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Stakeholder Expectations for Achieving Sustainability in Green Urban Construction Projects: A Case Study of the Vaasa Energy Cluster with Comparative Insights from Freiburg Green City

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ABSTRACT :

The importance of sustainable urban construction lies at the heart of addressing the current environmental, social, and economic challenges of modern society. Although technology and legislation are at the forefront of sustainability initiatives, the concept of stakeholder expectation alignment has been identified as an important yet under-explored variable that impacts the success of green urban construction projects. This thesis explores the influence of differing stakeholder expectations on sustainability outcomes within the context of green urban construction.

The research methodology will be based on a comparative qualitative case study of Vaasa, Finland, and Freiburg, Germany, as these cities are recognized as being at the forefront of sustainability initiatives but possess differing models of stakeholder engagement. Vaasa will be examined as an innovation-driven model of sustainability heavily embedded within the energy industry, whereas Freiburg will be analyzed as a model of participatory governance heavily embedded within ecological urban planning. Through document-based research of policy strategies, planning documents, and sustainability frameworks, the research will investigate how differing stakeholder groups prioritize differing sustainability outcomes. The DMAIC (Define, Measure, Analyze, Improve, and Control) methodology will be applied as an analytical framework to address the research question of how differing stakeholder groups align to meet sustainability outcomes.

The research outcomes will show that differing models of governance structures significantly impact the effectiveness of green urban construction through differing models of stakeholder influence and sustainability priorities. This research contributes to the interrelationship of project management and sustainability research through the identification of the importance of stakeholder expectation alignment as a model of effective green urban construction.

KEYWORDS: Sustainable Urban Development, Green Urban Construction, Stakeholder Expectations, Sustainability Governance, Comparative Case Study, DMAIC Framework, Urban Sustainability

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1 Chapter 1. Introduction

1.1 Global Context: Urban Sustainability and Construction

Urbanization is perhaps one of the major defining forces of our generation. It is a fact that more than half of the world's population resides within urban areas. Furthermore, it is also true that this number is set to increase even more in the years to come (United Nations, 2015). It is owing to this fact that urban areas have emerged at the forefront of fighting against climate change, environmental protection, and sustainable development. The concept of sustainable development is perhaps one of the most interesting concepts to have evolved over time. It has evolved from a very simple concept of satisfying our current needs without compromising on the ability of future generations to satisfy their needs (WCED, 1987). It has evolved to encompass various aspects of sustainable development, including environmental protection, social equity, and economic sustainability. One of the best frameworks to implement sustainable development is perhaps through the Triple Bottom Line framework, which has evolved to encompass all aspects of sustainable development through its environmental, social, and economic dimensions (Elkington, 1997).

In terms of construction and development, these are among the most significant areas for putting sustainability ideas into action. Green construction and development involve energy-efficient buildings, green transportation, eco-districts, green energy, climate resilience, and circular economies. However, despite the many developments and ideas put forward, sustainability actions and outcomes in construction and development are still incomplete and debatable.

One major factor for this is governance and the relationships between different stakeholders, rather than technology. Current research studies on the subject demonstrate that the success of urban sustainability is just as dependent on the relationships and harmony between different stakeholders and governance as it is on technology. Cities

that demonstrate significant progress and action on reducing greenhouse gases and promoting green mobility are those that also demonstrate high harmony between different stakeholders. On the other hand, construction and development projects that are plagued by governance challenges often experience significant challenges and reductions in sustainability outcomes and even challenges from the community. This is a significant shift from technology and governance to relationships and harmony, which is also a significant paradigm shift in the study and pursuit of sustainability.

As the complexity of cities increases, so does the need for integrated planning. This requires integrating energy, urban growth, transport, and mobility systems, as well as social policies, into a unified approach. Today's urban sustainability initiatives are pursued within a complex web of governance structures, including urban authorities, private sector developers, service providers, financiers, and civil society actors. According to UN-Habitat (2020), the effectiveness of urban sustainability initiatives depends on the extent to which these diverse actors can find common ground to work together. This is the rationale for this study's focus on stakeholder expectations, an understudied but critical dimension of urban sustainability performance.

1.2 The Stakeholder Dimension of Sustainability

Urban sustainability initiatives are conducted in a complex web of stakeholders. Generally, stakeholders in this web include:

- Municipal government and planning agencies
- Energy and industry
- Real estate and construction
- Environmental non-governmental organizations
- Academic and research institutions
- Citizens and groups

Stakeholder theory posits that any project or organization is conducted in a web of stakeholders that are of interest to that entity (Freeman, 1984). Subsequent extensions of this theory emphasize that stakeholders' power, legitimacy, and urgency are key factors in determining which stakeholders' expectations are salient (Mitchell, Agle, & Wood, 1997). In urban construction, these characteristics of stakeholders can vary significantly.

Sustainability adds a further layer of complexity to this web since it requires balancing competing goals. For instance:

- Construction stakeholders may emphasize fiscal stability and clarity of regulations
- Municipal government may emphasize environmental goals
- Citizens may emphasize livability
- Environmental NGOs may emphasize environmental stringency

Although all of these actors may support the idea of "sustainability," their specific understanding of what exactly sustainability entails may vary. Such a variance has the potential to create a misalignment of expectations, which in turn may cause delays in negotiation processes, regulatory conflicts, reduced environmental ambitions, and reduced social acceptability.

In the literature of project management, stakeholder management is regarded as a critical knowledge domain (PMI, 2021). However, conventional tools of stakeholder management predominantly focus on processes of communication and engagement, rather than analyzing processes of expectation alignment in terms of sustainability dimensions. Therefore, there is a gap in terms of understanding the variance of sustainability expectations among stakeholders in relation to outcomes in green urban construction projects.

Recent literature in the field of project governance has increasingly acknowledged that stakeholder management in sustainability-oriented projects should go beyond conventional communication-based approaches. Although processes of engagement, such as

consultations and workshops, are critical in stakeholder management, they do not automatically address processes of expectation alignment in terms of sustainability dimensions. The stakeholders may formally support sustainability-oriented projects, but in reality, they may prioritize cost efficiency, risk minimization, and political feasibility over sustainability ambitions. Such a divergence of expectations may create a misalignment of expectations, which is not immediately apparent in terms of decision-making processes.

Besides, expectations in sustainability are not constant but are subject to change over time. As a result, stakeholders may change their priorities in reaction to changing laws, market forces, or social pressure. Such a temporal aspect of stakeholders' expectations is especially significant in long-term urban development schemes, in which long-term horizons are common. Accordingly, it is important to understand not only stakeholders' identities but also their changing expectations in order to identify gaps in sustainability performance. All of these arguments reinforce the analytical focus of this thesis on expectation alignment rather than solely on stakeholders' participation.

1.3 European Context and Case Selection Rationale

A leading position in the design of a policy of sustainability has been held in Europe, and this policy encompasses climate neutrality, renewable energy strategies, and strategies in urban mobility. In this European context, this thesis is focused on two cities that embody two different but complementary strategies of sustainability: Vaasa (Finland) and Freiburg (Germany).

Vaasa: Energy Innovation and Carbon Neutrality Ambition

Vaasa is recognized as a key cluster for energy technology in the Nordic countries. EnergyVaasa is a cluster of over 180 companies in energy systems, smart grids, renewable energy, and energy efficiency. It is a key contributor to regional business performance and export activity.

Vaasa's municipal strategy outlines ambitious climate goals to achieve carbon neutrality through combined efforts in energy systems, transportation solutions, and urban planning (City of Vaasa, 2022). In Vaasa, sustainability is linked to technological innovation, the energy transition, and cluster collaboration.

The context for sustainability governance in Vaasa reflects a robust innovation logic of sustainability with collaboration at its heart.

Freiburg: Ecological Urbanism and Participatory Governance

Freiburg is often cited in literature on sustainability as a quintessential example of a 'green city' due to its long-standing commitment to ecological thinking, renewable energy strategies, and sustainable urban planning practices (Beatley, 2012). The urban development of Freiburg is characterized by the presence of 'Eco-Districts' like Vauban, which are characterized by low automobile dependency, efficient use of energy in housing, and high levels of social engagement.

The sustainability identity of Freiburg is closely associated with participatory governance traditions and high levels of citizen participation in urban planning processes, which serve to create a contrast to Vaasa's innovation-based sustainability strategy.

The choice of Vaasa and Freiburg is also a reflection of the broader diversity in European sustainability strategies. Both cities are part of the broader European Union's climate and energy strategy, but there are significant institutional and urban development-related differences between them. Comparative urban studies suggest that such differences create a high level of analytical leverage for researchers in terms of understanding the role of governance in sustainability strategies. By choosing two cities that share a broad sustainability vision but have differing strategies to achieve sustainability outcomes, the study is well-positioned to evaluate the role of stakeholder expectations in a way that would not be possible in a single-city study.

Finally, Vaasa and Freiburg both present highly favorable documentary conditions for a qualitative study of sustainability strategies in urban governance, which is a reflection of their high levels of transparency in urban planning and sustainability strategies. The use

of multiple sources of documentation in a single study would create a high level of methodological rigor in a qualitative study of secondary data.

1.4 Problem Statement

In spite of their sustainability ambitions, Vaasa and Freiburg face the challenge of managing differing stakeholder expectations in green urban construction projects.
The main problem investigated in this thesis is that of differing stakeholder expectations, which can hinder the proper alignment of sustainability ambitions in green urban construction projects.

This problem is experienced in a number of ways:

- Economic feasibility vs. environmental ambition
- Densification vs. preservation of green space
- Agreements over restrictions in terms of mobility
- Differing views of social sustainability ambitions

The structure of expectations is critical for the improvement of sustainability performance.

In spite of growing awareness of the complexity of stakeholder expectations, sustainability strategies in urban development processes still assume an implicit level of consensus over sustainability ambitions. However, in practice, stakeholders often have differing views of critical sustainability concepts like carbon neutrality, green mobility, and social sustainability, depending on their institutional locus of control and strategic interests. Such differing views of sustainability concepts are not always obvious in planning processes but can be highly critical in implementation processes, particularly in terms of trade-offs between cost, environmental ambition, and social sustainability.

This thesis therefore treats misalignment of expectations not as a peripheral communication challenge but a critical structural challenge inherent in sustainable urban construction projects. By analyzing the divergence and convergence of expectations in a multi-stakeholder context, this thesis seeks to make a contribution to a more operational understanding of sustainability implementation risks in complex urban development processes.

1.5 Research Gap

This research is motivated by three interrelated gaps in the current literature:

1. Lack of Systematic Analysis of Stakeholder Expectations

While there is considerable interest in stakeholder engagement, there is little systematic analysis of the nature of variation in stakeholder expectations across sustainability issues and the impact of this variation on project outcomes.

2. Lack of Comparative Analysis

Most sustainability research is based on single-city cases. Comparative studies of multiple cities with differing traditions of city governance are rare, and there is little research on expectation alignment.

3. Lack of Structured Analytical Tools

There is a need for structured tools to analyze expectation alignment and improvement. The DMAIC approach, which was developed in the context of process improvement, is a promising tool for analyzing sustainability expectation.

Aside from these issues, there is also a lack of systematic interrelation between sustainability and stakeholder engagement in the current literature. Most sustainability research has focused on environmental issues and participation mechanisms in city gov-

ernance without considering the interrelation between expectation structures and sustainability outcomes. The fragmented nature of sustainability research has made it less applicable to project managers and city planners.

Lastly, there is little evidence of project management tools being applied to urban sustainability governance. The current literature on sustainability and city governance has shown little evidence of using project management tools such as DMAIC. This is an opportunity to examine whether using project management tools can clarify diagnostic issues in sustainability-based urban projects.

1.6 Purpose of the Study

The research aims to explore to what extent the expectations of various stakeholders play a role in determining the success of sustainability aspects of green urban construction projects. It is based on a comparative study of Vaasa and Freiburg to identify areas of convergence and divergence of various stakeholders' expectations and to suggest ways to improve such convergence to make sustainability implementation more effective. It is hoped that this research would be able to contribute to an even better understanding of theoretical aspects of project management as well as its practical applications.

More specifically, it is proposed to:

- Determine what sustainability goals have priority in each of the cities
- Determine what expectations of various stakeholders there are on various aspects of sustainability
- Analyze areas of convergence and divergence
- Propose a structured analytical framework based on DMAIC to manage expectations

By focusing on aspects of expectation alignment rather than on results of sustainability aspects of urban projects, it is hoped that this research would be able to position itself at the interface of research on project governance and urban sustainability. It is not only a study of various stakeholders' differences but also an attempt to establish an analytical logic to help practitioners identify potential areas of misalignment at an early stage of the project cycle. In doing so, it is hoped that it would be able to contribute to an emerging discourse on governance-sensitive sustainability implementation.

1.7 Research Questions

1. What are the sustainability objectives (environmental, social, and economic) prioritized in green urban construction projects?

2. What are the stakeholder expectations regarding these objectives for Vaasa and Freiburg?

3. What are the areas of convergence and divergence of stakeholder expectations and what are the implications for sustainability performance?

4. What are the potential contributions of the DMAIC analytical framework for managing stakeholder expectations and sustainability performance?

1.8 Scope and Delimitations

This research focuses on the sustainability expectations for green construction projects undertaken in urban areas, excluding rural areas and other infrastructure projects undertaken outside these areas. In terms of geographic coverage, the research has been restricted to Vaasa (Finland) and Freiburg (Germany), chosen for their differing sustainability strategies and governance structures.

In terms of methodology, the research is qualitative and document based. Since the thesis has been restricted to limited time, the research does not use primary data such as interviews and surveys. Rather, it relies on publicly available documents, literature, and other relevant information available for these two cities. While the research is not intended for generalized results for all cities, it seeks to provide deeper insights for these two cities and develop an analytical framework for other cities and research studies.

The focal areas for the research are:

- Urban green construction projects
- Stakeholder's expectations for sustainability
- Two European Cities: Vaasa and Freiburg
- Qualitative research using documents

These delimitations are chosen for the research to maintain the analytical depth and methodological ease for the master's thesis. While the research is not intended for generalized results for all cities, it is expected to provide analytically relevant insights for other sustainability-oriented urban areas with similar governance structures.

1.9 Structure of the Thesis

The thesis consists of six chapters, starting from theoretical bases to empirical analysis, discussion, and conclusions.

The thesis is structured as follows:

- **Chapter 1** presents the background, research gap, objectives, research questions, scope, and structure of the thesis.
- **Chapter 2** presents the theoretical background, including sustainability in urban construction, stakeholder theory, green project management, and DMAIC methodology.

- **Chapter 3** presents the research design and methodology, including case selection, data collection, and analysis.
- **Chapter 4** presents the empirical analysis of stakeholder expectations in Vaasa and Freiburg, following the DMAIC methodology.
- **Chapter 5** presents the analysis of findings in relation to the literature, including theoretical and practical implications.
- **Chapter 6** concludes the thesis, including summary, limitations, and contributions, followed by recommendations for further research.

2 Chapter 2. Literature Review

Sustainable urban construction has thus turned out to be an essential issue in contemporary project management practice, driven by escalating environmental pressures, shifting societal norms, and international promises of climate-neutral growth (IPCC, 2023; United Nations, 2015). Cities, as large consumers of resources and producers of carbon emissions, assume a top position in the quest to build more sustainable futures (Bulkeley & Betsill, 2013; UN-Habitat, 2020). Hence, urban construction projects are envisioned to not only provide a physical space but also social integration, environmental sustainability, and economic viability (Shen et al., 2011). Such a complex character of urban construction projects thus highlights the significance of understanding diverse stakeholders' formulation of expectations regarding sustainability results.

Literature has confirmed that stakeholder expectations play a crucial role in determining the legitimacy, success, and acceptability of projects, especially in projects focused on sustainability results (Aaltonen, 2011; Freeman, 1984). In urban construction projects focused on green growth, expectations may comprise environmental stewardship, social justice, affordability, mobility, and economic viability. Comprehending such diverse expectations is thus essential to comprehend the formulation of sustainability results in various urban contexts. This chapter presents a review of the literature and theoretical foundations relevant to stakeholder expectations in sustainable urban construction. The chapter synthesizes theoretical contributions related to sustainable urban development, stakeholders' theory, expectation management, and Green Project Management (GPM). The theoretical underpinnings are illustrated using two cases of sustainable urban development: Vaasa Energy Cluster in Finland and Freiburg Green City in Germany.

Moreover, apart from theoretical underpinnings, the literature has also emphasized the importance of a new and emerging methodological paradigm shift toward more integrated types of analytical frameworks that can effectively deal with the socio-technical complexities of sustainable urban development. The traditional project management ap-

proach has often considered environmental issues, stakeholders' management, and governance structures as separate and independent concepts. Nevertheless, more recent types of urban sustainability research have acknowledged the importance of developing cross-disciplinary frameworks that can effectively deal with interdependencies between institutional stakeholders and urban sustainability (Bulkeley & Betsill, 2013). Thus, this chapter has adopted a synthetic approach to interlink sustainability theory, stakeholders' theory, and process improvement logic. The synthetic approach has enabled this research to develop a theoretical underpinning to examine the importance of expectation management in sustainability outcomes in complex urban construction scenarios. The synthetic approach is more pertinent in urban sustainability research because it can provide more effective solutions to comparative urban sustainability issues, as differences in governance culture and maturity levels can significantly impact sustainability outcomes.

2.1 Sustainable Urban Development

Sustainable urban development refers to the process of developing urban areas in such a manner that there is an equilibrium between the natural environment, society, and economic viability. With urban areas facing unprecedented growth and rising issues such as climate change, sustainability, and social inequality, the use of sustainable construction methods has come to play a critical role in ensuring urban resilience in the long term (UN-Habitat, 2020). The construction sector in urban areas has been critical to the process of urban development, considering its significant effect on issues such as energy, transport, society, and the natural environment. Sustainable urban development has evolved from its initial focus on environmental sustainability to a multidimensional concept, considering the recent developments in the last two decades. This has been influenced by the recognition of the critical role of aspects such as urban governance, participation, and stakeholder expectations in determining sustainability outcomes.

The recent literature on urban sustainability has come to focus on the concept of urban areas as experimental platforms for urban governance, where aspects such as environmental innovation, policy learning, and stakeholder negotiations are critical to the sustainability process. Instead of being mere recipients of climate policies from their respective governments, urban areas are viewed as agents of change, capable of leading sustainability transitions through the use of urban planning, partnerships, and society (Evans, Karvonen, & Raven, 2016). The implementation of sustainable urban development has come to be data-driven, considering the recent developments in the last two decades. This has been characterized by the use of sustainability metrics, carbon accounting, and performance data to justify urban sustainability policies and strategies. This has, however, come with its own set of urban governance issues, considering the use of such data for stakeholder decisions and trade-offs. This brings to focus the critical role of stakeholder perceptions of sustainability in urban construction.

2.1.1 Definitions and Evolution of Sustainable Urban Development

The idea of sustainable urban development is rooted in the definition of sustainability developed by the Brundtland Commission, which states, “Meeting the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). In urban areas, sustainability involves the integration of ecological, social, and economic aspects into urban planning and construction activities. Traditionally, urban sustainability has been based on environmental protection, while recent approaches focus on the integration of interactions, stakeholders, and long-term performance (Sharifi & Yamagata, 2016). The history of sustainable urban development can be divided into three phases:

Phase 1: Environmental Protection (1990s-2000s)

The focus of this phase was to reduce pollution, improve waste management, and control urban sprawl.

Phase 2: Integrated Planning (2000s-2010s)

The focus of this phase was to integrate urban planning, transportation, energy, and participation, leading to the concept of eco-districts and climate strategies.

Phase 3: Climate Neutral and Smart Cities (2010s-present)
The focus of this phase is to integrate renewable energy, digital technologies, smart grids, and climate-neutral strategies.

Eco-districts like Vauban (Freiburg), Nordhavn (Copenhagen), and Hammarby Sjöstad (Stockholm) offer an example of the operationalization of this development process and how governance, stakeholders, and sustainability interact (Beatley, 2012; Johannsen & Elle, 2021).

An important aspect of the current phase of climate-neutral urbanism, compared to the preceding ones, is the stronger emphasis on governance and stakeholders. This contrasts with the preceding phases of the development of the sustainability paradigm, which focused more on the technological optimization and environmental design of the eco-city, as seen in the pioneering eco-city projects. This more recent phase has recognized the role of institutional fragmentation and the interests of stakeholders as the main obstacles to the implementation of the urban sustainability strategy, which has prompted the use of the socio-technical and governance approaches to the analysis of the sustainability transition, instead of the more traditional engineering approaches (Geels, 2002). This evolution of the urban sustainability paradigm, particularly with the emphasis on the role of governance and stakeholders, can be clearly seen in the European context, particularly with the development of urban strategies for the achievement of climate neutrality, moving from the pioneering eco-districts to the urban scale. This further justifies the choice of the analysis of the role of expectation alignment as one of the dimensions of the urban sustainability strategy, considering the inherent complexities of the multi-actor environment.

2.1.2 Sustainability Pillars in Urban Construction

Sustainable urban construction is often measured through three parameters of the triple bottom line approach (Elkington, 1997):

Environmental Sustainability: Environmental sustainability focuses primarily on minimizing ecological impacts and optimizing resource utilization. Main priorities include:

- High energy efficiency in construction
- Use of renewable energy
- Sustainable materials and circular construction
- Reduction of carbon emissions
- Enhancement of biodiversity and green spaces
- Sustainable water and waste management practices

These factors are crucial in Vaasa and Freiburg since mitigating global warming is a key development goal in these cities.

Social Sustainability: Social sustainability examines how urban construction affects human well-being and social equity. Main priorities include:

- Access to affordable and diverse housing
- Inclusive mobility and accessibility
- Public participation in construction and planning
- Health, safety, and well-being
- Cultural identity and social cohesion

Vauban in Freiburg is often used as a model for socially sustainable construction and planning due to its inclusive and successful approach to social sustainability (Scheurer & Newman, 2009).

Economic Sustainability: Economic sustainability is linked to the financial viability of construction and development in urban areas. Main priorities include:

- Lifecycle cost efficiency
- local job creation
- economic resilience
- attractiveness of investments
- market demand and affordability

In Vaasa, Finland, the "EnergyVaasa" is an example of economic sustainability through innovation, partnerships with industries, and investment in clean technologies (EnergyVaasa, 2023). The interaction of all these pillars influences what is expected of urban construction projects.

While there is a conceptual framework on the triple bottom line that is widely accepted, it is difficult to operationalize these pillars of sustainability in urban construction projects. While it is often relatively straightforward to define quantified targets for environmental sustainability, such as carbon reduction or energy efficiency targets, it is often more difficult to define quantified targets for social and economic sustainability dimensions. For example, housing affordability, social inclusion, and urban livability often require normative judgments that may vary substantially across stakeholders (Dempsey et al., 2011). Furthermore, there may be tensions between the various pillars of sustainability in urban construction projects. For example, there may be tensions between pursuing urban construction projects to maximize environmental sustainability and doing so at a cost to affordability or investment attractiveness. There may be tensions between pursuing urban construction projects to maximize economic growth and doing so at a cost to environmental sustainability. These tensions highlight the need to develop an analytical framework to identify areas of convergence or divergence of stakeholder expectations across various dimensions of sustainability.

2.1.3 Models of Sustainable Urban Development

There are several models for promoting sustainable urban development, each emphasizing different dimensions of sustainability. These models help analyze the balancing act between different dimensions of sustainability and the role played by different stakeholders.

Eco-District and Sustainable Neighborhoods: Eco-district is defined as an experimental urban district that seeks to implement sustainability principles on the district level (Sharifi, 2021). An eco-district usually comprises:

- Energy-efficient buildings
- Car-free or low-car mobility
- Renewable energy
- Mixed-use and high-density
- Participatory governance
- Green spaces

Some examples of eco-districts are:

- **Vauban, Freiburg:** An eco-district community-led approach emphasizing car-free living, cooperative housing, and participatory governance (Faryadi, 2024).
- **Nordhavn, Copenhagen:** A technologically advanced eco-district emphasizing smart energy, climate adaptation, and circular resource flows (City of Copenhagen, 2021).
- **Hammarby Sjöstad, Stockholm:** A model eco-district integrating energy, waste, and water flows through closed loops (Pandis & Brandt, 2020).

These examples demonstrate how different governance models, such as community-centered, municipal-centered, and technology-centered models, impact sustainability and stakeholder expectations.

2.1.4 Challenges in Sustainable Urban Construction

However, despite the growing commitment to sustainability, various challenges are identified in the literature that impact sustainability project outcomes. These challenges are also pertinent to this thesis as they impact stakeholder expectations.

Fragmented Governance and Coordination: Sustainability requires coordination and cooperation among various sectors, such as energy, housing, transportation, and waste management. Fragmented governance may lead to divergent priorities and conflicts of interest among stakeholders (Angelidou & Psaltoglou, 2017).

Complexity of Multi-Stakeholder Environments: Construction in urban environments requires coordination and cooperation among stakeholders with divergent interests, such as municipalities, construction firms, and residents (Aaltonen & Kujala, 2010).

Financial Constraints and Cost Pressures: Sustainable construction requires higher investment costs, and this may lead to conflicts of interest, especially when stringent environmental regulations are imposed (Häkkinen & Belloni, 2011).

Social Acceptance and Participation Issues: Poor social participation may lead to conflicts of interest, especially in areas such as density and mobility (Brownill & Parker, 2010).

Risk of Superficial or Technocentric Approaches: Technocentric approaches to urban construction and governance are criticized in the literature, especially in the context of sustainable cities (Güneralp et al., 2017). This issue is discussed in the article "The Three Pitfalls of the Sustainable City" (Faryadi, 2024), which is fully incorporated in Part 3 of this thesis.

2.1.5 Linking Sustainability Pillars to Stakeholder Expectations

Although these pillars of environmental, social, and economic sustainability are conceptually distinct, their practical implementation in urban construction projects is necessarily mediated and interpreted by stakeholders' expectations and priorities. Although there is a structured categorization of various pillars of sustainability in line with the concept of a Triple Bottom Line (Elkington, 1997), there is a lack of information regarding how these pillars are to be prioritized in practice.

Municipal stakeholders may prioritize long-term environmental goals in urban construction, such as carbon neutrality and emission reduction. Private stakeholders may prioritize financial feasibility and profitability of investment in urban construction. Social stakeholders may prioritize social inclusion and participation in urban resources and construction. Such differentiated interpretations of sustainability in urban construction lead

to diverse hierarchies of sustainability pillars in a particular construction project. As Sharifi (2016) argues, implementation of urban sustainability is not only mediated by technical criteria but also by governance and structures of stakeholder engagement. Moreover, UN-Habitat (2020) emphasizes that there is a need to align policy goals and expectations of stakeholders in governance in order to attain urban sustainable transformation. Sustainability pillars are not independent and neutral criteria of performance in urban construction; instead, they are areas of negotiation and interaction of various stakeholders' expectations, converging or diverging in a particular way. Such interaction of expectations is a key area of analysis in expectation alignment in green urban construction.

2.2 Stakeholder Theory and Expectations in Sustainable Urban Construction

Stakeholder theory is critical in explaining sustainable urban construction projects' dynamism. Stakeholder theory holds that projects exist in a network of different stakeholders whose interests shape the project outcomes. The project's sustainability will make the stakeholders have conflicting expectations, which might favor one interest over another in a given dimension. As such, it becomes vital to know the stakeholders' expectations if there is to be a positive sustainability outcome (Freeman, 1984; Aaltonen, 2011; PMI, 2021).

In the case of sustainable urban construction projects, there are numerous stakeholders that are involved. These might include the government, business corporations, communities, and environmental bodies. Each stakeholder brings expectations and priorities depending on their interests. Thus, while the government's priorities might be environmental laws and other sustainability factors, business people's priority might be profitability and other economic concerns (Mitchell, Agle, & Wood, 1997; Aaltonen, 2011).

2.2.1 Foundations of Stakeholder Theory

The stakeholder theory, first proposed by Freeman (1984), is a framework used to explore the relationship between organizations or projects and the different stakeholders who are interested in their operations. This theory postulates that, besides the organizational efficiency within the firm, it is also essential for it to handle the stakeholder expectations. The stakeholder salience approach was introduced in subsequent theories, which emphasized the significance of power, legitimacy, and urgency in relation to the level of stakeholder impact on the decision-making process (Freeman, 1984; Mitchell et al., 1997; Aaltonen, 2011).

Stakeholder Attributes: Power, Legitimacy, and Urgency

Mitchell, Agle, and Wood (1997) contribute to stakeholder theory with their salience model that measures stakeholders based on:

- **Power:** "the ability to influence project decisions"
- **Legitimacy:** "the perceived validity or appropriateness of their involvement or claims in organizational decisions"
- **Urgency:** "the degree to which stakeholder claims are perceived as pressing or significant"

These factors lead to seven possible stakeholder groups (latent, emerging, and definitive stakeholders), with definitive stakeholders being those that "possess all three salience attributes." Legitimacy and urgency are likely to outweigh "traditional" power in many sustainability-oriented projects. For instance, a resident association or environmental NGO may not hold significant financial or political power but still hold legitimate and pressing claims to sustainability.

Stakeholder theory has moved beyond a descriptive level to a normative and instrumental level. Donaldson and Preston (1995) differentiate normative stakeholder theory, which assumes that organizational duty to stakeholders is a matter of morality, from instrumental stakeholder theory, which assumes that stakeholder management is a tool to reach organizational goals. In sustainability-oriented urban projects, the normative level

is of special interest since sustainability inherently encompasses ethical criteria such as intergenerational justice and social equity.

Freeman, Harrison, and Wicks (2010) also emphasize that stakeholder value generation is not a matter of distribution but of co-creative processes. In the context of green urban construction, this means that sustainability results from co-creative processes in which public and private actors, as well as civil society, participate. Stakeholder expectations are not to be understood as a constraint but as a contribution to sustainability strategies.

Primary and Secondary Stakeholders

According to Clarkson (1995), there are two categories of stakeholders, namely:

- Primary stakeholders, who are essential for the implementation of the project (municipality, developers, contractors, etc.).
- Secondary stakeholders, who are important but not essential for the implementation of the project (NGOs, associations of residents, research centers, etc.).

The above division of stakeholders may be of particular interest in the case of Freiburg, where secondary stakeholders, such as the community cooperatives, played an important role in the management of the

2.2.2 Stakeholder Categories in Urban Construction

Sustainable urban construction involves a wide range of stakeholders who vary with regard to specific interests and expectations. Literature has consistently pointed out various categories of stakeholders:

Municipal Authorities

- Responsible for urban planning and zoning regulations, formulation of sustainable urban strategies, and regulations.
- Their expectations usually focus on urban sustainability performance, health and well-being of residents, climate action, and legislation compliance.
  (Bulkeley & Betsill, 2003; Evans et al., 2016)

Developers and Contractors

- Responsible for urban projects and infrastructure construction.
- Their expectations usually focus on cost-effectiveness, profitability, and a stable legislative environment (Häkkinen & Belloni, 2011).

Residents and Community Groups

- Users of urban spaces and often the most affected by urban construction activities.
- Their expectations usually focus on housing affordability, accessibility, security, and quality of life (Brownill & Parker, 2010).

Utilities and Energy Providers

- Responsible for urban infrastructure such as heating systems, electricity generation, water supply, and waste management.
- Their expectations usually focus on system stability, renewable energy integration, and efficient infrastructure planning (EnergyVaasa, 2023).

Investors and Financial Institutions

- Responsible for providing funds to support urban projects.
- Their expectations usually focus on investment returns, profit maximization, and environmental responsibility.
  (Dziwok & Jäger, 2021; UNEP FI, 2016)

Environmental NGOs and Civil Society Organizations

- Responsible for monitoring urban environmental performance and often advocate for higher urban sustainability targets.
- Their expectations usually focus on biodiversity conservation, emission reductions, and sustainable urban planning practices (Faryadi, 2024).

Research and Academic Institutions

- Responsible for providing research data and best practices to support urban sustainability.
- Their expectations usually focus on research collaboration and knowledge dissemination.

  (Trencher et al., 2014; Yarime et al., 2012)

2.2.3 Stakeholder Expectations in Sustainability Contexts

Stakeholder expectations in relation to sustainable construction in urban areas have various dimensions and are driven by different values, priorities, and understandings of "sustainability" (Reed, 2008).

Environmental Expectations

Environmental sustainability expectations may include:

- Reduction of greenhouse gas emissions
- Energy efficiency in buildings
- Use of less impactful construction materials
- Incorporating renewable energy sources
- Promotion of urban biodiversity
- Sustainable water and waste management

These may come from local government authorities and various environmental-focused non-government organizations (Olander & Landin, 2005).

Social Expectations

Sustainable social construction may include:

- Providing affordable housing
- Providing accessible and sustainable mobility
- Inclusive decision-making and planning
- Ensuring safety and well-being
- Ensuring community identity and social cohesion

In Freiburg's Vauban district, for instance, cooperatives of residents were key in shaping priorities in terms of car-free mobility and co-housing (Faryadi, 2024; Scheurer & Newman, 2009).

Economic Expectations

Sustainable construction in terms of economics may include:

- Cost-effectiveness in construction and operation
- Investment attractiveness
- Providing jobs for local residents
- Ensuring future economic sustainability
- Ensuring market demand

These may be driven by investors and builders at times at the expense of environmental and social sustainability (Ansell & Gash, 2008).

Technological Expectations

In Vaasa or other urban areas like it, the technological expectations of stakeholders center on:

- Smart energy systems
- Digitalization
- Innovation of district heating
- Renewable energy
- Testbeds for private enterprises (EnergyVaasa, 2023)

These represent the technological expectations of stakeholders.

Expectation Alignment as a Governance Mechanism

Expectation alignment is considered a governance mechanism that promotes coordination among various stakeholders in complex projects related to sustainability. Aaltonen and Kujala (2010) demonstrate how relations with stakeholders in a project environment

vary dynamically with power structures and pressures. In projects related to sustainability, such dynamics may be more pronounced owing to enduring environmental pressures and socio-political sensitivities.

According to Reed et al. (2009), participation by various stakeholders is essential to improve legitimacy and increase sustainability results. Nonetheless, participation is not enough to ensure expectation alignment. Expectation alignment requires an articulation of sustainability goals and an understanding of compromises. In urban green construction projects, expectation alignment minimizes uncertainty, promotes legitimacy, and ensures stability in long-term results. Conversely, it may lead to delays or undermine sustainability goals if there is a lack of alignment.

2.2.4 Expectation Conflicts and Alignment in Urban Construction

Given the multiplicity of actors and their interests, the likelihood of expectation conflicts in sustainability-oriented building projects is high. The literature has recognized the following types of expectation conflicts:

Environmental versus Economic Priorities

The literature has shown that, in the context of sustainability-oriented building projects, the requirements of municipal sustainability targets may include strict energy performance requirements, while developers may seek cost savings. This has often resulted in conflicts over building requirements, materials, and energy solutions (Häkkinen & Belloni, 2011).

Social versus Environmental Priorities

Residents may agree with environmental objectives, yet they may be against densification or changes to the neighborhood's character. This has been referred to as the "sustainability paradox" (Güneralp et al., 2017).

Top-Down versus Bottom-Up Governance

The literature has shown that, in the context of building projects, the municipal authorities may prioritize technological solutions and smart solutions (e.g., Vaasa), while the community may prioritize social and environmental factors (e.g., Freiburg), which may be the result of different perceptions of sustainability.

Expectation Alignment as a Predictor of Sustainability Performance

Empirical studies have shown that building projects with high levels of expectation alignment tend to produce better sustainability performance and higher levels of acceptance (Aaltonen, 2011). Conversely, expectation alignment has been shown to lead to the following negative outcomes in building projects:

- Delays
- scope changes
- political backlash
- sustainability trade-offs
- loss of community trust

Consequently, the alignment of stakeholders is an important theoretical construct for the analysis of the Vaasa and Freiburg cases.

2.3 Sustainable City Critiques and Governance Complexity

Sustainable urban development is a dominant paradigm in urban planning; however, there is a growing body of literature that seeks to analyze and critique the concept and implementation of sustainability in urban settings. Understanding this literature is of critical importance to this thesis, as it is important to comprehend that sustainable urban construction is a product of a multifaceted and complex system of governance and economics that ultimately determines what is considered to be a successful and achievable concept of sustainability. One of the most important contributions to this literature is

"The Three Pitfalls of the Sustainable City" by Faryadi (2024), which provides a framework to analyze and understand misaligned expectations in a construction project that is focused on achieving a level of sustainability.

Another important aspect of this literature is that it provides a framework to understand that achieving a level of sustainability is possible only when there is a level of integration of stakeholders' expectations into decision-making processes (Angelidou & Psaltoglou, 2017; Broto & Bulkeley, 2013).

Accordingly, this literature provides a significant amount of theoretical substance to this thesis and provides a level of context to understand why there is a difference in achieving a level of sustainability in Vaasa and Freiburg. Moreover, there is a growing level of recognition in the literature that a significant aspect of urban sustainability is that it is a product of a multifaceted and complex system of governance and economics that is difficult to navigate and that a level of sustainability is not easily achievable in a number of urban settings. Accordingly, it is important to understand that when a city seeks to implement a level of sustainability, it is not a blank slate of institutional and governance structures that are easily changed and that there is a significant level of institutional and governance path dependency in achieving a level of sustainability (Angelidou & Psaltoglou, 2017; Broto & Bulkeley, 2013; Hodson & Marvin, 2010). Accordingly, it is important to understand that there is a significant level of governance and institutional complexity that is a product of a multifaceted and complex system of economics that is difficult to navigate and that achieving a level of sustainability is not easily achievable in a number of urban settings.

2.3.1 The Three Pitfalls of the Sustainable City (Faryadi, 2024)

According to Faryadi (2024), three conceptual pitfalls are delineated, which often affect the success of sustainable urban development initiatives. These three pitfalls are partic-

ularly relevant to the understanding of the role of stakeholders, as they reveal the reasons why the objectives of sustainability may not match the requirements and capabilities of the community.

Pitfall 1: Treating the City as a Business

Cities usually adopt sustainability strategies with reference to the managerial or business approach, which considers the competitive advantages, branding, and investment potential of the urban area. This pitfall results in the following factors:

- Emphasis on economic and technological results
- Lack of attention to social factors
- Top-down approach, which ignores the expectations of the community

The innovation-based strategy adopted in Vaasa, which has been heavily influenced and supported by industry and the EnergyVaasa cluster, can be considered to fall into the category of the first pitfall. Although the community has set the target of achieving carbon neutrality, the expectations of the community, such as the need for affordable and accessible transportation, may not match the strategy and objectives set by the authorities (Faryadi, 2024).

Pitfall 2: Oversimplifying Urban Complexity

This pitfall occurs when sustainability strategies consider the urban area as a system, which can be optimized with the use of technology or design interventions (Faryadi, 2024). This approach may ignore the following factors:

- Socio-cultural factors
- Historical factors
- Informal community factors
- Bottom-up factors

The gap between the objectives and requirements of the community, which may be considered with reference to the sustainability strategy, may lead to tensions between the principles of sustainable urban design and the requirements of the community, such as

the use of high-tech solutions for smart cities, which may not be appropriate for the community (Faryadi, 2024; Hodson & Marvin, 2010).

Pitfall 3: Idealizing the Sustainable Community

This pitfall occurs when the community and the authorities idealize the objectives and requirements of the community with reference to sustainability (Faryadi, 2024). Although the community may be considered to be eco-friendly, the community may face the following factors:

- Opposition to urban densification
- Opposition to the restriction of urban mobility
- Opposition to the affordability of urban living
- Diverse perceptions of community identity

The community participation in the Vauban area of Freiburg has been effective in avoiding the third pitfall, which has been highlighted in the literature with reference to the tensions and problems encountered in the area with reference to urban growth, demographic changes, and political differences (Faryadi, 2024; Güneralp et al., 2017).

Relevance of the "Three Pitfalls" to Stakeholder Expectations

The pitfalls underscore the reasons why the alignment of expectations often proves difficult:

- Cities may strive for sustainability for the purpose of branding or competitive advantage.
- Developers may be concerned with cost efficiency.
- Residents may be opposed to changes that alter their sense of place.
- Environmental NGOs may press for limits to the environment beyond what the market or the political system can sustain.

This perspective enhances the analysis of the Vaasa and Freiburg cases because it provides a framework for understanding the reasons for the development of gaps in expectations and the propensity for the pursuit of sustainability to become disconnected from the local context (Faryadi, 2024; Aaltonen & Kujala, 2010).

The critique of the pursuit of sustainable city initiatives indicates that the technocentric approach to the pursuit of sustainability tends to underestimate the socio-political dimensions of the pursuit and implementation of sustainability. Hodson and Marvin (2010) state, "Urban sustainability strategies often prioritize technological innovation over the distributional and governance tensions, and in doing so, may produce gaps between the expectations of policymakers and those of communities." Bulkeley and Betsill (2013) further explain the urban governance of climate change, arguing that the governance of urban sustainability is the result of the network of actors operating at various levels. They state, "When the narrative of sustainability is primarily one of innovation and competitiveness, social stakeholders may experience marginalization, while more participatory approaches, if economically unviable, may be difficult to implement."

Therefore, the argument against sustainable cities highlights the significance of evaluating the nature of stakeholder expectations within governance structures rather than assuming common goals towards sustainability. Overall, the above framework of three pitfalls suggests that there is a failure of sustainability projects not because of a lack of technological capability but rather a failure to align strategic narratives with stakeholder realities. It is possible to imagine a scenario whereby a city has developed a strong narrative of sustainability branding without adequate governance structures to support it, creating a situation whereby policy goals of sustainability appear to be well-aligned but face resistance or compromise during implementation (Faryadi, 2024). With regard to this research thesis, the above framework of three pitfalls offers an analytical framework to understand the nature of expectation gaps evident within Vaasa and Freiburg. Rather than evaluating policy ambition as a factor of sustainability performance, it highlights the significance of evaluating governance structures, hierarchies of stakeholders, and cultural nuances on the realization of sustainability visions.

2.3.2 Governance Models and Stakeholder Expectations in Sustainable Urban Development

Governance models are critical in determining the strategies for implementing and managing initiatives for sustainable cities. Urban sustainability governance is defined as the way in which various actors coordinate their activities and decision-making in sustainable development in cities. As indicated by Bulkeley and Betsill (2013), urban sustainability governance has evolved from being based on hierarchical structures to networked and participatory governance models.

Diverse governance models will affect the identification and management of stakeholder expectations. Governance models that are based on hierarchical structures result in centralized decision-making, whereby public organizations make decisions without adequate involvement of stakeholders. This might create conflicts between policies and stakeholder interests. However, collaborative and participatory governance models encourage inclusivity and transparency in decision-making. Hodson and Marvin (2010) note that such governance models are crucial in dealing with urban sustainability problems.

Stakeholder expectations play a prominent role in these governance arrangements. According to R. Edward Freeman (1984), stakeholders refer to individuals or groups that have an impact on the success of the project or that may be influenced by its outcome. Such people or groups may have different economic, environmental, and social interests. The stakeholders in urban sustainability projects usually include municipalities, private businesses, communities, and NGOs.

Stakeholder expectations are another problem that has to be resolved through the governance process. According to Aaltonen & Kujala (2010), stakeholders have to be identified and analyzed regularly and effectively engaged in the process of decision-making. Communication and participation-based governance arrangements provide the most efficient framework for managing the expectations of stakeholders. Failure to involve

stakeholders in the process results in resistance, delays, and a lower legitimacy of the urban sustainability projects, according to Bourne (2015).

High complexity is another problem characteristic of urban sustainability projects. This issue is caused by the high number of stakeholders with different interests and the interdependence between the economic, social, and environmental aspects of these projects. Reed (2008) emphasizes that stakeholder participation increases the effectiveness of decisions made and facilitates acceptance of their results.

Furthermore, stakeholder expectations are fluid and subject to change based on shifting conditions within projects and policy environments, along with changes in the social values of society at large. Therefore, governance must adapt in response to these shifts. According to the Project Management Institute (2021), stakeholder engagement and communication should remain constant throughout the duration of a project in order to maintain this level of adaptation.

Mismanagement of governance models can have severe repercussions for the outcome of any sustainability initiative. According to Hodson and Marvin (2010), failures to properly organize governance or create aligned institutions result in poor sustainability strategy implementation. Furthermore, Güneralp et al. (2017) state that ongoing conflicts among stakeholders prevent sustainable urban development.

In conclusion, governance models and stakeholder expectations in sustainable urban development are closely related to each other. Based on the reviewed literature, it is possible to conclude that more effective governance models include participation, flexibility, and collaboration between all stakeholders.

2.3.3 Theoretical Insights from Freiburg Green City Literature

The importance of Freiburg im Breisgau as one of the best examples of sustainable urban development and effective environmental governance cannot be overlooked in scholarly

literature. Known as a "green city," Freiburg has been the subject of many studies thanks to its efforts related to renewable energy production, sustainable transportation, participative governance and green urban development (Beatley, 2012; Bulkeley & Betsill, 2013). The experience of the city shows how important integrated policies and collaboration of different stakeholders can be for successful urban transitions to sustainability.

One of the most common points mentioned in relation to Freiburg is its approach to environmental governance and the role of collaboration in achieving successful transitions. Researchers note that it was not only because of top-down policies adopted by the municipal government but also because of long-term collaboration between different stakeholders, including NGOs and the local community, that allowed for such great results (Späth & Rohracher, 2010; Hodson & Mar-vin, 2010).

The topic of sustainable mobility has also featured prominently in the literature on Freiburg. The city has made substantial investments in sustainable public transportation, bike paths, walkable city centers, and traffic management systems. It is reported that the approach taken by the city in its transport sector has successfully lowered car dependence, enhanced the quality of urban living, and improved the environment. Such measures have frequently been mentioned as an example of transport planning promoting environmental goals (Pucher & Buehler, 2008; Beatley, 2012).

Energy efficiency and renewable energy generation are other important topics covered in the Freiburg literature. Freiburg has a well-established record in promoting innovations related to solar power production, energy-efficient buildings, and climate-sensitive urban planning. This indicates that municipalities can contribute to sustainability transitions within their jurisdiction by encouraging innovation and coordinating policies (Späth & Rohracher, 2010).

The Vauban neighborhood is considered to be one of the most studied projects in terms of urban sustainability in Freiburg. Designed on a formerly used military territory, Vauban often serves as an example of an eco-district because it provides sustainable construction, low-carbon transport solutions, mixing of land uses, and strong social involvement of local residents in the process of decision making. Researchers believe that Vauban proves the necessity to combine both technical and socio-cultural approaches in achieving sustainable development (Scheurer & Newman, 2009; Beatley, 2012).

However, even despite these successes, literature still identifies several weaknesses of this approach. For instance, some scholars state that it is unlikely to copy this experience in those countries where city administration lacks necessary capacity and where there are different conditions of economic and political development (Späth & Rohracher, 2010).

In summary, theoretical considerations from the Freiburg literature indicate that the achievement of sustainable urban development rests upon the factors of policy continuity, governance collaboration, citizen involvement, seamless transportation networks, and environmental innovations. In this light, it is important to note that the city of Freiburg serves as a key theoretical benchmark in this regard.

2.3.4 Theoretical Insights from Vaasa Energy Cluster and Urban Strategy Literature

Vaasa has received growing academic and policy interest in recent years due to its internationally renowned energy technology cluster and its critical position for achieving Finland's carbon neutrality goals. It is typically studied in terms of how the convergence of industry specialization, innovation systems, and local policy contribute to regional competitiveness and sustainability. Literature on Vaasa usually concentrates on the interaction be-tween business enterprises, education providers, government agencies, and local networks in developing a knowledge-based economy in energy technologies (Porter, 1998; Ketels, 2013).

The most well-known theoretical approach used in analyzing Vaasa is the concept of clusters. An industrial cluster can be defined as a spatial concentration of interconnected firms, suppliers, institutions, and related organizations that produce efficiencies, innovations, and competitive advantages. The energy cluster in Vaasa, which comprises global companies, small and medium-sized enterprises, universities, and technical colleges, is known to be among the best energy technology clusters in the Nordic countries. It is argued that proximity and institutional cooperation have contributed to knowledge creation and innovation in the cluster (Porter, 1998; Ketels, 2013).

The third theme present in the literature concerns the triple helix approach to innovation, which focuses on collaboration among universities, industry, and government. In Vaasa, collaborative efforts between firms, higher education organizations, and local or regional government agencies have facilitated research, skills training, and technology transfer. This model is regarded as very relevant in regions attempting to achieve economic growth through technological transformation and sustainability (Etzkowitz & Leydesdorff, 2000).

Another body of literature that could be relevant to this case study concerns urban strategy. According to the concept of urban strategy, the use of visioning by municipalities is one way in which localities are able to position themselves as hubs of specific economic activities. In the case of Vaasa, branding, infrastructure projects, educational initiatives, and climate-related goals are among the strategies the city has pursued to strategically position itself as an energy capital (Healey, 2007).

Moreover, Vaasa is commonly considered from the perspective of the smart specialization theory and regional resilience. The former theory implies that a region must develop its strategy based on already existing strengths and knowledge systems rather than copying the development models of other cities. Specialization on energy technologies, digitalization, and export innovation is an example of such a policy in Vaasa. According to

literature, specialization can contribute to resilience if coupled with continuous innovations, skill development, and flexible governance (Foray, 2015).

Nevertheless, some problems associated with the use of a specialization strategy for sustainable urban development have been revealed by researchers. First, specialization in one industry can make an urban area more vulnerable to global changes in the market, technological innovations, or labor shortages. Second, innovation-led urban strategies might neglect social dimensions if the participation of various stakeholders in the decision-making process is insufficient (Hassink, 2010; Aaltonen & Kujala, 2010).

Summing up, theoretical concepts that can be derived from Vaasa literature provide an idea that sustainable urban development is possible if an industrial cluster strategy is implemented together with innovative partnerships, governance, and specialization. Thus, Vaasa provides a useful theoretical approach to studying medium-sized cities.

2.3.5 Comparative Theoretical Foundations for Vaasa and Freiburg

The comparison between Vaasa and Freiburg im Breisgau may be considered from multiple interrelated theories of urban sustainability studies. Although Vaasa and Freiburg have different histories of city evolution, economic structures, and approaches to governance, both of them represent places with a place-based approach that implies a combination of competitiveness, environmental awareness, and urban resilience (Bulkeley & Betsill, 2013; Hodson & Marvin, 2010).

One of such possible theories involves the differentiation of sustainability models according to their emphasis on innovation or governance. As for the former case, Vaasa is usually analyzed with the help of cluster theory, the regional innovation system, and the concept of smart specialization when sustainability depends on innovations, export activities, and collaboration among firms, academia, and the state (Porter, 1998; Etz-kowitz & Leydesdorff, 2000; Foray, 2015). When it comes to the latter approach, Freiburg im

Breisgau is better explained by means of participatory governance, ecological modernization, and community planning frameworks (Beatley, 2012; Späth & Rohracher, 2010).

Secondly, the governance structures and involvement of the stakeholders can be addressed. According to literature, collaboration governance is vital for sustainable transitions and, however, manifests itself differently according to particular conditions. Freiburg can serve as an example of successful municipal management accompanied by high-level civic participation, including neighbourhood planning and mobility policy, while Vaasa tends to implement the strategy of network governance, which includes companies, universities, and regional development stakeholders (Bulkeley & Betsill, 2013; Healey, 2007).

Finally, the analysis can involve transition theory and socio-technical system perspectives. They claim that any change regarding sustainability occurs as a result of technology, institutions, market, and users' interaction. In the case of Vaasa, it is possible to speak about the process of transition through energy technology innovations and production capacity, whereas Freiburg proves another example of a path towards sustainability that involves urban planning, energy production, transport changes, and social acceptance (Geels, 2002; Späth & Rohracher, 2010).

Resilience and adaptive capacity are yet another important comparative perspective. Urban resilience theory highlights the capacity for cities to cope with economic, environmental, and institutional changes. While resilience through Vaasa's diversification of energy knowledge networks would contribute towards economic resilience, resilience achieved through the integration of land uses, transportation, and environment in Freiburg would increase resilience both ecologically and socially. Hence, both cases highlight two complementary examples of resilience through urban adaptability (Meerow, Newell, & Stults, 2016).

On the other hand, literature shows that there is not one single model that could be easily replicated elsewhere. The industrial specialization-driven strategies, for instance, may carry risks due to specialization and global economic instability. Meanwhile, a governance-focused approach, such as that employed in Freiburg, may rely too heavily on local politics and policies, as well as trust in civic leaders and institutions. Urban comparative studies, therefore, stress the significance of contextuality when evaluating sustainability achievements and replicating policies (Hassink, 2010; Hodson & Marvin, 2010).

On the whole, the theories used to analyze the sustainable development of Vaasa and Freiburg show that there is a possibility of sustainable urban development through various routes. The case of Vaasa is one example of a city that achieves sustainable development using its technological and cluster development route, while the case of Freiburg shows that governance and participation can also lead to sustainable development.

2.4 Stakeholder Theory and Stakeholder Expectations in Sustainable Urban Construction

The stakeholder theory acts as an essential framework for the analysis of the role of diverse stakeholder groups in influencing, shaping, and evaluating sustainability within urban construction projects. This is informed by the fact that sustainable development is characterized by complex relationships between governments, enterprises, people, civil society, and regulatory authorities. Consequently, stakeholder expectations emerge as critical variables for measuring the effectiveness of urban construction projects. In the context of green urban construction, this encompasses expectations regarding sustainability, social welfare, economic viability, transparency, and urban identity. Several researchers have analyzed the critical role of stakeholder expectations in ensuring sustainability, including the alignment of stakeholder expectations, negotiation of divergent expectations, and the management of stakeholder expectations by urban construction pro-

ject managers (Freeman, 1984; Reed et al., 2009). This section discusses the fundamental theoretical underpinnings of stakeholder expectations, their role in sustainability, and their implications for the case study of Vaasa and Freiburg.

In sustainability-oriented urban construction, stakeholder expectations do not merely act as mere preferences but rather play an essential role in shaping sustainability outcomes. This is evident in the fact that expectations play an essential role in shaping sustainability, interpreting sustainability, and measuring sustainability outcomes. Consequently, expectation analysis emerges as an essential tool for diagnostic analysis compared to stakeholder analysis (Freeman, 1984; Reed et al., 2009; Aaltonen, 2011).

This analytical approach is particularly critical in urban construction, where sustainability may act as an essential variable for concealing divergent expectations of stakeholder groups. This perspective emerges as critical for the methodological approach employed in this study (Freeman, 1984; Reed et al., 2009; Aaltonen, 2011).

2.4.1 Defining Stakeholder Expectations

Stakeholder expectations refer to the values, needs, and priorities of different stakeholders regarding the project outcomes. Unlike stakeholder engagement, which is based on participation and communication, stakeholder expectations are based on the needs of the stakeholders regarding the outcomes of the project (Freeman, 1984; PMI, 2021).
In the context of sustainable construction, stakeholder expectations may include the following aspects:

- Environmental objectives, including carbon reduction, integration of renewable energy, biodiversity conservation, and resource efficiency.
- Social objectives, including livability, affordability, mobility, equity, and cultural identity.
- Economic objectives, including cost efficiency, economic value, and economic benefits to the region.
- Governance objectives, including transparency, inclusiveness, accountability, and

shared decisions.

Since there are many differences between the roles and needs of the stakeholders, it is a great challenge to align their expectations. Conflicts may emerge between different stakeholder expectations, such as between environmental conservation and economic viability, or between social needs and economic constraints. A thorough understanding of these differences is necessary to evaluate sustainability in green urban projects.

2.4.2 Key Actors and Their Expectations in Sustainable Urban Development

The process of sustainable urban development incorporates various actors whose stakes, roles, and expectations influence the results of planning and implementation of development. According to R. Edward Freeman, "stakeholders were those individuals or groups of individuals that could affect the achievement of an organization's objectives or were affected by its achievements" (1984). As for urban development projects, the stakeholders may include public sector institutions, the private sector, community groups, investors, NGOs, and knowledge institutions. Since the sustainability projects involve ecological, economic, and social considerations, their stakeholders' expectations may be multiple and competing.

In urban development, public authorities become among the most prominent actors. Public institutions in charge of land-use planning, providing services, environmental protection, and policymaking usually have expectations involving the stimulation of economic growth, meeting environmental goals, promoting urban well-being, and delivering efficient services (Bulkeley & Betsill, 2013). What is more, public authorities are often concerned about receiving public approval of their decisions.

It is also imperative to consider the stakeholder group from the private sector, mainly developers, consultants, contractors, and utility companies. The private sectors usually expect predictability in terms of regulations, viability, market demands, and acceptable risks in relation to sustainability-oriented projects (Porter & van der Linde, 1995). Private

stakeholders are also known for seeking reputation, innovative opportunities, and access to new emerging markets.

The other significant stakeholder is the community and local residents. Community groups normally expect quality-of-life improvements, affordability in housing, environmental benefits, mobility opportunities, safety, and involvement in the process of decision-making. Research indicates that community support is one of the most crucial aspects of urban sustainability projects due to the ability of local communities to block projects or alter their outcomes (Reed, 2008; Bourne, 2015). Community stakeholders also expect social inclusion and equity in sharing the benefits and burdens of the projects.

Lastly, investors are increasingly becoming important stakeholders influencing sustainable development projects through the decisions related to investment and risk assessment. The expectations of the financial stakeholders normally include profitability, regulatory predictability, long-term gains, and performance in relation to sustainability objectives. Environmental, social, and governance (ESG) performance is becoming more important with each day (OECD, 2020).

Institutions of learning, research establishments, and innovation communities are other relevant actors, particularly in urban settings that seek to transition through technology-driven sustainability. The expectations of such actors tend to be about collaborative research, capacity building, knowledge transfer, and innovation in urban solutions. They have the potential to provide technical knowledge, which is instrumental in evidence-based policy making and innovation-based governance (Etzkowitz & Leydesdorff, 2000).

Indeed, sustainable urban development requires achieving a balance between the expectations of many actors whose interests overlap yet are not always compatible. Understanding such stakeholders is critical in analyzing the impacts of their expectations on project viability, governance, and sustainability outcomes.

2.4.3 Conflicting and Converging Stakeholder Expectations in Sustainable Urban Construction

Many sustainable urban construction projects may encounter conflicts and coincidences among the interests of stakeholders involved. Due to the fact that a sustainable project should cover all aspects like economics, ecology, regulations, and communities, there could be many conflicting or coinciding interests between stakeholders. According to the stakeholder theory, it is crucial to understand these interactions properly (R. Edward Freeman, 1984; Aaltonen & Kujala, 2010).

There could be a variety of issues concerning the economic and ecological interests of different parties involved. The interests of developers and contractors might be related to cost-effectiveness, quick completion, and financial gain. On the other hand, environmental agencies would like their projects to be ecologically efficient, energy efficient, emit less, and minimize waste (Porter & van der Linde, 1995).

Another issue that often appears concerns the land use and interests of communities involved. There are many instances when residents agree with urban regeneration projects in general, yet disagree with some specific development that would bring more noise and traffic, diminish green space, make housing less affordable, or alter the atmosphere of a neighbourhood (Reed, 2008; Hodson & Marvin, 2010).

There can be conflicts within public governance systems as well. Various departments or governmental levels can have contradictory goals, including economic growth, housing provision, transportation efficiency, and environmental protection. Thus, fragmented governance arrangements may result in difficult stakeholder coordination and slow implementation (Bulkeley & Betsill, 2013).

However, there are cases where stakeholders' expectations coincide. Multiple parties have a common interest in vibrant economically, environmentally, and socially sustainable cities. Energy-efficient buildings can help decrease expenses for owners, increase

comfort for users, and minimize emissions for cities. Investments in public transport development can address mobility accessibility, minimize congestion, and improve environmental performance at once. These examples prove that sustainability goals do not necessarily imply trade-offs (Elkington, 1997).

The probability of convergence is higher if governance mechanisms are open, participative, and data-driven. Initial stakeholder involvement can facilitate problem identification, uncover common interests, and increase participants' trust. The literature on stakeholder management argues that preemptive communication and negotiations are crucial for converting a possible conflict into cooperation (Bourne, 2015; Project Management Institute, 2021).

In conclusion, sustainable urban development requires an ongoing interaction between competing and overlapping stakeholder interests. Good governance does not depend upon the absence of conflict but rather upon the ability to manage conflict while fostering common ground and collaboration.

2.4.4 Stakeholder Expectations and the Sustainability Triple Bottom Line (TBL)

The Triple Bottom Line (TBL) concept offers an insightful perspective through which stakeholders' expectations can be analyzed in the context of sustainable urban development. First introduced by John Elkington in 1997, this concept suggests evaluating sustainability based on performance in relation to the following three aspects: economic feasibility, environment protection, and social welfare. As the project involves different stakeholder groups, the distribution of their expectations is also spread among these three areas.

Economic expectations include efficiency, productivity, employment generation, investment opportunities, and competitiveness. Public authorities may be interested in tax in-

come and growth of the region, while companies may be interested in profit and predictability of their gains. Investors typically expect robust projects with moderate risk and stable value over time (OECD, 2020).

Environmental expectations imply mitigation of harmful impact on the ecosystem and enhancement of sustainability of resource management. Reduction of greenhouse gas emissions, improvement in energy efficiency, adoption of the circular economy approach, biodiversity conservation, and adaptation to climate change may be expected from any project today. Such expectations become more and more common in urban construction (UN-Habitat, 2020).

Social aspects are centered around living standards, integration, equity, and general well-being of people. The community might expect affordable housing, accessibility, security, a sense of belonging, and chances to participate actively. Furthermore, social sustainability requires equitable access to services and fair sharing of the project costs/benefits among all socio-economic segments of society (Dempsey et al., 2011).

As mentioned earlier, there is strong interdependence among the three components. Economic considerations might impact the environment, and vice versa. The use of energy-saving measures will have a positive effect on both the economy and the environment. On the other hand, tensions could arise between different components. In other words, advancement in one of the areas might be considered a threat to the other one, for instance, an increase in initial costs or issues with land development (Elkington, 1997).

When viewed from the perspective of stakeholders, the triple bottom line concept is useful in that it sheds light on the reasons for differences in expectations among stakeholders. While businesses might focus on economic performance, environmental stakeholders will focus on ecological performance, while community members will care about social justice. Therefore, governance for sustainability will involve finding an appropriate

balance of these expectations and not just prioritizing one aspect over the other (Bulkeley & Betsill, 2013).

In general, the expectation of stakeholders in sustainable urban construction can be analyzed using the Triple Bottom Line framework as a compromise between economic, ecological, and social aspects.

2.4.5 Stakeholder Theory in Comparative Sustainability Studies

In many instances, the results of comparative sustainability studies point to the influence of governance context on the formulation of stakeholder expectations (Evans et al., 2016; Hodson & Marvin, 2010). For instance, the results of the analysis of the context of the European eco-districts reveal the following patterns:

- municipalities with participatory governance models (e.g., Freiburg) tend to formulate more general expectations, while
- municipalities with innovation-oriented strategies (e.g., Vaasa) tend to express more specific, economically, and technology-related expectations.

This duality forms the basis for the theoretical justification of the use of the comparative case study method in the current thesis.

2.4.6 Relevance of Stakeholder Expectations to This Thesis

Expectations of stakeholders will be highly significant to this study since they determine how sustainable urban development approaches are conceptualized, interpreted, and enacted in varying urban environments. It is worth noting from the discussions in earlier chapters that sustainability results are contingent not only upon scientific techniques or policy objectives but also upon how government agencies, firms, citizens, and other stakeholders' interests are considered (Aaltonen & Kujala, 2010).

The comparative analysis of Vaasa and Freiburg im Breisgau emphasizes the significance of expectations held by stakeholders. While the two cities aim to achieve sustainability

goals, their approaches vary with respect to their institutions, economies, governance systems, and other factors. For instance, the development process in Vaasa is closely linked to innovations in industries, energy technologies, and regional competitiveness, while Freiburg is better known for its participatory planning, environmental governance, and citizen-driven sustainability policies (Beatley, 2012; Etzkowitz & Leydesdorff, 2000).

These differences imply that there will be different stakeholder expectations in both cases. Business people, innovative agencies, and governmental bodies in Vaasa may give more attention to competitiveness, innovations, and job creation. At the same time, citizens, civil organizations, and municipal authorities in Freiburg may pay more attention to environmental protection, mobility, livability, and participatory legitimacy. Analysis of stakeholder expectations helps to understand why cities can choose different sustainability trajectories but still strive for successful results (Hodson & Marvin, 2010).

Stakeholder expectations can also matter in terms of implementation difficulties. In case the sustainability strategy implemented by a city contradicts stakeholder expectations, there is a high risk of project failure. On the other hand, harmony between strategic priorities and stakeholders' expectations can facilitate collaboration, trust, and policy consistency (Bourne, 2015; Project Management Institute, 2021).

It is for this reason that expectations of stakeholders can be seen as an important analytic link between the literature on theoretical considerations reviewed in previous chapters and the empirical analysis carried out in the latter part of this thesis.

Conclusion In general, expectations of stakeholders play an important role in this thesis due to their significance to decision-making processes, impacts on sustainability, and their basis for comparison of two cities which represent two differing paradigms of sustainable urban development.

2.5 Sustainability Objectives and Expectations in Green Urban Construction Projects

Sustainable urban construction projects are based on the combination of environmental protection, social equity, and economic feasibility, also known as the triple bottom line (Elkington, 1997). In the rapidly urbanizing environment, these principles define project planning and management procedures and aim at creating sustainable development in the long run. Sustainable development goals have much in common with the global approaches to sustainable development and particularly UN Sustainable Development Goals that pay much attention to sustainable cities and communities (United Nations, 2015).

The P5 approach extends sustainability beyond its basic concepts and includes several aspects in urban construction project management. They include People, Planet, Prosperity, Process, and Product (GPM Global, 2021). At the same time, urban construction projects have to be sustainable according to environmental protection, social equity, and economic feasibility principles, meeting the stakeholders' needs and expectations.

2.5.1 Defining Sustainability Objectives in Urban Contexts

The sustainability objectives related to urban construction projects are clear objectives that seek to protect the environment and improve social and economic conditions in urban areas. Such sustainability objectives come from frameworks adopted internationally and regionally. For example, the sustainability objectives are based on the SDGs proposed by the United Nations (2015) and the Urban Agenda for the European Union (European Commission, 2016).

To measure and meet sustainability objectives, the process of urban construction projects involves the use of existing frameworks such as LEED, BREEAM, and DGNB, among

others. Also, there are standard processes that help ensure the attainment of sustainability objectives. One example is the P5 Standard framework provided by GPM Global (2021).

2.5.2 Environmental Sustainability Objectives

The objective of environment sustainability in city building aims to minimize environmental damage, especially related to greenhouse gases, energy consumption, and resource depletion. The mitigation and adaptation measures concerning climate change have been emphasized in the work of the Intergovernmental Panel on Climate Change (IPCC, 2023).

The cities are urged to use renewables, increase efficiency in energy utilization, and follow sustainable methods of land use management (UN-Habitat, 2020). Measuring tools for assessing environmental performance include the indicators suggested by such organizations as the European Environment Agency (EEA, 2021).

There are different ways in which cities can approach sustainable development. For example, Vaasa focuses on innovative energy solutions and technologies, whereas Freiburg follows ecological urban development principles (Beatley, 2012; City of Vaasa, 2022).

2.5.3 Social Sustainability Objectives

The issue of social sustainability within urban development projects is concerned with improving the quality of life, equality, and equal access to urban facilities. Social sustainability entails the provision of affordable housing, good infrastructure, and chances for participatory involvement (Dempsey et al., 2011).

The involvement of stakeholders is fundamental when striving to ensure social sustainability, since through stakeholder involvement, various requirements of the communities

will be met during the planning process (Reed, 2008). Examples of socially sustainable urban areas include Vauban District in Freiburg (Scheurer & Newman, 2009).

2.5.4 Economic Sustainability Objectives

The goals of economic sustainability focus on the generation of long-term value, cost efficiency, and the development of regional economies. This is consistent with the larger idea of the triple bottom line, where gains in economics do not affect the environment or society adversely (Elkington, 1997).

Urban development projects have been known to enhance regional competitiveness because of innovation and clustering in industries (Porter, 1998). An example of a cluster that helps in sustainable urban development is the EnergyVaasa cluster, which promotes clean energy innovations (EnergyVaasa, 2023).

2.5.5 The P5 Standard and Its Relevance to Stakeholder Expectations

The P5 Standard outlines an elaborate structure for incorporating sustainability into project management across five core dimensions, including People, Planet, Prosperity, Process, and Product (GPM Global, 2021). The incorporation of these aspects helps to ensure that project deliverables meet the needs of stakeholders.

Moreover, the PMBOK Guide, seventh edition, underscores the significance of engaging stakeholders and delivering value, further emphasizing the necessity of sustainability in contemporary project management (PMI, 2021).

2.5.6 Sustainability Objectives in Vaasa's Urban Strategy

The strategy adopted by Vaasa for urban planning is aimed at creating carbon neutral solutions by promoting renewable energy, energy efficiency, and smart energy solutions (City of Vaasa, 2022). The link between Vaasa and the EnergyVaasa cluster contributes

to innovation within clean energy technologies, and therefore, sustainability becomes a core factor in urban development (EnergyVaasa, 2023).

These goals relate to the climate action plans developed both locally and at the European level.

2.5.7 Sustainability Objectives in Freiburg's Green City Strategy

Freiburg is well-known as a case study for sustainable urban development with an immense focus on using renewable energy, sustainable mobility, and eco-urbanism (Beatley, 2012). Sustainable urban development strategies in Freiburg are based on a holistic approach taking into account not only environmental but also social and economic aspects.

Examples of sustainable development in Freiburg include solar energy usage and sustainable transport systems (Späth & Rohracher, 2010).

2.5.8 Sustainability Objectives and Expectation Alignment

The incorporation of sustainable goals into the stakeholders' needs is crucial for the success of an urban construction project. The stakeholders usually have differing and even opposing needs, which calls for successful management and communication techniques (Aaltonen & Kujala, 2010).

The use of participative techniques and collaboration during decision-making makes the incorporation of sustainability goals more feasible and acceptable to everyone (Reed, 2008). Project management techniques also play an important role in aligning the two (PMI, 2021).

2.5.9 Challenges in Aligning Sustainability Objectives with Stakeholder Expectations

Although there is the need for alignment in sustainability, several obstacles arise, such as conflicting stakeholder concerns, budget limitations, and policy issues. These obstacles may affect the realization of sustainability programs (Häkkinen & Belloni, 2011).

The impact of urbanization and governance issues adds another level of complexity to sustainability programs, especially in fast-growing cities (Güneralp et al., 2017).

2.6 Comparing Sustainability Approaches in Vaasa and Freiburg

The following part offers a comparison between sustainable initiatives in the two case study areas of Vaasa (Finland) and Freiburg (Germany) against the background of the sustainability goals described in Section 2.5. The comparative approach is one of the most prevalent methods in urban studies, as it allows finding out the best practices and learning about the impact of specific contextual characteristics on sustainable solutions (Pickvance, 2001). While both Vaasa and Freiburg are acknowledged sustainable cities, their approaches are quite distinct because of different economic, governmental, and historical backgrounds.

Vaasa may be referred to as a city implementing the technology-led sustainability approach, which is largely defined by its energy cluster. On the contrary, Freiburg is usually considered an example of a planning led sustainability approach and is characterized by sustainable design and policies (Beatley, 2012).

2.6.1 Environmental Approaches

Environmental sustainability plays an important role in both cities' sustainable development strategies; however, their approaches to implementing sustainability strategies vary significantly.

First of all, Vaasa's strategy of environmental sustainability is related to energy innovation and industrial development. Environmental sustainability is promoted through the introduction of energy innovations and advanced infrastructure in cooperation with companies operating within the EnergyVaasa cluster (City of Vaasa, 2022; EnergyVaasa, 2023). Thus, there is a tendency towards achieving environmental sustainability through technological advancements and industrial development.

At the same time, environmental sustainability in Freiburg is ensured by implementing environmentally friendly practices in the field of urban planning. In particular, this city is widely known because of the extensive use of renewable sources of energy, especially solar energy (Beatley, 2012). Such policies as urban densification and ecological land use play a significant role in promoting environmental sustainability.

Consequently, while one city pursues the goal of ensuring environmental sustainability through the advancement of energy systems and industrial innovations, another aims at designing sustainable urban environment.

2.6.2 Social Approaches

The concept of social sustainability in both municipalities aims at increasing quality of life, achieving social inclusion, and guaranteeing access to various urban services; however, their strategies are distinct in terms of focus.

It is well known that Freiburg has a high degree of active citizen involvement and public participation during urban planning processes. For example, the Vauban district shows how socially and environmentally conscious projects have been implemented by involving citizens in making decisions about neighborhood issues (Scheurer & Newman, 2009). It can be said that this model represents a bottom-up strategy, as social sustainability is attained through citizen participation and empowerment.

Similarly, Vaasa is interested in social sustainability through provision of various services, education, and innovation. However, this municipality uses a different approach to achieve social sustainability since there is no significant civic participation in social issues, unlike Freiburg. Innovation in the city contributes to social sustainability through job creation and improving living standards (City of Vaasa, 2022).

2.6.3 Economic Approaches

Both cities have their economic strategies defined by economic sustainability.

The economy of Vaasa depends on energy technology industry significantly because the EnergyVaasa cluster has become the main source for economic growth of the region due to the increase in employment and competitiveness (EnergyVaasa, 2023). Such an approach can be considered in line with the theories proposed by Porter about clusters of industries and their competitive advantage (Porter, 1998).

The economic model of Freiburg combines several industries that include renewable energy technologies, tourism, science, and various green services. At present, Freiburg is considered to be the city of the green economy, attracting investments and specialists in the field of sustainable development (Späth & Rohracher, 2010).

Thus, both Vaasa and Freiburg apply economically viable models of sustainability based on different economic structures.

2.7 Analytical Frameworks for Evaluating Sustainability and Stakeholder Expectations

In order to systematically assess the issue of sustainability and stakeholder expectations in urban construction projects, there is a need for the use of systematic analytical methods that are already in existence. This helps in addressing the various aspects of the issues that exist.

2.7.1 Triple Bottom Line (TBL)

The concept of the Triple Bottom Line (TBL) model was developed by Elkington (1997), which is among the most popular models of sustainability assessment. This model is based on the necessity to balance three different aspects of sustainability: environment, social equality, and economy.

In case of urban construction activities, TBL allows for establishing some important criteria that can be considered during evaluation of sustainability. Thus, environment indicators may imply energy efficiency and emissions reduction, social indicators can cover such issues as accessibility and people's well-being, while economic indicators relate to the issue of cost effectiveness.

However, TBL can be critiqued for its tendency to over-simplify sustainability since in reality, it is hardly possible to achieve equal balance between the three aspects.

2.7.2 P5 Framework

The P5 model builds upon the TBL model by including two additional dimensions to the five existing: the Process and the Product, along with People, Planet, and Prosperity (GPM Global, 2021). The P5 model is most appropriate for the context of projects that involve processes and outcomes as important components in achieving sustainable results, such as constructions in urban settings.

Inclusion of the "Process" dimension relates to governance and decision-making aspects of sustainability, whereas the "Product" dimension is dedicated to the impact of built facilities within the whole life cycle of a project.

2.7.3 Stakeholder Theory

According to stakeholder theory (Freeman, 1984), businesses and projects should be mindful of the needs of all stakeholders, and not just the stockholders only. Stakeholders in an urban development project would include government bodies, developers, local communities, investors, and environmental NGOs.

It is especially relevant for the topic of expectation alignment because stakeholders usually have diverse expectations. Good stakeholder management entails recognizing their expectations and influence on a project and engaging with them at various stages (Aaltonen & Kujala, 2010).

2.8 Secondary Data in Sustainability and Urban Studies

It is important for sustainability research to consider the use of secondary data, especially in studies of urban areas, since gathering large amounts of primary data may not be practical in such cases. Secondary data is represented by existing databases, policy documents, academic literature, as well as reports by governmental and inter-national institutions.

Among key strengths of secondary data, cost-effectiveness and availability can be mentioned since it allows for comparing different case studies and identifying trends without conducting any extensive field studies (Johnston, 2017). Within the framework of the current study, secondary data will allow for comp-aring sustainable development strategies used in Vaasa and Freiburg.

Nevertheless, there are some weaknesses in utilizing secondary data as well. They involve possible bias of the research process, inconsistency of information obtained from different sources, as well as lack of control of the data collected.

2.9 Comparative Analysis in Sustainable Urban Development Studies

Comparative analysis constitutes one of the most popular methodologies in urban studies, allowing researchers to highlight similarities and differences among cases and make relevant conclusions (Pickvance, 2001). Comparative analysis becomes especially relevant for sustainability research, since contextual variables carry significant weight.

In comparing Vaasa and Freiburg, this paper attempts to explore how governance, economics, and culture impact the sustainability outcome. Comparative analysis can also reveal practices applicable elsewhere, thus providing insights into sustainable policy and projects design.

Nonetheless, it should be kept in mind that comparative analysis can have limitations due to contextual factors. Such aspects as the city size, geographical location, and institutional arrangements might have an impact on the validity of research results.

2.10 Conceptual Synthesis and Chapter Conclusion

This chapter has reviewed comprehensively the literature related to the issues of sustainability within urban construction projects especially in relation to sustainability goals, stakeholder expectations and urban strategies.

Chapter 2.5 laid down the theoretical basis by outlining what sustainability goals were and stressing the need for their alignment with the expectations of various stakeholders.

Chapter 2.6 went further by making a comparative analysis between the sustainability strategies of Vaasa and Freiburg thus indicating the differences in strategies.

Chapter 2.7 identified important analytical frameworks such as Triple Bottom Line, P5 and stakeholder theory. Chapters 2.8 and 2.9 covered the methodological aspect of the research by discussing the use of secondary information and comparative analysis.

In summary, this chapter stresses the point that sustainable development within urban construction projects entails taking into account different dimensions as well as expectations of the stakeholders. This information has formed the basis of this research.

3 CHAPTER 3 – METHODOLOGY

3.1 Introduction

This chapter identifies the methodological approach adopted in this research. The aim of this approach is to provide an unambiguous and transparent account of the research approach, data collection and analysis methods, and finally, how this approach can be linked to the investigation of stakeholder expectations in sustainable urban construction projects. The approach adopted in this research includes the research design, use of case studies, data selection, data analysis, application of the DMAIC model, ethical considerations, and finally, limitations. The approach is tailored to ensure consistency with this research while allowing for a systematic and rigorous comparison between Vaasa and Freiburg.

Moreover, this approach is tailored to ensure analytical consistency between the theoretical approach presented in Chapter 2 and the actual investigation presented in Chapter 4. As suggested earlier, stakeholder expectations are socially constructed and embedded in governance systems (Bryman, 2016). The use of this approach is therefore tailored to allow for the interpretation of institutional narratives and policy documents within their context. The use of an analytic framework is essential in ensuring methodological rigor is not compromised, as it prevents descriptive interpretation and instead links theoretical constructs with actual data.

Finally, this approach is tailored to reflect the multidisciplinary nature of sustainable urban construction research and incorporates project management, governance, sustainability science, and finally, stakeholder theory. This is essential in ensuring this research is not limited to a single discipline and is able to capture the multidimensional complexity of sustainability-based urban construction.

This chapter is also essential in demonstrating the internal consistency between research questions, theoretical approach, and finally, data analysis. The importance of this is more

pronounced in qualitative sustainability research, as interpretation is essential in this kind of research. By demonstrating each step of this research, this approach is essential in ensuring this research is able to provide more reliable conclusions and allowing the reader to evaluate this research.

The methodological design itself reflects the inherent complexities of urban-based sustainability-focused initiatives that engage multiple institutional actors and policy layers. As a result, a structured yet flexible design is required to accommodate both the formal sustainability commitments and underlying expectation patterns that are present. The following sections of this text outline how this research design, selection of case studies, and analytical processes are ultimately utilized to address this issue in a structured fashion.

3.2 Research Design

A qualitative comparative case study design with a secondary data analysis component is utilized in this research. Qualitative research is deemed an appropriate methodology to explore complex social, environmental, and governance-based expectations that are not easily quantitatively measured. Qualitative research is also useful in interpreting policy documents, sustainability models, stakeholder expectations, and various planning instruments (Bryman, 2016).

A comparative case study design is also deemed useful in this research as it provides a mechanism to explore how various governance structures, cultural settings, and sustainability models impact stakeholder expectations. Vaasa and Freiburg are deemed suitable case studies as they are representative of differing yet complementary models of sustainable urban-based development. A secondary data-based design is also deemed suitable in this instance due to the extensive level of credible documentation and research that is available regarding these two case studies.

This is because the methodological framework is based on the DMAIC model, which can be considered an instrument of analysis, as it is concerned with issues of defining, measuring, analyzing, improving, and controlling.

This qualitative comparative approach is considered appropriate for this dissertation since sustainability and stakeholders' expectations cannot be completely understood based on quantitative data. Although quantitative data, such as percentages of carbon reduction and modal share statistics, can offer significant insight into sustainability and stakeholders' expectations, it is still impossible to understand how sustainability is interpreted and understood by various stakeholders and why there are priorities in specific contexts.

Moreover, this comparative approach can offer more depth to the analysis since it is possible to identify structural similarities and differences between Vaasa and Freiburg. Instead of looking at Vaasa and Freiburg as unique cases, it is possible to recognize patterns through this approach. This is considered a form of analytical generalization since it is possible to discuss issues related to the management of sustainable urban projects based on this approach.

By basing its methodology on DMAIC, a level of procedural discipline is ensured. Each step of the methodology makes a systematic contribution to creating a clear analytical progression from data extraction to comparative interpretation and finally to recommendation generation.

From a methodological point of view, a qualitative comparative case study design is uniquely suited to exploring phenomena of governance-driven sustainability that are context-dependent and institutionally embedded. Although there is value in using quantitative methods in exploring performance measurement, there is often a lack of nuance

in exploring how policy narratives, strategic priorities, and stakeholder engagement interact in a given context. Accordingly, this design is most suited to analytical depth and contextual interpretation rather than seeking to generalize results statistically.

Moreover, the addition of secondary data analysis is a practical solution that does not compromise academic rigor. Vaasa and Freiburg are both cities that offer a wealth of publicly available documentation on climate strategies, urban planning, and sustainability performance. Such a wealth of documentary evidence makes cross-case comparison possible and provides transparency and rigor to this research design, which is suitable to balance methodological robustness with practical realities of a master's-level research project.

3.3 Case Study Approach

Case studies play an important role in the literature on sustainability and urban governance because of their potential to reflect the complexities, context, and interactions of stakeholders at various levels. This thesis will use a comparative method with two cases, as follows:

Case 1: Vaasa, Finland
A city with strong innovation-oriented sustainability, supported by strong cooperation between the authorities, industry, and the Energy Vaasa cluster.

Case 2: Freiburg, Germany
A well-known green city with a long tradition of participatory governance, ecological living, and community-based sustainability approaches.

The reasons for the choice of these two cases are methodological and conceptual. Although these two cities are considered to be among the best in terms of sustainability, there are many differences in their governance, culture, and stakeholders' influences,

which makes them good cases for comparing the differences and evaluating the impact of these differences on sustainability.

The case study method employed in this thesis is in line with a "theoretical replication" logic rather than a statistical sampling method. The reason for choosing Vaasa and Freiburg is that they represent two different governance models in the larger European sustainability context. The point is not to evaluate which of the two cities performs better but to examine which of the two governance models influences the formulation of stakeholder expectations and sustainability prioritization in a more significant way.

The case study method is particularly useful in analyzing complex governance processes involving multiple stakeholders, overlapping competencies, and changing policy landscapes (Yin, 2018). Sustainable urban building projects are part of such complex processes. Hence, a case study method helps in analyzing the way sustainability is achieved in real-world governance processes, the way stakeholders interact with one another, and the way conflicts are addressed in real-world governance processes.

The two-city case study method increases internal validity by allowing for comparison between two cases in a structured environment without compromising depth in either case. The cases were chosen in line with Yin (2018), who argues that cases should be chosen for their potential to produce contrasting patterns under different contextual circumstances. While both Vaasa and Freiburg are known for their high sustainability ambitions, they have different governance traditions and development drivers. Hence, they are not redundant cases.

The selected cases represent unique paths of maturity for sustainable urban development. Whereas Freiburg is known for its long history of participative environmental culture, Vaasa represents the innovation- and industry-based concept of sustainability. By exploring these different paths of urban sustainability, this study aims to investigate the

role of different institutional structures in shaping the alignment of stakeholder expectations in green urban construction projects.

3.4 Data Sources and Data Collection

The study is based only on secondary data, including publicly available documents and academic literature. Secondary data is found to be suitable for this research, considering the extensive literature available for urban strategies, sustainability, and urban governance in the selected cities.

3.4.1 Types of Data Used

The following types of secondary data are to be included for this study:

1. City documents and strategies, such as:
    - Vaasa Carbon Neutrality Roadmap
    - Vaasa city development strategies
    - Vaasa mobility strategies
    - Freiburg Green City strategy documents
    - Freiburg Vauban and Rieselfeld planning reports

2. Academic literature, such as journal articles, case studies, and books focusing on:
    - Sustainable urban development
    - Stakeholder Theory
    - Governance
    - Eco-Districts

3. NGO reports
    - Social sustainability, stakeholder, and environmental activism reports

4. Industry and clusters

- Particularly for the Energy Vaasa cluster

5. Uploaded materials

- The Sustainability Reporting Guide for Projects (vPMI–GPM)
- Academic reports for Freiburg
- Sustainability report for green construction
- Sustainability report for eco-districts

3.4.2 Data Selection Criteria

The data sources were identified based on the following requirements:

- Relevance to sustainability objectives and stakeholder expectations
- Credibility, verifiable via academic or official publication routes
- Recency, focusing on data published within the last 10-15 years
- Comparability, ensuring the availability of comparable data types for both case study cities
- Traceability, ensuring the data can be traced for supervisory and external reviewer verification

The data set offers sufficient depth to investigate stakeholder expectations and sustainability performance for both case study cities. Data collection followed a systematic review process. First, websites of both cities and official strategy websites were reviewed to gather essential sustainability data, such as climate roadmaps, urban master plans, housing strategies, and mobility strategies. Subsequently, peer-reviewed literature for Vaasa and Freiburg cities was obtained from academic databases such as Scopus and Web of Science. Industry clusters and NGO publications were included to represent non-governmental views.

Each document was considered according to authenticity, publication sources, and relevance to stakeholders' expectations. Those documents failing to explicitly discuss sustainability goals and stakeholders' involvement were discarded. Analysis of documents can provide significant insight into institutional interests and narratives of governance (Bowen, 2009).

To promote transparency, all documents have been compiled in a structured table of references (Appendix B). This is essential to trace and reproduce the research process.
To ensure data coverage, documents have been selected according to explicit criteria. Priority has been given to official documents of urban strategies, sustainability plans, and analyses directly related to urban sustainability goals and stakeholders' involvement. Moreover, there has been an effort to consider documents' temporality to ensure data relevance to current sustainability interests rather than outdated policy views. The selection of multiple types of documents has also been considered to triangulate data collection for each city. This approach can significantly reinforce the reliability of the secondary data foundation of this research.

3.4.3 Data Collection Procedure

The data gathering process was done using a systematic procedure for relevance and consistency. The sources of documents include city websites, institutional publications, and academic literature. Keywords such as "sustainability strategy," "urban development," "carbon neutrality," and "stakeholder participation" were used to find materials pertinent to the study.

Criteria for selecting the documents include:

- Pertinence to sustainability and green building
- Presence of stakeholders' involvement
- Availability of relevant policy, plan, or strategy information
- Credibility and source of the material

Those documents which are not relevant to the sustainability goals of the study and those lacking analytical worth were discarded from the dataset.

3.4.4 Data Coding and Analysis Procedure

The documents collected were coded qualitatively, with an emphasis on key themes that emerged from the study's research questions, such as sustainability goals, stakeholder interests, and governance structures.

The coding process comprised:

- Code sustainability theme categories (environmental, social, economic)
- Code stakeholder information (stakeholders' roles, expectations, influence)
- Classify findings into DMAIC framework phases

All collected data points were coded into one or more phases of the DMAIC framework: Define, Measure, Analyze, Improve, Control. The purpose of this step was to provide a systematic way to analyze each city.

3.5 Stakeholder Identification and Classification

Identification of stakeholders is an essential methodological step within this thesis, as it is considered in relation to the elucidation of sustainability expectations within green urban construction projects. Following the theoretical underpinnings of stakeholder theory and urban sustainability, stakeholders were identified based on their role, level of influence, and level of interest regarding sustainability-based decision-making within Vaasa and Freiburg. This classification provides a systematic base upon which the subsequent steps of the DMAIC model can be applied.

TABLE 1. Stakeholder Identification – Vaasa

STAKEHOLDER GROUP	ROLE IN SUSTAINABILITY PROJECTS	PRIMARY EXPECTATIONS	INFLUENCE LEVEL	INTEREST LEVEL
MUNICIPAL GOVERNMENT (CITY OF VAASA)	Urban planning, policy-setting, carbon-neutral strategy	Technology-driven sustainability, carbon neutrality, smart-city solutions	High	High
ENERGYVAASA (INDUSTRY CLUSTER)	Drives energy innovations, provides tech solutions	Innovation adoption, market competitiveness, renewable integration	Very High	Medium
DEVELOPERS & CONSTRUCTION FIRMS	Build residential & commercial green areas	Clear regulations, cost predictability, incentives	High	Medium
RESIDENTS & COMMUNITY GROUPS	Live in and use the urban spaces	Affordability, inclusiveness, green spaces	Medium	High
NGOS & ENVIRONMENTAL ORGANIZATIONS	Advocate for ecological protection	Biodiversity, stronger environmental actions	Low–Medium	High
UNIVERSITIES (UNIVERSITY OF VAASA, VEBIC, NOVIA)	Research, innovation, pilot projects	Collaboration, research funding, testing environments	Medium	Medium
TRANSPORT AUTHORITIES	Mobility planning	Efficient and green mobility systems	Medium	Medium

TABLE 2. Stakeholder Identification – Freiburg

STAKEHOLDER GROUP	ROLE IN SUSTAINABILITY PROJECTS	PRIMARY EXPECTATIONS	INFLUENCE LEVEL	INTEREST LEVEL
FREIBURG MUNICIPAL GOVERNMENT	Implements sustainability policies, urban master planning	Ecological protection, participation, passive-house standards	High	High
RESIDENTS	Active role in planning and community life	Car-free zones, green mobility, affordability	High	High
NGOS & ENVIRONMENTAL GROUPS (E.G., BUND)	Strong advocacy for ecological policies	Strict environmental protection, biodiversity	Medium	High
COOPERATIVE HOUSING ASSOCIATIONS	Provide affordable, sustainable housing	Long-term affordability, participatory governance	High	High
DEVELOPERS	Construction of eco-districts	Clear rules, manageable costs, flexibility	Medium	Medium
PUBLIC TRANSPORT COMPANY (VAG FREIBURG)	Manages green mobility system	High public usage, funding consistency	Medium	High
ACADEMIC INSTITUTIONS (UNI FREIBURG, FRAUNHOFER)	Research and innovation	Policy collaboration, pilot projects	Medium	Medium

This is shown in the following diagram, which is part of the comprehensive stakeholder analysis presented in Appendix A. The classification of stakeholders was further differentiated based on a power-interest assessment. Although the influence and interest levels of stakeholders were qualitatively assessed based on their roles and positions in governance, they were considered in relation to sustainability and not generally in relation to urban governance. For example, industry stakeholders in Vaasa have high levels of influence based on their economic and technological importance. On the other hand, resident associations in Freiburg have high levels of influence based on their institutionalized participation.

Additionally, stakeholders were classified based on their alignment with sustainability issues, which are environmental sustainability, social sustainability, and economic sustainability. This classification is essential in comparing the levels of expectation concentration in the next stage. For example, industry stakeholders in Vaasa have high levels of alignment with technological and economic sustainability, while resident stakeholders in Freiburg have high levels of alignment with social and environmental sustainability.

3.6 Application of the DMAIC Framework

The DMAIC (Define-Measure-Analyze-Improve-Control) method is utilized in this thesis as a tool for analysis and comparison of stakeholder expectations and sustainability targets in Vaasa and Freiburg. The DMAIC method is traditionally utilized in quality improvement studies; however, it is increasingly being utilized in sustainability studies owing to its potential to structure complex multi-dimensional data into distinct stages of analysis.

3.6.1 Define Phase

In this thesis, the Define Phase is utilized to identify the scope of sustainability targets and identify primary stakeholders in both Vaasa and Freiburg. The Define Phase consists of:

- Identifying sustainability targets in environmental, social, and economic dimensions.
- Identifying primary stakeholders in both Vaasa and Freiburg.
- Identifying the scope of sustainable urban areas under investigation.
- Identifying themes of expectations from urban plans and literature.

The Define Phase is utilized to lay a foundation for comparison of stakeholder expectations in both cities.

3.6.2 Measure Phase

The Measure Phase is utilized in this thesis to gather secondary data from a variety of sources, which include policy documents, sustainability reports, urban development plans, studies on urban mobility, housing reports, and literature. The measurement in this thesis consists of:

- extracting sustainability objectives formulated by city governments
- extracting documented stakeholder expectations
- summarizing sustainability performance indicators (e.g., mobility share, energy usage, CO2 reduction targets)
- linking expectations to sustainability dimensions (TBL/P5)

This phase transforms unstructured data into quantifiable data, which can be analyzed.

3.6.3 Analyze Phase

This phase is concerned with analyzing the alignment and non-alignment between sustainability objectives and stakeholder expectations. The Analyze phase includes:

- comparing expectation patterns between stakeholders
- analyzing structures of city governance
- recognizing conflicts between technological and social expectations
- comparing Vaasa and Freiburg sustainability expectation differences

This phase helps to elucidate the implications of city and cultural influences on sustainability.

3.6.4 Improve Phase

Although this phase is not applied in this research as per the requirements of the thesis, it synthesizes the data and offers possible avenues to improve expectation alignment and sustainability performance. For example:

- improving communication
- improving participation
- improving social sustainability and technological planning

- improving intersectoral collaboration

This phase is essential in informing this research and can be applied in the discussions and recommendations made in the subsequent chapters.

3.6.5 Control Phase

The Control phase identifies the mechanisms used to ensure the continued advancement towards long-term sustainability. For the purpose of the current thesis, the Control phase has the following key elements:

- existing monitoring systems
- long-term sustainability indicators
- institutional frameworks for continuity
- the use of feedback in the governance process

This phase places emphasis on the monitoring and perpetuation of sustainability in each municipality.

TABLE 3. DMAIC Framework Applied to the Study

DMAIC STEP	APPLICATION IN THESIS
DEFINE	Identification of stakeholders, sustainability objectives, and expectation categories.
MEASURE	Extraction of documented expectations from city plans, policies, and sustainability reports.
ANALYZE	Alignment/misalignment analysis using cross-case comparison.
IMPROVE	Proposing targeted strategies for expectation alignment.
CONTROL	Developing long-term governance and monitoring mechanisms.

The application of DMAIC in sustainability research requires interpretation and contextualization. Sustainability governance is not only concerned with normative issues and value judgments; it is also concerned with trade-offs. Hence, this research has applied the DMAIC approach as an interpretive tool rather than using it as a statistical control tool. The Define and Measure steps have relied heavily on document analysis and content coding. The Analyze step has incorporated comparative logic in governance. The

Improve and Control steps have incorporated theoretical knowledge as recommendations rather than interventions. The flexibility of the DMAIC approach as an analytical tool is evident from this application. The approach is project management-based and can be applied to analyze qualitative data as well. The application of this approach has ensured procedural clarity and addressed the multidimensional complexities of sustainability.

3.7 Data Analysis Procedures

The analysis is undertaken in a step-wise manner in conformity with qualitative comparative research. The analysis is achieved through combining thematic interpretation with structured process analysis through the use of the DMAIC framework. Through combining thematic interpretation with structured process analysis, it is ensured that the research is not relegated to a mere narrative form but instead follows a structured analysis approach. Additionally, it is easier to establish traceability between raw documentary evidence and higher-level analysis through the step-wise approach. The sub-sections that follow delineate the various analysis techniques used in more detail.

3.7.1 Document Analysis

Document analysis is used as the key approach for interpreting secondary data. Document analysis is defined by:

- Text analysis for sustainability objectives
- Statements for stakeholder expectations
- Coding of documents for thematic analysis (environmental, social, economic, and governance)
- Categorization of similarities and differences for comparative analysis

Document analysis is used as the key approach for analyzing secondary data. Through document analysis, it is easier to achieve a structured approach for interpreting qualitative data. Document analysis was undertaken through a systematic approach of reading and extracting data to identify sustainability objectives and stakeholder expectations. Particular emphasis was placed on terminology used in policy documents since it often reveals hidden structures of stakeholder expectations that may not be formally stated.
In addition, to enhance the consistency of analysis, the documents from both cities were coded with the same framework based on the constructs discussed in Chapter 2. This helps mitigate any interpretive bias and makes the comparison between the two cases more meaningful. Thus, the document analysis provides the empirical basis for the analysis.

3.7.2 Thematic Coding

A thematic coding process has been followed for the two case studies. The codes include:

- Environmental sustainability expectations
- Social sustainability expectations
- Economic sustainability expectations
- Governance expectations
- Conflicts and alignments between stakeholders

The use of the codes helps identify the patterns, which are crucial for the analysis and comparison. The use of thematic coding followed the process of identifying the patterns and then categorizing them, as recommended by Braun and Clarke (2006). The use of thematic coding followed the iterative process recommended as best practice for qualitative analysis. The initial codes were developed deductively, with emphasis on the environmental, social, economic, and governance dimensions of sustainability.

In order to maintain reliability, the coding strategies were consistently implemented for both sets of data. In situations where there was a level of ambiguity in the data, contextual reading was used rather than relying solely on keyword extraction.

3.7.3 Cross-Case Comparison

Once data analysis for both cities was completed, a cross-case comparison was made. The comparison was made for:

- Similarities in expectations
- Differences in expectations
- Governance impacts on expectations
- Sustainability outcomes related to expectations

The cross-case comparison is beneficial for the study in that it sheds light on contextual influences for sustainability outcomes.

The cross-case comparison utilized a structured matrix method to compare the expectations for Vaasa and Freiburg. This method of analysis is beneficial in that it helps to eliminate impressionistic evaluation of data. The structured matrix method ensures that both sets of data are analyzed in relation to common sustainability dimensions.

The comparison that was carried out was of an interpretive rather than an evaluative nature. The purpose of the comparison was not to evaluate the two cities but to shed more light on the nature of the influence of differing governance configurations in relation to the development of expectations landscapes. This nature of analysis is in keeping with the present trends in comparative urban studies that are more focused on contextual learning than normative comparisons.

3.7.4 Integration with DMAIC

The coded results are then integrated into the DMAIC stages. This is exemplified by:

- Define: stakeholders and objectives
- Measure: sustainability indicators
- Analyze: conflict and alignment
- Improve: potential improvements

- Control: institutional mechanisms

This integration of results into a broader methodological framework ensures a high level of analytical congruence.

In order to enhance a high level of reliability in analysis, coding categories were developed prior to analysis of documents, in keeping with the theoretical framework outlined in Chapter 2. The categories included environmental sustainability, social sustainability, economic sustainability, expectations, and finally, expectations/conflicts.

The cross-case comparison employed a structured matrix approach to comparison. The expectations of Vaasa were compared with those of Freiburg in relation to all dimensions of sustainability.

The convergence of thematic coding with DMAIC stages ensures that analysis is part of a larger whole rather than a fragmented observation. The integration of qualitative data into a DMAIC framework ensures a high level of analytical discipline by linking analysis to a larger process of synthesis. The Define and Measure stages of DMAIC organize data, while the Analyze stage of DMAIC interprets alignment.

The integration of qualitative data into a DMAIC framework is a significant methodological contribution of this study to urban sustainability analysis. The use of a well-structured framework to guide qualitative analysis enhances the overall relevance of the study to project managers and policymakers in urban governance. The use of a well-structured framework to guide qualitative analysis enhances the overall relevance of the study to project managers and policymakers in urban governance. The use of a well-structured framework to guide qualitative analysis enhances the overall relevance of the study to project managers and policymakers in urban governance.

3.8 Ethical Considerations

This research follows the set standards for ethical practice in any academic research. Considering the fact that the research only uses secondary data, the risks are minimal. The principal components include:

3.8.1 No Human Participants

The research does not, in any way, involve human participants, such as interviews, questionnaires, or direct interactions with individuals. Thus, no ethics clearance for human subjects research is required.

3.8.2 Respect for Data Integrity

The use of secondary data is cited with precision to avoid any forms of data misrepresentation. The data has been interpreted with care to respect the purpose of the original authors.

3.8.3 Transparency and Traceability

The data used in the research is publicly available, traceable, and verifiable. This makes the research fully transparent, and the results can be traced and verified by any individual or organization.

3.8.4 Academic Honesty

The research uses only real and verified official or academic documents. There are no instances of data, citation, or any statement from the stakeholders being fabricated in the research.

While the study does not directly involve human subjects, the ethical imperative extends to the accurate portrayal of institutional and stakeholders' positions. Every attempt has

been made to avoid the selective use of documents or the overgeneralization of information based on isolated statements. Wherever there has been the presentation of contrasting positions in the literature, these have been recognized and not ignored.

Furthermore, the use of references adheres to the requirements of academic integrity and traceability. The use of exclusively verifiable and publicly available documents strengthens the ethics and transparency of the research.

While the direct involvement of human subjects has been avoided, the need for ethical rigor has been maintained in the interpretation and presentation of documentary evidence. Every attempt has been made to avoid the selective use of quotations or the overinterpretation of the meaning of the documents, which could be interpreted as distorting the institutional positions. The need to be faithful to the meaning of the documents has been particularly important in the context of governance, where the use of language could imply subtle meanings.

Furthermore, the use of exclusively verifiable and publicly available documents strengthens the transparency and auditability of the research. Future researchers will be able to use the set of documents and assess the use of the analytical reasoning used in the present study. This strengthens the credibility and ethical robustness of the thesis.

3.9 Research Limitations

Acknowledging these limitations is a common practice in academic research. The limitations of this research are as follows:

3.9.1 Dependence on Secondary Data

The research is based on documented sources, which limits the ability to incorporate views of stakeholders not documented in public sources.

3.9.2 Variation in Data Quality Between Cities

One of the main limitations of the research is associated with the differences in the accessibility, volume, and type of secondary sources in both case cities. For example, Freiburg offers an ample number of publicly accessible documents, such as urban planning documents, sustainability measurement frameworks, and documents related to stakeholder participation. Meanwhile, Vasa tends to have a greater number of documents that refer to strategic planning initiatives and energy industry journals, rather than to stakeholder involvement.

This difference can impact the extent and nature of the analysis. Thus, Freiburg has enough data for the detailed analysis of social sustainability and stakeholder involvement, while Vasa tends to focus on innovative solutions and economics-based sustainability. Hence, the depth and volume of the analysis are not equally distributed among the two case cities.

3.9.3 Lack of Primary Data Verification

Since this research is not based on primary data collection methods, it is limited to the accuracy of documented sources.

3.9.4 Limited Scope to Urban Areas

Since this research is limited to urban areas and does not incorporate policies and practices in rural areas or beyond city limits, it is limited in that aspect.

3.9.5 Non-Generalizable Findings

Since this research is based on qualitative methods, it is not possible to generalize this research to all cities.

Another limitation, which could be considered, has to do with the lack of primary interviews with stakeholders, which might have provided more in-depth information on the dynamics of informal expectations and perceptions. Although secondary data has the advantage of being documented, sometimes tensions and conflicts, which are not documented, might not be considered.

Another limitation, which might be considered, has to do with the specificity of the contexts in which Vaasa and Freiburg operate. Both are located in different countries with different policy, economic, and cultural contexts. These factors might influence the results and limit their generalizability to contexts outside these specific European settings. Despite these limitations, the structured and comparative approach, as well as the use of theory, allow for analytically valid and academically credible results.

Another limitation, which might be considered, has to do with the interpretive nature of the analysis of secondary data, which might be considered biased, despite the use of transparent and codified procedures. To avoid such limitations, the use of clear and codified categories has been followed, and the results have been checked against the use of additional secondary data.

The comparison with two European cities might be considered limited, and the results might not be applicable to contexts outside these specific settings, considering the institutional context and the specific conditions in each country, which might be considered favorable or unfavorable to the development of sustainability governance.

3.10 Chapter Summary

This chapter outlines the methodologies used in the thesis. For instance, it is clear that the research used a qualitative comparative approach with Vaasa and Freiburg serving as the case study. Additionally, it is apparent that the research is based solely on secondary data. On the other hand, the DMAIC framework provides a structured approach for

analyzing data at every step of the way. Finally, it is clear that the methodologies used in the thesis address all ethical and potential limitations in order to ensure transparency and academic rigor. Therefore, it is apparent that the methodologies used in the thesis provide a solid foundation for analysis in Chapter 4.

Overall, Chapter 3 provides a methodological framework for analyzing stakeholder expectations in green urban construction in a coherent and comprehensive manner. For instance, it is apparent that the use of qualitative comparative analysis in conjunction with the DMAIC framework provides a comprehensive framework for analysis. By combining theories of stakeholders with sustainability and structured analysis of process, it is apparent that Chapter 4 of the thesis provides systematically derived and theoretically grounded empirical analysis of stakeholder expectations in green urban construction.

Overall, it is apparent that the methodological framework for analysis presented in Chapter 3 of the thesis provides a coherent and transparent framework for analysis of stakeholder expectations in green urban construction. For instance, it is apparent that the use of qualitative comparative analysis in conjunction with structured analysis of process provides a comprehensive framework for analysis of stakeholder expectations in green urban construction. Therefore, it is apparent that Chapter 4 of the thesis provides systematically derived and theoretically grounded empirical analysis of stakeholder expectations in green urban construction.

The next chapter of the thesis provides empirical analysis of stakeholder expectations in green urban construction in Vaasa and Freiburg. For instance, it is apparent that Chapter 4 of the thesis provides analysis of how stakeholder expectations align and diverge in Vaasa and Freiburg in order to elucidate sustainability performance in green urban construction projects.

4 CHAPTER 4 - FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the empirical findings of the study, guided by the DMAIC analytical framework. The study relies exclusively on secondary data sources, including municipal documents, sustainability strategies, academic literature, technical reports, and publicly available data sources for Vaasa and Freiburg. This chapter seeks to answer the following questions: (1) sustainability objectives in Vaasa and Freiburg, (2) stakeholder expectations, (3) alignment/misalignment between stakeholder expectations and sustainability objectives, and (4) the role of governance in sustainability performance.

The chapter begins with the Define and Measure phases of the DMAIC framework, followed by the Analyze, Improve, and Control phases. Instead of merely describing sustainability strategies, this chapter critically examines the relationship between stakeholder expectations and sustainability objectives. By using the DMAIC framework to guide the empirical analysis, this study can guarantee the consistency of expectation identification, measurement, and alignment analysis. This study, therefore, moves beyond descriptive analysis to critical interpretation of the role of governance in sustainability performance.

The chapter follows logical steps to present the findings of the study. First, this chapter delineates sustainability objectives in Vaasa and Freiburg. Second, this chapter measures stakeholder expectations and categorizes them. Third, this chapter analyzes the alignment/misalignment between stakeholder expectations and sustainability objectives. Fourth, this chapter synthesizes the findings for improvement. This logical sequence of presentation ensures the consistency of theoretical constructs and empirical findings.
This chapter applies the theoretical and methodological framework developed in the preceding chapters to the empirical context of Vaasa and Freiburg. By applying the DMAIC framework to guide the empirical analysis, this study moves beyond descriptive narration of case study findings to systematic diagnosis of stakeholder expectations.

Empirical material for the analysis is largely based on strategies, sustainability roadmaps, scholarly studies, and institutional reports. Emphasis is placed on the formulation of sustainability objectives, the manner in which different stakeholder groups articulate their needs and concerns, and the potential areas of tension. The following sections describe the findings for each phase, commencing with the Define stage.

These results have been drawn through an organized process of document analysis conducted in the course of this chapter. The analysis was carried out using the DMAIC model where the data gathered from the chosen documents and reports was analyzed according to the sustainability goals, expectations, and patterns of fit. In order to maintain the integrity of the research, there is a clear link between data and output provided.

4.2 DEFINE Phase: Sustainability Objectives and Stakeholder Mapping

In the Define phase, the sustainability objectives set by each city are delineated, and the major stakeholders involved in the process of sustainable city construction are identified. This phase helps to establish the analysis boundaries for the research and sets the stage for the comparative analysis between Vaasa and Freiburg.

The secondary data used in this study have been categorized for increased transparency and accountability regarding the research process. The relevant objectives of sustainability, stakeholder involvement, and governance have been noted from each document studied. Table 5 shows an overview of the various sources of data used in the study, along with the information drawn from them and the phases of DMAIC they influenced.

TABLE 4. Data Sources and Their Use in the Analysis

SOURCE DOCUMENT	TYPE OF DATA	SECTION/PAGE	EXTRACTED INFORMATION	DMAIC PHASE USAGE
VAASA CARBON NEUTRALITY ROADMAP	Policy strategy	Sections on climate targets	CO_2 reduction goals, energy transition priorities	DEFINE, MEASURE
VAASA CITY STRATEGY 2022–2030	Strategic document	Sustainability and development sections	Economic growth and sustainability integration	DEFINE
ENERGY VAASA PUBLICATIONS	Industry reports	Various sections	Role of energy cluster stakeholders, innovation focus	DEFINE, ANALYZE
FREIBURG GREEN CITY STRATEGY DOCUMENTS	Urban planning policies	Environmental and mobility sections	Ecological planning, transport systems, renewable energy	DEFINE, MEASURE
FREIBURG PARTICIPATION REPORTS	Governance documents	Citizen engagement sections	Stakeholder participation models and expectations	ANALYZE
COMPARATIVE SUSTAINABILITY LITERATURE	Academic sources	Relevant theoretical sections	Frameworks for stakeholder alignment and governance	ANALYZE, IMPROVE

This structured approach ensures that the analysis is traceable and that each finding presented in this chapter can be linked back to specific documented sources.

4.2.1 Sustainability Objectives in Vaasa

For the identification of sustainability objectives in Vaasa, we conducted an extensive analysis of secondary sources of information including Vaasa's Carbon Neutrality Roadmap, City Strategy 2022-2030 and publications from Energy Vaasa. The choice of these sources depended on the importance of the information provided and its relation to urban sustainability.

From each source, we have identified the main aspects of sustainability mentioned and related to carbon neutrality, energy transition strategy, and economic growth, among others. In this way, we were able to classify the data according to different sustainability dimensions: environmental, social, and economic, which will be used in the DEFINE stage of the DMAIC method.

Table 4 shows the details about the sources of information, the information extracted, and its contribution to the analysis.

Environmental Objectives

- Achieve carbon neutrality by 2035
- Expand renewable energy integration in municipal infrastructure
- Improve building energy efficiency
- Develop smart energy solutions and digital monitoring tools
- Promote low-emission solutions in mobility

Social Objectives

- Improve accessibility and livability through mobility planning
- Promote inclusion and equality in urban development
- Expand public services in new residential areas

Economic Objectives

- Reinforce Vaasa's role as the Nordic innovation hub in energy
- Support industrial development and export-oriented energy solutions
- Promote innovation partnerships between public and private actors

Governance Objectives

- Develop cross-sector collaboration
- Support data-driven planning
- Develop transparency in sustainability monitoring

The sustainability objectives identified are in line with an innovation-driven sustainability paradigm and are supported through industry collaboration. The sustainability objectives identified are environmental and are closely related to the energy transition. The policy documents repeatedly highlight carbon neutrality, renewable energy integration, and innovation as core themes. This is closely related to Vaasa's role as an energy technology innovation hub, where environmental sustainability is closely linked to economic competitiveness.

In addition to environmental objectives, economic sustainability objectives are found to be derived from the use of innovation ecosystems, export performance, and regional employment. Social sustainability objectives are present but to a lesser extent in strategic emphasis. This illustrates the structural integration of environmental and economic sustainability, while social sustainability could be acting in a secondary rather than leading role.

The sustainability objectives identified within Vaasa highlight the structural integration of environmental and economic sustainability. Environmental sustainability objectives, such as carbon neutrality, are found to be closely integrated with innovation ecosystems and industrial competitiveness. This illustrates sustainability acting as a strategic growth enabler rather than purely an environmental imperative. Social sustainability objectives, while present, are to a lesser extent integrated within formal strategic emphasis. This illustrates the presence of a governance structure where technological and economic viability are key influencers of sustainability definition.

Documentary analysis has identified Vaasa's sustainability narrative to be strongly influenced by the use of the energy transition and technological innovation narrative. Vaasa's strategic documentation consistently refers to the importance of carbon neutrality, smart energy integration, and industrial collaboration within the city's development

pathway. This illustrates the structural influence of the EnergyVaasa cluster and the city's position within the energy-technology sector.

In contrast, social sustainability elements such as urban livability, housing accessibility, and mobility services are present within the city's planning narrative but to a lesser extent within formal innovation emphasis. This illustrates the possibility of asymmetry within the prioritization of sustainability elements, which could have implications for stakeholder expectations within the latter phases of project implementation.

4.2.2 Sustainability Objectives in Freiburg

Based on the Freiburg Green City Strategy and planning documents of Vauban and Rieselfeld, and supported by related literature, it can be observed that Freiburg prioritizes ecological integrity, participatory governance, and socially inclusive urban development.

Environmental Objectives

- Reduction of carbon emissions through low-car and car-free mobility
- Implementation of passive house and energy-efficient building standards
- Preservation and expansion of biodiversity
- Promotion of renewable energy
- Reduction of land use and urban sprawl

Social Objectives

- Fostering participation in planning processes
- Supportive of cooperative and affordable housing
- Fostering social inclusion and equitable access to public spaces and services
- Fostering community identity and local governance

Economic Objectives

- Supportive of sustainable local economies
- Supportive of small-scale and community-oriented development initiatives

- Supportive of energy-efficient building concepts and affordable housing

Governance Objectives

- Institutionalizing participatory planning
- Using neighborhood councils and citizen assemblies
- Fostering transparency and public accountability

Freiburg's sustainability objectives are based on a sustainability approach that is socially and environmentally oriented and is based on long-term engagement and participation of the community.

Comparing Freiburg and Vaasa, it can be observed that Freiburg's sustainability objectives are more integrated in terms of environmental protection and social inclusion. The city has adopted environmental building standards, low-car and car-free mobility, and biodiversity preservation, along with participatory planning and social inclusion. Economic sustainability is based on long-term affordability and ecological efficiency rather than industrial sustainability and innovation.

Compared to Vaasa, it can be observed that Freiburg's sustainability approach is more integrated and includes environmental and social sustainability. The city has emphasized low-car and car-free mobility, environmental building standards, and biodiversity preservation, along with participatory planning and social inclusion. The sustainability approach is more integrated and includes environmental and social sustainability. The city has adopted environmental building standards, low-car and car-free mobility, and biodiversity preservation, along with participatory planning and social inclusion. The sustainability approach is more integrated and includes environmental and social sustainability, which is based on environmental culture and long-term engagement and participation of the community.

In spite of Freiburg's well-established and comprehensive sustainability model, there are still some underlying tensions that exist, such as those relating to housing and growth control. While there is broad support for environmentalism, there is still some tension and debate over balancing environmentalism with growth control. To understand these underlying dynamics is important so that there is not an overly idealistic assessment of the alignment of stakeholder expectations, such as those represented by the Freiburg model.

4.2.3 Stakeholder Mapping for Vaasa

Stakeholders were identified through documents published by the city, cluster publications, housing strategies, and mobility strategies, and sustainability reports.

Primary Stakeholders:

Municipality of Vaasa: Responsible for sustainability policy formulation, mobility strategies, land use strategies, and carbon neutrality targets.

Companies operating in the Energy Vaasa cluster: Have significant influence on technology innovation, smart energy initiatives, and renewable energy.

Construction companies and developers: Influence building and housing strategies and the implementation of energy-saving technologies.

Residents and neighborhood associations: Have certain expectations regarding housing, mobility, and community services.

Environmental NGOs: Influence environmental and biodiversity considerations, albeit less so than Freiburg.

Universities and research centers (e.g., University of Vaasa): Provide knowledge and research support for energy innovation and sustainability monitoring.

This is also reflected in the Vaasa configuration of stakeholders, which shows a rather centralized structure of influence. The city authorities and companies within the EnergyVaasa cluster hold significant power and legitimacy. The inhabitants and NGOs are represented within this planning process but hold lower levels of influence. This configuration suggests that expectation articulation in Vaasa is likely to be dominated more by institutional and industrial stakeholders than by initiatives within society.

4.2.4 Stakeholder Mapping for Freiburg

Stakeholders have been identified based on reports produced by city authorities, eco-district initiatives, and participatory governance practices.

Primary Stakeholders:

Municipality of Freiburg: Drives sustainability planning, environmental policy development, and housing strategies.

Resident associations and cooperatives: Hold high levels of influence within Vauban and Rieselfeld projects.

Environmental NGOs and citizen initiatives: Have historically high levels of influence since the 1970s.

Urban planning professionals: Work closely with stakeholders within participatory planning processes.

Developers and housing cooperatives: Tend to be based on social and ecological design rather than financial gains.

Research institutions (e.g., Fraunhofer Institute): Have expertise in renewable energy and building ecology.

In Freiburg, there is also a greater dispersal of stakeholder influence. Resident associations and housing cooperatives are also seen to have significant legitimacy and decision-making power, such as with regard to eco-district developments such as Vauban. Environmental NGOs also played a significant role in the city's sustainability policy and have helped instill a culture of ecological accountability. This is also seen to institutionalize stakeholder expectation articulation, transparency, and possibly alignment.

Stakeholder analysis for both Vaasa and Freiburg is seen to demonstrate the complex stakeholder landscape that is often seen with contemporary sustainability initiatives. While the core stakeholder groups are the same (local authorities, developers, utilities, residents, and civil society) there are significant differences in terms of stakeholder influence and prioritization between Vaasa and Freiburg.

Stakeholder salience is also seen to be influenced by governance culture and developmental history. In Freiburg, community and resident associations are seen to have greater influence, reflective of the city's participatory culture. In Vaasa, industry and energy companies are seen to be more central to the sustainability governance landscape. These are significant differences and provide the crucial backdrop for examining expectation alignment in the next phases.

4.2.5 Summary of DEFINE Phase Findings

In the Define phase, there are significant differences observed:

Vaasa:

- Innovation-led sustainability
- High influence of industry

- Moderate influence of community
- Emphasis on technology-led solutions

Freiburg:

- Participatory approach to community-led sustainability
- High influence of environmental activism
- Established history of prioritizing social and ecological values
- High influence of community and environmental NGOs

In the Define phase, it is observed that while both Vaasa and Freiburg are committed to sustainability, there are significant differences between the governance logics and structures. Vaasa is technology-led and industry-led, whereas Freiburg is participatory-led and community-led.

4.3 MEASURE Phase: Sustainability Indicators and Expectation Themes

The Measure phase of this process is responsible for identifying and organizing documented indicators and expectation themes in both of these municipalities. In this phase, sustainability objectives are extracted from official city documents and then grouped under environmental, social, and economic sustainability objectives. This threefold categorization of sustainability objectives is essential for the comparative analysis of stakeholder expectations in Vaasa and Freiburg.

The process of measurement requires the systematic extraction of sustainability objectives and statements of expectations from official city documents, reports, and statements, along with relevant literature from scholarly sources. This process of categorization helps in avoiding the selective analysis of sustainability objectives.

TABLE 5. Sustainability Objectives (Environmental, Social, Economic) – Comparative

OBJECTIVE CATEGORY	VAASA	FREIBURG
ENVIRONMENTAL	Smart energy systems, carbon neutrality, renewable integration	Passive-house standards, biodiversity, reduced car mobility
SOCIAL	Liveability, digital accessibility, service availability	Participation, affordability, community cohesion
ECONOMIC	Innovation-driven growth, tech development	Long-term affordability, small local economy, eco-tourism
GOVERNANCE	Institutional planning + tech governance	Participatory planning + community-led governance

This categorization is the basis for the alignment analysis in the next phase.

4.3.1 Sustainability Indicators for Vaasa (Based on Secondary Data)

Environmental Indicators

- Target year for carbon neutrality: 2035
- Proportion of renewable electricity: high, owing to wind generation in the region
- Building energy consumption standards (municipality's efficiency targets)

Mobility Indicators

- Increasing share of public transportation and cycling
- Development of low-emission mobility infrastructure
- Smart mobility through EnergyVaasa collaboration

Housing Indicators

- Energy efficiency in new housing districts
- Focus on smart heating and district energy solutions

Governance Indicators

- Collaboration between municipality and industry
- Digital monitoring through smart energy solutions

The sustainability indicators for Vaasa highlight the importance of quantified environmental performance, with particular emphasis placed on energy and emission reduction targets. Social sustainability is not as quantified and is often included in more general urban development strategies. This may highlight that the quantified approach to sustainability is more systematically applied in terms of environmental-economic sustainability compared to social sustainability in Vaasa's sustainability monitoring framework.

Evaluating the expectations of various stakeholders with regard to Vaasa indicates that there is an overriding focus on technological performance and competitiveness. Industry and municipal strategies consistently highlight innovation potential, energy efficiency, and carbon reduction metrics as critical success factors for sustainability. These expectations strongly resonate with Vaasa's position within the broader Nordic energy transition landscape.

Nevertheless, available documentary evidence indicates an emerging focus on social aspects such as urban accessibility, serviceability, and liveability. Although evident, there is an apparent disparity with regard to the level of integration of social aspects compared to technological aspects. Such imbalances may indicate latent expectation gaps with regard to various institutional and community-based stakeholders.

4.3.2 Sustainability Indicators for Freiburg (Based on Secondary Data)

Environmental Indicators

- Significant level of bicycle mobility with 30-35% modal split of districts
- Strict passive house building standards applied to Vauban and Rieselfeld districts
- Low car ownership and car-free districts
- Emphasis on biodiversity

Social Indicators

- High participation rates in neighborhood planning

- Widespread uptake of cooperative housing
- Emphasis on urban spaces

Housing Indicators

- Community-oriented housing
- Low-cost cooperative housing

Governance Indicators

- Formal participation
- Citizen assemblies
- Long-term continuity of sustainability policy

The data on Freiburg indicates an increased emphasis on the performance of social sustainability, particularly with regard to the modal share of mobility, participatory planning processes, and housing models. The environmental performance indicators are more closely linked to behavioral changes, such as increased rates of cycling and decreased dependency on automobiles, than to technological solutions. Overall, the data on Freiburg indicates that the performance of sustainability in the city is tracked on both structural and behavioral levels.

The measurement environment in Freiburg presents a relatively balanced mix of environmental and social sustainability performance indicators. For instance, policy reports, results of eco-district assessments, and academic studies tend to identify the interconnectedness of urban mobility, community engagement, energy performance, and quality of life. This multi-dimensional approach to urban performance measurement appears to foster the development of greater transparency with regard to the expectations of the various stakeholders.

However, the literature suggests that the balance between these factors becomes increasingly difficult to manage with the growth and development of the urban environment and the increased pressures on the demographic composition of the urban population. These factors indicate that the alignment of the expectations of the stakeholders in Freiburg should be recognized as an active process, as opposed to one which can be structurally secured.

4.3.3 Stakeholder Expectation Themes in Vaasa

Grouped according to the TBL/P5 model:

Environmental Expectations

- reduction of emissions with technological solutions
- integration of smart grid technology and renewable energy solutions
- improving building efficiency

Social Expectations

- improving the quality of urban mobility solutions
- accessible urban spaces
- quality of life in new urban districts

Economic Expectations

- creating jobs with innovation solutions
- fostering a competitive energy industry
- cost-efficient urban solutions

Governance Expectations

- transparent urban planning processes
- industry cooperation
- data-based monitoring of sustainability performance

4.3.4 Stakeholder Expectation Themes in Freiburg

Environmental Expectations

- enhanced ecological protection
- expansion of green mobility
- stringent building efficiency standards

Social Expectations

- ownership and participation of the community
- affordable cooperative housing
- social and cultural cohesion

Economic Expectations

- long-term energy savings
- promotion of local, small-scale economies

Governance Expectations

- participatory decision-making
- co-creation in neighborhood planning
- strong mechanisms of accountability

4.3.5 Summary of MEASURE Phase Findings

Some significant differences can be noted between the two contexts under investigation:

- Vaasa Stakeholders' emphasis is on technology, innovation, and economic sustainability; moderate emphasis on social expectations.
- Freiburg Stakeholders' emphasis is on ecological integrity, social cohesion, and participatory governance; economic sustainability is considered as supporting long-term well-being.

The indicators and expectation themes identified above shall form the basis of the Analyze Phase.

4.4 ANALYZE Phase: Alignment and Misalignment of Stakeholder Expectations

The Analyze phase measures the degree to which there is alignment between, or lack of alignment between, the sustainability goals of Vaasa and Freiburg and the expectations of stakeholders. The assessment is based on themes identified in the Define and Measure phase and examines the degree to which governance patterns, cultural influences, and structural factors impact expectation patterns in Vaasa and Freiburg. The assessment is based on four types of expectation patterns: environmental, social, economic, and governance.

The Analyze phase moves beyond the identification of sustainability goals and expectation patterns to examine the degree and nature of alignment between them. The alignment is examined along environmental, social, and economic sustainability factors, as well as governance transparency. The phase does not simply presume alignment between sustainability discourse and expectation patterns; rather, it systematically identifies whether there is convergence between expectation patterns.

The analysis is based on a comparison of intra-case alignment and inter-case differences between Vaasa and Freiburg.

4.4.1 Environmental Expectation Alignment

Vaasa

Vaasa has high levels of alignment in terms of technology-based environmental sustainability. For instance:

- The carbon neutrality objective towards 2035 is in line with the objectives of Energy Vaasa on integrating renewables and smart energy systems.

- Developers are supportive of energy-efficient buildings if the standards are compatible with the requirements of market competitiveness and regulatory requirements.
- Residents are optimistic about the reductions in emissions, but their role in influencing environmental strategies is relatively low.

Misalignment

- Environmental NGOs often expect more robust biodiversity and ecological restoration than the current municipal strategy suggests.
- Residents sometimes expect more in terms of green space than technology solutions alone.

Freiburg

Freiburg has high levels of alignment with respect to environmental expectation levels. For instance:

- Residents, NGOs, and urban planners share the same expectations with respect to car-free mobility, high levels of building efficiency, and strong ecological requirements.
- Passive houses and green corridors reflect the traditional community-based values on sustainability.

Misalignment

- Developers sometimes face problems in meeting high levels of ecological requirements, which sometimes creates tension with respect to cost and regulatory requirements.
- There are sometimes tensions with respect to the extension of car-free zones, which sometimes affects the interests of the community, particularly those relying on cars for work.

Comparative Insight

On a broader level, it is found that Freiburg shows stronger alignment in terms of environmental expectations, which is a result of its environmental culture and participatory governance arrangements. In Vaasa, alignment is found among institutional and industrial actors, with residents showing relatively less influence.

4.4.2 Social Expectation Alignment

Vaasa

In Vaasa, there is a relatively low level of alignment with social expectations compared to environmental and economic aspects:

- Municipal goals focus on improving accessibility, providing mobility services, and enhancing livability.
- Citizens demand better service quality with regard to equity, better public transportation services, and housing affordability.
- Industry stakeholders place less emphasis on social sustainability and focus on technological feasibility and economic results.

Consequently, there is moderate misalignment between citizen expectations and municipal goals, especially regarding:

- Affordability
- Inclusiveness
- participation in municipal planning

Freiburg

Freiburg has a very high level of alignment with social sustainability expectations:

- Citizens, housing cooperatives, and the municipality focus on social aspects such as social cohesion and affordability.
- Cooperative housing projects meet all stakeholders' expectations regarding affordability and participation in municipal planning.
- Public spaces and urban planning have been developed with reference to community values.

Misalignment

- Pressures on housing demand and population growth negatively impact affordability, creating an occasional conflict with social sustainability goals.

Comparative Insight

Freiburg has a higher level of alignment with social sustainability expectations compared to Vaasa. In Freiburg, participatory governance ensures that community values are prioritized during planning decisions. In Vaasa, municipal goals do not fully align with citizen expectations.

4.4.3 Economic Expectation Alignment

Vaasa

Vaasa exhibits a high level of agreement with anticipated economic outcomes:

- Industry stakeholders expect improvements in technological innovation and competitive growth.
- Municipal policies align with goals of a green economic growth strategy, export potential, and investment attraction.
- Research institutions reinforce these goals through cooperation with EnergyVaasa.

Misalignment

- Vaasa's citizenry may not prioritize economic competitiveness to the level that institutional actors do.
- Community expectations that are in conflict with Vaasa's economic goals include housing affordability.

Freiburg

Freiburg's economic expectations are relatively low and socially focused:

- Industry stakeholders anticipate long-term cost savings that result from energy-efficient housing and transportation.

- Prioritization of small-scale enterprises is consistent with social and ecological values.

Misalignment

- Developers of Freiburg's economy may experience economic limitations imposed by stringent ecological and participatory policies.
- Housing demand is a concern to long-term affordability expectations.

Comparative Insight

A comparison of Vaasa and Freiburg reveals that Vaasa exhibits a higher level of economically focused goals, while Freiburg exhibits a higher level of socially and ecologically focused economic expectations.

4.4.4 Governance Expectation Alignment

Vaasa

Vaasa's partial governance alignment is characterized by:

- The shared expectations of the municipality and industry actors in terms of efficient decision-making processes.
- The integration of digitalization and smart planning processes in municipal governance.

On the other hand, misalignments in Vaasa's governance are:

- The expectations of residents in terms of a higher level of participatory involvement.
- The expectations of non-governmental organizations in terms of a higher level of ecological governance structures.

Freiburg

Freiburg's governance alignment is characterized by:

- The institutionalization of participatory governance in terms of planning councils

in neighborhoods.

- The expectations of residents in terms of participatory governance.
- The institutional authorities' recognition of participatory governance structures in terms of sustainability identity.

Misalignments in Freiburg's governance are:

- The challenges of urban development, which make it difficult to maintain participatory participation at a high level.

Comparative Insight

Freiburg's governance alignment is high due to the integration of participatory governance, whereas Vaasa's governance is characterized by institutional alignment with low levels of integration of residents' expectations.

4.4.5 Sources of Expectation Alignment and Misalignment

Overall, in both of the case study cities, it is clear that alignment or misalignment is driven by a series of interplaying factors related to governance, culture, economics, and technology.

Factors Promoting Alignment

- Presence of a robust sustainability culture (Freiburg)
- Long-term commitment to sustainability (both cities)
- Presence of clearly defined technological and environmental goals (Vaasa)
- Presence of effective communication and participation structures (Freiburg)

Factors Contributing to Misalignment

- Presence of unequal power dynamics between stakeholders (Vaasa: industry stakeholders more dominant)
- Presence of regulatory drivers in excess of developer capabilities (both cities)
- Presence of social sustainability drivers in contrast to economic sustainability

drivers (Freiburg: affordability)

- Presence of technological drivers in excess of social sustainability drivers (Vaasa)

Vaasa

The analysis of alignment in Vaasa reveals that there is considerable alignment between municipal authorities and industrial stakeholders in relation to sustainability drivers. In particular, it is noted that municipal authorities and industrial stakeholders share mutual sustainability priorities in relation to energy transition and technological innovation. This is likely to reduce the potential for short-term conflict in strategic decision-making between stakeholders.

However, it is noted that social sustainability drivers are less clearly articulated in official documentation. Although no conflict is noted in official documentation, it is observed that social sustainability drivers are less clearly articulated in official documentation compared to technological and environmental sustainability drivers. This may indicate potential misalignment between stakeholders in relation to social sustainability drivers in Vaasa.

Overall Assessment

The analysis reveals that Vaasa demonstrates relatively high levels of alignment between municipal authorities and industrial stakeholders in relation to technological sustainability drivers. This is likely to support the effective delivery of energy transition drivers and technological innovation drivers in Vaasa and support the city's reputation for innovation in technology and energy transition. This is likely to represent a key strategic strength in relation to urban governance in Vaasa.

However, it is noted that potential areas of misalignment between institutional priorities and social sustainability drivers related to livability and affordability in Vaasa may be present. Although not necessarily representing overt areas of conflict, it is noted that latent

areas of misalignment may represent potential areas of conflict in relation to future urban development in Vaasa.

Freiburg

Freiburg presents a relatively high level of integration in environmental and social sustainability expectations. Mechanisms of participatory planning processes institutionalize citizen involvement, thus reducing ambiguity in expectations. Environmental expectations are generally shared among municipal authorities, civil society, and planning institutions.

However, environmental expectations are likely to create structural economic conflicts, especially in housing affordability and development pace. Transparency in governance processes reduces conflict, but balancing long-term environmental and economic expectations is a key challenge in sustainability governance.

Comparing expectations in Freiburg and Vaasa, it is apparent that expectations in Freiburg are relatively more diffused across various stakeholder groups rather than being concentrated in institutional-industrial groups.

Freiburg presents a relatively high level of expectation alignment in environmental and social sustainability dimensions, mainly driven by its institutionalized participatory governance tradition. Early involvement of stakeholders in the development of eco-districts is likely to reduce resistance and increase the legitimacy of ambitious sustainability policies. This is consistent with findings in participatory urban governance (Scheurer & Newman, 2009).

However, emerging pressure points in Freiburg's sustainability governance indicate that even in relatively high levels of expectation alignment, there is a constant need to adjust governance processes. Expectation alignment in Freiburg is thus a dynamic and conditional concept rather than a static concept.

4.4.6 Cross-Case Comparison: Key Findings

A structured comparison highlights the core differences:

TABLE 6. Comparative Highlights between Vaasa and Freiburg

DIMENSION	VAASA	FREIBURG
ENVIRONMENTAL ALIGNMENT	Strong among institutions, weaker with residents	Strong across all stakeholder groups
SOCIAL ALIGNMENT	Moderate; gaps in affordability and participation	High; participation embedded
ECONOMIC ALIGNMENT	Strong (innovation-driven)	Moderate (socially oriented, less growth-focused)
GOVERNANCE ALIGNMENT	Strong among institutions; weaker with community	Strong, participatory, long-term

Overall, it appears that Freiburg presents more of a holistic approach to alignment, while Vaasa presents more of a sectoral approach with industry and municipal influences. The cross-case analysis demonstrates how the structure of governance and urban development influences the formation of stakeholder expectations. Vaasa presents more of a techno-economic approach with industry influences, while Freiburg presents more of a socio-environmental approach with influences related to participatory traditions of governance. Significantly, it is noted that neither model is better or worse; it is more a question of strengths and weaknesses. For Vaasa, it is noted that rapid technological implementation is a strength but social alignment is a potential weakness, while for Freiburg it is noted that it has high levels of legitimacy but must manage trade-offs associated with growth. This cross-case analysis supports the use of expectation-focused analysis in better understanding sustainability performance.

4.4.7 Implications of Misalignment

There are various implications of misalignment that impact sustainability performance. These include:

- Residents in Vaasa may not feel part of the decision-making process and therefore social cohesion may suffer.

- Developers in Freiburg may face costs that impact affordability.
- Industry may dominate in Vaasa and ecological considerations may not be relevant.
- Community may dominate in Freiburg and decision-making may be slowed with longer project implementation times.

This demonstrates the importance of managing expectations in sustainability performance and is discussed in more detail in the Improve and Control phase.

TABLE 7. Stakeholder Expectation Alignment Matrix

DIMENSION	VAASA: ALIGNMENT LEVEL	FREIBURG: ALIGNMENT LEVEL	EXPLANATION
ENVIRONMENTAL	Medium	Very High	Freiburg's environmental identity creates shared values; Vaasa aligns institutionally but less with residents.
SOCIAL	Low–Medium	High	Vaasa lacks participation; Freiburg embeds it.
ECONOMIC	High (tech growth)	Medium (social economy)	Vaasa pushes innovation; Freiburg balances economy with social values.
GOVERNANCE	Medium	High	Freiburg's participatory model = stronger expectation coherence.

TABLE 8. Case Comparison Summary – Vaasa vs. Freiburg

FACTOR	VAASA	FREIBURG
SUSTAINABILITY MODEL	Technology-driven	Ecology-driven + socially driven
GOVERNANCE MODEL	Hybrid, institutional	Participatory democratic
STAKEHOLDER PARTICIPATION	Moderate	Very high
HOUSING MODEL	Market-driven	Cooperative & affordable
MOBILITY	Smart mobility development	Car-free priority
ENVIRONMENTAL STANDARDS	High (tech)	Very high (eco-regulation)

Moreover, cross-case analysis shows that sustainability alignment is not uniform but depends on context. Vaasa has an innovation-centered alignment model, in which environmental and economic sustainability are structurally integrated. On the other hand, Freiburg has a participatory-ecological alignment model, which is characterized by the integration of environmental and social sustainability.

Alignment intensity varies not based on sustainability ambitions but is influenced by the governance structure, which in turn influences channels of articulating expectation. For Vaasa, alignment is concentrated among institutional and industrial actors. On the other hand, alignment is diffused in Freiburg through participatory governance.

This shows evidence of the proposition that governance architecture significantly influences expectation convergence.

4.5 IMPROVE Phase: Strategies for Enhancing Expectation Alignment and Sustainability Outcomes

The Improve phase is part of the DMAIC approach and involves combining data from the Define, Measure, and Analyze phases to identify strategies which have the ability to enhance expectation alignment and sustainability outcomes in green urban construction projects. Although this research does not aim to make improvements, it is based on the comparative analysis of Vaasa and Freiburg. The strategies are based on recommendations to rectify misalignment patterns identified during the analysis phase.

Strategies are categorized into four types based on sustainability types. The four types are environmental sustainability, social sustainability, economic sustainability, and improvements related to governance. The Improve phase is based on interpreting alignment patterns and developing recommendations based on governance structures. The

phase does not aim to provide improvements based on project-level operations but rather expectation management mechanisms which can be improved to strengthen sustainability coherence.

4.5.1 Environmental Sustainability Improvements

The analysis reveals that both Vaasa and Freiburg demonstrate high environmental ambitions; however, there is a level of inconsistency in terms of stakeholder alignment. In order to improve stakeholder alignment in terms of environmental expectations, the following strategies are recommended for both Vaasa and Freiburg:

1. Integrating Ecological and Technological Approaches (Vaasa)

The sustainability strategy of Vaasa is largely focused on technological solutions. The integration of ecological priorities into innovation-driven strategies could improve alignment with residents and environmental stakeholders.

- biodiversity-based smart city solutions
- ecological restoration-based energy solutions
- urban green infrastructure-based smart mobility solutions

2. Improving Communication of Environmental Benefits (Vaasa)

Improving communication of environmental benefits associated with smart energy-based projects could improve alignment with residents.

- improved communication of environmental benefits associated with smart energy-based projects

3. Improving Guidance for Ecological Standards among Developers (Freiburg)

In order to improve misalignments between developers and ecological priorities, the following strategies are recommended:

- tools for developers to comply with passive house standards
- financial incentives for developers to comply with ecological standards
- templates for developers to comply with ecological standards

4. Improving Knowledge Transfer between Cities (Both Cities)

Vaasa could benefit from Freiburg's approach to ecological governance, which could improve alignment with residents. Similarly, Freiburg could benefit from Vaasa's digital monitoring solutions to improve transparency of environmental data.

4.5.2 Social Sustainability Improvements

Social sustainability has the greatest level of mismatch, followed by moderate levels of challenge in Freiburg. The suggestions should include bridging the gaps between the institutional and the resident levels.

1. Enhance Participatory Planning Mechanisms (Vaasa)

The Participatory Planning Mechanisms in Vaasa should be improved with the following suggestions:

- establishment of neighborhood forums during the planning stages
- establishment of resident's advisory groups for the development of housing and mobility initiatives
- the inclusion of diverse social groups

2. Link Social Objectives with Technological Innovations (Vaasa)

Social sustainability should be included in the technological development process with the following suggestions:

- accessibility of the mobility system
- affordable smart housing
- inclusive public space

3. Reduce Affordability Pressure in Expanding Eco-Districts (Freiburg)

The expanding eco-districts in Freiburg should be improved with the following suggestions to address the rising affordability pressures:

- development of cooperative and social housing quotes

4. Foster Intergenerational and Cultural Inclusion (Both Cities)

Both Vaasa and Freiburg should enhance the intergenerational and cultural inclusion levels with the following suggestions:

- inclusive design
- community programs
- accessibility

4.5.3 Economic Sustainability Improvements

The economic sustainability levels show contrasting trends in Vaasa and Freiburg.

1. Align Economic and Social Objectives (Vaasa)

Economic objectives in Vaasa can be improved with the following suggestions to match the resident levels:

- linking innovation with affordability strategies
- improving access to energy-efficient housing for all income groups
- supporting small businesses in the new residential districts

2. Support Developers in Adapting to Ecological Requirements (Freiburg)

The cost pressures on developers in Freiburg can be improved with the following suggestions:

- subsidies for ecological building
- simplification of the approval process
- cost-benefit analysis tools for ecological features

3. Develop Collaborative Models (Both Cities)

Collaborative models can be developed to ensure joint economic responsibilities, including:

- cooperative financing models for housing (Freiburg model)
- joint innovation funds (Vaasa model)

4.5.4 Governance Improvements

Governance structures are a critical component in ensuring that there is a high level of alignment between expectations. This is evident in Freiburg's participatory governance structure, which shows a high level of alignment. On the other hand, Vaasa's hybrid governance structure reveals a low level of alignment between residents and governance structures.

1. Augment Participatory Governance Structures (Vaasa)

The strategies to improve participatory governance in Vaasa include:

- Formalizing citizen councils
- Incorporating community representatives in planning processes at an early stage
- Enhancing digital participation tools
- Developing transparent planning dashboards

2. Enhance Institutional Coordination (Vaasa)

There is a need to enhance coordination between Vaasa's municipal departments, industries, and residents to improve sustainability outcomes in a holistic manner.

3. Institutionalize Feedback Mechanisms (Freiburg)

Although Freiburg has a high level of participatory governance, there is a need to improve feedback mechanisms by:

- Evaluating long-term social and ecological outcomes
- Periodically reviewing sustainability targets in consultation with residents
- Improving participatory governance to involve other demographics

4. Promote Cross-City Learning Platforms (Both Cities)

A learning platform between Vaasa and Freiburg could improve sustainability governance, policy innovation, participatory governance, and digital monitoring practices in both cities.

4.5.5 Summary of IMPROVE Phase Findings

Improvement Phase:

Priorities identified by the Improvement Phase are:

- Vaasa should focus on enhancing participatory practices, intensifying the integration of social sustainability, and harmonizing technological objectives with ecological and community needs.
- In Vaasa, improvement potential is seen in enhancing the visibility and institutionalization of social sustainability expectations. While the alignment between environmental and economic needs is strong, the establishment of formal mechanisms for the structured engagement of citizens may improve the legitimacy and long-term acceptability of the alignment.
- Furthermore, the explicit integration of social sustainability into performance monitoring may improve the balancing of dimension weighting and the intensification of comprehensive sustainability alignment.
- Freiburg should focus on enhancing affordability and ensuring the effectiveness of participatory governance as the city grows.
- In Freiburg, improvement potential is seen in enhancing long-term economic feasibility while balancing high ecological ambition. The intensification of financial sustainability models for housing and infrastructure developments may improve the mitigation of structural strain. The integration of innovation-driven economic strategies and participatory governance may improve resilience without compromising ecological integrity.
- Balancing ecological rigor and economic adaptability can help to build sustainable alignment.
- Both cities can benefit from shared learning, the integration of technology and ecology, and the maintenance of long-term governance continuity.

The strategies outlined above lay the foundation for the Control Phase, which examines long-term sustainability monitoring and mechanisms for maintaining expectations. The

analysis of improving sustainability indicates that improving expectation alignment requires context-specific governance adaptations rather than across-the-board policy solutions. For Vaasa, further institutionalization of resident participation mechanisms may help improve the social dimension of sustainability while avoiding delays in technological progress. For Freiburg, continued focus on housing affordability and demographic inclusion appears critical for long-term legitimacy.

The study findings imply that, for urban projects, there is value in proactively including expectation mapping in the initial phases of urban project planning. This can be achieved by integrating stakeholder analysis into sustainability governance. This can help urban areas better manage emerging conflicts and build more resilient implementation strategies. The DMAIC framework can provide an effective procedural guide for this process.

4.6 CONTROL Phase: Ensuring Long-Term Alignment and Sustained Sustainability Performance

The Control phase is responsible for outlining various mechanisms meant to ensure that the improvements made during the preceding stage are sustained over time. In urban construction projects focused on sustainability, it is essential to ensure that there is alignment between various stakeholders' expectations and sustainability objectives. For this to be sustained over time, there is a need to establish various processes and structures that are able to adapt to various needs. With reference to Vaasa and Freiburg, this Control phase is proposing various control mechanisms that can be adopted by various urban construction projects to ensure continuity.

4.6.1 Need for Control Mechanisms in Sustainability Projects

Sustainability expectations vary over time in response to various factors such as:

- Changes in demographic trends
- Changes in environmental trends

- Emergence of new technologies
- Increase in economic pressures
- Changes in governance systems

In the absence of proper control measures, even well-aligned expectations are bound to change, leading to divergence from sustainability targets. As such, the Control phase places emphasis on:

- preventing recurrence of misalignment
- ensuring transparent decision-making processes
- monitoring sustainability Key Performance Indicators (KPIs)
- developing institutional memory
- developing pathways for continuous improvement

4.6.2 Control Mechanisms for Vaasa

The context of Vaasa demands control mechanisms that prioritize participatory governance, technological ambitions, and community demands in a way that ensures a smooth transition from one municipal planning period to another.

1. Sustainability Monitoring Dashboard

Vaasa can leverage its digital strengths to create a monitoring dashboard for sustainability targets such as:

- carbon emissions trajectory
- smart mobility targets
- energy consumption patterns
- green space targets
- resident satisfaction targets

This would not only instill a sense of trust among residents but would also align expectations in a sustainable way.

2. Institutionalization of Community Participation

To prevent a drift towards institutional/industrial interests, Vaasa should:

- institutionalize resident participation boards
- require participation in the initial stages of projects
- formalize participatory processes in planning regulations

3. Annual Sustainability Expectation Review

An annual cross-stakeholder review would help to identify:

- emerging misalignments
- resident concerns
- technological changes
- affordability pressures

This would create a continuous loop of feedback and interaction between the city and its residents.

4. Documentation of Best Practices

A structured sustainability knowledge base would be beneficial to Vaasa to help it sustain and document:

- past experiences
- stakeholder feedback
- technical design
- ecological restoration practices

This would help Vaasa to sustain consistent decision-making processes even in the event of a change in government or administration.

4.6.3 Control Mechanisms for Freiburg

Freiburg is a city that is already in a high level of governance alignment and thus requires control mechanisms to ensure that there is a level of continuity in governance despite increasing population pressure and affordability concerns.

1. Periodic Participatory Governance Evaluation

Participatory governance would require a periodic evaluation every 3 to 5 years to assess:

- Inclusiveness
- quality of participation
- presence of new demographic groups
- effectiveness of decision-making

This would help Freiburg to sustain a high level of participatory governance without stagnation.

2. Affordability Monitoring and Policy Adjustment

Freiburg would require control mechanisms to mitigate market-driven displacement, and this would involve:

- annual housing affordability
- monitoring of cooperative housing
- adaptive zoning
- ongoing collaboration with non-profit developers

These would help to reinforce social sustainability expectations.

3. Environmental Threshold Tracking

Freiburg is a city that is known to have high environmental expectations and thus would require tracking of environmental thresholds to ensure that there is a level of consistency in ecological restoration and compliance with environmental expectations. Such tracking would involve:

- biodiversity
- passive house compliance
- integrity of urban green corridors
- traffic reduction

These would help to ensure that there is a level of consistency in environmental expectations and that there is a level of compliance with ecological restoration and environmental expectations.

4. Community Feedback Integration Platform

Freiburg would also require a mechanism to help it sustain a level of consistency in decision-making and thus would require a community feedback integration platform that would allow it to integrate and respond to feedback from its diverse stakeholders, and this would involve:

- expressing concerns
- expressing satisfaction levels
- expressing suggestions for improvement

These would help to reinforce long-term alignment.

4.6.4 Cross-City Control Strategies

Shared Long-Term Governance Mechanisms for Vaasa and Freiburg:

1. Standardized Sustainability Key Performance Indicators (KPIs)

A standardized KPI may include:

- Reduction of CO2 emissions per capita
- Usage of renewable energy
- Public transportation usage
- Affordability index
- Community participation rate
- Ecological footprint per project

This would help in benchmarking and cross-learning between two or more cities.

2. Long-Term Policy Commitment Mechanisms

To avoid political interference in sustainability issues in the short term, it is recommended that:

- Multi-year sustainability mandates be established
- Cross-party sustainability agreements be formed
- Statutory urban planning include sustainability objectives

3. Periodic Expectation Alignment Surveys

It is recommended that surveys be conducted to assess:

- Expectations of residents
- Concerns of developers
- Priorities of non-governmental organizations (NGOs)
- Ambitions of the city

These surveys must be conducted at least once every 1-2 years.

4. Sustainability Learning Networks

Collaborative working between Vaasa and Freiburg may be achieved through:

- Joint workshops
- Knowledge exchange
- Comparative sustainability reporting
- Virtual conferences on energy, mobility, and housing

This would create a framework for cross-learning between two or more cities.

4.6.5 Summary of the CONTROL Phase

The suggested control mechanisms would ensure that there is continued alignment of sustainability goals with stakeholder expectations. The principal results of this would be:

- **For Vaasa:** Enhanced participatory governance, transparent sustainability monitoring, and annual reviews of expectations.
- **For Freiburg:** Continued participatory effectiveness, affordability monitoring, and ecological performance monitoring.
- **For both Vaasa and Freiburg:** Standardized key performance indicators, long-term policy anchoring, and learning from each other.

Monitoring would involve the integration of environmental performance indicators with social acceptability indicators and economic resilience indicators. For Vaasa, it would be desirable to consider citizen satisfaction surveys as part of the monitoring parameters

alongside emission monitoring. For Freiburg, it would be desirable to consider periodic assessments of economic viability to avoid any conflict of interest with ecological goals. Transparent reporting platforms would be desirable to enhance trust and alignment of expectations from all stakeholders.

Overall, it would be desirable to consider all of the above control mechanisms to complete the DMAIC cycle and establish a platform for long-term sustainability performance in green urban construction projects.

TABLE 9. Key Performance Indicators (KPIs) for Control Phase

Category	***KPI***	***Purpose***
Environmental	CO_2 reduction per capita	Track climate impact
	Renewable energy share	Monitor energy transition
	Green space per resident	Monitor ecological health
Social	Housing affordability index	Track equity outcomes
	Participation rate in planning	Measure governance quality
Economic	Local green jobs created	Track economic sustainability
Governance	Transparency score / dashboard updates	Measure accountability

4.7 chapter summary

Chapter 4 utilizes the DMAIC approach in analyzing sustainability goals and stakeholder expectations in Vaasa and Freiburg. From the analysis, it is evident that expectation alignment is significantly influenced by governance structures and culture. Although there is a high level of environmental sustainability in Vaasa and Freiburg, there is a notable difference in terms of economic and social sustainability. From the analysis in Chapter 4, it is evident that the role of governance structures in expectation convergence is crucial. These findings set the stage for further analysis in Chapter 5 in terms of its implications for theory.

For sustainability and expectation alignment to be sustained in the future, it is essential to incorporate control principles that transcend individual project periods. Monitoring and adaptive policy review mechanisms play a crucial role in sustaining expectation and sustainability in dynamic environments. For instance, without control principles in place, it is likely that expectation and sustainability may diverge over time due to changing economic conditions and dynamics in terms of politics and demographics. From the analysis in Chapter 4 in terms of Vaasa and Freiburg, it is evident that sustainability and expectation in dynamic environments can be sustained if control principles are incorporated in urban environments.

5 Chapter 5. Discussion

This chapter seeks to interpret the results of the empirical analysis in light of the existing literature and the theoretical framework that was introduced in Chapter 2. It is hoped that this chapter will help to bridge the Vaasa-Freiburg comparison to broader debates in sustainability, stakeholder theory, and Green Project Management. In this section, it is possible to identify various areas of theoretical, practical, and methodological implications of this research and how it can contribute to both academic knowledge and project management in general.

Apart from connecting the results of this research to theory, this chapter also critically reflects on how far stakeholder expectation alignment is being utilized as a governing mechanism in sustainable urban construction. Instead of focusing on technical achievements in sustainability, this chapter seeks to emphasize various institutional and relational factors that are involved in prioritizing and achieving sustainability goals.

By linking the Vaasa-Freiburg comparison to broader debates in sustainability and Green Project Management, this chapter seeks to contribute to various scholarly debates on how to implement and operationalize sustainability in complex urban environments. In this chapter, it is possible to identify various research objectives and interpret the results of this research in light of this integrative theoretical framework.

5.1 Revisiting the Research Objectives

The research is informed by four main research objectives, which are as follows:
1. Identify the sustainability objectives that are prioritized in green urban construction.
2. Examine the expectations of stakeholders regarding these objectives in Vaasa and Freiburg.
3. Analyze areas of convergence or divergence of expectations and reasons thereof.
4. Establish an analytical framework in line with DMAIC to manage expectations.

The following discussion seeks to explicate the research findings in relation to the research objectives and their contributions to scholarly discourse and practice.

With regard to the first research objective, this study aimed to identify the sustainability objectives that are prioritized in green urban construction. Based on the research findings, it is clear that sustainability objectives are not universal and are instead socially constructed in governance structures and institutional cultures. This is in line with the sustainability literature that suggests that "urban sustainability pathways are diverse and vary depending on historical development trajectories, policy priorities, and socio-economic contexts" (Sharifi & Yamagata, 2016). From a comparative perspective of Vaasa and Freiburg, it is clear that sustainability objectives can be socially constructed in either a technological innovation tradition or a participatory ecological tradition, thus supporting the idea that sustainability is a dynamic concept that is socially constructed and not a universal framework.

The second and third objectives deal with stakeholders' expectations and processes of alignment. The findings affirm and validate the core arguments of Stakeholder Theory, which argue that project legitimacy is derived from balancing multiple stakeholders' interests rather than those of one dominant group (Freeman, 1984). The differences between the two cities' findings imply that project stakeholders' alignment is significantly influenced by project governance maturity and levels of participation. This underlines the importance of project stakeholders' governance in project sustainability.

The fourth objective introduces the DMAIC approach as an analytical tool. The application of the DMAIC approach demonstrates how project management tools can facilitate project governance analysis. The introduction of this approach is significant to this paper as it contributes to the Green Project Management literature by combining process-based methodologies and socio-political aspects of sustainability (Silvius & Schipper, 2014).

Collectively, the four objectives for the research process offer a clear and logical path of analysis, which connects the dimensions of sustainability, the expectations of stakeholders, and the process of structured management. Overall, the results of the analysis offer clear insights into the role of expectation alignment as an intermediary governance process, which connects the ambitions of strategic sustainability with the outcomes of implementation. This supports the emerging literature on the role of coordination in the process of sustainability transition, as opposed to technological change (Bulkeley & Betsill, 2013).

The results of the comparative analysis also offer the view that the success of the process of expectation alignment appears to be contingent on the maturity and governance culture of the urban context. For example, the more participatory culture of the Vaasa context appears more conducive to multidimensional sustainability balance, whereas the innovation culture of the Freiburg context might be achieving rapid technical change at the expense of the social dimensions of sustainability. These insights offer further development of the theory of stakeholders in the context of urban sustainability governance.

5.2 Interpretation of Findings in Relation to Sustainability Objectives

The analysis suggests that the process of sustainability in the context of green urban development remains a multidimensional construct, which varies between the two urban contexts.

Environmental Objectives

The analysis suggests that the priority given to environmental sustainability in the context of Vaasa and Freiburg is underpinned by two different rationales:

- **Vaasa:** Emphasis on technological innovation, such as smart energy, digital monitoring, and the use of renewables.
- **Freiburg:** Emphasis on ecological protection, passive houses, and carbon reduction as part of the community's value set.

The two urban contexts reflect two different sustainability paradigms, which are described in the literature as:
(1) technology-driven sustainability and (2) ecology-driven sustainability.

Social Objectives

The analysis also suggests that the priority given to social sustainability varies between the two urban contexts, with the Vaasa context struggling with the process of expectation alignment, particularly with regard to social sustainability, and the Freiburg context achieving stronger results with regard to social cohesion and participation, which is being challenged by the need to meet the demand for housing.

These results further support the sustainability literature's claim that social sustainability is often the least institutionalized of all sustainability pillars and therefore requires continuous alignment. The contrast between Vaasa and Freiburg also represents two of the sustainability paradigms that are widely discussed in urban sustainability literature. Vaasa's sustainability strategy represents a technology-driven sustainability approach, which is characterized by expectations of environmental benefits from efficiency improvements and innovations (Bulkeley & Betsill, 2013). This approach is often associated with smart technologies and data-driven governance. While such sustainability strategies are effective in producing environmental benefits, there is a risk of overlooking social sustainability dimensions unless social governance is integrated into sustainability strategies (Bulkeley & Betsill, 2013).

On the other hand, Freiburg's sustainability development is more in line with ecology-driven sustainability strategies, which are characterized by behavioral change, spatial planning, and shared environmental responsibility (Beatley, 2012). This supports the claim that sustainable urban development is a matter of cultural and institutional change rather than a matter of relying on technological solutions (Beatley, 2012). The integration of ecological sustainability dimensions with social participation is a good example of how

sustainability dimensions are embedded in urban culture and therefore support sustainability alignment.

The comparative results also support the claim that social sustainability is often the least institutionalized of all sustainability pillars. While environmental sustainability dimensions are often easily quantified in terms of environmental benefits, social sustainability dimensions require continuous governance adaptation. This is in line with Elkington's (1997) claim that sustainability's Triple Bottom Line is often out of balance in practice, with social sustainability dimensions being less operationally prioritized.

The comparative results also suggest that sustainability dimensions are negotiated constructs rather than fixed sustainability targets. While both Vaasa and Freiburg prioritize multidimensional sustainability, there are obvious differences in their operational prioritization of sustainability dimensions. This is in line with sustainability transition literature's claim that urban sustainability development is a matter of path dependency and locally embedded governance logic (Sharifi & Yamagata, 2016).

These results indicate that a lack of balance in the pillars of sustainability may not necessarily lead to a quick failure of a project but could create underlying dynamics of tension in expectations. In Vaasa, there is a strong techno-economic orientation that provides driving force to initiatives in the energy transition, but there may also be a need to develop social integration strategies to a higher level. In Freiburg, the participatory model provides broad legitimacy that requires constant adaptation to changing demographic and housing dynamics.

5.3 Interpretation of Findings in Relation to Stakeholder Expectations

Differences in terms of what is expected by stakeholders were found to be significant across the cities.

Expectation Alignment in Freiburg

Freiburg has a very high level of expectation alignment, which is influenced by:

- an existing environmental culture
- participatory governance
- community-based housing
- transparent planning

This is consistent with the proposition of stakeholder theory that participation and collaborative decision-making would improve expectation alignment and thus improve the outcome of projects.

Expectation Misalignment in Vaasa

Vaasa has a level of alignment with institutional stakeholders but is relatively low with residents:

- Industry stakeholders and the local authority have innovation-oriented goals
- Residents have goals related to equity of services provided
- There is a need to improve the ecological focus compared to what is currently implemented

These findings support other literature that argues that technological sustainability may override other needs when there is limited participation.

The results also demonstrate the salience of stakeholder salience theory in facilitating our understanding of the dynamics of alignment. In Vaasa, institutional and industrial stakeholders are significant in terms of power and urgency due to their involvement in innovation in the field of energy, whereas residents and their groups are significant in terms of legitimacy rather than institutional power. Such a pattern is in line with the stakeholder salience theory proposed by Mitchell, Agle, and Wood (1997), in which stakeholder salience is a function of combinations of power, legitimacy, and urgency, not necessarily involvement or participation in decision-making processes.

With regard to Freiburg, it is important to acknowledge that the institutionalization of participatory governance structures in Freiburg provides a level of tangible salience to citizen groups, thus reducing expectation asymmetry. Such a pattern is in line with our argument that long-term stakeholder involvement is a key determinant of enhanced project success in that it promotes trust and reduces conflict (Aaltonen, 2011). Such results also demonstrate that expectation alignment is not necessarily a function of stakeholder involvement but of a broader governance structure that promotes a level of salience balance.

With regard to expectation conflict, it is also important to acknowledge that such conflict is not necessarily a negative aspect of stakeholder salience but rather a demonstration of emerging sustainability priorities. Stakeholder theory is moving towards a position in which conflict is recognized as a mechanism that promotes adaptation and innovation in a positive sense (Freeman et al., 2010).

5.4 Insights from the Vaasa–Freiburg Comparison

This shows that sustainability and stakeholder alignment have different paths depending on:

- Governance maturity
- Cultural values
- Participation traditions
- Economic drivers
- Technological capabilities

Key Comparative Insights

1. Governance Model Is More Significant Than Technology

The sustainability of Freiburg's participatory model is more comprehensive in terms of stakeholder alignment compared to Vaasa's innovation-focused model, despite Vaasa's more technologically advanced capabilities.

2. Technology Is Not Sufficient for Achieving Alignment

While Vaasa's smart technologies support sustainability in terms of environmental outcomes, it is not sufficient for resolving social and governance misalignments.

3. Social Sustainability Is Dependent on Institutions

Cooperative housing and social planning in Freiburg illustrate how values can be converted into effective practice.

4. Expectation Conflicts Must Not Be Seen as Failure but as Opportunity for Change

These findings provide evidence to theoretical propositions indicating that sustainable urban development is not a technological or ecological system but rather a socio-technical system. The comparison has strengthened the argument that sustainable urban development is indeed a socio-technical system in which the role of governance is significant in interpreting and implementing technological solutions to sustainable development. Technological innovation is the driving force in Vaasa, and it is mediated by governance structures in interpreting social implications of technological innovation. In Freiburg, it is governance and cultural values that precede technological innovation, thereby establishing a context in which technological innovation is applied.

These findings are consistent with comparative sustainability research indicating that path dependency in institutional frameworks influences sustainability outcomes in cities (Evans et al., 2016). Sustainability outcomes in cities are influenced by historical policy frameworks, patterns of civic engagement, and economic structures. Sustainability frameworks should, therefore, be transferred based on institutional rather than technological compatibility.

Moreover, this comparison has shown that participatory governance does not necessarily eliminate conflicts but can strengthen conflict resolution mechanisms. This is consistent with urban governance literature indicating that deliberative processes are significant drivers of sustainability legitimacy (Bulkeley & Betsill, 2013).

5.5 The DMAIC Framework as a Tool for Stakeholder Expectation Management

A key contribution of this research is that it applies the DMAIC methodology to stakeholder expectation management in a sustainability-focused project environment.

Effectiveness of DMAIC

- **Define:** stakeholders and their expectations are articulated in a clear manner.
- **Measure:** sustainability goals are expressed in measurable dimensions.
- **Analyze:** a thorough examination of established patterns of alignment and conflict.
- **Improve:** strategies are formulated based on evidence.
- **Control:** long-term monitoring is established.

DMAIC methodology effectiveness

DMAIC methodology effectiveness in structuring a complex, multi-stakeholder, and multi-dimensional sustainability-focused issue is demonstrated. DMAIC methodology's key strengths are its clarity, logic, and flexibility in accommodating various urban planning environments.

Contribution to GPM Theory

By combining DMAIC and GPM theory, this research establishes that:

- there is a positive impact of green project management when expectation analysis is conducted in a systematic fashion;
- sustainability-focused key performance indicators can be linked to a structured methodology;
- stakeholder expectation management is possible in a proactive fashion.

The usage of DMAIC in this research also demonstrates its flexibility in moving beyond industrial quality management to incorporate complex socio-political environments. Tra-

ditionally linked to process optimization, DMAIC offers a logic that facilitates the systematic identification and analysis of stakeholder expectations. In dividing the analytical process into phases of Define, Measure, Analyze, Improve, and Control, it reduces the potential for conceptual ambiguity and increases methodological transparency.

From a theoretical point of view, the integration of DMAIC and GPM advances the interface of technical project management and the literature on sustainability governance. GPM is centered on lifecycle thinking and the integration of sustainability, yet it is often limited in its ability to offer structured analytical tools in expectation management. The integration of DMAIC addresses this issue and offers a direct interface of measurable sustainability indicators and governance-focused interpretation (GPM Global, 2021).

From a broader analytical point of view, the iterative nature of DMAIC also resonates with adaptive governance principles, in which ongoing monitoring and feedback loops are utilized to facilitate ongoing adjustments to organizational alignment. This also speaks to a broader interface of project management and sustainability governance.

5.6 Practical Implications

The results provide actionable recommendations for municipalities, planners, developers, and other relevant stakeholders.

Implications for Vaasa

- Reinforce participatory governance.
- Balance ecological interests with smart technologies.
- Enhance communication to synchronize expectations and build trust.
- Create monitoring tools to enhance transparency.

Implications for Freiburg

- Ensure affordability by using adaptive instruments.

- Sustain participatory governance in a growing city.
- Improve long-term environmental monitoring.
- Leverage digital technologies to build upon existing strengths.

Shared Implications

- Standardized sustainability metrics could aid in comparative analysis.
- Policy stability is critical for stabilizing stakeholder expectations.
- Inter-city learning networks could drive sustainability innovation.

The study's implications for practitioners are that it is critical to assess stakeholder expectations in the early stages of a planning process. Cities in pursuit of sustainability strategies should not assume that innovation in technologies will automatically secure stakeholder acceptance. Rather, effective communication is critical to building legitimacy and reducing potential resistance.

Moreover, the results of the comparative analysis also suggest that the strategies should be tailored to the governance context. In other words, innovation-driven cities may need more participatory governance mechanisms to reconcile social demands, while participatory cities may need more adaptive economic strategies to maintain competitiveness. In either case, the recommendations should not be presented as templates but rather as framework conditions based on stakeholder analysis.

Lastly, the results also demonstrate the importance of considering social and governance factors alongside environmental factors in sustainability monitoring systems. In short, sustainability monitoring should be more holistic.

From the perspective of Green Project Management, the results confirm the need for project success factors to be more extensive than the traditional cost, time, and scope factors. In other words, sustainability-oriented urban projects require multidimensional performance monitoring that combines environmental performance with stakeholder

acceptance and governance transparency. This recommendation is also supported by other authors in the GPM literature, who also advocate for more holistic project evaluation approaches (Silvius & Schipper, 2014).

Furthermore, the results also suggest that expectation analysis should be included earlier on in the front-end planning process rather than being relegated to stakeholder management, which is often seen as more of a reactive approach. In other words, proactive expectation analysis can help project sponsors and city planners anticipate potential problems and develop strategies to mitigate these problems before they arise. This forward-looking approach is also seen as a contribution of the DMAIC-informed framework presented in this study.

5.7 Methodological Reflections

The qualitative case study approach, which relied heavily on document analysis, was effective in exploring the concept of expectation alignment in cities. However, there are:

- Limitations in terms of data collected, which restricts a deeper level of understanding of stakeholder expectations
- The success of comparison is highly dependent upon the documentation of cases
- The study could be further explored using a mixed-methods approach to validate it further

Despite the above-mentioned limitations, the methodological framework was effective in conducting a rigorous analysis of stakeholders and generating a credible theoretical contribution. The qualitative case study approach, which relied heavily on document analysis, provided a good level of insight into stakeholder expectations. The approach of using documents for data collection is highly effective in analyzing governance narratives (Bowen, 2009). The use of a comparative method provided a high level of robustness to the analysis by allowing for pattern recognition in a wide range of cases. As suggested

by Yin (2018), using a comparative method is highly effective in establishing internal validity by using a replication logic to test theories. The comparative method was effective in establishing a differentiation between specific case outcomes and broader governance outcomes.

The study could be further explored using a mixed-methods approach to gain a deeper level of understanding of changing expectations over time.
Nevertheless, despite the aforementioned limitations, there are also various strengths of this methodological approach, which add to the credibility of this research. For example, the fact that this research relied only on publicly verifiable documents is an important aspect, which is often hard to achieve in research on sustainable governance. Furthermore, the application of the DMAIC (Define-Measure-Analyze-Improve-Control) approach provided this research with an analytical framework, which is essential in avoiding narrative-based interpretations.

Moreover, this research has also identified areas of improvement in this methodological approach, which can be achieved in future research. For example, conducting this research using this approach and incorporating data from stakeholders and participatory observation can provide this research with more profound understandings of this concept of expectation dynamics. This can be achieved as an extension of this document-based approach applied in this thesis and can add more credibility to this concept of stakeholder expectation within the context of sustainable urban development.

5.8 Answers to Research Questions

These sub-sections directly answer the research questions by using the results of this research.

Research Question 1: What are the sustainability objectives prioritized in green urban construction projects?

Based on this research, it is evident that environmental sustainability objectives play an important role in both Vaasa and Freiburg. Carbon reduction and efficiency of energy are top priorities for both municipalities. But, Vaasa focuses more on technology and energy systems, while Freiburg concentrates on ecology in urban areas and mobility solutions.

Research Question 2: What are the stakeholder expectations regarding these objectives?
There are many differences between stakeholder expectations concerning these objects. Industrial stakeholders expect economic growth and technological possibilities in Vaasa, while municipality stakeholders expect environment-based solutions. Citizens in Freiburg have higher expectations about social sustainability and ecological standards in people's lives.

Research Question 3: What are the areas of convergence and divergence?
There is convergence in terms of environment-based sustainability, especially in carbon reduction. There is divergence in relation to social and economic perspectives. There is a better level of alignment in terms of participatory governance in Freiburg, while in Vaasa there is better alignment for industrial and technological expectations.

Research Question 4: What is the contribution of the DMAIC framework?
DMAIC model offers an analytical process, which helps in systematic identification, measurement, and analysis of stakeholder expectations. It improves clarity of alignment understanding and formulates improvement measures.

5.9 Summary of Discussion

The above discussion has thus established that:

- Expectation alignment is an essential component of sustainable urban development.
- Governance and cultural influences play an important role in determining the nature of expectation alignment.

- Vaasa and Freiburg represent two different models of urban sustainability.
- DMAIC is an effective tool to manage expectations with regard to sustainability.
- The study has made an important contribution to stakeholder theory, Green Project Management, and sustainability management.

Overall, Chapter 5 has established that stakeholder expectation alignment is an essential mechanism that links urban sustainability with urban governance. The Vaasa-Freiburg case study has thus established that urban sustainability is influenced by governance structures and cultural influences rather than technological capabilities. Furthermore, it has established that structured frameworks such as DMAIC improve analytical clarity with regard to complex urban sustainability issues.

By using theoretical frameworks from various theories of stakeholder management, sustainability management, and project management methodologies, this chapter has provided an integrated framework of understanding how urban sustainability is influenced by urban governance through alignment dynamics. Such an understanding is essential to arrive at the conclusions and contribution of this study as discussed in Chapter 6.

Overall, it may thus be established that Chapter 5 has established that urban governance through stakeholder expectation alignment is an essential component of sustainable urban construction governance. Furthermore, it has established that Vaasa and Freiburg have adopted different models to arrive at urban sustainability goals. It has also established that it is essential to integrate various theories of stakeholder management, Green Project Management, and DMAIC to arrive at an understanding of urban sustainability management.

Overall, it may thus be established that Chapter 5 has established that urban governance through stakeholder expectation alignment is an essential component of sustainable urban construction governance. Furthermore, it has established that Vaasa and Freiburg

have adopted different models to arrive at urban sustainability goals. It has also established that it is essential to integrate various theories of stakeholder management, Green Project Management, and DMAIC to arrive at an understanding of urban sustainability management.

6 Chapter 6. Conclusion

This chapter offers the final conclusions of this research work by bringing together all of the main findings, theoretical and practical contributions, methodological considerations, and future research directions. In this research work, the key issue of how stakeholder expectations impact sustainability results in green urban construction projects was investigated, using Vaasa (Finland) and Freiburg (Germany) as comparative case studies. An analytical framework based on DMAIC methodology was also proposed to analyze expectation alignment and propose strategies to improve it.

This chapter draws together the results of this research work to offer a synthesized argument regarding sustainability governance in green urban construction. Instead of thinking of sustainability as a technical output, it is important to understand that it is a function of the interaction of (1) formal sustainability goals, (2) expectations of stakeholders, and (3) governance structures that shape priorities and their implementation (Bulkeley & Betsill, 2013).

The structure of this chapter follows a logic of analytical generalization. In this research work, Vaasa and Freiburg are not claimed to be representative of all green cities, but instead are used to offer general insights regarding expectation alignment and its impact on sustainability results (Yin, 2018). Finally, it has been proven that making sustainable urban constructions cannot be considered simply an issue of applying sustainable policies and technologies; it is primarily a matter of governance since all stakeholders' expectations have to align in order for sustainable solutions to be fully successful. In case there is no harmony between the interests of different groups, the sustainable strategy cannot reach its objectives regardless of how sophisticated it may be.

6.1 Summary of the Research

The study aims to answer four main research questions:

1. Prioritized sustainability objectives in green urban construction projects.
2. The expectations of stakeholders concerning sustainability objectives in Vaasa and Freiburg.
3. The level of convergence and divergence of expectations between stakeholders and reasons for such expectations.
4. The potential contribution of a DMAIC-based approach in managing stakeholder expectations for sustainability outcomes.

To answer the above-mentioned research queries, a qualitative study of relevant documents is carried out from a theoretical perspective of stakeholder expectations and Green Project Management.

The study makes a contribution to the literature by offering a fresh perspective on sustainability governance, rather than a conventional environmental or technological perspective. The comparative analysis of Vaasa and Freiburg reveals that sustainability outcomes are highly contingent upon institutional arrangements, decision-making styles, and levels of integration of stakeholder expectations in urban planning processes. This is in line with sustainability governance literature that underlines the socio-technical nature of urban sustainability transitions (Bulkeley & Betsill, 2013).

The overall implication of the study is in line with the main argument of this dissertation that sustainability outcomes in green urban construction projects are not fully captured by environmental and technological criteria. Rather, a study of Vaasa and Freiburg reveals that governance arrangements and stakeholder expectations act as mediating variables between strategic sustainability ambitions and implementation outcomes. This is in line with a growing body of literature on urban sustainability that underlines the importance of coordination capacity and institutional coherence in urban sustainability transitions.

Moreover, it can be noted that the comparative approach also reveals expectation alignment to be an evolutionary rather than static concept, dependent on declarations of

policy rather than actualities of implementation. This is demonstrated within the context of Freiburg, which is known as a model of sustainability, yet emergent socio-economic drivers can still create new alignment issues. This underlines the importance of using structured approaches to analysis, as represented within this current research via the DMAIC approach.

Thus, it can be noted that this current thesis has demonstrated expectation alignment to be a concept of governance, which can facilitate or limit sustainability initiatives based on patterns of influence between groups of stakeholders and the institutionalization of sustainability initiatives. This underlines the importance of using stakeholder-based approaches to project and business outcomes, as represented within Freeman (1984), and Aaltonen (2011).

Moreover, it can also be noted that this current research has demonstrated the importance of using a structured approach to processes in attempting to render expectation alignment dynamics more analytically "manageable." The use of the DMAIC approach as an evaluative tool has allowed fragmented documentary evidence to be interpreted into a more coherent evaluative approach, demonstrating the importance of using improvement methodologies as an approach to sustainability initiatives (Sokovic et al., 2010; Bowen, 2009). Thus, this current research has integrated concepts of stakeholder theory with a more process-based logic, as represented within project management methodologies.

6.2 Key Findings

6.2.1 Prioritized Sustainability Objectives

Both Vaasa and Freiburg demonstrate high commitment to environmental sustainability; however, they differ in their approach and formulation through different paradigms:

- **Vaasa:** Emphasis on technological innovation, smart energy development, and

carbon neutrality.

- **Freiburg:** Emphasis on ecological protection, passive houses, and community-oriented sustainability.

Social sustainability is more integrated in Freiburg than in Vaasa, whereas economic sustainability is more innovation-oriented in Vaasa and socially regulated in Freiburg. The analysis indicates that there are two different sustainability paradigms: Vaasa represents a technology-centered approach to sustainability, where innovation and energy transition strategies are drivers for sustainability, corresponding to the smart city approach that views technological efficiency as the pathway to sustainability (Evans et al., 2016). Freiburg represents an ecology-centered approach to sustainability, emphasizing social sustainability and community-oriented sustainability.

These variations suggest that there is no universally defined set of sustainability objectives but rather that they are socially constructed within local governance cultures. The results support claims that urban sustainability should be viewed as context-dependent and shaped by historical and legacy factors rather than policy formulae. Such a comparative exercise reinforces the argument that sustainability objectives are not objective policy targets but rather policy choices shaped by local models of development and local policy priorities. Vaasa's sustainability objectives were shaped by a 'cluster-based' pathway, with innovation ecosystems and energy transition strategies driving the formulation of 'sustainability' objectives, while Freiburg's objectives were shaped by a 'civic-ecological' pathway with participatory planning and lifestyle-based sustainability practices strongly influencing policy objectives (Beatley, 2012).

A notable observation is that sustainability objectives may be superficially similar at a high level of abstraction but may vary significantly at a detailed level of implementation. Such an observation is consistent with research on smart cities that has suggested that narratives of technological efficiencies may dominate urban sustainability discourse at times to the exclusion of other objectives such as social inclusion (Evans et al., 2016).

6.2.2 Stakeholder Expectations and Alignment

The results suggest that stakeholder expectations are influenced by structures of governance, cultural values, and economic systems.

- Freiburg has shown high levels of expectation alignment between residents, NGOs, authorities, and developers, largely due to participatory approaches to governance and its long history of environmentalism.
- Vaasa has shown high institutional alignment between the authorities and industry, while alignment between residents and NGOs is weaker, particularly in terms of affordability, participation, and environmentalism.

The study has identified stakeholder alignment as a relational process influenced by structures of governance rather than the attributes of the stakeholder. In Freiburg, participatory approaches to governance transfer stakeholder legitimacy to stakeholder influence, thus supporting the view that participatory approaches to sustainability can improve long-term sustainability acceptance (Reed et al., 2009). By including resident expectations in the planning process, conflicts can be minimized by early negotiation of priorities. The level of alignment or misalignment of expectations has a direct impact on sustainability performance outcomes.

In Vaasa, alignment is largely between institutional actors, such as between authorities and industry. This approach to stakeholder engagement has enabled rapid implementation of new technologies but may undermine the prominence of social sustainability issues. This mirrors the stakeholder salience approach, where actors with greater power and institutional proximity are able to dominate the agenda-setting process (Mitchell et al., 1997).

6.2.3 Sources of Alignment and Misalignment

Expectation alignment in Freiburg is enhanced through participatory planning, mutual housing, and openness in communication. In Vaasa, there are areas of partial misalignment in expectation due to:

- Low involvement of Vaasa's residents in decision-making processes
- Overemphasis on technology in contrast to ecological and social aspects
- Different expectations of priorities between institutional and social actors

These results affirm literature that recognizes that governance and participation are significant factors in determining the effectiveness of sustainability strategies.

Misalignment should not be equated with failure but possibly a reflection of multiple interpretations of sustainability in governance structures. Urban sustainability literature recognizes that conflicts in expectation between stakeholder groups are a symptom of broader debates about distributive justice, development pathways, and resource distribution (Hodson & Marvin, 2010). In this sense, differences in expectations between industry actors and social groups in Vaasa indicate structural tensions that are inherent in innovation-based sustainability transitions.

Freiburg, on the other hand, illustrates how long histories of participatory practices can reduce differences in expectation. Nevertheless, participatory systems are also subject to emerging tensions in affordability and demographic change. Hence, there is a need to understand expectation alignment as a dynamic process that requires constant negotiation.

6.2.4 Value of the DMAIC Framework

The DMAIC framework provided an organized process for the analysis of expectation alignment, where:

- Define stage helped to clarify the stakeholders and sustainability goals.
- Measure stage quantified the identified aspects of sustainability expectations.

- Analyze stage examined the alignment, non-alignment, and causes of non-alignment of expectations.
- Improve stage developed specific strategies for each city.
- Control stage outlined mechanisms for long-term management of expectations.

The DMAIC framework adds value to GPM practices by including continuous improvement and stakeholder expectation analysis.

This study's use of the DMAIC framework illustrates its suitability for process-based frameworks, which can be extended to other areas, such as sustainability expectation analysis, rather than being restricted to industrial quality management. This process-based framework facilitated clear differentiation between expectation analysis, interpretation, and improvement, thereby avoiding analytical ambiguity. This supports the argument that improvement methodologies can improve transparency in urban governance research (Sokovic et al., 2010).

Further, the cyclical process of the DMAIC framework is consistent with the principles of adaptive governance, promoting continuous improvement. Therefore, the DMAIC framework can be seen to complement Green Project Management methodologies by including the process of systematic evaluation in sustainability planning.

6.3 Theoretical Contributions

The study makes several contributions to academic literature in the following ways:

1. Linking DMAIC to Sustainability and Stakeholder Theory

The study offers an innovative tool for sustainability planning by applying the DMAIC methodology to urban sustainability planning and stakeholder expectations.

2. Developing New Insights into Sustainability Governance Models

The Vaasa-Freiburg comparison offers new insights into the role of urban governance culture in shaping stakeholder relationships, thus expanding the literature on sustainability objectives and their implementation.

3. Expanding Green Project Management (GPM) Theory

The thesis offers new insights into the practical implementation of GPM principles in urban sustainability planning, thus expanding GPM literature by linking GPM to urban improvement methodologies.

The study offers several theoretical contributions to the literature, including reframing stakeholder expectations as an analytical tool rather than an outcome of stakeholder engagement. Current stakeholder literature has traditionally been based on stakeholder engagement and influencing, but this study offers new insights into stakeholder expectations and their alignment, thus serving as a bridge between sustainability performance and stakeholder governance structures (Freeman, 1984).

Moreover, the study offers new insights into the integration of sustainability governance and technical project management, thus bridging the gap between these two academic theories. This is important in the context of Green Project Management, where the challenge facing scholars is to translate abstract sustainability objectives into operationally manageable processes (Silvius & Schipper, 2014).

Overall, this integrated conceptual framework bridges sustainability theory, stakeholder theory, governance analysis, and project management practice to provide an analytical foundation to support the research design developed within this thesis. Consequently, it is proposed that this conceptual framework represents an analytical framework and a diagnostic framework. Furthermore, it is proposed that this integrated conceptual framework incorporates stakeholder theory, sustainability dimensions, and DMAIC logic to facilitate a systematic and integrated analysis of patterns of expectation alignment across complex urban contexts. Such an integrated framework directly addresses calls

within the literature to develop more operationally relevant urban sustainability analysis frameworks.

Finally, the study offers new insights into urban sustainability literature by demonstrating the critical role of urban governance culture in shaping sustainability objectives.

6.4 Practical Contributions

The findings provide actionable recommendations for cities, developers, and sustainability practitioners.

For Vaasa

- Implement more effective participatory planning
- Leverage digital sustainability dashboards to increase transparency
- Integrate ecological and social sustainability with smart city initiatives
- Conduct annual reviews to refine stakeholder expectation alignment

For Freiburg

- Improve monitoring of long-term affordability
- Examine and refine participatory processes based on city development
- Leverage digital tools to facilitate ecological performance tracking

For Both

- Implement standardized sustainability indicators
- Develop cross-city learning networks
- Embed long-term sustainability commitment into city initiatives

Together, these recommendations provide actionable solutions to develop and maintain a more stable alignment between stakeholder expectation and project outcomes. The practical implications of this research are significant beyond the scope of these two case

studies and are more broadly applicable in terms of promoting the importance of expectation monitoring within sustainability initiatives. For example, innovation-driven sustainability initiatives in cities can benefit from more participatory processes to ensure social sustainability is maintained. Conversely, participatory cities can benefit from evaluative tools to maintain economic sustainability as city initiatives scale over long-term project timelines.

Moreover, conducting expectation analyses through periodic reviews can help alleviate long-term governance issues. The implementation of digital dashboards and transparent processes can potentially strengthen city initiatives and help cities adapt to changing stakeholder expectation.

6.5 Methodological Reflections

The qualitative document-based method has proven to be effective in exploring the policy frameworks and stakeholder expectations of the sustainability-based urban environments. Nevertheless, the study has several limitations, including:

- A lack of primary data, which makes it difficult to obtain deeper insights into actual stakeholder perceptions.
- Document availability differed between the case study environments, especially regarding the internal governance structures of Freiburg.
- A lack of generalization of the findings to other green urban construction projects.

One of the issues arising in terms of methodology in this study refers to unequal availability and organization of secondary data in the case cities under discussion. Thus, Freiburg provides a wealth of information concerning participative governance and sustainability monitoring, while data in respect of Vaasa is more oriented towards strategic and industrial approaches.

This issue affected the analytical process, especially concerning some dimensions that are related to social sustainability and stakeholders' involvement. Nevertheless, using an organized analytical framework (DMAIC) and the technique of systematic data coding helped overcome the potential inconsistencies of the process. Possible remedy for this issue in future studies may include obtaining additional primary data through surveys or interviews.

The methodology, however, provided an excellent foundation for conducting sustainability-based comparative research. By using the document-based comparative method, the study provided a comprehensive analysis of the institutional narratives and policy priorities of the case study environments. Document-based research is effective for conducting sustainability-based research, according to Bowen (2009), as it helps to identify the formalized expectations of sustainability-based policies and frameworks. Nevertheless, this method may not provide comprehensive insights into informal dynamics or emerging stakeholder perceptions, especially if these are not documented.

The use of the comparative method has greatly enhanced the validity of the research, as it has enabled the replication of the theoretical study across the case study environments. Instead of relying on statistical generalization, the study has employed analytical generalization, which is essential for case study-based research, according to Yin (2018). The cases also highlight that expectation alignment is dependent upon stakeholder salience and how institutional arrangements translate stakeholder legitimacy into decision-influence. For example, in Vaasa, municipal and industry stakeholders have more structural power in terms of decision-influence due to their role in energy innovation and strategic planning, whereas residents and civil society groups have more legitimacy but less direct decision-influence. This is in line with stakeholder salience theory, where stakeholder influence is seen as a function of combinations of power, legitimacy, and urgency (Mitchell et al., 1997).

In Freiburg, participatory modes of governance strengthen the actual decision-influence of residents and civil society stakeholders, which in turn helps to reduce expectation asymmetry and facilitates overall expectation alignment. This is in line with sustainability governance theories that highlight the significance of coordination capacity and the institutionalization of participation in sustainability governance arrangements, not only in terms of policy aspiration (Bulkeley & Betsill, 2013). From a project management perspective, it is suggested that expectation alignment is not assumed but is instead treated as a condition that can be enhanced through transparency and social objectives.

6.6 Suggestions for Future Research

Possible paths for future research:

- Conducting interviews to provide more depth in terms of expectation dynamics;
- Extending the applicability of the DMAIC-based approach to more cities or project types;
- Using sustainability performance data to validate the findings of this research;
- Investigating expectation alignment in renewable energy and climate change adaptation projects;
- Designing digital solutions to automate expectation monitoring and sustainability metrics.

This will provide more insight into the interrelation between city governance, stakeholders' expectations, and sustainability. Further research can be carried out to explore the impact of digital participation tools on stakeholders' expectation alignment, as more and more cities are implementing smart city solutions into their governance. Further investigation into AI-based tools for stakeholders' analysis and sustainability monitoring can provide more depth to the theoretical framework introduced in this thesis.

Another direction of future research can be based on extending the scope of comparative research beyond Europe and exploring whether similar patterns of alignment based

on city governance are observed in other regions and countries, including emerging economies.

Future research may also extend the dimension of measurement by linking expectation mapping in documents with quantitative sustainability performance indicators. This would help to further triangulate stakeholder expectations, municipal claims, and empirically measurable outcomes in areas like mobility patterns, emission reduction, housing affordability, and access to services (Shen et al., 2011). This would help to further strengthen the potential of the framework for analysis and support more robust claims in terms of expectation alignment and sustainability performance.

There is definitely potential for further development of the DMAIC-informed framework through more explicit measures of expectation alignment and responsiveness of governance. For example, future research may investigate whether multiple rounds of participation or transparency and monitoring tools relate to reduced levels of expectation conflict over time. This would contribute to further development of sustainability governance literature and Green Project Management practice through more operationalized measures of expectation alignment (Silvius & Schipper, 2014).

6.7 Final Remarks

This thesis has shown that sustainability in green urban construction projects is not only dependent on technological innovation and environmental sustainability, but also on the alignment of diverse stakeholders' expectations. The Vaasa and Freiburg cases have shown two unique yet complementary routes to sustainable urban development. The use of a DMAIC-informed approach has ensured that this research is not only theoretically significant but also practically applicable in terms of expectation management within complex sustainability initiatives.

This research has shown that sustainability is dependent on continuous learning, transparent governance, and the balanced achievement of environmental, social, and economic sustainability. The research has shown that sustainable urban construction is not only dependent on technological innovation and environmental sustainability, but also on continuous learning and the management of stakeholders' expectations within changing governance structures. The Vaasa and Freiburg cases have shown that there are multiple routes to sustainability, and each route is unique and dependent on institutional culture and participation.

This research has shown that the DMAIC-informed approach is not only practically applicable but also theoretically significant in terms of future research and sustainability-oriented project management. By showing the importance of expectation alignment as a significant factor in sustainability, this research has made an important contribution to our understanding of sustainable urban construction and development.

In conclusion, it is important to understand green urban construction projects as socio-technical systems of governance rather than just technical project implementation processes. Sustainability is shaped by the effectiveness of city-level priority setting, power balancing among stakeholders, and expectation alignment along environmental, social, and economic factors (Elkington, 1997; Bulkeley & Betsill, 2013). The Vaasa-Freiburg comparison shows that there are multiple paths to successful sustainability outcomes, yet each path carries specific risks if specific stakeholder expectation groups are structurally underrepresented.

Through its emphasis on stakeholder expectations as an essential research lens and using DMAIC as an approach to interpretation, this research contributes to more practical understandings of sustainability governance in project-based urban contexts. The underlying logic of this research can be applied more broadly as follows: sustainability is enhanced in cities where expectation alignment is understood as an ongoing governance process rather than an endpoint of aspirational targets.

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APPENDICES

Appendix A — Detailed Stakeholder Tables (Vaasa and Freiburg)

A.1 Stakeholder Analysis — Vaasa

A.1.1 Stakeholder Overview Table (Vaasa)

Stakeholder Group	Role in Sustainability Projects	Main Interests	Influence Level	Sustainability Focus
Municipal Authorities	Policy making, planning, regulation	Carbon neutrality, regional competitiveness	High	Environmental, economic
EnergyVaasa Cluster Companies	Technology development, implementation	Innovation, market growth	High	Environmental, economic
Construction & Development Firms	Project delivery	Efficiency, compliance, profitability	Medium–High	Economic, environmental
Residents & Citizens	End-users, community actors	Quality of life, affordability, services	Medium	Social
NGOs / Environmental Groups	Advocacy and awareness	Environmental protection	Low–Medium	Environmental
Universities & Research Institutions	Knowledge generation, innovation support	Research impact, collaboration	Medium	Environmental, technological

A.1.2 Power–Interest Grid (Vaasa)

High Power / High Interest

- Municipal authorities
- Energy cluster companies

High Power / Lower Interest

- Large developers

Low Power / High Interest

- Residents
- Environmental NGOs

Low Power / Lower Interest

- External investors not directly engaged in sustainability policy

A.1.3 Key Stakeholder Expectations (Vaasa)

- Strong emphasis on energy innovation and economic growth
- Stable regulatory environment for technological investments
- Infrastructure reliability and energy system efficiency
- Improved mobility and urban services for residents
- Gradual integration of social sustainability concerns

A.2 Stakeholder Analysis — Freiburg

A.2.1 Stakeholder Overview Table (Freiburg)

Stakeholder Group	Role in Sustainability Projects	Main Interests	Influence Level	Sustainability Focus
Municipal Government	Strategic planning, regulation	Ecological urban planning	High	Environmental, social
Citizen Associations	Participation and community influence	Livability, participation	High	Social, environmental
Housing Cooperatives	Sustainable housing development	Affordability, quality housing	Medium–High	Social
Environmental NGOs	Advocacy and policy influence	Ecology, climate mitigation	Medium	Environmental

Stakeholder Group	Role in Sustainability Projects	Main Interests	Influence Level	Sustainability Focus
Developers	Project implementation	Feasibility, regulation compliance	Medium	Economic
Mobility & Transport Agencies	Sustainable mobility systems	Reduced emissions, accessibility	Medium	Environmental, social

A.2.2 Power–Interest Grid (Freiburg)

High Power / High Interest

- Municipal authorities
- Citizen associations

High Power / Medium Interest

- Housing cooperatives

Low Power / High Interest

- NGOs and community groups

Medium Power / Medium Interest

- Developers and transport agencies

A.2.3 Key Stakeholder Expectations (Freiburg)

- Strong ecological standards in construction
- Participatory decision-making processes
- Reduced car dependency and sustainable mobility
- Affordable housing and social inclusion
- Long-term environmental preservation

Appendix B — Sustainability Objective Mapping

B.1 Sustainability Objective Categories

Environmental Objectives

- Carbon emission reduction
- Renewable energy integration
- Energy efficiency in buildings
- Sustainable mobility systems
- Biodiversity protection

Social Objectives

- Inclusive urban planning
- Housing affordability
- Community participation
- Public space quality

Economic Objectives

- Regional competitiveness
- Innovation and green jobs
- Long-term financial sustainability

Governance Objectives

- Transparent decision-making
- Cross-sector collaboration
- Policy consistency

B.2 Sustainability Objective Mapping — Vaasa

Sustainability Dimension	Main Objectives
Environmental	Carbon neutrality, clean energy innovation
Social	Service accessibility, urban livability
Economic	Energy cluster growth, innovation-driven economy
Governance	Public–private collaboration

B.3 Sustainability Objective Mapping — Freiburg

Sustainability Dimension	Main Objectives
Environmental	Eco-district development, low-carbon mobility

Sustainability Dimension	Main Objectives
Social	Citizen participation, affordable housing
Economic	Sustainable local economy
Governance	Participatory planning tradition

B.4 Cross-Case Sustainability Objective Comparison Matrix

Dimension	Vaasa	Freiburg
Environmental	Technology-oriented	Ecological planning-oriented
Social	Secondary emphasis	Strong integration
Economic	Innovation-driven	Supporting ecological goals
Governance	Institutional-industrial collaboration	Participatory governance

Appendix C — DMAIC Analytical Framework

C.1 Define Phase Framework

Purpose:

- Identify sustainability objectives
- Map stakeholders
- Establish governance context

Outputs:

- Stakeholder tables
- Sustainability objective categories

C.2 Measure Phase Framework

Purpose:

- Extract documented expectations
- Categorize expectations into TBL dimensions

Outputs:

- Expectation matrices
- Indicator tables

C.3 Analyze Phase Framework

Purpose:

- Identify alignment and misalignment
- Compare stakeholder priorities

Outputs:

- Alignment patterns
- Conflict indicators

C.4 Improve Phase Framework

Purpose:

- Propose governance improvements
- Suggest expectation management strategies

Outputs:

- City-specific recommendations

C.5 Control Phase Framework

Purpose:

- Define monitoring mechanisms
- Ensure long-term sustainability alignment

Outputs:

- Suggested indicators
- Monitoring strategies

Appendix D — Data Sources and Document List

D.1 Municipal Policy Documents

- City climate strategies
- Urban master plans
- Sustainability roadmaps

D.2 Sustainability Reports

- Energy cluster sustainability reports
- Environmental performance reports
- Mobility strategy documents

D.3 Strategic Planning Documents

- Regional development strategies
- Urban regeneration plans

D.4 Supporting Academic and Institutional Sources

- Peer-reviewed journal articles
- International sustainability frameworks
- Project management standards