerged in the Hammarby Sjöstad case analysis are shown in Table 23:

	"MoE"	**"MoE" Coding**	**"MoE" Category**	**Associated Concepts**
Group 1 Foundation	Metamorphosis	[MET]	Transformation	Hammarby Model
	Reproduction	[REP]	Future Development	Hammarby Sjöstad Future
	Habit	[HAB]	Behavioural Change	Residents Behavioural Change
Group 2 [Quasi]-Objects	Technology	[TEC]	Technology Development	Environmental Solutions
	Fiction	[FIC]	Urban Development	Master Plan
	Reference	[REF]	Knowledge	Information exchange
Group 3	Politics	[POL]	Decision Making	Strategy

	"MoE"	"MoE" Coding	"MoE" Category	Associated Concepts
[Quasi]-Subjects	Law	[LAW]	Environmental Goals	Law
Group 4 Transformation	Attachment	[ATT]	Involvement	Hammarby Community
	Organization	[ORG]	Governing	Project Team
	Morality	[MOR]	Sustainability thinking	Environmental ethics

Table 23. "MoE"s in Hammarby Sjöstad Case Analysis

The "MoE"s throughout Chapter 5 show that some "modes" have a more decisive influence on the sustainability process in the Hammarby Sjöstad case than others. Metamorphosis [MET], represented by the "Hammarby Model" concept, is crucial to the district's sustainability process. The whole project has been built with the eco-model concept. As a result, the urban development with the master plan has been designed to integrate new technology for environmental solutions to achieve the environmental goals. Therefore, Metamorphosis [MET] leads to Fiction [FIC] and Technology [TEC] represented by the "Master plan" and "Environmental solutions" concepts. These "modes", [MET], [FIC] and [TEC] lead to Law [LAW] represented by the "Environmental goals" concept. These initial "MoE"s belong to Groups 1, 2 and 3, as explained in Table 23 above. Diagram 15 shows the following results with the emerging "MoE"s in the initial 1.0 project:

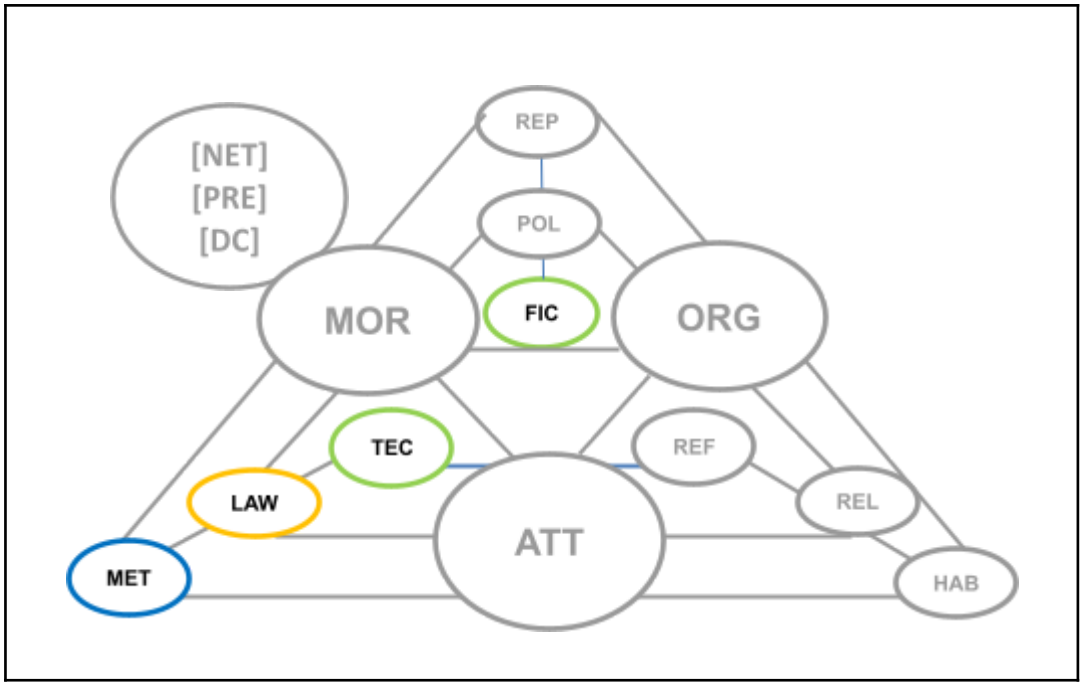


Diagram 15. "MoE"s in the Hammarby Sjöstad Project 1.0

From these emerging "modes", the question turns to what other "modes" are emerging within the governance process that can contribute to explaining how change into sustainability is happening within the transition process. Latour (2013a) defends that transitioning into an ecologically minded society is possible through the modes in Group 5: Organization [ORG], Attachment [ATT] and Morality [MOR]. These modes allow transformation and change in a situated scenario; they can shift knowledge to allow an alternative episteme to emerge and ultimately transform a paradigm, as explained in Chapter 2. Where are these transformative modes in Hammarby Sjöstad?

Organization [ORG] is represented in Hammarby Sjöstad's case analysis with the "Project Team" concept. As explained in Chapter 5, the Hammarby Sjöstad district has been developed through two main project stages: Hammarby Sjöstad 1.0 and Hammarby Sjöstad 2.0. The City of Stockholm developed the Hammarby Sjöstad 1.0 project with a new integrated planning process called "Eco-Governance". The aim of the "Eco-Governance" planning process has been characterised by cooperation, collaboration and transparency between all actors involved in the process through the different stages of design, planning, development and implementation (Sweco, 2012). For this purpose, the City of Stockholm created a dedicated project team to develop the district, including the City Planning Administration, Development Administration of Stockholm, private developers, architects, public sector stakeholders and Stockholm residents. The aim was to develop a new urban concept with a sustainability concept and shared vision amongst all actors involved in the 1.0 project process (Svane, 2012; cited by China Development Capital, 2015). The City of Stockholm's planning department coordinated and involved the different actors to work together as a special dedicated group to plan Hammarby Sjöstad (Sweco, 2012). The second stage of Hammarby Sjöstad's transformation has been driven by the Hammarby Sjöstad 2.0 initiative, which was created and managed by the Hammarby Community and its residents. In 2015, a group of residents in Hammarby Sjöstad got together to create a new social initiative to discuss the district's environmental, social and economic issues. The residents believed that the Hammarby Sjöstad 1.0 project was ending, and they felt that they needed to step in to develop the sustainability process in the district further (ElectriCity Stockholm, 2019).

The Hammarby Sjöstad 2.0 initiative, representing the second stage in the Hammarby Sjöstad sustainability governance process, is a prime example of the Attachment [ATT] mode. This mode has allowed the 'Project Team' into the 'Hammarby Community' concept, demonstrating the community's active role in the district's transformation. As part of the Hammarby Sjöstad 2.0 project, the ElectriCITY Stockholm platform was established with the mission to bring the Paris Climate Deal 2050 to Hammarby Sjöstad by 2030 and transform it into a Co2-free city district (ElectriCITY Stockholm, 2019). Electricity Stockholm has been instrumental in supporting the residents' involvement in the area to continue the evolution of Hammarby Sjöstad and implement further

sustainability measures with strategic goals in energy, buildings, mobility, and circular economy (ElectriCITY Stockholm, 2019).

The last transformative aspect in Group 5 is Morality [MOR]. This "mode" represents "Sustainability thinking". The [MOR] "mode" has allowed the analysis to understand how the changes in Hammarby Sjöstad district have influenced the residents' morality concerning their environmental ethics. The findings summarise three main aspects in translating "Sustainability thinking" into Hammarby Sjöstad: 1) Transition into environmental sustainability; 2) Residents motivation for moving to Hammarby Sjöstad; and 3) Environmental awareness amongst the residents. The findings show that the primary motivation for the residents to move into the Hammarby Sjöstad district has been because it is "a nice place to live" and "it is a scenic place to live". This reveals that urban development and design have played a crucial role in the motivation of the people moving into the Hammarby area, mainly influenced by Fiction [FIC] and Technology [TEC]. Higher levels of environmental consciousness and sustainability thinking exist compared to other places as a result.

The three transformative "modes", [ORG][ATT] and [MOR], are visible in the Hammarby Sjöstad case analysis with the "Project Team," "Hammarby Community," and "Environmental Ethics" concepts. These "MoEs" contribute to the sustainability governance process and further transformation in the Hammarby Sjöstad district. Diagram 16 gives an overview of the identified emerging "modes" of the transition from 1.0 to 2.0.

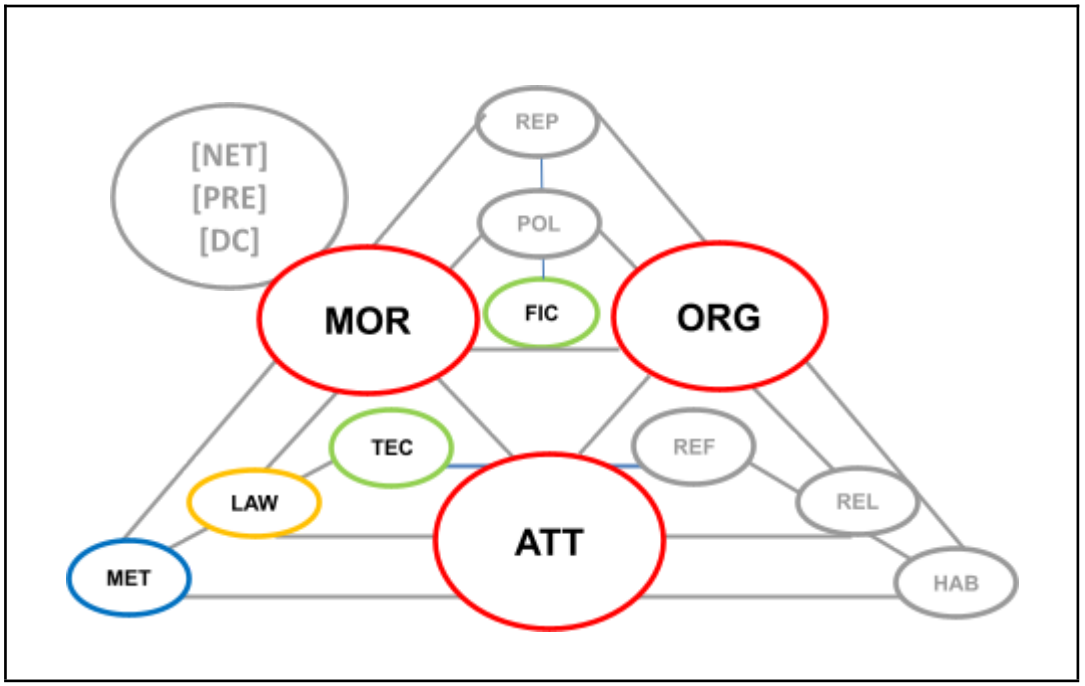


Diagram 16. Emerging transformative "MoE"s in the Hammarby Sjöstad 2.0 project

However, is this a "real change," as Latour (2013a) argues in the AIME project, and how are these "MoE"s affecting the sustainability transition process in the Hammarby Sjöstad case analysis? Before this question can be answered, the discussion requires looking into the Networks [NET] "mode" to structure how different "MoE" cross with each other within a set network.

8.4.2 The Networks [NET] in the Hammarby Sjöstad Case

Chapter 6 contributes to understanding the actors involved in the Hammarby Sjöstad project team and their role throughout the sustainability governing process. The Network [NET] "mode" has identified seven main actors directly involved in the governance process representing a Network [NET]. Table 24 summarises these Networks:

[NET]1- GlashusEtt Environmental Centre
[NET]2- Tengbom Architectural practise
[NET]3- ElectriCity Stockholm
[NET]4- Envac Group
[NET]5- Sjöstadsföreningen Association
[NET]6- KTH Royal Institute of Technology
[NET]7- City of Stockholm

Table 24. Main Actors in the Hammarby Sjöstad Case Analysis

The presented [NET] connect in different ways throughout the governing process in relation to two main concepts: "Hammarby Sjöstad 1.0 Project" and "Hammarby Sjöstad 2.0 Initiative". [NET]7-City of Stockholm is the leading actor involved in developing the Hammarby Sjöstad 1.0 project with the "Eco-Governance" planning process and the "Hammarby Model" concept to design and implement the master plan for the district. [NET] 7 promotes the [ORG], [MET], [FIC] and [TEC] "modes" to emerge in the first stage of the sustainability transition process. However, [NET]3-ElectriCity Stockholm takes responsibility for continuing to transform the Hammarby Sjöstad district into a further transformation process. [NET]3 involves and encourages the participation of the Hammarby community and residents with new goals and objectives with the Hammarby Sjöstad 2.0 Initiative. [NET]7 and [NET]3 allow two of the transformative modes, [ORG] and [ATT], to expand in different ways, connecting with other Networks and "MoE"s.

Diagram 17 below shows the mind map from the memo-writing results on how different Networks [NET] allow the [ORG] and [ATT] "modes" to expand and cross with other "modes" throughout the

sustainability governance process. This process allows transformation with the [MET] mode in the Hammarby Sjöstad case analysis:

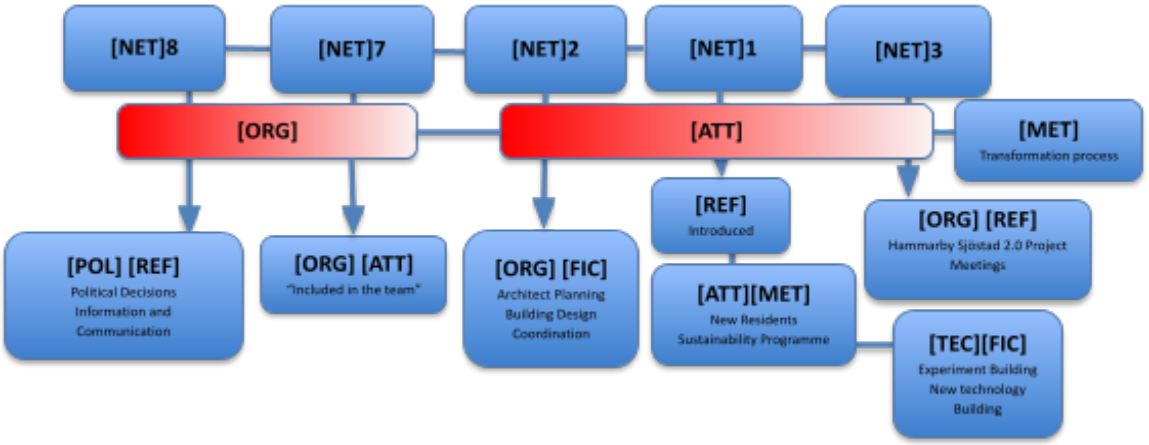


Diagram 17. Mind Map on [ORG] and [ATT] with Networks [NET] in Hammarby Sjöstad Case Analysis

8.4.3 Dominant "Modes" driving the Sustainability Governance Transition

Chapter 7 explains that specific "MoE" are emerging more than others, dominating the Hammarby Sjöstad case analysis and challenging Latour's (2013a) argument that all modes are equal. The Grounded analysis procedure explained in Chapter 4 led to identifying the vocabulary used by the key informants linked to the "MoE" presented in Chapter 3 to register the main concepts in the sustainability governing process of the project team in the Hammarby Sjöstad case. As a result, an explosion of "MoE" occurred. The findings concluded that the main "modes" dominating the sustainability governing transition process are Organization [ORG] and Attachment [ATT] with the "Project team" with Hammarby Sjöstad 1.0 project and "Organisations and Residents involvement" with Hammarby Sjöstad 2.0 initiative. These dominant "MoE"s are influenced mainly by Fiction [FIC] with urban planning and infrastructure development and Metamorphosis [MET] with the "Hammarby Model" concept.

The four modes identified in the research play a crucial role in the transition into sustainability, particularly the dominant modes [ORG] and [ATT], which represent two of the transformative "modes" in Group 5. These two "modes" interact and expand with each other, facilitating and contributing to a transformation change with Fiction [FIC], which represents the master plan and Metamorphosis [MET] with the "Hammarby Model" concept. The Networks allowing these dominant modes to expand are [NET]7-City of Stockholm and [NET]3- ElectriCity Stockholm, driving the

complex transformation process forward and connecting with the other Networks [NET] identified in Chapter 6. Diagram 18 and Table 25 visualise the complexity of the sustainability governance process with the dominant modes as a result:

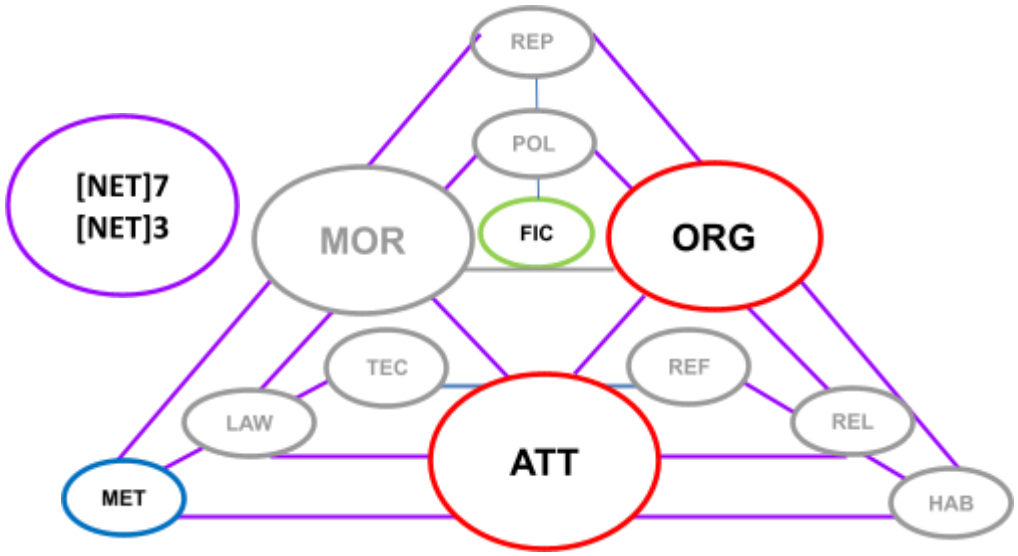


Diagram 18. Dominant Modes connecting in Hammarby Sjöstad Case Analysis

Group 5 **Structure**	**Group 1** **Foundation**	**Group2** **[Quasi]-Objects**	**Group 3** **[Quasi]-Subjects**	**Group 4.** **Transformation**
[NET]works **[NET]7- City of Stockholm** **[NET]3- ElectriCity Stockholm**	**[MET]**amorphosis **Hammarby Model**	**[FIC]**tion **Urban Planning**	**[POL]**itics **[LAW]** **[REL]**igion	**[ATT]**atchment **Organisations and Residents Involvement** **[ORG]**anization **Project Team** **Hammarby 1.0 and 2.0**

Table 25. Dominant Modes in the Hammarby Sjöstad Case Analysis

The dominant modes, a key aspect of our discussion, provide an opportunity to evaluate if the governing process in the Hammarby Sjöstad case has led to an epistemological shift in thinking and acting on sustainability. This is in line with Latour's (2013a) argument that transitioning into an ecologically minded society is possible through the transformative modes: Organisation [ORG], Attachment [ATT] and Morality [MOR]. To discuss the potential for a "real change" and an epistemological shift within the case analysis, looking to the anti-mode, Double-Clicks [DC] is imperative. Double-Clicks [DC] anti-mode (Latour, 2013a; Conway, 2016) has been presented in Chapter 3 and represents the "taken for granted" concepts. [DC] is a way of extending the analysis

process as it takes into consideration further insights within a course of action and the interpretations of the concepts identified that are alienating a situated process (Tummons, 2021). As Latour (2013a) explains, there are a significant number of category mistakes that bear on different modes that need to be identified and resolved in order to construct accounts for specific scenarios. Latour adds that "there are no such things as facts that speak for themselves" (Latour, 2013a, p. 137) and the identification of the [DC] mode gives the opportunity to overcome these "taken for granted" concepts.

Therefore, to be able to discuss if epistemological shifts are manifested in the project team in the Hammarby Sjöstad case, it is imperative to look to the transformative "modes" emerging in the sustainability governing process and discuss which category mistakes [DC] have been identified in Organization [ORG] and Attachment [ATT]. Table 25 summarises the category mistakes identified in the dominant modes:

Emerging Modes	**Hammarby Concepts**	**"Taken for Granted" Concepts [DC]**
Organization [ORG] Mode	**Hammarby Sjöstad 1.0 Project**	"One-off project" "Lack of sustainability awareness amongst all actors"
	Eco-Governance	"Not aware of the concept"
Attachment [ATT] Mode	**Residents Involvement**	"Lack of residents participation and engagement"

Table 25. Dominant Modes and Category Mistakes [DC]

The findings in Chapter 7 regarding the [DC] "mode" have identified the assumptions and interpretations alienating the sustainability governance process in the Hammarby Sjöstad case. Although [DC] alienates the sustainability governing process in the presented case, it gives an understanding of the mistakes occurring along the way. This process identifies where improvements need to be made and the opportunities to overcome the category mistakes that have been identified. The central "Taken for Granted" concepts and assumptions relate to the residents being unaware of the sustainability concepts in the Hammarby Sjöstad district, such as the "Eco-Governance" and the "Hammarby Model". The main assumptions within the interview transcripts have been that the Hammarby Sjöstad project has allowed people to "do the right thing", "live eco-friendly without having less", and "not to change behaviour" as a consequence. Urban planning and infrastructure have been taken for granted as the residents have adapted to the urban redevelopment changes with the "Hammarby Model". The "Hammarby Model" reproduces unsustainable assumptions and practices because it sees people as consumers rather than co-agents who need to be involved in

thinking and acting on translating sustainability. Consequently, the Hammarby residents are unaware of the sustainability concepts, which is reflected in their lack of participation and engagement within the community, resulting in little behavioural change beyond the urban infrastructure.

The identified Category Mistakes [DC] in Hammarby Sjöstad are challenged by the Attachment [ATT] mode with the Hammarby Sjöstad 2.0 initiative to increase residents' awareness, participation and engagement within the community. Although Hammarby Sjöstad's sustainability governing process has focused on technical innovation and performance, Hammarby Sjöstad 2.0 is challenging the assumptions and interpretations created as a result. An epistemological shift has happened in how the project team understood sustainability thinking and acting on how the residents in the Hammarby Sjöstad community experience sustainability. This process has enabled the thesis to develop an in-depth understanding of the sustainability governance process in Hammarby Sjöstad district from both sides: the City of Stockholm project team and the Hammarby community. The first has translated sustainability thinking linked to innovation through urban development and technology; the second has questioned what it means to sustainability thinking and acting in the Hammarby Sjöstad district. This process has allowed an epistemological shift into developing a sustainability governing process that puts the residents in the centre to participate and get involved in their environmental profile, how they travel, how they live sustainably and also what more they can do to support projects and initiatives to translate sustainability thinking and acting in the community. This reflects a deep understanding of sustainability and challenges the thinking and acting translated by the City of Stockholm, which has evolved into the Hammarby Sjöstad 2.0 initiative and ElectriCity Stockholm social enterprise.

The results from the findings support Latour's (2013a) argument that transitioning into an ecologically minded society is possible through the transformative modes with Organisation [ORG], Attachment [ATT] and Morality [MOR] modes. However, the identified category mistakes alienate the process, limiting the "real change" within the Hammarby community with the lack of participation and engagement, awareness, and taken-for-granted ecological footprint due to the taken-for-granted urban infrastructure. The category mistakes acknowledges the errors and assumptions within the sustainability governance process and the need to overcome the "taken for granted" concepts.

The findings also show that these category mistakes are being challenged by the Hammarby 2.0 initiative with Attachment [ATT] and Network [NET]3 with ElectriCity Stockholm platform to address the participation, awareness and urban infrastructure issues that are alienating the sustainability process. However, it is crucial to emphasise the need for further research and more practice with AIME aspects with different case studies to be able to assess the "real change" into sustainability. This ongoing work, along with further comparative analysis, will be beneficial in

evaluating the results in the future, underlining the importance of the research's continued efforts in the field of sustainability governance.

8.5 Contributions and applications

The thesis has built on developing understanding and experience in conducting research with the adapted aspects of the AIME project and theorising the Modes of Existence approach to develop a study on epistemological shifts issues on sustainability governing transitions. The adapted AIME aspects and the methodology drawn to conduct the research to incorporate the "MoE"s have been the basis for understanding how to conduct research with the Modes of Existence approach. The findings in Chapters 5, 6 and 7 reinforce the conclusion that incorporating concepts from the AIME project and the Modes of Existence approach within the social sciences research studies provide rich close-up insights to observe and understand epistemological shift issues. The thesis findings have given an in-depth understanding of how different realities are interconnected throughout specific scenarios, opening the possibility to identify the mistakes, errors and misunderstandings to address the matter of epistemological shift and observe the possibility of transitioning into thinking and acting differently on sustainability. The research study has provided a theorising and conceptualising of the Modes of Existence approach that can benefit policymakers, institutions, organisations, and researchers in sustainability to understand the complexity of translating sustainability from governing transition processes. Conducting research studies with the "MoE" provides insights into how individuals, organisations, and communities understand and experience the transformation process by thinking and acting on sustainability.

8.5.1 Contribution to Latour's AIME project

The thesis has introduced the conceptualising and theorising with the presented "MoE" aspects as part of contributing to the Latourian analysis of the MoEs in the AIME project for research practice on epistemological shift issues on sustainability thinking and acting. The research has aimed to consider to what extent the AIME project introduces the possibility of understanding and exploring sustainability governing transition, as the Modes of Existence approach is open to interpretation and subjectivity. Latour appealed to the research community by creating a virtual platform called the AIME project (http://modesofexistence.org/) to have academics participate in his work. This virtual platform has aimed to complete the Modes of Existence approach as it is subject to interpretation and continuous research (Amat, 2016). Although the AIME project has been researched and interpreted with the virtual community and platform, Latour's work has been criticised in academia. Researchers have felt that the hypothesis and theory around the Modes of Existence is too ambiguous. Academics

argue that AIME is selectively pluralist in the different ontologies, and they argue that the Modes of Existence have insufficient methodology and reflexivity available for conducting research (Delchambre and Marquis, 2013). Also, academics such as Hämäläinen and Lehtonen (2016) criticise the AIME project as being characterised by a "'mind-boggling heterogeneity" (p. 30), and Berliner, Legrain and van de Port (2013) argue that the method and methodology remain obscure to test and explore the conceptualising and theorising with the Modes of Existence approach. The criticism from the different academics agrees that there is no methodology or concrete method to conduct research with the approach and that the AIME project is too ambiguous and open to too many interpretations. These criticisms give away the complexity of understanding the ambiguities of linking research practice and theorising with the Modes of Existence approach as part of the AIME project.

The conceptualising of the Modes of Existence approach involves understanding multiple ontologies that are open to interpretation depending on the researcher's aims, objectives, and the topic to be investigated. As a doctoral researcher, it has been a difficult task taking on board the different aspects of the AIME project and conceptualising the "MoE"s to provide a workable framework for the thesis. The adapted "MoE"s in this thesis provide a conceptualised framework to research epistemological issues contributing to the Latourian analysis with the MoEs in the AIME project. It gives structure to a complex, time-consuming, rich approach to researching the social sciences; moreover, it gives a framework on how to design a research procedure to observe sustainability issues from an epistemological matter. The AIME project and the modes of existence approach can bring significant contributions to understanding sustainability from an alternative perspective, leaving behind "fashionable" concepts such as "sustainable development", which is centred on economic growth to embracing "real change" as part of embracing sustainability and reconnect to the natural world, placing our civilisation as part of Nature and the environment. The "MoE" concepts provide a conceptualised framework that allows the possibility to understand specific situations and describe new ways of talking about the plurality of the world, ways of linking and networking, and coexisting. The presented different "modes" are interested in observing a phenomenon; however, Latour's (2013a) work requires further articulation to empirical situations to be understood. Therefore, it is necessary to confront them in real-life situations.

The Latourian analysis with the MoEs needs further practice in order to see if we, as researchers, can identify such modes in our research areas; the presented framework in this thesis with the "MoE" aspects contributes to opening the door to further research practice, conceptualising and theorising with the AIME project and its applicability to gain further understanding about current and future environmental and social challenges. The thesis has contributed to the AIME project understanding and exploring how the multiple modes can explain the sustainability governance process from an

epistemological perspective. This process requires understanding key aspects of the Modes of Existence approach to develop a structure for the research study. The conceptualised framework has presented 15 “MoE”s interconnected in five groups to understand the MoEs Latour (2013a) presented in the AIME project. The “MoE”s are connected through a network that needs to be researched to understand and establish the associations. In this process, there are three main “modes” that can build the inquiry to be investigated: Networks [NET], Preposition [PRE] and Double-Clicks [DC]. In this thesis, the preposition [PRE] mode to identify the associations has been established using the example of a sustainability governance process: Hammarby Sjöstad Case. The case analysis has allowed the thesis to understand the networks and “modes” interacting in this specific scenario.

Although Latour (2013a) defends that all modes need to be treated as equals, the results in Chapter 7 determine that two main recurrent “modes” emerge repeatedly in the Hammarby Sjöstad case analysis: Organisation [ORG] and Attachment [ATT]. These two “modes” dominate the sustainability governance process in Hammarby Sjöstad, challenging Latour’s argument about the equal nature of the different modes.

The finding of the dominant modes enriches Latour’s AIME project, contributing to theorising with the Modes of Existence approach to include that dominant modes can be present subject to the research topic to be investigated. Naturally, the data collection and analysis will aim to answer specific questions subject to one “mode” or another; therefore, this process has facilitated specific “MoE”s to emerge. The three transformative “modes” (Organization [ORG], Attachment [ATT] and Morality [MOR]) have been discussed to observe the manifestation of epistemological shifts in the sustainability governing transition process in the Hammarby Sjöstad case. These three “MoE”s have been subject to being observed more than the others in sustainability governance and transition research. Therefore, the research design and planning focus on these three modes to understand how the epistemological shift is happening within the sustainability governing transition process.

The conceptualised framework with the “MoE” aspects contributes to the Latourian analysis in understanding the complexity in sustainability governance in various ways:

- Identifying the “MoE”s in a specific scenario.
- Building accounts in sustainability governance using understanding and experiences from organisations and individuals involved actively in the selected case.
- Identifying which actors build networks allows the change to happen in the sustainability process.
- Understanding of mistakes and assumptions that alienate the sustainability governance process and manifest an epistemological shift as a result.

The thesis has provided the basis to understand, evaluate and design a study considering aspects of the AIME project and the adaptation to conduct Latourian analysis to provide rich findings in observing and understanding how the thinking and acting on sustainability is translated into a real scenario. It provides a methodology and conceptualised framework to understand a significant global concern: sustainability governance and the need for an epistemological shift into understanding our place and responsibilities within the current climate regime. It also provides validity and the possibility of conducting research using the Modes of Existence approach as part of the AIME project.

The presented "MoE" aspects and methodology in this thesis bring the opportunity to complement the AIME project to be used as a tool by professionals and researchers to investigate existing sustainability transition scenarios to evaluate and assess the complexity of its governance. It brings the potential of Latourian analysis and contributions from the AIME project to the front row to observe and assess sustainability subjects or other social-science subjects and build qualitative studies that can provide in-depth analysis and discussion.

8.6 Limitations and Future work

Due to the time constraints of the PhD programme and the complexity of building the research study with Latour's Modes of Existence approach and AIME project, the decision was taken to focus on one case study. The initial research incorporated two case studies, Hammarby Sjöstad district in Sweden and Yantai Hammarby district in China, to compare the sustainability governance process from a Western and Eastern perspective. The initial literature review was carried out in both case studies, and the visits to Sweden were completed with interviews and surveys between June and November 2019 as part of the fieldwork. A trip to China was being organised for March 2020; however, the COVID-19 pandemic cancelled the plans for travelling to China, and the decision was made to use Hammarby Sjöstad as the main case study.

When I started analysing the data collected with the "constant comparative analysis", I realised that the process was far more complicated than expected. Although the initial coding process with the "MoE" codes and categories simplified the analysis, the interpretation needed to code the interview transcripts became complicated. I questioned word by word, sentence by sentence, what vocabulary was used by the key informants, and which "MoE" belonged to, depending on the concepts that they were emerging. The analysis was exhaustive, and as I went backwards and forwards, I added the codes and concepts into the Metalanguage vocabulary. I realised that my knowledge and experience were growing in conceptualising and theorising with the key aspects of the AIME project. Therefore,

one case analysis was enough to build the thesis around sustainability governance and its transition process.

Throughout the analysis process the “MoE”s started to emerge continuously, sometimes individually, sometimes with two modes crossing and other times with three modes crossing. The interview transcripts were full of modes from the vocabulary and concepts used by the key informants. The outcome complicated how to write the results, so the spider web graph became very useful in quantifying the “modes” and visualising which emerged from all the interviews. The results showed that specific “modes” emerged more than others, dominating the understanding of sustainability and its complexity in the Hammarby Sjöstad case analysis. The data collection and analysis process with the grounded analysis process have determined which “MoE”s were in action in the selected study, the concepts in each category, and the results of the main “modes” in thinking and acting on translating sustainability.

The methodological procedure and the conceptualised framework from the adapted aspects of the AIME project require further practice and application to develop the possibilities of the Modes of Existence approach in sustainability research. The thesis allows for incorporating Latourian analysis into research studies to observe how individuals, communities and organisations understand sustainability from their perspective and how it can affect management, governance and policy-making to translate this understanding as part of an epistemological matter. More specific case studies need to be completed and compared to determine the possibility that further conceptualisations and theorising of the Modes of Existence approach and AIME project can bring to explore knowledge, understanding and processes to address the changes needed to become an environmentally minded society. Each country, community and individual addresses sustainability differently depending on their beliefs, traditions and cultures. However, the scientific reality of climate change is forcing us as a civilisation to encounter the necessary changes in our society.

The thesis allows for an understanding of the complexity of sustainability governance by observing where mistakes and errors can be overcome in its transition process. The following future studies can give further insights incorporating the aspects of the AIME project presented in the thesis and its contributions to sustainability governing from an epistemological shifts matter for further practice on conceptualising and theorising with the Modes of Existence approach:

Comparative Study with China EcoCivilisation Sustainability Concept.

The research study provides the possibility of doing further research regarding understanding the sustainability governance process from the West/East perspective to complete the original research

study, taking a case study from China to compare both perspectives. The comparative analysis between two case studies from different countries will be beneficial to understand how it affects the understanding of the sustainability process, the barriers that alienate the process, and how it can affect the policy-making process.

Sustainability Policy Making and Application.

Further research is needed to develop the conceptualised framework presented in the thesis and analyse sustainability policy-making and its application. It will be possible to take as a case study a sustainability policy applied in a real scenario and the outcomes that came from the policy application to identify the barriers and mistakes that happened along the way.

Modes of Existence Study with Individual Modes.

The methodological procedure and the interpretative nature of the research have given the research an additional complexity when doing research with the Modes of Existence approach. The analysis process in the thesis has been dominated by an "explosion of modes" and has shown that for future research projects, the study could be simplified by taking into account individual "MoE"s instead of identifying all the "modes" in the case study and interpreting how they connect with each other.

8.7 Final Conclusions

The thesis has presented a structured research study in sustainability governance to observe the manifestation of epistemological shifts in acting and thinking on translating sustainability in the Hammarby Sjöstad case. An innovative methodological procedure has been presented in this thesis, taking on board Bruno Latour's Modes of Existence approach and the possibility of conceptualising key aspects of the AIME project. As a result, the thesis has presented specific research based on observation and understanding of sustainability governance and its transition process with the Hammarby Sjöstad case analysis. The thesis contributes to the Modes of Existence approach through the conceptualising and theorising of key aspects of the AIME project as well as incorporating a workable framework to design and conduct research in epistemological shifts manifestations to address the current environmental issues on city governance and urban development to incorporate sustainability governance as a transformative essential subject to address the climate change. The study has completed a methodological procedure that allows Latourian analysis to build research accounts on the understanding of translating, thinking and acting differently on sustainability. The findings in Chapters 5, 6 and 7 have shown the "MoE" aspects identified throughout the analysis process and how they relate to building the case study. It also reveals that specific "modes" play a

dominant role in this complex process. Chapter 7 explained that the dominant "modes" in Hammarby Sjöstad's case are Organization [ORG] and Attachment [ATT] with the "Project Team" and "Organisations and Residents involvement" concepts. The dominant "modes" contribute to Latour's Modes of Existence approach as he argues that all modes are equal and need to be understood individually. The findings contribute to evaluating the research subject depending on the "MoE"s that lead to understanding the sustainability process and its transition process, manifesting an epistemological shift.

The presented conceptualised framework and the key adapted aspects from the AIME project to structure the research design and methodology presented in Chapters 3 and 4 offer a novel and intriguing approach to understanding sustainability governance. Inspired by Latour's analysis of the MoEs, this innovative method provides in-depth accounts of how sustainability governance can be understood and what the elements alienating the process to a transition into an epistemological shift into acting and thinking on sustainability and its translation to our society. This unique perspective allows us to identify where the errors lie within the process, overcome the mistakes, and improve the sustainability transition when applied to a real-life scenario.

The thesis has attempted to contribute to the observation and understanding of sustainability governance processes on urban [city] management by incorporating the Modes of Existence approach concepts to develop an in-depth understanding of sustainability thinking and acting as part of a manifestation of epistemological shift. The results support Latour's (2013a) argument regarding the transitioning into an ecologically minded society with Organisation [ORG], Attachment [ATT] and Morality [MOR]. However, the identified category mistakes alienate the process, limiting the "real change" within the Hammarby Community with a lack of participation and engagement, awareness, and taking the ecological footprint for granted. Morality [MOR] with "sustainability thinking" has not emerged as often as Organization [ORG] and Attachment [ATT], alienating the epistemological shift on sustainability acting. However, the empirical findings show that residents' behavioural changes happen through the urban infrastructure and integrated technology in Hammarby Sjöstad. This alienates the process, as the main driver for change in Hammarby Sjöstad district has become environmentally friendly without having less or changing the residents' behaviour. Urban design and technology take the leading role, leaving Morality [MOR] with "Sustainability thinking" on one side, affecting the manifestation of the epistemological shift in acting and thinking differently about sustainability. However, as the Hammarby Sjöstad 1.0 project has evolved into the Hammarby Sjöstad 2.0 initiative, the second dominant "mode" Attachment [ATT] is taking the lead on involving organisations and residents in the community to overcome these aspects that are alienating the transformation process on sustainability acting and thinking, challenging on how the district should progress on sustainability governing of energy, transport and energy; as well as how the community

should be involved driving these changes through participation and involvement in the area. This transition process manifests as an epistemological shift as the original 1.0 project has evolved into a 2.0 project. The responsibility of governing sustainability has been transferred from the City of Stockholm project team to the Hammarby community with ElectriCity Stockholm and the Housing associations. They are the main actors involved in the ongoing changes to keep working on the district's sustainability thinking and acting.

Further research is required with the presented concepts and analytical procedure as part of the contribution to the AIME project and the Modes of Existence approach to observe further case studies and the applicability of the presented framework and methodology to develop a further understanding of sustainability governance transition and its epistemological results.

Personal Reflections

The PhD programme and the thesis have been a personal project to become a professional in sustainability governance research. I developed the research proposal for the PhD programme myself in 2011 when I took a break from my job in project management at a multinational branding enterprise. The proposal was born from a frustrating stage of my life where I was working for business-as-usual organisations that had unsustainable governance patterns with no awareness of sustainability and how their actions directly impacted their environment. I decided to grow as a professional and direct my career towards academia, putting forward a research project which involved opening a discussion about sustainability and the possibility of a paradigm shift. The project proposal was presented at several universities, such as the University of Basque Country (Spain), Cardiff University and The University of Sheffield. The initial idea was to conduct collaborative research with two universities to develop further validity and quality of the research project. However, the decision was taken that The University of Sheffield would develop my project with Prof. Frank Birkin as a supervisor. The beginning of the research project was complicated; the literature review needed to show clues about how to conduct sustainability transition research in a paradigm shift. It was a void. The degrowth transition literature gave glimpses of possible transition paths, but they did not clarify how this transformation needed to be done. How do we transform into sustainability? How do we observe the type of governance needed? Everyone at the doctoral centre asked me, how will you do this? The answer was “I don’t know”.

At this point, Prof. Frank Birkin suggested a new book, “An Inquiry into the Modes of Existence” (AIME) from Bruno Latour. He recommended this book as the author discussed overcoming the current modern paradigm and the possibility of an emerging episteme as the main solution. The book was really hard to read, and the writing was not straightforward. It was full of personal reflections and vocabulary that was hard to comprehend. Most of the time, I was not sure what I was reading. However, as I was approaching the end of the book, something clicked, and something made sense. The three transformative modes!! [ORG] [ATT] and [MOR]. Latour suggested that these three modes could transform the episteme and overcome the modern paradigm into an environmentally conscious society! This is it!! So, I reread the book. Ideas, concepts and descriptions of the modes started making sense. I drew a diagram, the modes were put in groups, their associations became more evident, and suddenly I realised that the [DC] mode (Category mistakes), the anti mode, completed the Modes of Existence approach. Different realities join together, mixing, connecting and making mistakes. Perfect! I have my theory and a possible framework. I did a second literature review to look at examples of research with the AIME project; I only found three authors and one PhD thesis that vaguely discussed the subject.

The next step was to get a methodology to understand how to conduct research using the Modes of Existence approach. Latour did not clarify any specific methodology, just guidelines that could be subject to interpretation! Developing the methodology was very difficult as the approach needed to be conceptualised into a workable framework. I had to look at examples such as ethnographic research, Grounded Theory Approach and Case Study research. The Modes of Existence approach needed to be applied to a real scenario, a real example of sustainability governance that represented a transformation, an episteme change in society. Various examples were taken into consideration, such as Iceland with the geothermal renewable energy solutions, The Netherlands with the Almere Sustainability district, Ecuador with Buen Vivir concept and China with the "Eco-Civilization" concept with eco-development cities such as Yantai Hammarby and Wuxi Taihu. The decision was taken to conduct a case study and adapt aspects from the AIME project to conceptualise the framework and structure to incorporate key concepts from Latour's work and Latourian analysis. This process gave the research the needed steps to develop the thesis in sustainability governing and observe how the epistemological shift was present in the transition process. Hammarby Sjöstad district was taken as a case study for its uniqueness in urban development and community support, as well as accessibility to the site and information about the governance process.

At this point, I had two very small children. The PhD research programme and building a family were going hand in hand. It was like the research study had become one of my children that needed equal attention and love as my two girls. I was trying to be a dedicated, loving mother for all three of them, trying not to compromise the time I spent with them, so neither felt my absence as I was trying to grow as a researcher. This is the hardest thing that I have ever done! Throughout that process, I felt supported by the university, supervisors and colleagues. The research department always accommodated my needs regarding leave of absence, such as maternity leave, relocating to Scotland, trying to move away from Brexit and the COVID-19 pandemic to do homeschooling. The Brexit campaign and leaving the EU process impacted my motivation to carry on with the research project. I felt betrayed by the UK, British society and the authorities. I greatly respected the tolerant country that Britain had built since the Second World War, and I developed great sadness of no longer belonging to the place that I had called "home" for the last 20 years. The university's communications of the Brexit outcome and the subsequent reassuring process that they were committed to being an international community kept me on the PhD programme. I was glad to be part of an organisation that supported me and believed in my qualities as a person rather than where I was from.

As the lockdown and COVID-19 pandemic were coming to an end in 2021, I started doing the analysis work on the data collected in the Hammarby Sjöstad case study. The analysis resulted in a complicated, extensive, in-depth procedure to register the "modes" translated from the AIME project through the analytical procedure. The main concern was registering these "modes" and their

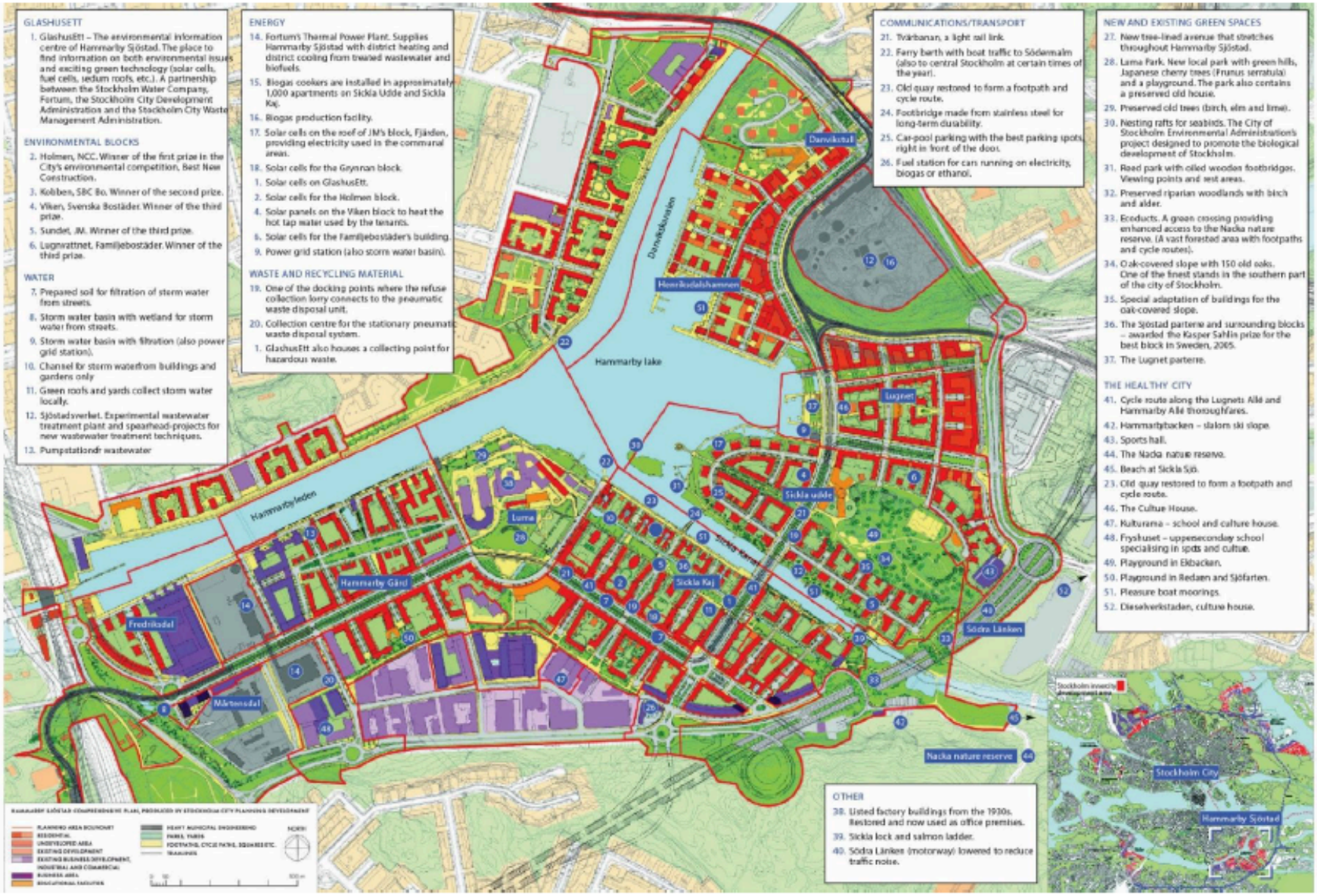
associations in the selected study. The interview transcripts were analysed using the codes and categories, and the Hammarby concepts were identified throughout the literature review. The transcripts became full of “modes” crossing together. It was quite difficult to make sense of the results. I started counting them and logging them in spreadsheets. Let’s make a spider graph to look at the modes! It looked clearer which ones were emerging more than others! Eureka!! I have results! There are dominant modes! How do I explain this now!

Writing up the thesis was the next challenge. It took two years to write up the document, chapter after chapter. Revision after revision. Confusion after confusion. It has been arduous work. While writing, editing and revising, I realised the thesis was coming together. I have produced unique research that has contributed to social sciences! I was a social scientist! I can explain my research to people! I have concluded my original objective of developing a unique study in sustainability that could observe and understand the transformation process into becoming an environmentally minded society!

My supervisors, Lien and Olga, have been key in this personal development process. Thank you for all the hours spent reading unreadable, complex chapters, for all your advice and words of encouragement, and last but not least, for supporting me until the end of the PhD process.

Appendix I

Hammarby Sjöstad Master Plan


GLASHUSETT
1. GlashusEtt – The environmental information centre of Hammarby Sjöstad. The place to find information on both environmental issues and exciting green technology (solar cells, fuel cells, sedum roofs, etc.). A partnership between the Stockholm Water Company, Fortum, the Stockholm City Development Administration and the Stockholm City Waste Management Administration.
ENVIRONMENTAL BLOCKS
2. Holmen, NCC. Winner of the first prize in the City's environmental competition, Best New Construction.
3. Kobben, SBC Bo. Winner of the second prize.
4. Viken, Svenska Bostäder. Winner of the third prize.
5. Sundet, JM. Winner of the third prize.
6. Lugnvattnet, Familjebostäder. Winner of the third prize.
WATER
7. Prepared soil for filtration of storm water from streets.
8. Storm water basin with wetland for storm water from streets.
9. Storm water basin with filtration (also power grid station).
10. Channel for storm waterfrom buildings and gardens only
11. Green roofs and yards collect storm water locally.
12. Sjöstadsverket. Experimental wastewater treatment plant and spearhead-projects for new wastewater treatment techniques.
13. Pumpstationdr wastewater
ENERGY
14. Fortum's Thermal Power Plant. Supplies Hammarby Sjöstad with district heating and district cooling from treated wastewater and biofuels.
15. Biogas cookers are installed in approximately 1,000 apartments on Sickla Udde and Sickla Kaj.
16. Biogas production facility.
17. Solar cells on the roof of JM's block, Fjäriden, providing electricity used in the communal areas.
18. Solar cells for the Gryning block.
1. Solar cells on GlashusEtt.
2. Solar cells for the Holmen block.
4. Solar panels on the Viken block to heat the hot tap water used by the tenants.
6. Solar cells for the Familjebostäder's building.
9. Power grid station (also storm water basin).
WASTE AND RECYCLING MATERIAL
19. One of the docking points where the refuse collection lorry connects to the pneumatic waste disposal unit.
20. Collection centre for the stationary pneumatic waste disposal system.
1. GlashusEtt also houses a collecting point for hazardous waste.
COMMUNICATIONS/TRANSPORT
21. Tvärbanan, a light rail link.
22. Ferry berth with boat traffic to Södermalm (also to central Stockholm at certain times of the year).
23. Old quay restored to form a footpath and cycle route.
24. Footbridge made from stainless steel for long-term durability.
25. Car-pool parking with the best parking spots right in front of the door.
26. Fuel station for cars running on electricity, biogas or ethanol.
NEW AND EXISTING GREEN SPACES
27. New tree-lined avenue that stretches throughout Hammarby Sjöstad.
28. Lama Park. New local park with green hills, Japanese cherry trees (Prunus serratula) and a playground. The park also contains a preserved old house.
29. Preserved old trees (birch, elm and lime).
30. Nesting rafts for seabirds. The City of Stockholm Environmental Administration's project designed to promote the biological development of Stockholm.
31. Road park with oiled wooden footbridges. Viewing points and rest areas.
32. Preserved riparian woodlands with birch and alder.
33. Ecoducts. A green crossing providing enhanced access to the Nacka nature reserve. (A vast forested area with footpaths and cycle routes).
34. Oak-covered slope with 150 old oaks. One of the finest stands in the southern part of the city of Stockholm.
35. Special adaptation of buildings for the oak-covered slope.
36. The Sjöstad parterre and surrounding blocks – awarded the Kasper Salin prize for the best block in Sweden, 2005.
37. The Lugnet parterre.
THE HEALTHY CITY
41. Cycle route along the Lugnets Allé and Hammarby Allé thoroughfares.
42. Hammarbybacken – slalom ski slope.
43. Sports hall.
44. The Nacka nature reserve.
45. Beach at Sickla Sjö.
23. Old quay restored to form a footpath and cycle route.
46. The Culture House.
47. Kulturama – school and culture house.
48. Fryshuset – upperseconday school specialising in sports and culture.
49. Playground in Ekbacken.
50. Playground in Redaren and Sjöfarten.
51. Pleasure boat moorings.
52. Dieselverkstaden, culture house.
OTHER
38. Listed factory buildings from the 1930s. Restored and now used as office premises.
39. Sickla lock and salmon ladder.
40. Södra Länken (motorway) lowered to reduce traffic noise.
Hammarby Lake
Danvikskanalen
Henriksdalshamnen
Danvikstull
Lugnet
Sickla udde
Sickla Kaj
Lama
Hammarbyleden
Hammarby Gård
Fredriksdal
Mårtensdal
Södra Länken
Nacka nature reserve
Stockholm City
Hammarby Sjöstad

Appendix II

Hammarby Sjöstad Survey

ENERGY PRODUCTION

Biogas Production Facility.

Fortum's Thermal Power Plant. Supplies Hammarby Sjostad with district heating and district cooling from treated wastewater and biofuels.

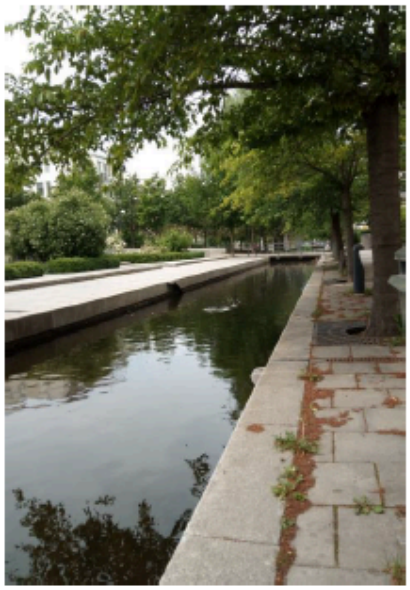
Solar cell on the roof of JM's block, Fjarden, providing electricity used in the communal areas.

WATER

Sjostadsverket. Experimental wastewater treatment plant and spearhead projects for new wastewater treatment techniques

Storm water basin with filtration and power grid station

Channel for storm waterfront buildings and gardens



Green roofs and yards collect storm water locally

Pumpstationdr wastewater

WASTE AND RECYCLING MATERIAL

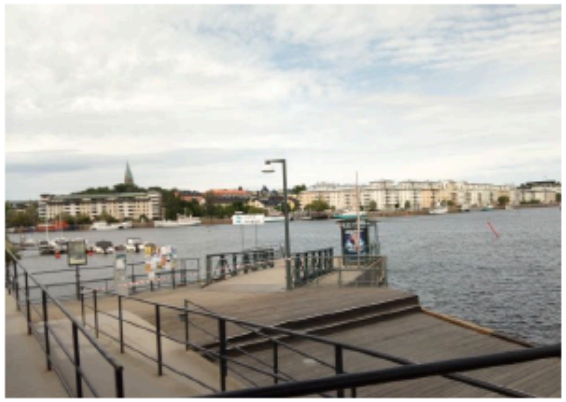
One of the docking points where the refuse collection lorry connects to the pneumatic waste disposal unit.

Recycling Material

GlashusEtt- The Environmental Information Centre. Collection point for hazardous waste.

COMMUNICATIONS/ TRANSPORT

Tvarbanan- Light Rail



Ferry berth with boat traffic to Sodermalm and Stockholm.

Footbridge made from stainless steel for long term durability.

Old quay restored to form a footpath and cycle route.

Car-pool parking with the best parking spots, right in front of the door.

Fuel station for cars running on Electricity, Biogas or Ethanol.

NEW AND EXISTING GREEN SPACES

Luma Park, New local park with green hills, Japanese cherry trees and playground.

Preserved old trees.

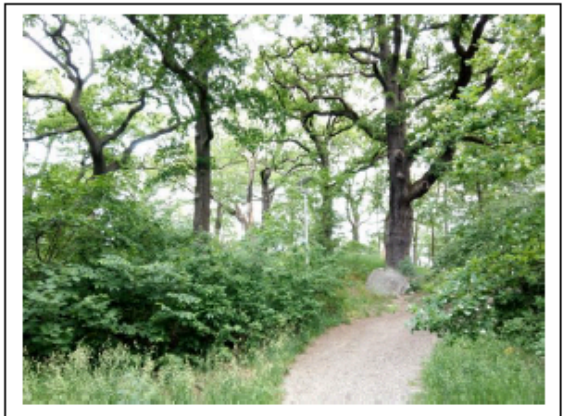
Nesting rafts for seabirds.

The City of Stockholm Environmental Administration's project designed to promote the biological development of Stockholm.

Reef park with oiled wooden footbridges.
Viewing points and rest areas.

Preserved riparian woodlands with birch and alder.

Ecoducts. A green crossing providing enhanced access to the Nacka nature reserve. (A vast forested area with footpaths and cycle routes.)



Oak-covered slope with 150 old oaks. One of the finest stands in the southern part of the City of Stockholm.

Special adaptation of buildings for the oak-covered slope.

The Lugnet Parterre.

The Sjostad parterre and surrounding blocks.

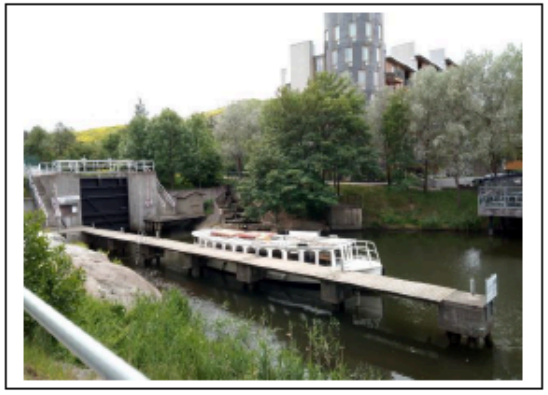
THE HEALTHY CITY

Cycle route along the Lugnets Alle and Hammarby Alle.

Old quay restored to form a footpath and cycle route

The Culture House

Pleasure boat moorings.



Sikla lock and salmon ladder.

Appendix III

Information Sheet for key informants

Mrs Saioa San Miguel Bell
PhD Researcher in Sustainable Transitions and Green Urban Development Management

Sheffield University Management School
Conduit Road
Sheffield
S10 1FL
United Kingdom

Email: ect12ss@sheffield.ac.uk

20th of August 2019

Research Project: Sustainable Green Urban Development Management in Sweden and China. Sustainability Transition into a Holistic approach.

Dear Sir/ Madam,

You are being invited to take part in a research project. Before you decide whether or not to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide if you wish to take part. Thank you for reading this.

I am writing to you to request your participation on a PhD research project conducted by the Sheffield University Management School in the UK about green urban development and Management Transition into a Holistic approach in Sustainability, we are collecting data in Sweden and China and studying the Green urban projects developed with the SymbioCity approach. We are looking for examples of holistic and sustainability projects across Sweden and China and how these values are improving the citizens behavioural change into environmental sustainability. The study aims to argue that a paradigm shift into ecologically minded societies is already happening and we want to develop two case studies with the SymbioCity projects in Sweden and China. The study will want to assess how different organizations (Businesses, government bodies and social initiatives) are involved in these projects and how the holistic and environmental sustainability values are transferred into project design, redevelopment and ultimately behavioural change into the society.

Therefore, I will like to invite you to participate in this project due to your involvement and knowledge about the SymbioCity approach and green urban development projects in Sweden and China. The field study and data collection in Sweden and China will be running from October 2018 until June 2020 and we will be interviewing around 15 to 20 key informants and visiting the following green urban developments: Hammarby Sjöstad and Yantai- Hammarby. I will be conducting informal interviews and site visits to organizations, project managers, business area managers, consultants, architects and researchers involved in these projects. The interviews will be informal, and they will last approximately an hour to discuss economic, social, environmental topics related to the SymbioCity approach and the Green Urban projects. The interviews will be audio recorded with each key informant's consent and the data collected will be always discussed with you and used for research purposes with your consent. If you decide to participate we can discuss further the available dates to arrange an interview and a visit to your organization.

Taking part in the research project is entirely voluntary and if you do want to be involve you will be given this information sheet to keep and asked to sign a consent form. You can still withdraw at any time without any negative consequences and any data collected during the interviews/ site visits will

be discussed with you and you will be aware of its use for research purposes and publications. If you wish to withdraw from the research at any time, please contact me via email.

The nature and focus of the PhD research projects will be observation and data collection through informal interviews and site visits from the policy development, business models and social initiatives point of view. Therefore, the potential for physical and/or psychological harm/distress to key informants is minimal and it will be conducted with people that has professional and personal expertise in the subject. No sensitive personal data (such as racial or ethnic origin, political opinions, religion, criminal records, etc) classed as 'Special Category' under the General Data Protection Regulation (applicable in the UK and EU from 25Th May 2018) will be collected during the study and participation in this research project.

It will be no retribution involved in participating in the project and your participation will be seeing as a contribution to future Green Sustainability research projects and building a better green world for everyone.

All the information that we collect about you during the research will be kept strictly confidential and will only be accessible to members of the research team. You will not be able to be identified in any reports or publications unless you have given your explicit consent for this. If you agree to us sharing the information you provide with other researchers (e.g. by making it available in a data archive) then your personal details will not be included unless you explicitly request this.

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general. As we will be collecting some data that is defined in the legislation as more sensitive (name, address, job title and responsibilities), we also need to let you know that we are applying the following condition in law: that the use of your data is 'necessary for scientific or historical research purposes under the General Data Protection Regulation (applicable in the UK and EU from 25 May 2018) the appropriate legal basis for research purposes will be 'a task in the public interest'.

All the confidential and personal data will be kept on a confidential file securely locked in the premises and the digital copy will be kept on the University of Sheffield system. The informal interview will be stored securely for 5 years and the data collected and analysed will be discussed with the key informant to check if all the data collected can be used for publications and conference presentations. The data collected will be used to write the PhD thesis and any future projects, as well as future publications and conference participation. Any personal data will be stored securely and kept strictly confidential by the University of Sheffield protection data policy and UK- EU protection data and confidentiality laws. The data generated at each stage of the research will be securely stored at The University of Sheffield system and the data will be identifiable with organizations names, addresses, contact details, information and activity of the organizations and project information. The data will be shared with the supervisors, Prof. Frank Birkin and Prof. David Oglethorpe; possible collaborating researchers in Sweden and transcription services for The University of Sheffield for the informal interviews. Also, the data generated might be shared with future possible collaborating/partner organizations and/or research teams in future studies, research projects, publications, research, teaching material or research topics with the consent of the key informants. Any identifiable personal data will be stored only digitally within the University of Sheffield system and it will be destroyed after 10 years that the project has ended. Due to the nature of this research it is very likely that other researchers may find the data collected to be useful in answering future research questions. We will ask for your explicit consent for your data to be shared in this way.

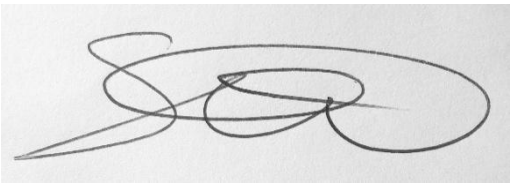
The University of Sheffield will act as the Data Controller for this study. This means that The University of Sheffield is responsible for looking after your information and using it properly. This project has been ethically approved via the University of Sheffield's Ethics Review Procedure, as

administered by the Management School. If you wish to raise a complain as a key informant regarding the treatment by the researchers involved in this project whiles the research is being conducted, please contact me or my Supervisor Prof. Frank Birkin via email. If something serious has occurred during or following your participation in the project, it will be reportable as a serious adverse event to the Head of Department. Please find all the contact details in the consent form. If you should feel your complaint has not been handled to your satisfaction you can contact the Head of Department, who will then escalate the complaint through the appropriate channels. If the complaint relates to how your personal data has been handled, information about how to raise a complaint can be found in the University's Privacy Notice: https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

If you wish to request further information about the research project, please do not hesitate to contact me or my supervisor Prof. Frank Birkin and we will send you a more explanatory document about the study. If you agree to take part as a key informant, you will be given a copy of the information sheet and a copy of the signed consent form to keep.

Finally, many thanks for taking your time to read about our PhD research project and contributing to our mission into Green Sustainable Future.

Yours Sincerely,



Mrs Saioa San Miguel Bell
PhD Researcher in Sustainable Transitions and Green Urban Development Management

Appendix IV

Metalanguage Vocabulary in Hammarby Sjöstad Case Analysis

1	2	3	4	5
“MoE”	**“MoE” Coding**	**“MoE” Category**	**Associated concepts**	**Emerging Concepts**
Networks	[NET]	Organisations	Government Institutions Business Organisations Social Initiatives	[NET]1- GlashusEtt Environmental Centre [NET]2- Tengbom Architectural practise [NET]3- ElectriCity Stockholm [NET]4- Envac [NET]5- Sjöstadsforeningen Association [NET]6- KTH Royal Institute of Technology [NET]7- City of Stockholm [NET]8- Other Associations, Organizations, Businesses, Projects, Actors
Double Click	[DC]	“Taken for Granted”	Mistakes Assumptions Interpretations	Unsustainable Problems/ Problematic Challenge
Preposition	[PRE]	Sustainability	Sustainability	Modes Crossing [NET][NET] [REP][MET][HAB][TEC][FIC][REF][POL][LAW][ATT][ORG][MOR]
Reproduction	[REP]	Future Development	Hammarby Future	Climate Friendly district Climate Neutral 2030 Holistics Approach Lifestyle/ Reality Sustainable Development Replicated Concept “To renew a new city” Paradigm Concept Future Frame

1	2	3	4	5
“MoE”	**“MoE” Coding**	**“MoE” Category**	**Associated concepts**	**Emerging Concepts**
Metamorphosis	[MET]	Transformation	The Hammarby Model	Next Step/ New Ideas Improve Transition Develop Opportunities Innovation Alternative Modern Opportunities
Habit	[HAB]	Behavioural Change	Residents Behavioural Change	Cultural Embedment Adapt/ Evolve “Consider the way we live, how we travel, what we eat, what we use in our day to day lives” Environmental Consciousness
Technology	[TEC]	Technology Development	Environmental solutions	Technology Environmental Solutions
Fiction	[FIC]	Urban Development	Master Plan	Smart and Renewable Energy Sustainable Transport/ Electric vehicles Circular economy (recycling at home) Energy efficient Houses. City Building Development. “So Innovation build in Innovation in a City.” Architecture Building Development
Reference	[REF]	Knowledge	Information Exchange Research Development Education	Information exchange Communication Awareness Acknowledgment Promote Experience Understanding Experience

1	2	3	4	5
“MoE”	**“MoE” Coding**	**“MoE” Category**	**Associated concepts**	**Emerging Concepts**
Politics	[POL]	Decision Making	Strategy	Paris Agreement Goal by 2030. Fossil-Free City in 2040. Policy development Power relations
Law	[LAW]	Environmental Goals	Law	Sweden National Framework and Stockholm City’s Climate goal Energy and environmental measures/ regulations Targets
Attachment	[ATT]	Involvement	Hammarby Community Organisational Involvement	Behaviour Citizens Cooperation Critical Mass Participate Willingness Engaged Involvement Everyday Life Society
Organization	[ORG]	Governing	Project Team Hammarby Sjöstad 1.0 Project Hammarby Sjöstad 2.0 Project	Eco-Governance Organisations and Business System Management/ Planning Way of working Initiatives Promote Practises Agents
Morality	[MOR]	Sustainability Thinking	Environmental Ethics	Gaia Ecology

1	2	3	4	5
“MoE”	**“MoE” Coding**	**“MoE” Category**	**Associated concepts**	**Emerging Concepts**
				Eco-Perspective Climate Environmental factor

Appendix V

Covid-19 Impact Form

THE UNIVERSITY OF SHEFFIELD: COVID-19 IMPACT FORM

This form is not compulsory but is intended to be a helpful note to examiners. You may submit this form alongside (not in) your thesis. The purpose of the form is to detail how your thesis has been impacted by the Covid-19 disruption.

STUDENT'S DETAILS	
Name: Saioa San Miguel Bell	Registration Number: 120214703
Department: Management	Faculty: Social Sciences

Please provide a brief summary of the work you were planning to complete before covid-19 restrictions were implemented (max 300 words)

The initial Research project for the PhD was intended to deliver using two case studies to do a comparative analysis of two eco-cities urban development: Hammarby Sjöstad eco-development in Sweden and Yantai Hammarby eco-development in China. The purpose of the comparative analysis was to compare different factors influencing the transition into sustainability in different countries using the Modes of Existence Approach by Bruno Latour to understand the possibilities and difficulties of the process.

The field work and the interviews in Sweden were concluded in October 2019 and the plan was to travel to China to visit Yantai Hammarby in March 2020 to interview key informants and survey the area. These plans were cancelled due to the Covid-19 Pandemic and I decided to focus on the data that I collected in Sweden and develop one case study to develop a theoretical framework to understand sustainability using Bruno Latour's Modes of Existence approach.

Please provide a summary of plans for specific studies you were intending to conduct in the future (see note 1) (max 300 words)

Where relevant, please provide details of changes to your personal circumstances (see note 2) (max 150 words)

Due to the Covid-19 Pandemic, in March 2020 I decided to request Leave of Absence to my department for 6 months so I could look after my children, 6 and 4 years at the time, and do home schooling whiles we were in lockdown and the children were at home. I felt that was the right decision as I needed to make sure my children were entertained and they suffered the least from not being able to see family ands friends. My husband is a doctor and he needed to be working in the hospital every day, therefore having a break from the PhD was the right decision as I was on my own with the children and we were facing a very stressful situation.

If your thesis includes Covid-related research, please include a brief statement of how it relates to your overall research aims (see note 3) (max 150 words)

Please provide details of any previous funded extension, tuition-free extension or non-medical Covid-related leave of absence approved since March 2020

Leave of Absence due to Covid-19 from 18th of March 2020 to 2nd of September 2020.

Research England Funded Stipend Request Approved in June 2021 to grant 3 month extension to my registration period without incurring additional tuition fees.

Note 1. This information could form a basis for discussion at the viva examination and give Examiners additional means to assess the volume and standard of the work completed. Detailed information could be included in a future work section in the thesis itself.

Note 2. For example, ill health or additional caring responsibilities. additional difficulty related to an underlying disability, returned to clinical service, or has worked in a voluntary capacity for Covid-related research. These data could contextualise the judgement made by Examiners as to the most appropriate outcome.

Note 3. If in doubt, consult with your supervisor and Departmental PGR Lead.

Abbreviations

AIME: An Inquiry into the Modes of Existence

ANT: Actor Network Theory

MoE: Modes of Existence Approach

“MoE”: Adapted Modes of Existence Concepts

[ATT]: Attachment Mode

[DC]: Double-Click Mode

[FIC]: Fiction Mode

[HAB]: Habit Mode

[LAW]: Law Mode

[MET]: Metamorphosis Mode

[MOR]: Morality Mode

[NET]: Network Mode

[ORG]: Organization Mode

[POL]: Politics Mode

[PRE]: Preposition Mode

[REF]: Reference Mode

[REL]: Religion Mode

[REP]: Reproduction Mode

[TEC]: Technology Mode

References

Adolfsson, P., Lindblad, J. and Peacock, S. (2021) 'Translations of sustainability in urban planning documents — A longitudinal study of comprehensive plans in three European cities', *Cities*, 119, p. 103360. doi: 10.1016/j.cities.2021.103360.

Amat, A. (2016) *Le changement climatique de la simulation aux Modes d'Existence. Etude de trajectoires climatiques de villes et d'enterprises en Alsace*. Université de Strasbourg.

Anand, S. and Sen, A. (2000) 'Human development and economic sustainability', *World development*, 28(12), pp. 2029–2049. doi: 10.1016/S0305-750X(00)00071-1.

Arrow, K. *et al*. (1995) 'Economic growth, carrying capacity, and the environment', *Ecological economics*, 15(2), pp. 91-95. https://doi.org/10.1016/0921-8009(95)00059-3.

Balfors, B. *et al.* (2005) 'IMPACTS OF REGION-WIDE URBAN DEVELOPMENT ON BIODIVERSITY IN STRATEGIC ENVIRONMENTAL ASSESSMENT', *Journal of environmental assessment policy and management*, 7(2), pp. 229–246. doi: 10.1142/S1464333205002006.

Barton, H. (2000) *Sustainable communities [electronic resource] : the potential for eco-neighbourhoods*. London: Earthscan Publications.

Batty, M. (2008) 'Size, Scale, and Shape of Cities', *Science (American Association for the Advancement of Science)*, 319(5864), pp. 769–771. doi: 10.1126/science.1151419.

Baumgärtner, S. and Quaas, M. (2010) 'Sustainability economics — General versus specific, and conceptual versus practical', *Ecological economics*, 69(11), pp. 2056–2059. doi: 10.1016/j.ecolecon.2010.06.018.

Baxter, P. and Jack, S. (2008) 'Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers', *The Qualitative Report*, 13(4), pp. 544-556.

Becker, C. (2006) 'The human actor in ecological economics: Philosophical approach and research perspectives', *Ecological economics*, 60(1), pp. 17–23. doi: 10.1016/j.ecolecon.2005.12.016.

Beretti, A., Figuières, C. and Grolleau, G. (2013) 'Behavioral innovations: The missing capital in sustainable development?', *Ecological economics*, 89, pp. 187–195. doi: 10.1016/j.ecolecon.2013.03.004.

Berg, A. and Hukkinen, J. I. (2011) 'The paradox of growth critique: Narrative analysis of the Finnish sustainable consumption and production debate', *Ecological economics*, 72, pp. 151–160. doi: 10.1016/j.ecolecon.2011.09.024.

Berger, P. L. and Luckmann, T. (1990) *The social construction of reality [electronic resource] : a treatise in the sociology of knowledge*. New York: Anchor Books.

Bergh, J. C. J. M. van den (2009) 'The GDP paradox', *Journal of economic psychology*, 30(2), pp. 117–135. doi: 10.1016/j.joep.2008.12.001.

Berliner, D., Legrain, L. and van de Port, M. (2013) 'Bruno Latour and the anthropology of the moderns', *Social anthropology*, 21(4), pp. 435–447. doi: 10.1111/1469-8676.12051.

Bermejo, R. *et al*. (2010) *Menos es más: del desarrollo sostenible al decrecimiento sostenible*. Cuadernos de Trabajo de Hegoa, 52.

Bermejo, R. (2011) *Manual para una Economía Sostenible*. Catarata, Madrid.

Bilancini, E. and D'Alessandro, S. (2012) 'Long-run welfare under externalities in consumption, leisure, and production: A case for happy degrowth vs. unhappy growth', *Ecological economics*, 84, pp. 194–205. doi: 10.1016/j.ecolecon.2011.10.023.

Bina, O. and Vaz, S. G. (2011) 'Humans, environment and economies: From vicious relationships to virtuous responsibility', *Ecological economics*, 72, pp. 170–178. doi: 10.1016/j.ecolecon.2011.09.029.

Birkin, F. and Cam, O. (2016) *Accounting for sustainability: episteme change and ontological plurality.* Вестник Санкт-Петербургского университета. Серия 5. Экономика - Bulletin of St. Petersburg University - Economics, 2016 (4). pp. 104-123. ISSN 1026-356X

Birkin, F. and Polesie, T. (2012) *Intrinsic sustainable development : epistemes, science, business and sustainability*. Singapore ; Hackensack, NJ: World Scientific.

Birkin, F. and Polesie, T. (2013) 'The relevance of epistemic analysis to sustainability economics and the capability approach', *Ecological economics*, 89, pp. 144–152. doi: 10.1016/j.ecolecon.2013.02.005.

Birks, M., Chapman, Y. and Francis, K. (2008) 'Memoing in qualitative research', *Journal of research in nursing*, 13(1), pp. 68–75. doi: 10.1177/1744987107081254.

Blaikie, N. W. H. (2000) *Designing social research : the logic of anticipation*. Cambridge: Polity Press.

Brown, K. W., Ryan, R. M. and Creswell, J. D. (2007) 'Mindfulness: Theoretical Foundations and Evidence for its Salutary Effects', *Psychological inquiry*, 18(4), pp. 211–237. doi: 10.1080/10478400701598298.

Brown, K. W., and Cordon, S. (2009) 'Toward a phenomenology of mindfulness: Subjective experience and emotional correlates' In F. Didonna (Ed.), *Clinical handbook of mindfulness* (pp. 59–81). Springer Science + Business Media. https://doi.org/10.1007/978-0-387-09593-6_5

Bryant, A. (2017) *Grounded theory and grounded theorizing: Pragmatism in research practice*. Oxford University Press.

Borland, H. *et al.* (2016) 'Building Theory at the Intersection of Ecological Sustainability and Strategic Management', *Journal of business ethics*, 135(2), pp. 293–307. doi: 10.1007/s10551-014-2471-6.

Burgess, R. G. (1982) *Field research [electronic resource] : a sourcebook and field manual*. London ; Boston: G. Allen & Unwin.

Callon, M. (1986) 'Elements for a Sociology of Translation: The Domestication of Coquilles Saint-Jacques and the Fishermen of the Bay of Saint-Brieuc', *Année sociologique*, 36, pp. 169–208.

Callon M., Latour B. (1981) ‘Unscrewing the big leviathan: How actors macrostructure reality and how sociologists help them to do so?’, In Cetina K. K., Cicourel A. (Eds.), *Advances in social theory and methodology: Toward an integration of micro and macro-sociologies*. Routledge.

Campbell, T. (2012) *Beyond smart cities : how cities network, learn and innovate*. Abingdon, Oxon [England]: Earthscan.

Capellán-Pérez, I. *et al.* (2015) ‘More growth? An unfeasible option to overcome critical energy constraints and climate change’, *Sustainability science,* 10(3), pp. 397–411. doi: 10.1007/s11625-015-0299-3.

Caprotti, F. (2014) ‘Eco‐urbanism and the Eco‐city, or, Denying the Right to the City?’, *Antipode*, 46(5), pp. 1285–1303. doi: 10.1111/anti.12087.

Caprotti, F. (2015) *Eco-cities and the transition to low carbon economies*. Basingstoke: Palgrave Macmillan.

Caprotti, F. and Romanowicz, J. (2013) ‘Thermal Eco-cities: Green Building and Urban Thermal Metabolism’, *International journal of urban and regional research*, 37(6), pp. 1949–1967. doi: 10.1111/1468-2427.12049.

Caragliu, A., Del Bo, C. and Nijkamp, P. (2011) ‘Smart Cities in Europe’, *The Journal of urban technology*, 18(2), pp. 65–82. doi: 10.1080/10630732.2011.601117.

Chang, I.-C. C. and Sheppard, E. (2013) ‘China's Eco-Cities as Variegated Urban Sustainability: Dongtan Eco-City and Chongming Eco-Island’, *The Journal of urban technology*, 20(1), pp. 57–75. doi: 10.1080/10630732.2012.735104.

Chapin, F. S. *et al.* (2010) ‘Ecosystem stewardship: sustainability strategies for a rapidly changing planet’, *Trends in ecology & evolution (Amsterdam)*, 25(4), pp. 241–249. doi: 10.1016/j.tree.2009.10.008.

Charmaz, K. (2006) *Constructing grounded theory : a practical guide through qualitative analysis*. London: SAGE.

Charmaz, K. and Belgrave, L. L. (2019) ‘Thinking About Data With Grounded Theory’, *Qualitative inquiry*, 25(8), pp. 743–753. doi: 10.1177/1077800418809455.

China Development Bank Capital (2015) *Hammarby Sjöstad, An Urban Development Case Study of Hammarby Sjöstad in Sweden, Stockholm*. China Development Bank Capital’s Green and Smart Urban Development Guidelines. https://energyinnovation.org/wp-content/uploads/2015/12/Hammarby-Sjöstad.pdf

City of Stockholm (2022) *City of Stockholm Environmental Programme (2020-2023)* https://international.stockholm.se/city-development/the-eco-smart-city/, https://international.stockholm.se/globalassets/rapporter/environment-programme-2020-2023_ta.pdf

Colding, J. and Barthel, S. (2017) ‘An urban ecology critique on the “Smart City” model’, *Journal of cleaner production*, 164, pp. 95–101. doi: 10.1016/j.jclepro.2017.06.191.

Cole, R. J. (2012) ‘Regenerative design and development: current theory and practice’, *Building research and information : the international journal of research, development and demonstration*, 40(1), pp. 1–6. doi: 10.1080/09613218.2012.617516.

Cole, R. J. *et al.* (2012) ‘A regenerative design framework: setting new aspirations and initiating new discussions’, *Building research and information : the international journal of research, development and demonstration*, 40(1), pp. 95–111. doi: 10.1080/09613218.2011.616098.

Conway, P. (2016) ‘Back down to Earth: reassembling Latour's Anthropocenic geopolitics’, *Global discourse*, 6(1-2), pp. 43–71. doi: 10.1080/23269995.2015.1004247.

Cooren, F. (2010) *Action and agency in dialogue [electronic resource] : passion, incarnation and ventriloquism*. Amsterdam ; Philadelphia, Pa.: John Benjamins.

Cousin, G. (2005) ‘Case Study Research’, *Journal of geography in higher education*, 29(3), pp. 421–427. doi: 10.1080/03098260500290967.

Corbin, J. M. and Strauss, A. (1990) ‘Grounded theory research: Procedures, canons, and evaluative criteria’, *Qualitative sociology*, 13(1), pp. 3–21. doi: 10.1007/BF00988593.

Corvalán, C. *et al.* (2005) *Ecosystems and human well-being [electronic resource] : a report of the millennium ecosystem assessment*. Geneva: World Health Organization.

Creswell, J. W. (2012) ‘Grounded theory designs’. In J. W. Creswell (Ed.) *Planning, conducting and evaluating quantitative and qualitative research*, pp. 422–500. Addison Wesley

Creswell, J. W. (2013) *Qualitative inquiry and research design : choosing among five approaches*. 3rd ed. Los Angeles: SAGE Publications.

Cugurullo, F. (2013) ‘How to Build a Sandcastle: An Analysis of the Genesis and Development of Masdar City’, *The Journal of urban technology*, 20(1), pp. 23–37. doi: 10.1080/10630732.2012.735105.

Czarniawska. B (2002a). *A tale of three cities, or the glocalization of city management*. Oxford, UK: Oxford University Press

Czarniawska, B. (2002b). Remembering while forgetting: The role of automorphism in city management in Warsaw. *Public Administration Review,* 62(2), 163–173.

Czarniawska, B. (2004) ‘Gabriel Tarde and Big City Management’. *Distinktion: Scandinavian Journal of Social Theory*. Vol. 5 (2) pp. 119-133.

Czarniawska. B (2009) Translation Impossible? Accounting for a city project. *Accounting, Auditing and Accountability Journal*. Vol. 23. No. 3, pp. 420-437.

Czarniawska, B. (2019) ‘From Sustainability to Resilience: A Change of Wording or a Change in Thinking?’, *Nauki o Wychowaniu. Studia Interdyscyplinarne*, 9, pp. 212-215. 10.18778/2450-4491.09.14.

Czarniawska, B. (2022) ‘Bruno Latour (1947-2022) Obituary’, *Organization studies*, 43(12), pp. 2027–2029. doi: 10.1177/01708406221135856

Czarniawska-Joerges, B. (2014) *Social science research : from field to desk*. First edition. London: SAGE Publications Ltd.

Czarniawska, B. and Joerges, B. (1996) 'Travels of Ideas', In: Czarniawska, B. and Sevón, G. ed. *Translating Organizational Change*. Berlin, New York: De Gruyter, pp. 13-48. https://doi.org/10.1515/9783110879735.13

Czarniawska, B. and Sevon, G. (2005) *Global Ideas: How Ideas, Objects and Practices Travel in a Global Economy*, Liber & Copenhagen Business School Press.

Daly, H. E. (1974) 'Steady-State Economics versus Growthmania: A Critique of the Orthodox Conceptions of Growth, Wants, Scarcity, and Efficiency', *Policy sciences*, 5(2), pp. 149–167. doi: 10.1007/BF00148038.

Daly, H.E. (1980) *Economics, Ecology, Ethics: Essays toward a Steady-state Economy*, W. H. Freeman and Company, San Francisco.

Dasgupta, S. *et al.* (2006) 'Environment During growth: Accounting for governance and vulnerability', *World development*, 34(9), pp. 1597–1611. doi: 10.1016/j.worlddev.2005.12.008.

Datta, A. (2012) 'India's Ecocity? Environment, Urbanisation, and Mobility in the Making of Lavasa', *Environment and planning*. C, Government & policy, 30(6), pp. 982–996. doi: 10.1068/c1205j.

Datta, A. (2015) 'New urban utopias of postcolonial India', *Dialogues in human geography*, 5(1), pp. 3–22. doi: 10.1177/2043820614565748.

De Jong, M. *et al.* (2015) 'Sustainable–smart–resilient–low carbon–eco–knowledge cities; making sense of a multitude of concepts promoting sustainable urbanization', *Journal of cleaner production*, 109, pp. 25–38. doi: 10.1016/j.jclepro.2015.02.004.

Deal, B. and Pallathucheril, V. (2009) 'Sustainability and urban dynamics: Assessing future impacts on ecosystem services', *Sustainability*, 1(3), pp. 346–362. doi: 10.3390/su1030346.

Delchambre, J.-P. and Marquis, N. (2013) 'Modes of existence explained to the moderns, or Bruno Latour's plural world', *Social anthropology*, 21(4), pp. 564–575. doi: 10.1111/1469-8676.12048.

Du Plessis, C. (2012) 'Towards a regenerative paradigm for the built environment', *Building research and information : the international journal of research, development and demonstration*, 40(1), pp. 7–22. doi: 10.1080/09613218.2012.628548.

Dyer, W. G. and Wilkins, A. L. (1991) 'Better Stories, Not Better Constructs, to Generate Better Theory: A Rejoinder to Eisenhardt', *The Academy of Management review*, 16(3), pp. 613–619. doi: 10.2307/258920.

Easterby-Smith, M., Thorpe, R. and Lowe, A. (1991) *Management research : an introduction*. London: Sage Publications.

Edmondson, A. C. and McManus, S. E. (2007) 'Methodological Fit in Management Field Research', *The Academy of Management review*, 32(4), pp. 1155–1179. doi: 10.5465/AMR.2007.26586086.

Edward, M. (2016) 'From actor network theory to modes of existence: Latour's ontologies', *Global discourse*, 6(1-2), pp. 1–7. doi: 10.1080/23269995.2015.1112103.

Eisenhardt, K. M. (1989) 'Building Theories from Case Study Research', *The Academy of Management review*, 14(4), pp. 532–550. doi: 10.2307/258557.

ElectriCity Stockholm (2019) *Welcome to Hammarby Sjöstad 2.0!*. Presentation. www.electricitystockholm.se.

Envac Group (2019) *Envac's Guide to Hammarby Sjöstad. Waste Solutions in a sustainable urban development*. http://www.solaripedia.com/files/719.pdf

Envac Group. (2022) *Hammarby Sjöstad Project.* https://www.envacgroup.com/project/hammarby-Sjöstad/

Ericson, T., Kjønstad, B. G. and Barstad, A. (2014) 'Mindfulness and sustainability', *Ecological economics*, 104, pp. 73–79. doi: 10.1016/j.ecolecon.2014.04.007.

Freudenthal, E. (2019) *Hammarby Sjöstad- unique environmental project in Stockholm*. GlashusEtt Environmental Information Centre.

Folleta, N. (2011) *Hammarby Sjöstad Case Study. Europe's Vibrant New Low Carbon Communities*. Institute for Transportation and Development Policy. https://www.itdp.org/2011/09/22/europes-vibrant-new-low-carbon-communities-2/

Folke, C. *et al.* (2010) 'Resilience Thinking: Integrating Resilience, Adaptability and Transformability', *Ecology and society*, 15(4), p. Art. 20. doi: 10.5751/ES-03610-150420.

Folke, C. and Gunderson, L. (2012) 'Reconnecting to the Biosphere', *Ecology and society*, 17(4), p. 55. doi: 10.5751/ES-05517-170455.

Foucault, M. (1971) *The order of things : an archaeology of the human sciences*. First American edition. New York: Pantheon Books.

Fournier, V. (2008) 'Escaping from the economy: the politics of degrowth', *International journal of sociology and social policy*, 28(11/12), pp. 528–545. doi: 10.1108/01443330810915233.

Gaffney, A. *et al.* (2007) *Hammarby Sjöstad- Stockholm, Sweden: A case Study*. CP249 Urban Design in Planning, https://www.solaripedia.com/files/718.pdf

Gallopin, G.C (2002) 'Planning for Resilience: Scenarios, surprises and branch points', Gunderson, L. H., and Holling, C. S. *Panarchy: Understanding transformations in human and natural systems*. Island Press: Washington, D.C.

Georgescu-Roegen, N. (1979) 'Energy Analysis and Economic Valuation', *Southern Economic Journal*, 45(4), pp. 1023–1058. https://doi.org/10.2307/1056953

Girardet, H. (2013) *Sustainability Is Unhelpful: We Need to Think about Regeneration*. The Guardian. http://www.theguardian.com/sustainable-business/blog/sustainabilityunhelpful-think-regeneration.

Glaser, B. G. (1998) *Doing grounded theory : issues and discussions*. Mill Valley, Calif.: Sociology Press.

Glaser, B. G. (2003) *The grounded theory perspective*. Mill Valley, CA: Sociology Press.

Glasser, B. G. and Holton, J. (2004) ‘Remodeling grounded theory’, *Forum, qualitative social research*, 5(2).

Glaser, B. G. and Strauss, A. L. (1966) *Awareness of dying*. London: Weidenfeld and Nicolson.

Glaser, B. G. and Strauss, A. L. (1967) *The discovery of grounded theory : strategies for qualitative research*. New York: Aldine de Gruyter.

Glaser, B. G. and Strauss, A. L. (2017) *The discovery of grounded theory : strategies for qualitative research. London*, [England] ; New York, [New York]: Routledge.

Golafshani, N. (2003) ‘Understanding reliability and validity in qualitative research’, *Qualitative report*, 8(4), p. 597.

Gray, E. A. (2020) *Protecting oneself from emotional discomfort or harm: a Classic Grounded Theory study of how anxious pupils cope in mainstream education*.

Grimm, N. B. *et al.* (2008) ‘Global Change and the Ecology of Cities’, *Science (American Association for the Advancement of Science)*, 319(5864), pp. 756–760. doi: 10.1126/science.1150195.

Grin, J., Rotmans, J. and Schot, J. W. (2010) *Transitions to sustainable development : new directions in the study of long term transformative change*. New York: Routledge.

Guba, E., and Lincoln, Y. (1994) ‘Competing paradigms in qualitative research’, In N. K. Denzin and Y. S. Lincoln (Eds.), *Handbook of qualitative research* (1st ed., pp. 105–117). Sage Publications.

Gunderson, L.H., and Holling, C. S. (2002) *Panarchy: Understanding Transformations in Human and Natural Systems, Island press*, Washington DC

Gunderson, L. H., Allen, C. R. and Holling, C. S. (2010) *Foundations of ecological resilience [electronic resource]*. Washington: Island Press.

Gustafsson, J. (2017) ‘Single case studies vs. multiple case studies: A comparative study’, *Academy of Business, Engineering and Science Halmstad University*, (pp. 1–15). http://www.diva-portal.org/smash/record.jsf?pid¼diva2:1064378%0Ahttp://www.diva-portal.org/smash/get/diva2:1064378/FULLTEXT01.pdf

Haberl, H. *et al.* (2011) ‘A socio-metabolic transition towards sustainability? Challenges for another Great Transformation’, *Sustainable development (Bradford, West Yorkshire, England)*, 19(1), pp. 1–14. doi: 10.1002/sd.410.

Hache, E. and Latour, B. (2010) ‘Morality or Moralism?’, *Common knowledge (New York, N.Y.)*, 16(2), pp. 311–330. doi: 10.1215/0961754X-2009-109.

Halbe, J. *et al.* (2015) ‘Lessons for model use in transition research: A survey and comparison with other research areas’, *Environmental innovation and societal transitions*, 15, pp. 194–210. doi: 10.1016/j.eist.2014.10.001.

Hallberg, L. R.-M. (2006) ‘The "core category" of grounded theory: Making constant comparisons’, *International journal of qualitative studies on health and well-being*, 1(3), pp. 141–148. doi: 10.1080/17482620600858399.

Hämäläinen, N. and Lehtonen, T.-K. (2016) ‘Latour's empirical metaphysics’, *Distinktion (Aarhus)*, 17(1), pp. 20–37. doi: 10.1080/1600910X.2016.1154883.

Hammarby Sjöstad 2.0 (2022) *Hammarby Sjöstad 2.0 Initiative.* http://hammarbySjöstad20.se/

Hamilton, C. and Bond, S. (2003) ‘Growth fetish’, *Journal of Australian studies*, pp. 194–195.

Hansen, J. *et al.* (2008) ‘Target atmospheric CO2: Where should humanity aim?’, *Open Atmospheric Science Journal*, 2 (2). pp. 217-231. ISSN 1874-2823

Harvey, D. and Marx, K. (2010) *A companion to Marx's Capital*. London ; New York: Verso.

Harvey, D. (2010) *The enigma of capital : and the crises of capitalism*. Oxford ; New York: Oxford University Press.

Heie, P. (2022) *We Own our Vision of the Future, Jan Martinsson Interview*, Tidningen Hammarby Sjöstad Newspaper, http://tidningenhammarbySjöstad.se/stadsfreningen

Heinberg, R. (2011) *The end of growth : adapting to our new economic reality*. Gabriola, B.C.: New Society Publishers.

Hennink, M. M., Hutter, I. and Bailey, A. (2011) *Qualitative research methods. London* ; Thousand Oaks, Calif.: SAGE.

Holling, C. S. (1986) ‘The resilience of terrestrial ecosystems: local surprise and global change’, pp. 292-317 in (W. C. Clark and R. E. Munn, editors.) *Sustainable development of the biosphere.* Cambridge University Press, Cambridge, UK.

Holling, C. S. (2001) ‘Understanding the Complexity of Economic, Ecological, and Social Systems’, *Ecosystems (New York)*, 4(5), pp. 390–405. doi: 10.1007/s10021-001-0101-5.

Holton, J. A. and Walsh, I. (2017) *Classic grounded theory : applications with qualitative and quantitative data*. Los Angeles, CA: SAGE Publications, Inc.

Hueting, R. (1996) ‘Three persistent myths in the environmental debate’, *Ecological economics*, 18(2), pp. 81–88. doi: 10.1016/0921-8009(96)00031-6.

Intergovernmental Panel on Climate Change (2007) *Summary for Policymakers. The Physical Science Basis. Working Group 1 Contribution to the Fourth Assessment Report of the IPCC*, Cambridge University Press, Cambridge.

International Energy Agency (2008) *World Energy Outlook 2008: Technical Report*, International Energy Agency/OECD, pp 578

Jackson, T. (2009) *Prosperity without growth : economics for a finite planet*. London: Earthscan

Jamshed, S. (2014) ‘Qualitative research method-interviewing and observation’, *Journal of basic and clinical pharmacy*, 5(4), pp. 87–88. doi: 10.4103/0976-0105.141942.

John, W. S. and Johnson, P. (2000) ‘The Pros and Cons of Data Analysis Software for Qualitative Research’, *Journal of nursing scholarship*. Accepted for publication: January 14, 2000., 32(4), pp. 393–397. doi: 10.1111/j.1547-5069.2000.00393.x.

Joss, S. (2011) ‘Eco-City Governance: A Case Study of Treasure Island and Sonoma Mountain Village’, *Journal of environmental policy & planning*, 13(4), pp. 331–348. doi: 10.1080/1523908X.2011.611288.

Joss, S., Cowley, R. and Tomozeiu, D. (2013) ‘Towards the 'ubiquitous eco-city': An analysis of the internationalisation of eco-city policy and practice’, *Urban research & practice*, 6(1), pp. 54–74. doi: 10.1080/17535069.2012.762216.

Joss, S., Tomozeiu, D. and Cowley, R. (2011) *Eco-Cities - A Global Survey 2011*. London: University of Westminster International Eco-Cities Initiative.

Kallis, G., Martinez-Alier, J. and Norgaard, R. B. (2009) ‘Paper assets, real debts: An ecological-economic exploration of the global economic crisis’, *Critical perspectives on international business*, 5(1-2), pp. 14–25. doi: 10.1108/17422040910938659.

Kallis, G., Kerschner, C. and Martinez-Alier, J. (2012) ‘The economics of degrowth’, *Ecological economics*, 84, pp. 172–180. doi: 10.1016/j.ecolecon.2012.08.017.

Keirstead, J. and Schulz, N. B. (2010) ‘London and beyond: Taking a closer look at urban energy policy’, *Energy policy*, 38(9), pp. 4870–4879. doi: 10.1016/j.enpol.2009.07.025.

Kim, C. (2010) ‘Place promotion and symbolic characterization of New Songdo City, South Korea’, *Cities*, 27(1), pp. 13–19. doi: 10.1016/j.cities.2009.11.013.

Kirilyuk, A. P. (2005) ‘Towards Sustainable Future by Transition to the Next Level Civilisation’. doi: 10.48550/arxiv.physics/0509234.

KTH (2008) *KTH Professor involved in development of eco-city in China.* https://www.kth.se/en/om/nyheter/centrala-nyheter/kth-professor-med-och-utvecklar-ekostad-i-kina-1.19944

KTH (2011) *Hammarby Sjöstad – evaluation of the environmental profile of an new urban district in Stockholm.* https://www.kth.se/en/seed/tidigare-avdelningar/industriell-ekologi/forskning/finalized/hammarby-Sjöstad-evaluation-of-the-environmental-profile-of-an-new-urban-district-in-stockholm-1.77604

KTH (2014a) *Grasping the environmental complexity of city districts.* Grasping the environmental complexity of city districts | KTH

KTH (2014b) *That's how good Hammarby Sjöstad was from an environmental point of view.* https://www.kth.se/om/nyheter/centrala-nyheter/sa-bra-blev-hammarby-Sjöstad-ur-miljosynpunkt-1.494764

KTH (2016) *KTH becomes a partner in a big EU-project within ERA-NET Smart Cities and Communities programme.* https://www.kth.se/en/forskning/forskningsplattformar/energi/nyheter/kth-becomes-a-partner-in-a-big-eu-project-within-era-net-smart-cities-and-communities-programme-1.636884

KTH (2022) *Facts about KTH.* https://www.kth.se/en/om/fakta

Larsson, L. (2002) *CV*. http://allanlarsson.se/cv/

Larsson, A. (2019) *Welcome to Hammarby Sjöstad 2.0!*. ElectriCITY Stockholm Presentation.

Latouche, S. (2010) 'Degrowth', *Journal of cleaner production*, 18(6), pp. 519–522. doi: 10.1016/j.jclepro.2010.02.003.

Latour, B. (1986). The powers of association. In J. Law (Ed.), *Power, action and belief: A new sociology of knowledge?* (pp. 264–280). Routledge and Kegan Paul.

Latour, B. (1996) 'On actor-network theory: A few clarifications', *Soziale Welt*, 47(4), pp. 369–381.

Latour, B. (1998) 'To Modernise or to Ecologize, that is the Question'. Braun, B. and Castree, N. Ed. *Remaking reality : nature at the millenium*. London ; New York: Routledge.

Latour, B. (1999) *Pandora's hope : an essay on the reality of science studies*. Cambridge, Mass. ; London: Harvard University Press.

Latour, B. (2001) '"Thou Shalt Not Take the Lord's Name in Vain": Being a Sort of Sermon on the Hesitations of Religious Speech', *Res (Cambridge, Mass.)*, 39(39), pp. 215–234. doi: 10.1086/RESv39n1ms20167530.

Latour, B. and American Council of Learned Societies (2005) *Reassembling the social : an introduction to actor-network-theory*. Oxford: Oxford University Press.

Latour, B. (2009) 'Will non-humans be saved? An argument in ecotheology', *The Journal of the Royal Anthropological Institute*, 15(3), pp. 459–475. doi: 10.1111/j.1467-9655.2009.01568.x.

Latour, B. (2011) 'Reflections on Etienne Souriau's Les Differents Modes D'existence'. In (edited by Graham Harman, Levi Bryant and Nick Srnicek, *The Speculative Turn Continental Materialism and Realism*, re.press Australi, pp. 304-333, Melbourne, Australie] http://www.re-press.org/bookfiles/OA_Version_Speculative_Turn_9780980668346.pdf

Latour, B. (2013a) *An Inquiry into Modes of Existence: An Anthropology of the Moderns*. Harvard University Press, Cambridge, Massachusetts, London, England.

Latour, B. (2013b) *Biography of an inquiry: On a book about modes of existence*. Social Studies of Science. Vol 43 (2), pp. 287-301.

Latour B. (2013c). What's the story? Organizing as a mode of existence. In Robichaud Daniel, Cooren François (Eds.), *Organization and organizing: Materiality, agency and discourse* (pp. 37–51). London: Routledge.

Latour, B. (2017). *Facing Gaia, Eight Lectures on the New Climatic Regime*. Polity Press.

Latour, B. (2021). *After Lockdown. A Metamorphosis*. Polity Press.

Latour, B. and Lépinay, V. A. (2009) *The science of passionate interests : an introduction to Gabriel Tarde's economic anthropology*. Chicago: Prickly Paradigm Press.

Latour, B. and Strum, S. C. (1986) 'Human social origins: Oh please, tell us another story', *Journal of social and biological structures*, 9(2), pp. 169–187. doi: 10.1016/0140-1750(86)90027-8.

Latour, B. and Porter, C. (1993) *We have never been modern*. Cambridge, Massachusetts: Harvard University Press.

Law, J. (1994) *Organizing Modernity*. Oxford: Blackwell.

Law, J. (2004) *After method : mess in social science research*. London: Routledge.

Leavy, P. (2014) *The Oxford handbook of qualitative research / [electronic resource]*. New York: Oxford University Press.

Liu, L. (2012) 'Environmental poverty, a decomposed environmental Kuznets curve, and alternatives: Sustainability lessons from China', *Ecological economics*, 73, pp. 86–92. doi: 10.1016/j.ecolecon.2011.10.025.

Mabsout, R. (2015) 'Mindful capability', *Ecological economics*, 112, pp. 86–97. doi: 10.1016/j.ecolecon.2015.01.008.

Makri, C. and Neely, A. (2021) 'Grounded Theory: A Guide for Exploratory Studies in Management Research', *International journal of qualitative methods*, 20, p. 160940692110136. doi: 10.1177/16094069211013654.

Mang, P. and Reed, B. (2012) 'Designing from place: a regenerative framework and methodology', *Building research and information : the international journal of research, development and demonstration*, 40(1), pp. 23–38. doi: 10.1080/09613218.2012.621341.

March, H. and Ribera-Fumaz, R. (2016) 'Smart contradictions: The politics of making Barcelona a Self-sufficient city', *European urban and regional studies*, 23(4), pp. 816–830. doi: 10.1177/0969776414554488.

Martinez-Alier, J. (1990) *Ecological Economics: Energy, Environment and Society*, Basil Blackwell, Oxford.

Mason, J. (2002) *Qualitative researching*. 2nd ed. London ; Thousand Oaks, Calif.: Sage Publications.

Maturana, H., Varela, F. J. and Beer, S. (1980) *Autopoiesis and cognition : the realization of the living*. Dordrecht, Holland ; Boston, Massachusetts ; London, England: D. Reidel Publishing Company.

Matutinovic, I. (2001) 'The aspects and the role of diversity in socioeconomic systems: an evolutionary perspective', *Ecological economics*, 39(2), pp. 239–256. doi: 10.1016/S0921-8009(01)00205-1.

Matutinovic, I. (2002) 'Organizational patterns of economies: an ecological perspective', *Ecological economics*, 40(3), pp. 421–440. doi: 10.1016/S0921-8009(02)00007-1.

McCutcheon, D. M. and Meredith, J. R. (1993) 'Conducting case study research in operations management', *Journal of operations management*, 11(3), pp. 239–256. doi: 10.1016/0272-6963(93)90002-7.

Meadows, D. H. and Club of Rome (1972) *The limits to growth*. London: Earth Island Ltd.

Mfinanga, F. A., Mrosso, R. M. and Bishibura, S. (2019) 'Comparing case study and grounded theory as qualitative research approaches', *International Journal of Latest Research in Humanities and Social Science*, 02(05), pp. 51–56.

Mickwitz, P. *et al.* (2011) 'Sustainability through system transformation: lessons from Finnish efforts', *Journal of cleaner production*, 19(16), pp. 1779–1787. doi: 10.1016/j.jclepro.2011.07.011.

Moore, G. *et al.* (2008) 'The photo-survey research method: capturing life in the city', *Visual studies (Abingdon, England)*, 23(1), pp. 50–62. doi: 10.1080/14725860801908536.

Morse, J. M. *et al.* (2002) 'Verification Strategies for Establishing Reliability and Validity in Qualitative Research', *International journal of qualitative methods*, 1(2), pp. 13–22. doi: 10.1177/160940690200100202.

Mörtberg, U. *et al.* (2013) 'Urban ecosystems and sustainable urban development—analysing and assessing interacting systems in the Stockholm region', *Urban ecosystems*, 16(4), pp. 763–782. doi: 10.1007/s11252-012-0270-3.

Neal, D. T., Wood, W. and Quinn, J. M. (2006) 'Habits: A Repeat Performance', *Current directions in psychological science : a journal of the American Psychological Society*, 15(4), pp. 198–202. doi: 10.1111/j.1467-8721.2006.00435.x.

Newton, P. and Newman, P. (2013) *Low Carbon Green Growth: Tracking Progress in Australia's Built Environment Industry towards a Green Economy*. Swinburne Research Bank, Canberra.

Norgaard, R. B. (1994) *Development betrayed : the end of progress and a coevolutionary revisioning of the future*. London ; New York: Routledge.

Olsson, P., Folke, C. and Hahn, T. (2004) 'Social-Ecological Transformation for Ecosystem Management', *Ecology and society*, 9(4), pp. 2–2. doi: 10.5751/ES-00683-090402.

Oswald J. P.F. (2014) *What Does Eco-civilisation Mean? China Story Yearbook 2014.* Shared Destiny, http://www.thechinastory.org/2014/09/what-does-eco-civilisation-mean/

Packard, J. (2008) ''I'm gonna show you what it's really like out here': the power and limitation of participatory visual methods', *Visual studies (Abingdon, England)*, 23(1), pp. 63–77. doi: 10.1080/14725860801908544.

Patton, M. Q. (1990) *Qualitative evaluation and research methods*. 2nd ed. Newbury Park, Calif. ; London: Sage.

Phillippi, J. and Lauderdale, J. (2018) 'A Guide to Field Notes for Qualitative Research: Context and Conversation', *Qualitative health research*, 28(3), pp. 381–388. doi: 10.1177/1049732317697102.

Polkinghorne, D. E. (2006) 'An agenda for the second generation of qualitative studies', *International journal of qualitative studies on health and well-being*, 1(2), pp. 68–77. doi: 10.1080/17482620500539248.

Porritt, J. (2007) *Capitalism as if the world matters*. Revised paperback edition, Fully updated, revised edition. London ; Sterling, VA: Earthscan.

Ranhagen, U. and Frostell, B. (2014) *Eco-cycle model 2.0. for Stockholm Royal Seaport City district" Feasibility study – final report.* City of Stockholm and KTH School of Architecture and the Built Environment, FULLTEXT01.pdf (diva-portal.org)

Rapoport, E. and Hult, A. (2017) 'The travelling business of sustainable urbanism: International consultants as norm-setters', *Environment and planning*. A, 49(8), pp. 1779–1796. doi: 10.1177/0308518X16686069.

Ricci, D. *et al.* (2015) 'Clues. Anomalies. Understanding. Detecting underlying assumptions and expected practices in the Digital Humanities through the AIME project', *Visible language*, 49(3), p. 35.

Robinson, J. and Cole, R. J. (2015) 'Theoretical underpinnings of regenerative sustainability', *Building research and information : the international journal of research, development and demonstration*, 43(2), pp. 133–143. doi: 10.1080/09613218.2014.979082.

Rockström, J. *et al.* (2009) 'A safe operating space for humanity', *Nature (London)*, 461(7263), pp. 472–475. doi: 10.1038/461472a.

Rosenberg, E. L. (2004) 'Mindfulness and consumerism', In: Kasser, T., Kanner, A.D. (Eds.), *Psychology and Consumer Culture: The Struggle for a Good life in a Materialistic world, American Psychological Association*, Washington, D.C., pp. 107–125.

Rosol, M., Béal, V. and Mössner, S. (2017) 'Greenest cities? The (post-)politics of new urban environmental regimes', *Environment and planning*. A, 49(8), pp. 1710–1718. doi: 10.1177/0308518X17714843.

Rouchier, J. *et al.* (2008) 'Progress in model-to-model analysis', *Journal of artificial societies and social simulation*, 11(2).

Rydin, Y. (2010) *Governing for sustainable urban development*. First edition. London ; Washington, D.C.: Earthscan.

Ryle, G. (1949) *The concept of mind*. London: Hutchinson.

Saunders, M., Lewis, P. and Thornhill, A. (2009) *Research methods for business students [electronic resource]*. 5th ed. Harlow: Financial Times Prentice Hall.

Schlüter, M. *et al.* (2012) 'NEW HORIZONS FOR MANAGING THE ENVIRONMENT: A REVIEW OF COUPLED SOCIAL-ECOLOGICAL SYSTEMS MODELING', *Natural resource modeling*. Accepted by the editors 5 September 2011., 25(1), pp. 219–272. doi: 10.1111/j.1939-7445.2011.00108.x.

Schneider, F., Kallis, G. and Martinez-Alier, J. (2010) 'Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. Introduction to this special issue', *Journal of cleaner production*, 18(6), pp. 511–518. doi: 10.1016/j.jclepro.2010.01.014.

Shipp, S. S. (2014) 'Urban Competitiveness and Innovation edited by Pengfei Ni and Zheng Qiongjie', *Science & public policy*. Cheltenham, UK: Edward Elgar, pp. 698–699. doi: 10.1093/scipol/scu051.

Shwayri, S. T. (2013) 'A Model Korean Ubiquitous Eco-City? The Politics of Making Songdo', *The Journal of urban technology*, 20(1), pp. 39–55. doi: 10.1080/10630732.2012.735409.

Silverman, D. (2010) *Doing qualitative research : a practical handbook*. 3rd ed. London: SAGE.

Simondon, G. (2018) 'El modo de existencia de los objetos técnicos: introducción', *Laboreal (Porto)*, 14(1). doi: 10.4000/laboreal.548.

Sjölander Lindqvist, A. and Adolfsson, P. (2015) 'In the Eye of the Beholder: On Using Photography in Research on Sustainability', *The international journal of social sustainability in economic, social and cultural context (Print)*, 11(4), pp. 19–31. doi: 10.18848/2325-1115/CGP/v11i04/55168.

Sjöstadforeningen (2022a) *Sjöstadforeningen Hammarby Sjöstad Association*. https://Sjöstadsforeningen.se/om-Sjöstadsforeningen

Sjöstadforeningen (2022b) *Sjöstadforeningen Hammarby Sjöstad Association Members.* https://Sjöstadsforeningen.se/samarbetspartners.

Sjöstadforeningen (2018) *Sjöstadforeningen Hammarby Sjöstad Report*. https://Sjöstadsforeningen.se/

Speth, J. G. (2012) 'American passage: Towards a new economy and a new politics', *Ecological economics*, 84, pp. 181–186. doi: 10.1016/j.ecolecon.2011.01.018.

Stake, R. E. (1995) *The art of case study research*. Thousand Oaks, CA: Sage.

Starks, H. and Brown Trinidad, S. (2007) 'Choose Your Method: A Comparison of Phenomenology, Discourse Analysis, and Grounded Theory', *Qualitative health research*, 17(10), pp. 1372–1380. doi: 10.1177/1049732307307031.

Stockholm Stad (2024) *Urban development area Hammarby Sjöstad.* Stadsutvecklingsområde Hammarby Sjöstad - Stockholms stad (vaxer.stockholm)

Suddaby, R. (2006) 'From the editors: What grounded theory is not', *Academy of Management journal*, 49(4), pp. 633–642. doi: 10.5465/AMJ.2006.22083020.

Suen, C.K. (2017) Are residents living in eco-districts environmentally conscious? A case study of environmental attitudes of residents living in the European Green Capital of Stockholm, Sweden, Master thesis in Sustainable Development at Uppsala University, No. 2017/39, 71 pp, 30 ECTS/hp

Sweco Group (2012) *Hammarby Sjöstad, Stockholm. Sweco Sustainable Engineering and Design*. www.swecogroup.com

Taylor Buck, N. and White, A. (2015) 'Competitive urbanism and the limits to smart city innovation: the UK Future Cities initiative', *Urban Studies*, 54(2): pp. 501–519.

Tengbom (2019) *Hammarby Sjöstad- an eco friendly urban project in Stockholm, Focus on Sustainability.* Tengbom Presentation.

Tengbom (2022a) *Hammarby Sjöstad/ Sustainable City, Sustainable district Creates Inspiration Worldwide.* Hammarby Sjöstad/Sustainable City - Tengbom

Tengbom (2022b) *Tengbom Architectural Practice Mission and Vision*. https://en.tengbom.se/

Tengbom (2022c) *Sustainability in Tengbom*. https://en.tengbom.se/about-us/sustainability/

Tummons, J. (2019) 'Ethnographies of higher education and modes of existence: Using Latour's philosophical anthropology to construct faithful accounts of higher education practice'(pp. 207–223), In J. Huisman and M. Tight (Eds.), *Theory and method in higher education research*. Vol. 5. Bingley, England: Emerald Publishing.

Tummons, J. (2020) ‘Education as a mode of existence: A Latourian inquiry into assessment validity in higher education’, *Educational philosophy and theory*, 52(1), pp. 45–54. doi: 10.1080/00131857.2019.1586530.

Tummons, J. (2021) ‘Higher education, theory, and modes of existence: thinking about universities with Latour’, *Higher education research and development*, 40(6), pp. 1313–1325. doi: 10.1080/07294360.2020.1804337.

UNDP (2007) *Summary version The United Nations Development Programme*. United Nations.. http://hdr.undp.org/en/reports/global/hdr2007-2008/. (accessed: 14/9/08).

UN (2011) *Shanghai Manual e a Guide for Sustainable Urban Development in the 21st Century*. United Nations. http://sustainabledevelopment.un.org/content/ documents/shanghaimanual.pdf.

UN (2022) *Sustainable Development Goals. Sustainable Cities and Communities*. United Nations. https://www.un.org/sustainabledevelopment/cities/. Accessed (20/09/2022).

Van Griethuysen, P. (2010) ‘Why are we growth-addicted? The hard way towards degrowth in the involutionary western development path’, *Journal of cleaner production*, 18(6), pp. 590–595. doi: 10.1016/j.jclepro.2009.07.006.

Van den Bergh, J. C. J. M. and Kallis, G. (2012) ‘Growth, A-Growth or Degrowth to Stay within Planetary Boundaries?’, *Journal of economic issues*, 46(4), pp. 909–920. doi: 10.2753/JEI0021-3624460404.

Victor, P. A., (2008) *Managing Without Growth: Slower By Design, Not Disaster*. Edward Elgar, Cheltenham, UK; Northampton,MA.

Viitanen, J. and Kingston, R. (2014) ‘Smart Cities and Green Growth: Outsourcing Democratic and Environmental Resilience to the Global Technology Sector’, *Environment and planning*. A, 46(4), pp. 803–819. doi: 10.1068/a46242.

Wackernagel, M. *et al.* (2002) ‘Tracking the Ecological Overshoot of the Human Economy’, *Proceedings of the National Academy of Sciences - PNAS*, 99(14), pp. 9266–9271. doi: 10.1073/pnas.142033699.

Walker, B. *et al.* (2004) ‘Resilience, Adaptability and Transformability in Social–ecological Systems’, *Ecology and society*, 9(2), pp. 5–5. doi: 10.5751/ES-00650-090205.

Walker, B. *et al.* (2006) ‘A Handful of Heuristics and Some Propositions for Understanding Resilience in Social-Ecological Systems’, *Ecology and society*, 11(1), p. 13. doi: 10.5751/ES-01530-110113.

Walsh, I. *et al.* (2015) ‘What Grounded Theory Is…A Critically Reflective Conversation Among Scholars’, *Organizational research methods*, 18(4), pp. 581–599. doi: 10.1177/1094428114565028.

Walshe, C., Ewing, G. and Griffiths, J. (2012) ‘Using observation as a data collection method to help understand patient and professional roles and actions in palliative care settings’, *Palliative medicine*, 26(8), pp. 1048–1054. doi: 10.1177/0269216311432897.

Weick, K. E. (1995) *Sensemaking in organizations*. Thousand Oaks ; London: Sage Publications.

Westley, F. R. *et al.* (2013) 'A Theory of Transformative Agency in Linked Social-Ecological Systems', *Ecology and society*, 18(3), p. 27. doi: 10.5751/ES-05072-180327.

Wheeler, S. M. and Beatley, T. (2009) *The sustainable urban development reader*. 2nd ed. London: Routledge.

White Peak (2019) *Hammarby EcoCity- Yantai*. White Peak Project Brochure.

Wiig, A. (2016) 'The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia', *Urban geography*, 37(4), pp. 535–553. doi: 10.1080/02723638.2015.1065686.

Wu, F. (2012) 'China's eco-cities', *Geoforum*, 43(2), pp. 169–171. doi: 10.1016/j.geoforum.2011.08.001.

Yigitcanlar, T., Velibeyoglu, K. and Martinez-Fernandez, C. (2008) 'Rising knowledge cities: the role of urban knowledge precincts', *Journal of knowledge management*, 12(5), pp. 8–20. doi: 10.1108/13673270810902902.

Yin, R. K. (2003) *Case study research : design and methods*. 3rd ed. Thousand Oaks, Calif. ; London: Sage.

Xiao, J. (2016) *A study to explore smellscape: from understanding and interpretation to evaluation and design in urban intermodal transit spaces in UK and China*. University of Sheffield.