Improving Collaboration in Regional Mobility Hub Projects

Strategies to Improve Stakeholder Collaboration in the Development and Implementation Phases of Regional Mobility hubs

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Preface

In front of you lies the thesis I wrote to complete the Master's programme in Transport, Infrastructure and Logistics at Delft University of Technology. This marks the final assignment I complete for this Master, which also means the end of my days as a student.

This thesis would not have been possible without the support and guidance of many people who helped me along the way. First of all, I would like to thank my graduation committee. Thank you all for your kindness, positivity and encouragement throughout the process. You made every meeting something to look forward to, instead of something to stress over. Your guidance helped me stay motivated, keep learning, and feel confident that I was on the right track.

I especially want to thank Jan Anne, for your warm involvement and encouraging feedback throughout this process. Niels, thank you for your trust in me from the beginning and your help in getting this project together, and for your inspiring perspective on the world of mobility. Erik and Kees, a huge thank you for the warm welcome you have given me at AT Osborne, and for all your time, the brainstorm sessions and conversations we shared. I also want to express my gratitude to Ineke and the mobility team, for your openness and genuine interest in me and my project, and to the fellow interns for the support throughout this project. You all made me feel at home from the very beginning, which I have found very valuable. Lastly, thank you to Niek for being part of my thesis committee.

To my friends, thank you for your support, coffee breaks, shared lunches and dinners. You made not only the last few months, but the past seven years in Delft truly unforgettable. A big thank you my TIL friends, especially Sophie, without whom i wouldn't even get to the point of starting my thesis and who supported and worked with me throughout every project and many (late) deadlines. I hope we'll collaborate again in the future. And to my housemates: thank you for your infectious enthusiasm about mobility hubs, and for all your support and empathy during this time.

Last but certainly not least, I want to thank my parents, Anneke and Herman, for always supporting and encouraging me throughout my time in Delft, and making finishing this masters a reality.

This thesis closes off a time that has shaped me both personally and academically. Studying TIL has sparked my enthusiasm for the mobility transition, and I look forward to applying everything I've learned to make a real, sustainable impact in this field.

L.D. van Dijk
Amsterdam, Delft, July 2025

Executive Summary

Introduction

With the adoption of the Paris Agreement and the European Green Deal, reducing greenhouse gas (GHG) emissions has become a global priority ("European Green Deal", 2019; UN, 2015). While emissions are declining across most major sectors in the European Union (EU), the transportation sector remains the least improved, continuing to be a significant contributor to overall emissions (Dolge et al., 2023). In the Netherlands too, domestic transport accounts for a substantial share of the total CO_2 emissions, with passenger cars alone responsible for nearly half of these emissions (CBS, 2024).

Simultaneously, the Dutch population continues to grow, and this mobility demand is expected to keep rising, particularly in urban areas. However, rural regions are experiencing population decline (CBS, 2018). This shift presents distinct mobility challenges for both urban and rural areas (van den Berg, 2020). Cities must balance limited space between housing, green areas, and transport infrastructure (Rongen et al., 2022; van Gerrevink et al., 2021; Weustenenk & Mingardo, 2023), while rural areas must maintain accessibility even though the demand for public transport is declining. (Trygg & Grundel, 2025). Regional mobility hubs aim to address these issues by integrating multiple transport modes, such as public transit, shared mobility, and active travel, at strategic locations (Aono, 2019; Blad et al., 2022). They enhance connectivity between cities and surrounding rural areas, offering a more sustainable and efficient alternative to individual car use (Trygg & Grundel, 2025; Weustenenk & Mingardo, 2023).

The delivery of regional mobility hubs can be conceptually divided into four phases, as depicted in Figure 1. This thesis focuses on the middle phases, transitioning from regional strategy to local execution, where collaboration between stakeholders becomes essential. This is where the phases involve navigating different interests, aligning ambitions, and coordinating responsibilities across multiple governance layers, which is crucial for delivering scalable and effective mobility solutions, such as regional mobility hubs (Rijksoverheid, 2019; Rongen et al., 2022; Weustenenk & Mingardo, 2023).
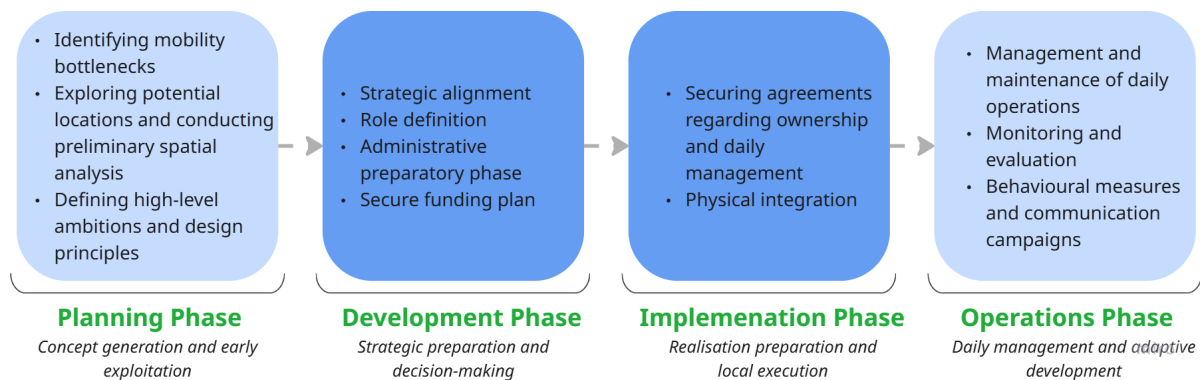

- Identifying mobility bottlenecks
- Exploring potential locations and conducting preliminary spatial analysis
- Defining high-level ambitions and design principles

- Strategic alignment
- Role definition
- Administrative preparatory phase
- Secure funding plan

- Securing agreements regarding ownership and daily management
- Physical integration

- Management and maintenance of daily operations
- Monitoring and evaluation
- Behavioural measures and communication campaigns

Planning Phase
Concept generation and early exploitation

Development Phase
Strategic preparation and decision-making

Implemenation Phase
Realisation preparation and local execution

Operations Phase
Daily management and adaptive development

Figure 1: Phased Delivery Approach Regional Mobility Hubs

While literature extensively discusses the definitions, objectives, and typologies of mobility hubs, less is known about the dynamics involved in the shift from development to implementation. This transition phase is especially critical for regional mobility hubs, where success often hinges not on technical design, but on effective stakeholder collaboration. It is precisely in this handover, from regional vision to local execution, that political, institutional, and organizational tensions emerge. Existing studies underline the importance of public-private collaboration, particularly due to the integration of shared mobility and transport services, but offer limited guidance on how such collaboration should evolve across project phases. Other research domains, such as energy or infrastructure governance, do provide insights into managing shifting stakeholder roles and expectations, but these have not yet

been systematically applied to the governance of regional mobility hubs. As a result, concrete, phase-specific collaboration strategies tailored to these hubs remain scarce.

This research addresses that gap by identifying identify potential improvement opportunities for enhanced collaboration between relevant stakeholders, specifically in the development and implementation phases of regional mobility hubs. In doing so, this research will address the following **main research question:**

How can collaboration be improved in the development and implementation phases of regional mobility hubs?

To systematically address this question, the following **sub-questions** are defined:

1. According to the literature, what defines effective stakeholder collaboration in mobility projects?
2. Which stakeholders are involved in the development and implementation of mobility hubs in the case study, and how do their roles differ between these phases?
3. What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?
4. How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?

Methodology

This thesis adopts a qualitative, exploratory case study approach, complemented by literature research. A case study enables in-depth understanding of complex governance and collaboration processes that are context-dependent and actor-driven. The case study relied on multiple data sources to ensure triangulation, including semi-structured interviews with stakeholders and experts, document and policy analysis, and field observations. In the case study, stakeholder analysis is performed and manual thematic analysis. These methods are used to analyze how stakeholder roles evolve across development and implementation phases and to identify how the stakeholders experience collaboration in the case study. The literature review focused on peer-reviewed studies concerning stakeholder collaboration frameworks.

The research approach consists of the following steps. After defining the research questions, the research developed a collaboration framework based on literature, tested and refined it through a regional case study, and translated the findings into actionable strategies for improving stakeholder alignment in the development and implementation of mobility hubs.

Results

Conceptual Foundation

As a starting point, a conceptual foundation was established through a review of academic literature on stakeholder collaboration and governance in multi-actor mobility projects. Based on this review, a collaboration framework was developed, identifying key principles for effective collaboration during both development and implementation.

This resulted in the following conceptual framework (see Figure 2), which serves as the analytical lens for the case study. In this framework, the blue rectangular blocks reflect key concepts, methods and theoretical tools derived from the literature study. The white oval blocks represent the core process components and guide the actions practitioners have to undertake in order to build effective stakeholder collaboration, according to the literature study.
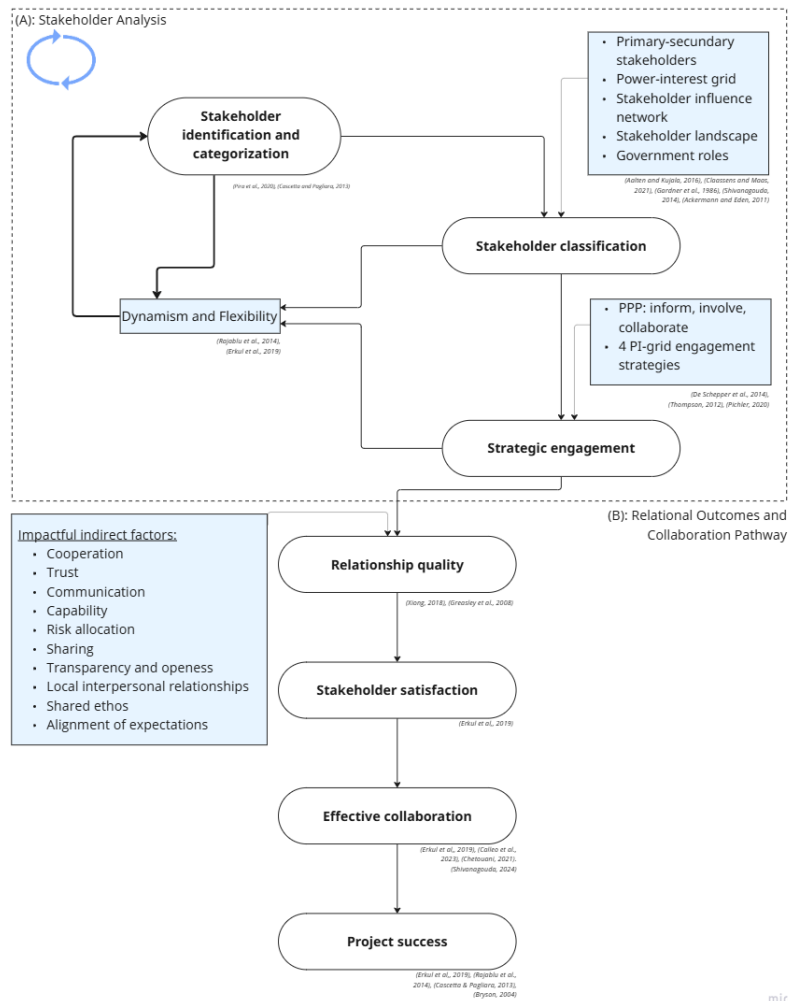
Figure 2: Conceptual Collaboration Framework

Application to Case Study

To apply and test the conceptual collaboration framework in practice, the Metropolitan Region of Eindhoven and its Brainporthub project was selected as the case study. The framework provided a structured lens to assess stakeholder roles, power dynamics, and relational quality throughout the development and implementation phases.

The analysis began with a context scan of the Brainport region, focusing on its multi-layered governance structure and institutional landscape. This set the stage for a stakeholder analysis, starting with stakeholder identification and moving onto stakeholder classification. For this step, the methods power-interest grids and a stakeholder influence network were selected. These tools, informed by governance documents, project reports, and 12 semi-structured interviews, revealed how power and interest shift between phases. In the development phase, strategic actors such as the Province of North Brabant, the Municipality of Eindhoven, and MRE hold central influence. As the project transitions to implementation, local stakeholders, such as civil servants, Rijkswaterstaat (RWS), and hub municipalities, gain power and become key decision-makers. Local councils, in particular, become pivotal due to their formal approval roles and spatial responsibilities. Engagement strategies were formed based on the PI-grids. However, mismatches started to arise when comparing the engagement strategy per actor and their actual involvement in the case, based on the stakeholder influence network.

Applying the second part of the framework, focused on relational outcomes, the interview data and reference cases were analyzed to identify key collaboration barriers and enablers. Three key barriers

were identified:

1. **Mismatch between problem ownership and solution implementation:** Local municipalities bear the burden of implementing hubs driven by regional or national interests, often without clear benefits.

2. **Unclear governance and decision-making roles:** Complex and fragmented structures lead to opacity, delaying action and reducing ownership.

3. **Lack of a shared vision and urgency:** Stakeholders interpret the purpose and value of hubs differently, leading to misalignment and resistance.

Five key enablers for effective collaboration emerged:

1. **Mutual trust and respect** improve cooperation across institutional boundaries.
2. **Support from national government** increases legitimacy and momentum.
3. **Framing hubs as multifunctional solutions** creates broader buy-in.
4. **Flanking policies and tangible user benefits** strengthen hub usage and acceptance.
5. **Standardization and shared language**, improve alignment and scalability.

Together, these findings demonstrate that collaboration in regional hub projects is not merely a procedural challenge but fundamentally relational and strategic. The framework proved useful in clarifying how collaboration can be strengthened by embedding trust, reciprocity, and clarity of roles into the core of project governance.

Evaluation and Refinement

The conceptual collaboration framework developed in this study offered a structured approach to stakeholder collaboration in regional mobility hub projects. However, applying the framework to the Brainporthubs case revealed several inconsistencies between theoretical assumptions and practical realities.

Most notably, the original framework assumed that stakeholder classification and engagement could lead to effective collaboration. However, the case study showed that these steps often failed in practice when key relational conditions, such as trust, shared vision, and clear role division, were absent. Engagement efforts lacked traction when stakeholders did not feel ownership, saw limited benefits, or experienced the process as top-down.

In response, the framework was revised in three essential ways. First, a *context analysis* step was added to account for the complex, multi-level governance structure in which regional hubs operate. Second, *relationship quality* was reframed as a prerequisite rather than an outcome, acknowledging that collaboration only becomes effective when mutual trust and understanding are in place. Third, a dedicated step on *role division* was introduced to clarify stakeholder responsibilities and influence early on, before formal engagement strategies are deployed.

These adaptations resulted in the evidence-based collaboration framework shown in Figure 3, which integrates theoretical principles with empirically grounded insights. It provides a more realistic roadmap for improving collaboration in regional mobility hub projects.
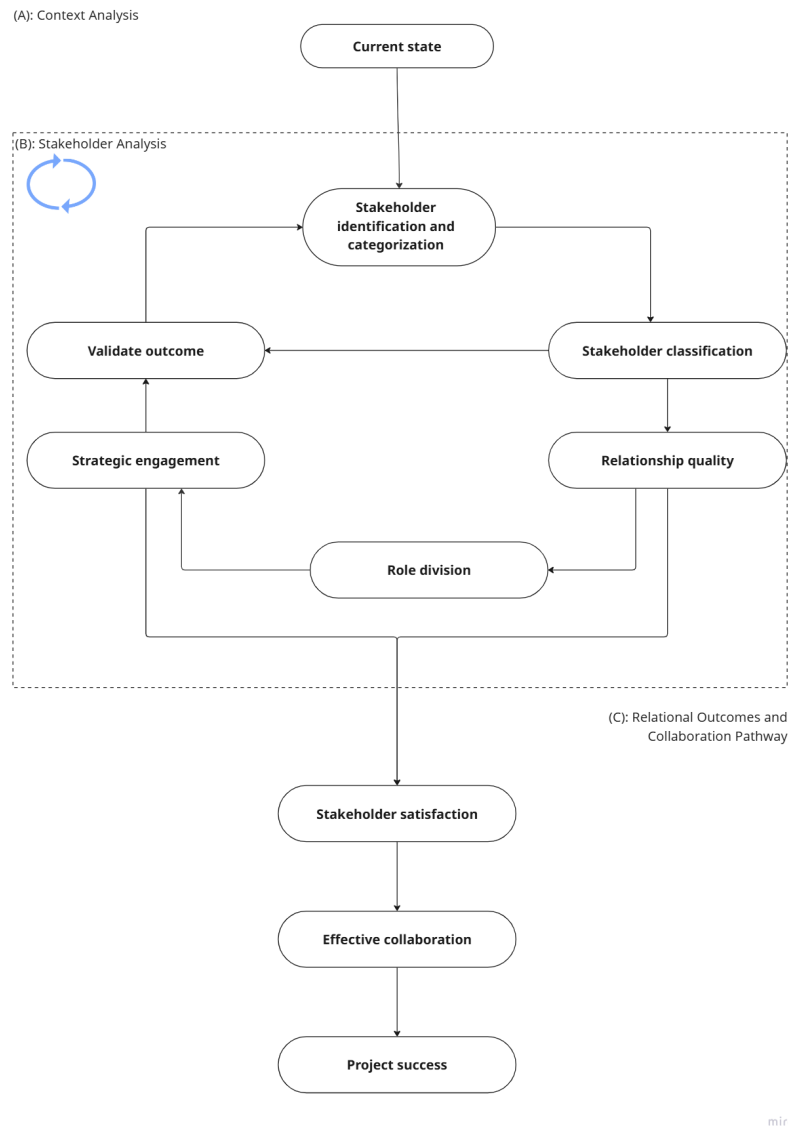
(A): Context Analysis

Current state

(B): Stakeholder Analysis

Stakeholder identification and categorization

Validate outcome

Stakeholder classification

Strategic engagement

Relationship quality

Role division

(C): Relational Outcomes and Collaboration Pathway

Stakeholder satisfaction

Effective collaboration

Project success

miro

Figure 3: Evidence-Based Collaboration Framework

Strategy Development

Based on the revised framework, giving a high-level strategy for collaboration, and the insights from Brainport case study and the reference cases, this thesis identifies tangible recommendations to improve stakeholder collaboration in regional mobility hub projects, both for the case study as for future regional hub projects.

Case-specific recommendations focus on trust-building, role clarification, and fostering co-ownership. In the development phase, key actions include selecting a motivated pilot location, initiating shared vision through co-creation, and strengthening relationship quality before formal governance decisions are made. For the implementation phase, iterative role negotiation and sustained trust-building are essential to secure local ownership and stakeholder satisfaction. A phase-specific strategy map of these recommendations is given in Figure 4, where the effects, activities and results are derived from the framework and analyses developed throughout this thesis.

Generalizable recommendations for future Dutch regional mobility hub projects in the development and implementation phase include:

- Conducting early *context analyses* and appointing a *neutral facilitator* to enhance process clarity;

- Strategically linking hubs to *housing and regional development agendas* to attract national support and funding;

- *Co-creating the hub vision* with stakeholders to increase alignment and reduce resistance;

- Ensuring *local autonomy* in hub design while coordinating shared policies regionally;

- Including *stakeholder satisfaction* as a key performance metric alongside traditional infrastructure KPIs.

These recommendations, visualized as a step-by-step pathway in Figure 5, aim to shift collaboration from fragmented and top-down dynamics toward inclusive, adaptive, and trust-based governance, supporting more effective development and implementation of regional mobility hubs.
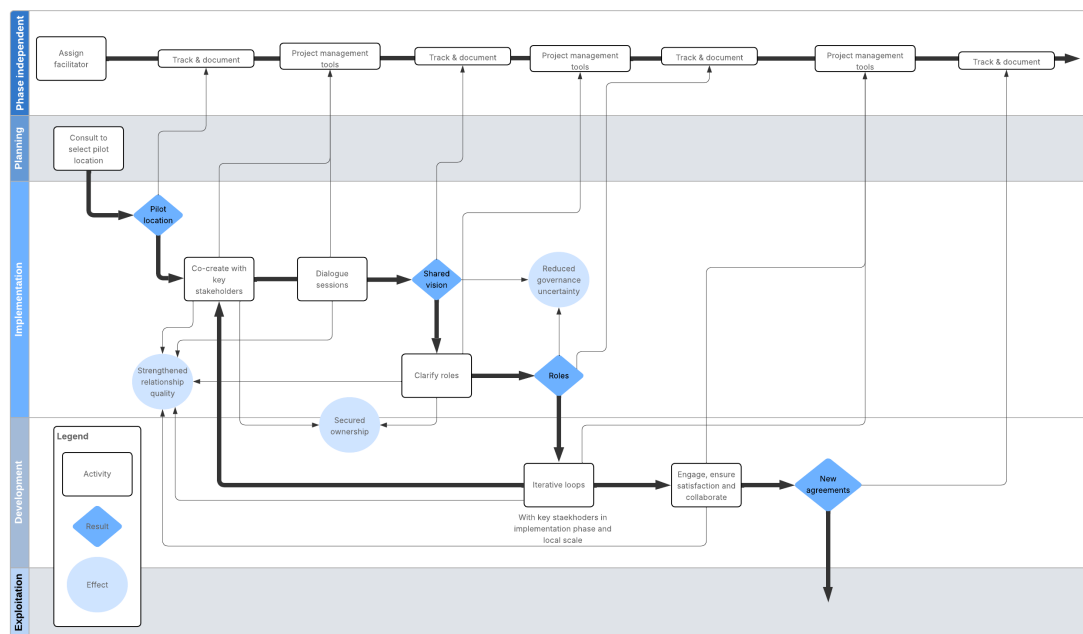
Figure 4: Case Study Recommendations
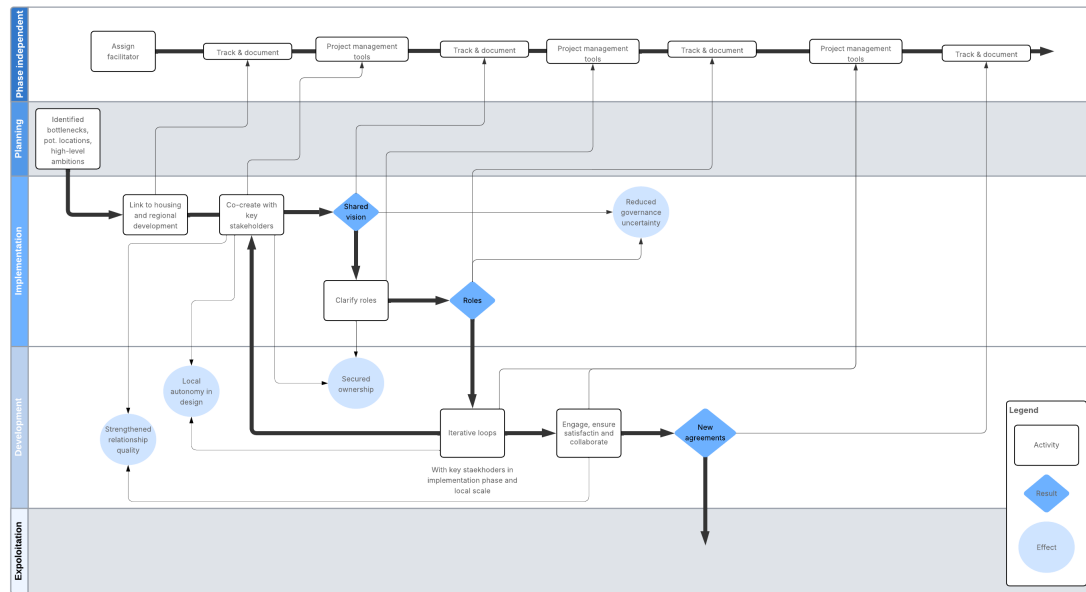
Figure 5: General Recommendations

Scientific Contribution

This thesis contributes to the academic discourse on stakeholder collaboration by refining existing collaboration frameworks and applying them to the underexplored context of regional mobility hubs. It re-conceptualizes collaboration not as a static engagement step, but as a dynamic process dependent on trust, role clarity, and reciprocal value. The research provides a phase-sensitive, evidence-based framework that integrates theoretical insights with empirical validation, and translates these into actionable governance strategies tailored to the specific challenges of regional hub delivery.

Limitations

Due to its qualitative and case-specific nature, based primarily on semi-structured interviews, introduces a degree of interpretive bias. Although triangulated with policy documents and governance structures, the manual thematic analysis relied on subjective judgment. Second, due to time constraints, interviews were continued until saturation of information occurred. However, a wider distribution across stakeholder groups would have offered critical insight into regional alignment and resistance patterns. Third, the research was intentionally scoped around the development and implementation phases of regional mobility hubs. As a result, more upstream planning and agenda-setting, where shared value propositions such as housing integration or nitrogen legislation alignment are first formulated, remained outside the core analysis. The finding that shared benefits are key to collaboration was thus acknowledged, but not elaborated into a fully developed implementation strategy within this thesis.

Recommendations for Future Research

Further research is recommended to examine how reciprocity can be actively designed into mobility projects. This includes exploring policy linkages, such as to housing development or environmental goals, that enhance shared value across governance levels.

Additionally, expanding the temporal scope to include the planning and operational phases would provide insight into when and how collaborative dynamics shift. A longitudinal study could help identify critical intervention points for stakeholder alignment. Especially the final phase, in which the hub becomes operational, deserves more attention. Challenges around long-term commitment, usage, and non-profitable business models may emerge there, requiring ongoing coordination and trust.

Last, the role of national actors warrants further investigation. National ministries and agencies influence regional mobility through funding, standards, and regulatory frameworks. Studying their involve-

ment can clarify how multi-level collaboration can be better coordinated.

Contents

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1

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Introduction

1.1. Context

With the adoption of the Paris Agreement and the European Green Deal, reducing greenhouse gas (GHG) emissions has become a global priority ("European Green Deal", 2019; UN, 2015). While emissions are declining across most major sectors in the European Union (EU), the transportation sector remains the least improved, continuing to be a significant contributor to overall emissions (Dolge et al., 2023).

In the Netherlands too, domestic transport accounts for a substantial share of the total CO_2 emissions, with passenger cars alone responsible for nearly half of these emissions (CBS, 2024). However, this type of mobility plays a crucial role in enabling social and economic participation (TNO, 2024). As the Dutch population continues to grow, this mobility demand is expected to rise, particularly in urban areas, while some rural regions are experiencing population decline (CBS, 2018). This shift presents distinct mobility challenges for both urban and rural areas (van den Berg, 2020). Cities must balance limited space between housing, green areas, and transport infrastructure (Rongen et al., 2022; van Gerrevink et al., 2021; Weustenenk & Mingardo, 2023). Meanwhile, potential mobility solutions must balance the livability of cities and maintaining accessibility for both the cities as the rural areas. Car dependency exacerbates congestion, creates parking shortages, and consumes valuable urban space (Trygg & Grundel, 2025). On average, private cars are parked 96% of the time, mostly in public space (Zijlstra et al., 2022). Together with the transport sector's significant contribution to total emissions in the Netherlands (CBS, 2018), addressing these challenges is essential for fostering more sustainable, livable and accessible cities and surrounding areas.

One approach to address these challenges and facilitate this mobility transition is the use of mobility hubs. Mobility hubs integrate multiple transport options—such as public transit, shared and private mobility services, and active travel modes—at strategic locations, enhancing connectivity and encouraging multi-modality (Aono, 2019; Blad et al., 2022). Regional mobility hubs are a form of mobility hubs with same objective, but at regional level. Their objective is to increase accessibility of both urban regions and rural regions surrounding a city. These hubs provide a convenient and efficient alternative to car use, improving access to less-connected areas while alleviating urban congestion (Weustenenk & Mingardo, 2023). By facilitating seamless multi-modal-travel, regional mobility hubs can reduce emissions, optimize urban space, and support a more sustainable mobility system, while simultaneously accommodating the growing demand for mobility (Rijksoverheid, 2019; Trygg & Grundel, 2025; Van Oort, 2024). The goals of regional mobility hubs present a promising solution for the earlier stated problems of reducing car dependency and fostering more sustainable and accessible transport networks.

1.2. Problem definition

The delivery of regional mobility hubs can be conceptually divided into four phases: planning, development, implementation, and operation. These are shown in Figure 1.1. While the planning and operations phases are generally well-structured and relatively unproblematic, with planning supported by

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regional visions and technical studies, and operation often handled by market parties such as Q-Park (AT Osborne, 2025; Brainport Bereikbaar, 2025b; Gemeente Amsterdam, 2025), the central bottleneck lies in the transition from development to implementation. This is where the regional vision must be translated into local execution, a step that often triggers political, spatial, and institutional frictions (AT Osborne, 2025; Gemeente Utrecht, 2025; Ministry of I&W, 2025; Provincie Noord-Brabant, 2025).
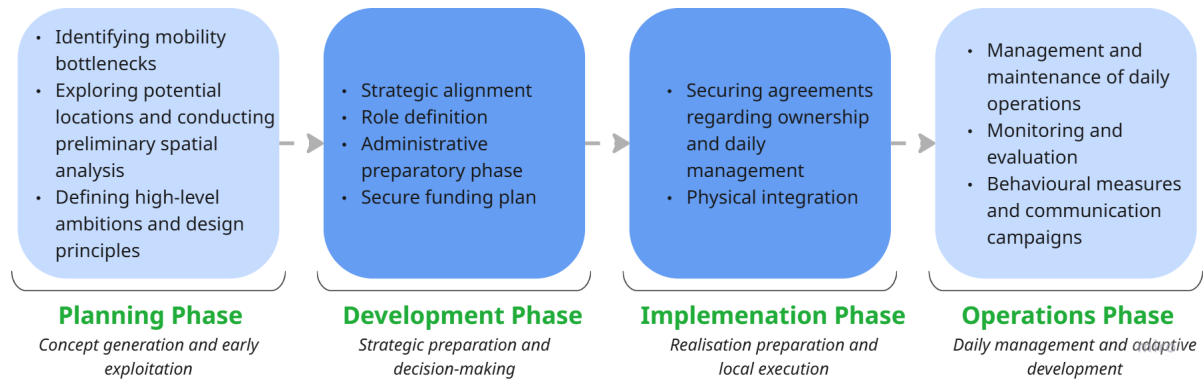

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Planning Phase
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Realisation preparation and local execution

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Daily management and adaptive development

Figure 1.1: Phased Delivery Approach

While much has been written about what mobility hubs are, including their definitions, goals, and typologies (Section 2.1), less attention has been paid to the dynamics that emerge when these hubs move from vision to execution. Especially during the development and implementation phases, collaboration between stakeholders becomes crucial but often proves difficult (Section 2.2). Previous research on stakeholder engagement in other policy domains provides useful insights, presented in Section 2.3, but concrete, actionable strategies tailored to the governance complexities of regional mobility hubs are still lacking.

This gap is more than academic. In practice, many mobility hub projects stall precisely in this middle segment of the process. Challenges such as unclear ownership and fragmented responsibilities regularly arise when translating regional ambitions into locally embedded solutions. As stakeholder alignment is widely recognized as a key success factor in mobility governance (Kua, 2016), targeted strategies to strengthen collaboration during these phases are needed.

1.3. Research objective and scope

As regional mobility hubs frequently face stagnation in the development and implementation phases, and stakeholder alignment through collaboration is seen as a critical success factor for overcoming these barriers, this study aims to develop strategies that strengthen collaboration and enable smoother advancement through these key phases of regional mobility hub realization. This research focuses exclusively on regional mobility hubs, as they inherently involve a high level of stakeholder complexity due to their integration of multiple transport modes, policy layers, and governance structures. Their objective is namely increasing accessibility of both urban regions and rural regions surrounding a city.

A well-structured development process accelerates the establishment of mobility hubs, while enhanced collaboration in the implementation phase ensures their continued effectiveness. Since stakeholder roles may shift between these phases, misunderstandings and coordination challenges can arise. Strengthening both phases and ensuring a smooth transition between them will improve the overall functionality of mobility hubs. Since these two phases are the central bottleneck for the regional hubs, this will be the scope of the research on regional mobility hubs.

1.4. Research questions

Based on the problem definition, objective and scope, the following research question is formulated:

How can collaboration be improved in the development and implementation phases of regional mobility hubs?

To systematically address this question, the following sub-questions are defined:

1. According to the literature, what defines effective stakeholder collaboration in mobility projects?
2. Which stakeholders are involved in the development and implementation of mobility hubs in the case study, and how do their roles differ between these phases?
3. What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?
4. How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?

1.5. Research structure

The remainder of this thesis is structured as follows. First, the knowledge gap is explored in Chapter 2, which provides a review of relevant literature. Next, Chapter 3 outlines the methodology used to answer the research questions.

Chapter 4 addresses the first sub-question and establishes the conceptual foundation, resulting in a conceptual collaboration framework based on existing literature. The framework is then applied by the case study, in Chapter 5, which investigates stakeholder collaboration in the context of the Brainporthubs project and answers sub-questions 2 and 3.

In Chapter 6, the empirical findings are compared to the theoretical model to identify misalignments and context-specific challenges. This synthesis leads to a revised, evidence-based collaboration framework, outlining high-level strategies to improve stakeholder collaboration, answering sub-question 4.

Finally, Chapter 7 translates these strategies into concrete, actionable recommendations. These are both tailored to the Brainport mobility hub case and generalizable to future regional mobility hub projects in the Netherlands, thereby answering the main research question.

2

Literature review

To identify the knowledge gap, this research first conducts a literature review of the existing body of work produced by researchers, scholars, and practitioners to establish the current state of the art.

A systematic approach was employed to identify relevant literature, as shown in Table 2.1. Google Scholar served as the primary academic database, complemented by the university's research repository. Peer-reviewed articles were selected based on academic background and relevance to the research questions. Additionally, a snowballing technique was applied by examining references in key articles to identify further relevant sources. After retrieving the relevant literature, detailed notes were compiled in an Excel spreadsheet, focusing on the abstract and conclusion. The most pertinent studies were examined in depth to extract insights that inform this research. The exact studies reviewed are discussed in detail within each corresponding subsection, structured by specific research themes. This literature review not only synthesizes existing evidence but also highlights the knowledge gap in the research, which this research will aim to fill.

Concept groups	Mobility hubs; Implementation challenges; Governance structures; Stakeholder collaboration
Keywords	Mobility hubs: definition; typology; multimodal transport; shared mobility; transport integration Governance structures: institutional frameworks; public-private partnerships; policy alignment Stakeholder collaboration: multi-actor coordination; decision-making processes; power dynamics; engagement strategies Implementation challenges: barriers; regulatory complexity; funding mechanisms; planning strategies
Truncation	(Mobility hubs) OR (Mobility hubs) AND (Topology) OR (Mobility hubs) AND (Implementation) OR (Mobility hubs) AND (Governance structures) OR (Mobility hubs) AND (Stakeholder collaboration) OR (Mobility hubs) AND (Governance structures) AND (Stakeholder collaboration) OR (Governance structures) AND (Stakeholder collaborations)

Table 2.1: Conceptual and methodological framework for the literature review

2.1. What are mobility hubs?

The literature reviewed in this section is summarized in Table 2.2, found due to one or more truncations of Table 2.1. The selected studies provide insights into different aspects of mobility hubs, including their historical background, definitions, objectives, and typologies. First, the background of mobility hubs is discussed, then, different definitions from the literature are compared. Following this, the key objectives of mobility hubs are outlined, and various typologies are analyzed to categorize different forms of mobility hubs. Finally, a conclusion synthesizes the key takeaways and highlights potential research gaps.

Table 2.2: Overview of literature used in the mobility hub section

Source	Keywords
Hached et al. (2023)	Mobility hub background, mobility hub definition, mobility hub classification
Vale (2015)	Land use integration, Transit-Oriented Development (TOD)
Wuestenenk (2021)	Mobility hub background, mobility hub classification
Chorus and Bertolini (2011)	Node-place model, transport supply and land use balance
Bertolini (1999)	Node-place model, transport hubs classification
van Gerrevink et al. (2021)	Mobility hub definition, mobility hub classification
Stojanovski et al. (2024)	Mobility hub definition
Aono (2019)	Mobility hub definition

2.1.1. Background

Although mobility hubs are often referred to as a relatively new concept, their origins can be traced back much further. To gain a clear understanding of mobility hubs, their background will be briefly discussed. The first recorded search request for the term "mobility hub" appeared on Google in 2008 ("Google Trends", 2023), yet the fundamental principles underpinning mobility hubs—such as multimodal transport integration and strategic urban planning—have been in practice for decades.

Before the emergence of the mobility hub concept, multimodal transport solutions were already being implemented to enhance connectivity and reduce congestion. Examples include park-and-ride (P+R) facilities and transferia, where travelers can switch from private vehicles to public transport at city peripheries, and intermodal transit stations, designed to facilitate seamless transfers between different transportation modes (Hached et al., 2023; Van Oort, 2022). These already had something in common with the current mobility hub concept: a central location where multiple mobility services converge to improve urban accessibility.

Essential for assuring accessibility and sustainability in urban mobility is the integration of land use an transportation planning (Vale, 2015). One of the most widely used frameworks for this integration is Transit-Oriented Development (TOD), which promotes high-density, mixed-use development around transit nodes (Wuestenenk, 2021). TOD aims to enhance multimodal accessibility by prioritizing active travel modes such as walking and cycling while reducing car dependency (Vale, 2015; Wuestenenk, 2021). Unlike traditional urban planning approaches that focus solely on infrastructure, TOD emphasizes livable urban spaces where transport and land use function in harmony. This balance between transport supply and land use-driven demand, means that transit nodes should function both as efficient transport interchanges (node function) and as attractive urban destinations (place function) (Chorus & Bertolini, 2011).
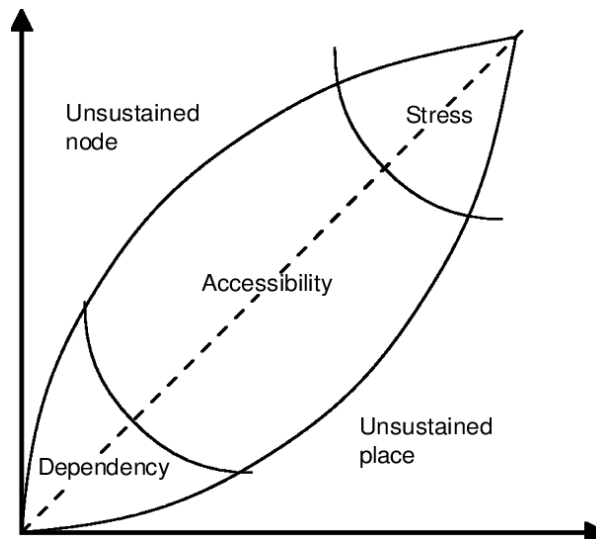
Figure 2.1: Node-place model, (Bertolini, 1999)

This model helps determine whether an area has successfully integrated transport and urban development—or whether imbalances exist—such as overbuilt transport infrastructure with insufficient land use activity (unbalanced nodes) or high-intensity land use with inadequate transport access (unbalanced places) (Chorus & Bertolini, 2011).

While TOD concentrates urban development around transit nodes and considers public transport as its backbone, shared mobility extends this concept further by introducing on-demand, flexible transport services that increase network reach and adaptability (van Gerrevink et al., 2021). TOD is inherently multimodal, but shared mobility introduces a new layer of flexibility and accessibility that strengthens the urban transport system.

The link between TOD and shared mobility lies in their shared objective: enhancing multimodal accessibility and reducing reliance on private vehicles to create more sustainable and efficient urban mobility systems. Mobility hubs act as key enablers, ensuring connections between public transit, active mobility and shared transport options (Hached et al., 2023; van Gerrevink et al., 2021). Unlike TOD, which aims to reshape entire neighborhoods into walkable, transit-oriented environments, mobility hubs can be implemented as smaller-scale interventions (Stojanovski et al., 2024). These may include adaptations of urban parking spaces, or the transformation of suburban P+R facilities into multifunctional public spaces.

Thus, rather than being a novel concept, mobility hubs represent the evolution of existing multimodal transport principles, shaped by advancements in land use planning, public transport integration, and shared mobility. As stated by Aono (2019): "Mobility hubs require an integration of land use, infrastructure and services, that benefit sustainable transport modes and transit-oriented development.". This historical and conceptual foundation provides essential context for the formal definitions of mobility hubs, which will be explored in the next section.

2.1.2. Definition
The definition of mobility hubs varies across the literature, with no universally agreed-upon description. However, a core characteristic that consistently emerges is that a mobility hub is always a physical, recognizable location designed to connect multiple transport modes and facilitate seamless multimodal travel. In essence, it serves as a transfer point that enables integrated mobility chains.

Beyond this fundamental function, several additional characteristics frequently appear in the literature, including the presence of shared mobility options, public transport integration, supporting facilities or service and the associated governance structures. However, these elements are not included in all definitions. A detailed comparison of how different studies define mobility hubs and which elements they incorporate can be found in Appendix B.1, where an overview table illustrates the variations in

definitions.

For the purpose of this research, the following comprehensive definition is adopted, incorporating the key elements identified in the literature:

"A mobility hub is a <u>physical, multimodal node</u> that integrates <u>multiple transport modes</u>, facilitating <u>seamless transfers</u> between <u>public transport, shared mobility, and other available modalities</u>. The successful development and operation of mobility hubs require <u>multi-level governance arrangements and collaboration</u> between stakeholders, ensuring coordinated planning, implementation, and management. The specific composition of transport options, <u>services and amenities</u>, and governance structures varies depending on the local context and mobility needs."

2.1.3. Objectives
While mobility hubs share a common function as multimodal transfer points, their objectives extend beyond merely facilitating transport connections. The following section explores the diverse objectives of mobility hubs as identified in the literature.

A key objective of mobility hubs is reducing private car use and ownership, which helps lower emissions, decrease congestion, and promote more sustainable transport choices (van Gerrevink et al., 2021; van den Berg, 2020; Van Oort, 2024). By reducing car ownership and car use, mobility hubs also minimize the need for on-street parking, allowing for a more efficient and community-friendly use of public space (Claasen, 2020).

Another crucial function of mobility hubs is stimulating multimodal travel by enabling seamless transitions between transport modes such as public transit, shared mobility, cycling, and walking (van Gerrevink et al., 2021). By improving first- and last-mile connectivity, Gemeente Eindhoven (2022) states that hubs encourage travelers to choose sustainable transport options over private car use. Furthermore, mobility hubs contribute to transport network optimization, where strategic placement enhances overall connectivity and ensures efficient public transport integration (van den Berg, 2020).

Beyond transport efficiency, mobility hubs also support urban development objectives by reshaping parking policies, reducing traffic pressure in cities, and repurposing space for green areas and pedestrian zones (van Gerrevink et al., 2021; van den Berg, 2020). Some hubs are also designed to facilitate zero-emission urban logistics, consolidating deliveries and promoting sustainable freight transport (van den Berg, 2020). Additionally, hubs play an important role in enhancing accessibility, particularly for individuals without private vehicles, thereby fostering more inclusive urban mobility (Hached et al., 2023).

In summary, mobility hubs serve multiple objectives, including:

- Reducing private car use and ownership to lower emissions and congestion.
- Improving public space by reducing parking demand and increasing pedestrian-friendly areas.
- Stimulating multimodal travel, enabling smooth transfers between different modes.
- Enhancing accessibility, particularly for those without private vehicles.
- Optimizing transport networks by improving public transit integration.
- Supporting urban sustainability, including green space development and emission-free logistics.

Since mobility hubs come in a variety of forms, their specific objectives depend on their local context, scale, and governance structures. Not all hubs pursue every goal listed above, as their design and functionality are often tailored to the needs of a particular region. The next section examines the different types of mobility hubs, analyzing their specific roles and how they vary in implementation.

2.1.4. Typologies
The classification of mobility hubs varies widely across different studies, reflecting their diverse nature in terms of location, scale, function, and transport integration. Various frameworks categorize hubs based on urban context, transport role, and service provision, offering insights into their operational differences and stakeholder complexity. An overview of the different typologies is depicted in Appendix B.2, and a brief explanation is given below.

A commonly used classification is based on scale and transport function. Chetouani (2021) identifies three primary types: neighborhood hubs, serving local travel needs within residential areas; urban hubs, integrated into larger city transport networks; and peripheral hubs, positioned on the outskirts to facilitate regional connectivity. Expanding on this, Weustenenk and Mingardo (2023) introduces a more detailed typology, distinguishing between community hubs, suburban hubs, city district hubs, city edge hubs, and city center hubs, illustrating the variation in scale and function within urban and regional transport systems. Wuestenenk (2021) builds on this scale-function approach by mapping mobility hubs based on their size and the number of transport modes they accommodate. Similarly, van Gerrevink et al. (2021) classifies hubs according to their geographical location and operational scale. A common pattern in these classification methods is that hubs progressively increase in size and complexity, with larger hubs integrating more transport modes and serving broader regions.

From a transport system perspective, Blad et al. (2022) categorizes hubs based on their integration with different transport modes. This includes residential shared mobility hubs, which primarily offer shared mobility without direct public transport integration; city and regional shared mobility hubs, which are linked to public transport but exclude private car facilities; city shared mobility hubs, located in dense urban areas; and regional shared mobility hubs, positioned outside cities and facilitating intermodal car-based transport chains.

Hached et al. (2023) presents multiple classification approaches based on different criteria, including location, function, role in the transport network, urban context, services provided, and size. These typologies, along with their respective distinctions, are further detailed in the Appendix B.2.

Other studies emphasize location-specific characteristics. van den Berg (2020) differentiates between city hubs, regional hubs, business park hubs, and temporary hubs. Similar to the findings in Goudappel (n.d.) research, this highlights that the functioning of a mobility hub depends on its specific location.

These classifications highlight the different ways mobility hubs can be defined, depending on the research focus and the specific challenges addressed. While existing research primarily emphasizes physical infrastructure, transport functions, and spatial classifications, it often overlooks the complexity of stakeholder collaboration in both the development and implementation phases. The extent to which different types of mobility hubs require stakeholder coordination varies. In this research, regional mobility hubs are the focus, as they inherently involve a high level of stakeholder complexity. This makes them particularly relevant for examining governance challenges and collaboration strategies during both the development and implementation phases.

2.2. Governance of mobility hubs

Governance structures play a fundamental role in the successful development and implementation of mobility hubs. However, research specifically tailored to the governance and decision-making structures required for mobility hub development and implementation remains limited. Additionally, the transition of these governance structures, when going from the development and implementation phase are not researched. This section reviews studies that have examined governance structures and multi-actor coordination in mobility hub delivery process, looking at both the development and implementation phase. An overview of the studies found is shown in Table 2.3.

Table 2.3: Overview of literature used in the governance section

Source	Keywords
Gemeente Eindhoven (2022)	Governance structures, public-private partnerships, governance at system and location level
Aono (2019)	Implementation challenges, stakeholder partnerships, governance barriers
Hansel (2025)	Multi-level governance, stakeholder coordination, governance fragmentation, urban space management
Witte et al. (2021)	Government roles, policy alignment, national governance frameworks

Governance and stakeholder dynamics play a crucial role in the development and implementation of mobility hubs. Previous research by Gemeente Eindhoven (2022), has focused on governance of hubs at both the system level (a regional hub network) and the location level (individual hubs). This research highlights that clear governance is essential for successful implementation and operation of hubs, however a distinction between the governance between these two phases is not explicitly made in this research. It identifies three types of governance structures: public entities (such as municipalities and provinces), private entities (providing services like shared mobility and charging infrastructure), and public-private partnerships (PPS), where ownership remains public but operations are private. A key finding from Gemeente Eindhoven (2022) is that when hubs primarily focus on parking, governance is often public, whereas hubs oriented towards public transport tend to be managed from a network perspective. While this study does give recommendations regarding governance level and advices based on system levels, this study does not provide an in-depth analysis of governance challenges specifically related to strategies in the two different phases in multi-stakeholder environments, nor does it include the roles of the other parties involved.

Aono (2019) is one of the few studies that explicitly addresses delivery process challenges in mobility hubs. This research identifies four categories that are involved in the delivery process: planning, services and elements, spatial development, and funding. Aono (2019) highlights that, as mobility hubs involve public and private services, partnerships are crucial for implementation. However, aside from the four categories, specific stakeholder (groups) needed for the partnerships are not discussed. Furthermore, the research does not discuss specific strategies to enhance the efficiency or effectiveness of these collaborations. Moreover, the study primarily focuses on the physical aspects of mobility hubs, while governance barriers are less thoroughly examined. A notable recommendation in this research is further research on implementation strategies, particularly for elements requiring complex stakeholder dynamics.

Hansel (2025) emphasizes that mobility hubs require multi-actor and multi-level governance. The research highlights the challenges of fragmented multi-level governance in mobility hub development. Using a framework that distinguishes between organizational (actors, resources, policy instruments) and ideational (discursive negotiations, policy narratives) dimensions, the study finds that unclear responsibilities and institutional fragmentation hinder coordination.

Case studies in Vienna and Munich done by Hansel (2025) emphasize the need for a clearly responsible actor with resources and political support to drive implementation. Experimental governance, through iterative approaches and informal communication, helps navigate regulatory uncertainties. Additionally, urban space and funding are key yet contested resources, with parking management emerging as a powerful but conflict-prone policy tool.

While Hansel (2025) identifies governance complexities, the study does not explore concrete strategies for optimizing stakeholder collaboration. Nor does the research include the multi-level governance complexity when going from one phase to another. This research builds on Hansel's findings by examining governance mechanisms that enhance coordination and decision-making in mobility hubs.

The report by the Netherlands Institute for Transport Policy Analysis Witte et al., 2021 acknowledges that practical experience with mobility hubs remains limited and that hub development requires alignment with other policy instruments. Witte et al. (2021) describes various roles that the government can assume, such as regulator, financier, or launching customer. The study suggests that the national government can support complex planning and coordination efforts and that policy alignment at the micro, meso, and macro levels is essential. These recommendations act as guidelines for shaping the roles in mobility hub implementation. However, while the report outlines conditions and role distributions, it does not provide an in-depth analysis of governance challenges or strategies within stakeholder networks.

Although existing studies discuss governance models in mobility hubs, they primarily focus on high-level role distributions rather than practical governance mechanisms for multi-stakeholder collaboration strategies in the development and implementation phase. Research addressing governance challenges, decision-making structures, and stakeholder coordination in both these phases of mobility hubs remains scarce. This study aims to address this gap by examining governance structures that support collaboration in both phases, ensuring the efficient operation and functionality of mobility hubs.

2.3. Stakeholder engagement and collaboration

Stakeholder involvement plays a crucial role in the development and implementation of sustainability and transport policies. Effective stakeholder engagement ensures that diverse perspectives are considered, leading to more robust and widely accepted policy decisions. Various frameworks have been proposed in the literature to structure stakeholder identification, engagement, and collaboration processes. Literature used in this section is summarized in Table 2.4.

Table 2.4: Overview of literature used in the stakeholder engagement and collaboration section

Source	Keywords
Kua (2016)	Stakeholder identification, stakeholder engagement, decision-making processes
Przybylska et al. (2023)	Stakeholder analysis, power-interest grid, urban logistics planning, stakeholder role assignment
Claassens and Maas (2021)	Government roles, stakeholder participation, adaptive governance
Brouwer et al. (2017)	Multi-stakeholder partnerships, participatory decision-making, collaboration structures

Kua (2016) introduce the Integrated Framework for Stakeholder Identification, Understanding, Engagement, and Role Management (IFSIUER). This framework emphasizes that meaningful stakeholder involvement follows a structured, chronological process consisting of four key steps: stakeholder identification, understanding of identified stakeholders, customization of engagement methods based on stakeholder insights, and finally, role management to optimize participation in the decision-making process. While this framework was designed for energy policymaking, its structured approach to stakeholder involvement can be adapted to transport policy and mobility hubs.

A similar systematic approach is found in the research by Przybylska et al. (2023), which examines stakeholder engagement in urban logistics planning. The study highlights the necessity of incorporating different stakeholder groups into the development of sustainable transport policies. By first identifying key stakeholders and their challenges, the research conducted a stakeholder analysis using a power-interest (PI) grid to assess levels of influence and interest. Based on this analysis, recommendations were made for local governments on how to effectively collaborate with stakeholders in the field of sustainable urban mobility. Although this research was conducted in Polish cities and focused on general sustainable urban policy, its methodology for stakeholder identification and role assignment offers a structured approach that can be useful for mobility hub governance.

Claassens and Maas (2021) propose a governance framework that categorizes government roles into four quadrants, determining where responsibility for stakeholder participation lies. The framework acknowledges that multiple roles can coexist within a single project, requiring an adaptive governance approach. Since the different phases of mobility hub implementation involve multiple stakeholders and shifting policy landscapes, a rigid governance model is insufficient. Regular reassessment of government roles and stakeholder involvement is necessary to align with evolving priorities. While this framework provides a structured tool for defining governmental roles, it does not specifically address how public and private authorities should engage with other stakeholders in the case of mobility hubs.

Additionally, Brouwer et al. (2017) explore the development of multi-stakeholder partnerships (MSPs) through a research-based approach aimed at forming tangible management tools. Their work introduces a structured framework for collaboration between governments, businesses, civil society, and knowledge institutions, consisting of four iterative process phases—initiating, adaptive planning, collaborative action, and reflective monitoring (Figure 2.2)—and seven guiding principles for effective facilitation.

The guide also includes 60 practical tools to support collaboration, which are categorized according to the different phases. For this particular case, being in the early stages of implementation, tools related

to *connection* are especially relevant. Key findings in this section include the importance of creating space for open dialogue and personal sharing early in the process. As the authors state:

> "At this stage, your aim is to get as many people as possible talking to each other. Participants will listen more if they have been able to talk and share themselves and feel that they know some of the others. One of the key outcomes should be that everybody is clear what the issue is." (p. 140)

While the guide provides concrete tools for stakeholder engagement and participatory governance, it does not address the specific governance challenges or a collaboration framework associated with mobility hub development, nor does it distinguish between phases in infrastructure project management.
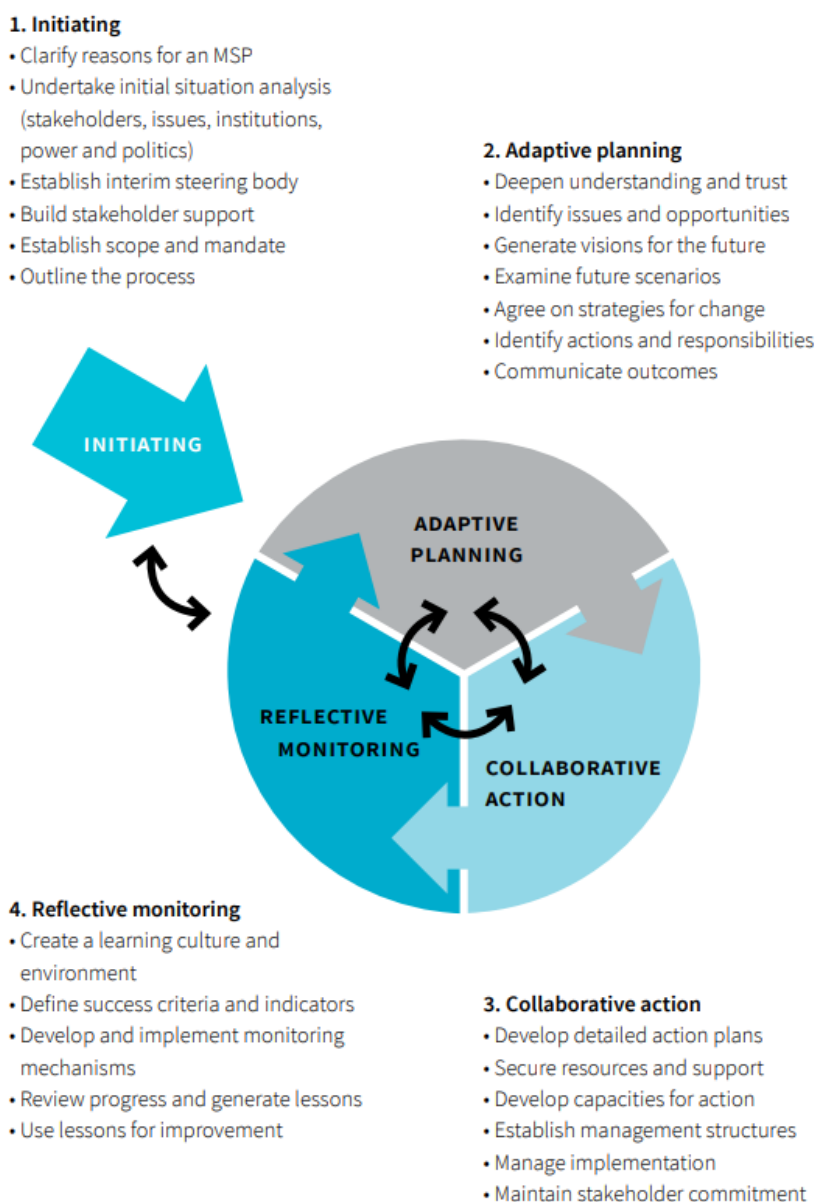
1. Initiating
- Clarify reasons for an MSP
- Undertake initial situation analysis (stakeholders, issues, institutions, power and politics)
- Establish interim steering body
- Build stakeholder support
- Establish scope and mandate
- Outline the process

2. Adaptive planning
- Deepen understanding and trust
- Identify issues and opportunities
- Generate visions for the future
- Examine future scenarios
- Agree on strategies for change
- Identify actions and responsibilities
- Communicate outcomes

4. Reflective monitoring
- Create a learning culture and environment
- Define success criteria and indicators
- Develop and implement monitoring mechanisms
- Review progress and generate lessons
- Use lessons for improvement

3. Collaborative action
- Develop detailed action plans
- Secure resources and support
- Develop capacities for action
- Establish management structures
- Manage implementation
- Maintain stakeholder commitment

Figure 2.2: MSP Process Model (Brouwer et al., 2017)

Although stakeholder engagement and multi-stakeholder governance have been widely studied in sustainability and transport research, existing frameworks have not been directly applied to mobility hubs. The methods for stakeholder identification, role management, and engagement strategies re-

main largely unexplored in the specific context of mobility hub development and implementation. Neither does the literature focus on the challenges in the potentially different stakeholder roles in the different phases of projects. This research aims to address this gap by investigating how stakeholder collaboration frameworks can be tailored to improve the governance of mobility hubs, in both the development and implementation phase.

2.4. Research gap

While mobility hubs have been widely studied in terms of definitions, typologies, objectives, and user behavior, there remains a critical gap in research regarding their governance and stakeholder collaboration challenges—not only during development but also in the subsequent implementation phase. Existing literature primarily focuses on the physical infrastructure, transport functions, and service integration but overlooks the evolving stakeholder dynamics that shape both phases.

Several studies acknowledge that mobility hubs require collaboration between public and private stakeholders, yet little research has been conducted on how governance structures and coordination mechanisms should adapt across the transition from development and implementation. The roles and responsibilities of stakeholders can shift between these phases, often leading to uncertainties, misalignment, and inefficiencies. While governance research frequently highlights the need for partnerships, it lacks concrete strategies to manage stakeholder interdependencies, resolve conflicts, and ensure a seamless transition from implementation to long-term operational viability. Additionally, while governance frameworks exist for broader transport and urban development projects, they have not been sufficiently tailored to address the evolving complexities of stakeholder collaboration in different phases of mobility hub development.

In Table 2.5, an overview of the literature used in this review is provided, categorizing each source based on its primary focus area. The Table reveals the gap in studies linking the areas.

Thus, this research aims to bridge this gap by investigating governance mechanisms and stakeholder collaboration strategies that influence the successful development and subsequent implementation of mobility hubs. By examining how governance structures can be designed and optimized, this study will contribute to a more comprehensive understanding of the institutional and collaborative challenges that determine the feasibility and scalability of mobility hubs. Ultimately, this research seeks to provide actionable insights that can support more effective stakeholder coordination and governance strategies in mobility hub projects.

Table 2.5: Overview of existing research on mobility hubs

Source	Mobility hub definition	Mobility hub development	Mobility hub implementation	Governance structures	Stakeholder collaboration
Hached et al. (2023)	✓				
Vale (2015)					
Wuestenenk (2021)	✓				
Chorus and Bertolini (2011)					
Bertolini (1999)					
van Gerrevink et al. (2021)	✓				
Stojanovski et al. (2024)	✓				
Aono (2019)	✓	✓			
Gemeente Eindhoven (2022)	✓	✓	✓	✓	
Hansel (2025)	✓	✓		✓	
Witte et al. (2021)	✓		✓	✓	
Kua (2016)					✓
Przybylska et al. (2023)					✓
Claassens and Maas (2021)				✓	✓
Brouwer et al. (2017)					✓
This research	✓	✓	✓	✓	✓

3

Research methodology

This chapter outlines the research methodology and research approach used to answer the main research question and the sub-questions.

Table 3.1 summarizes the methods corresponding to each sub-question, all aiming at synthesizing knowledge to answer the main research question. In the following sections, the rationale and application of each method will be discussed in more detail.

Main Research Question:	
How can collaboration be improved in the development and implementation phases of regional mobility hubs?	
Sub-question	**Research method**
1. According to the literature, what defines effective stakeholder collaboration in mobility projects?	Literature review
2. Which stakeholders are involved in the development and implementation of mobility hubs in the case study, and how do their roles differ between these phases?	Case study (semi-structured interviews, document analysis), stakeholder analysis, feedback sessions
3. What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?	Case study (semi-structured interviews, thematic analysis, field observations)
4. How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?	Case study (expert interviews), feedback sessions, comparative analysis

Table 3.1: Research questions and corresponding methods

3.1. Case study
3.1.1. Why a case study?
For this study, a case study approach has been selected as the main method, answering sub-questions 2 and 3, given its suitability for exploring nuanced experiences and detailed stakeholder perspectives within specific governance contexts. As Chapter 2 revealed a gap in literature reviewing the subject of this research, a relevant case study can provide necessary empirical grounding to understand the challenges and uncover context-specific improvement opportunities.

Case study research is particularly suitable for investigating complex stakeholder dynamics and governance structures (Yin, 2014). Unlike quantitative approaches, which often rely on broad statistical
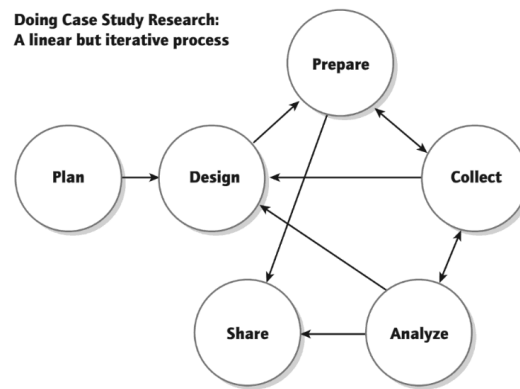
Figure 3.1: Phases of Case Study Research (Yin, 2014)

analyses, a case study allows for an in-depth exploration of real-world decision-making and implementation processes. This approach prioritizes depth over breadth, allowing researchers to analyze context-dependent factors and engaging with the case to develop a nuanced understanding of the social and political dimensions involved (White & Cooper, 2022; Yin, 2014).

For this research, a single case study was selected specifically. Single case studies are often criticized for their perceived inability to generate scientific knowledge beyond the specific cases they examine (Flyvbjerg, 2006; Yin, 2014). However, a single case study can still significantly contribute to discussion beyond the case, by providing transferable insights. Strategic selection can maximize analytical generazilability and provide knowledge about broader systems (Flyvbjerg, 2006; White & Cooper, 2022; Yin, 2014).

3.1.2. Case study methodology
The case study follows Yin's structured approach (Yin, 2014), following six phases both linear and iteratively (Figure 3.1): planning, design, preparation, collecting data, analyzing data and sharing data to enhance validity.

A critical component of case study research is the use of multiple data sources (Yin, 2014), in this research this includes:

- **Interviews**: Semi-structured interviews with key stakeholders, including policymakers, mobility service providers, and urban planners.
- **Field observations**: Direct observations of stakeholder interactions in planning meetings and pilot project implementations.
- **Document analysis**: Policy documents, project reports, and strategic plans related to mobility hubs in Brainport Eindhoven.

By using multiple sources of evidence, the study ensures triangulation, increasing the reliability and validity of findings (White & Cooper, 2022).

3.2. Data collection and analysis
The data for this researched will be gathered through the case study. As this research involves human participation, permission from the TU Delft ethical committee is secured before conducting this research.

3.2.1. Interviews
Interviews are conducted with representatives from key stakeholder groups involved in mobility hub development and implementation:

- Public sector (municipalities, (multi-level) governance groups)

- Private sector (regional firms, involved consultant groups)
- Policy advisors and urban planners

A semi-structured approach is used to allow flexibility while ensuring that core topics—governance structures, collaboration challenges, and implementation strategies—are covered. Interviews should be conducted until sufficient information is gathered to adequately inform and validate the case study.

Additionally, expert interviews are conducted with a selected group of stakeholders to gather in-depth knowledge on specific topics. These interviews follow a more structured approach compared to the semi-structured interviews, as they focus on specialized expertise and reflections to enhance the quality of insights (Meuser & Nagel, 2009).

3.2.2. Field observations
Field observations involve attending meetings and site visits related to mobility hub planning and implementation in Brainport Eindhoven. These observations provide insights into real-time stakeholder interactions and governance challenges. In these observations, notes are made to use for the case study analysis.

3.2.3. Document analysis
Relevant policy and planning documents are analyzed to understand existing governance frameworks and institutional barriers to mobility hub implementation. These documents are collected through contacts established during the interviews, allowing access to relevant materials.

3.2.4. Thematic analysis
Inductive thematic analysis was used to analyze the interview data, allowing patterns to emerge without a predefined theoretical framework. The process involved analyzing the expert insights, identifying recurring patterns, grouping them into sub-elements. These will form the basis of the answer of sub-question 3. This approach ensured a structured yet flexible analysis of stakeholder perspectives (Damyanov, 2023).

3.3. Validation and Reliability
To enhance validity and reliability, products are validated with feedback sessions with chosen experts on the subject. Validating feedback loops are incorporated after every sub-question, ensuring the feasibility of proposed strategies and validation of current state analyses on the governance of the region.

3.4. Stakeholder Analysis
A stakeholder analysis will be performed in order to identify the actors who are involved and have interest in the development and implementation of the mobility hubs in the case study. The purpose of this analysis is to monitor al needs, interests and possible contributions of stakeholders in the development and implementation. Because of this dual phased approach, a dynamic stakeholder analysis will be conducted, to clearly depict the potential change in position of the stakeholders.

Wallbridge (2023) proposes to categorize stakeholders by interest and influence, and place all stakeholders into a power-interest grid in order to visualize the results. It is expected that a stakeholder analysis may support of communication and collaboration strategies and by doing so, increase the probability of project success. Additionally, the stakeholder analysis may contribute to the identification of potential opportunities and threats that emerge from stakeholder dynamics, and therefore contribute to better organizational alignment.

3.5. Literature study and desk research
The research methodology combines a literature study and desk research to provide a comprehensive understanding of mobility hubs and stakeholder collaboration. This method is specifically used to answer sub-question 1. This approach is particularly suitable for the emerging field of mobility hubs, which is rapidly evolving. The difference between these methods and the added value of their combination will be briefly explained, highlighting how they complement each other in providing both theoretical

insights and practical context.

Literature study focuses on academic, peer reviewed, journal articles and published books, providing a theoretical foundation and synthesizing current knowledge on mobility hubs and stakeholder participation in transport planning (Martinez & Keserü, 2024). It allows for a critical examination of existing research, identifying gaps and theoretical contributions (Preis, 2023).

Desk research complements the literature review by encompassing a broader range of sources, including reports, statistics, and online databases (Preis, 2023). This method is particularly useful for gathering up-to-date information on mobility hub projects, stakeholder involvement practices, and policy frameworks from both expert consultation from the case study as expert interviews within AT Osborne.

The combination of these methods enables a thorough exploration of both theoretical concepts and practical applications. It provides a solid foundation for answering the research questions, particularly in identifying key stakeholders, understanding their roles, and examining governance challenges in mobility hub implementation (Coenegrachts et al., 2021).

3.6. Comparative Analysis

The conceptual foundation and the case study are analyzed using a comparative analysis. The governance framework derived from theory was compared with the adapted framework from the case study to identify similarities and differences. The similarities reinforced the validity of the proposed strategies in supporting adaptive cooperation for the development and implementation of mobility hubs, while the differences highlighted areas potential adjustments and missing elements for a dual-phase governance framework. These findings directly contribute to answering sub-question 4.

3.7. Approach

As outlined in Table 3.1, each sub-question is addressed using specific qualitative methods. A visual representation of the overall research logic and its phase-wise structure is provided in Figure 3.2, which will be explained below.

The research begins by answering the **first sub-question**, which seeks to define what constitutes effective stakeholder collaboration in mobility projects. To do so, a literature review is conducted, drawing on theories of collaborative governance, stakeholder theory, and inter-organizational dynamics. This review results in the construction of a conceptual collaboration framework, which synthesizes key success factors and structures them into an actionable model.

This conceptual framework then serves as an analytical lens for the case study, which addresses the remaining sub-questions. The **second sub-question** involves identifying the key stakeholders involved in both the development and implementation phases of regional mobility hubs. Through interviews and document analysis, the roles, interests, and interrelations of stakeholders are mapped using methods from the developed framework, with attention to how these shift between project phases.

The **third sub-question** focuses on the challenges stakeholders encounter in their collaboration efforts. Using manual thematic analysis of interview data, recurring tensions, institutional constraints, and coordination issues are identified.

In the case study analysis, the conceptual framework serves as a guiding structure to assess stakeholder collaboration throughout both the development and implementation phases. As the framework is applied, instances where the empirical findings do not align with the theoretical model are identified. These misalignments highlight context-specific challenges or reveal limitations in the initial framework.

After the case study has been completed, these discrepancies are further examined to better understand where the framework requires adjustment. This process leads to the development of an evidence-based collaboration model, grounded in existing literature and validated through empirical insights.

The resulting refined framework provides a direct answer to the **fourth sub-question**, offering concrete strategies for improving stakeholder collaboration in regional mobility hub projects.

Lastly, practical strategies are developed to improve collaboration during both the development and implementation phases, applicable not only to the case study context but also to regional mobility hubs
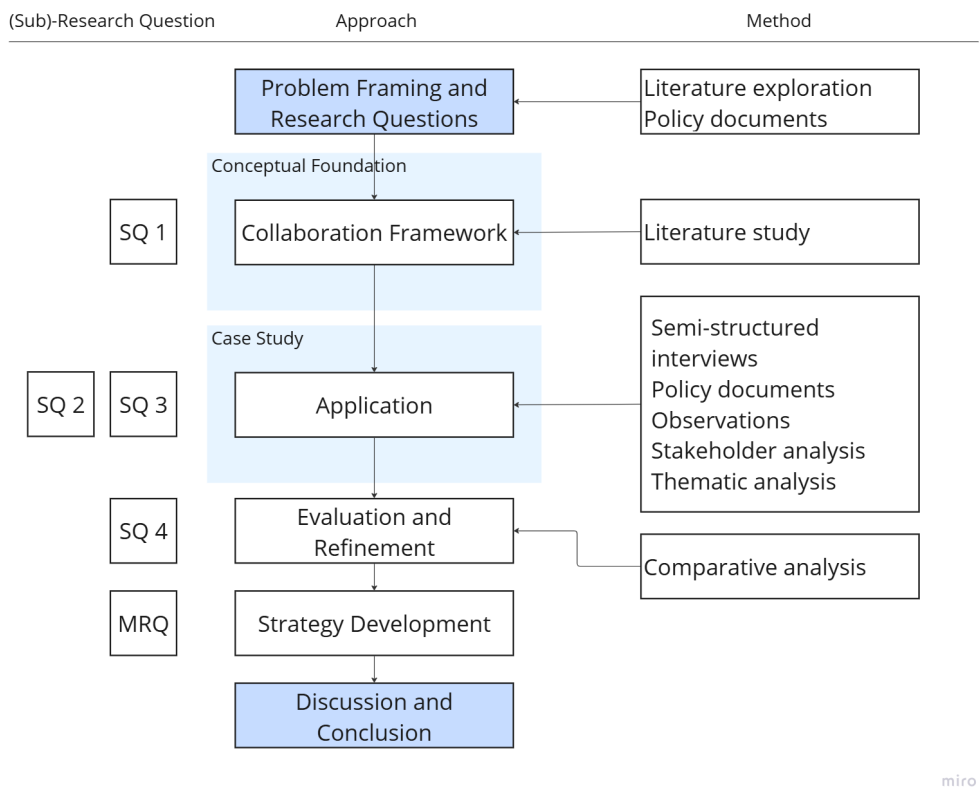
Figure 3.2: Research Approach

more broadly. These strategies are derived from case study insights, reference cases, and relevant components of the refined framework.

While the refined framework provides structured guidance on how collaboration should ideally take place, it does not in itself resolve the concrete challenges stakeholders face in practice. Therefore, all findings, both from the case study and the literature, are synthesized to formulate a set of strategic recommendations. These recommendations go beyond the framework by directly addressing the barriers, tensions, and coordination issues experienced by stakeholders during the development and implementation phases, and aim to answer the **main research question** of this thesis.

Together, the evidence-based framework and the targeted recommendations offer both a conceptual foundation and actionable tools for improving stakeholder collaboration in regional mobility hub projects.

4

Conceptual Foundation

To understand how collaboration between stakeholders can be improved in regional mobility hub projects, it is important to first define what effective stakeholder collaboration entails. This chapter provides the theoretical foundation for the research by answering the **first sub-question**:

According to the literature, what defines effective stakeholder collaboration in mobility projects?

This chapter draws on academic literature to explore key concepts such as stakeholder definitions in transport planning, their interests and power relations, and existing theoretical frameworks that structure collaboration processes. Together, these insights form the conceptual lens through which the empirical findings in later chapters will be analysed and interpreted.

4.1. Goal of understanding effective stakeholder collaboration in mobility projects

Before exploring how to foster effective stakeholder collaboration, it is important to first understand *why* this topic deserves focused attention in the context of mobility projects. In today's increasingly interconnected and shared-power world, no single actor holds full control over public problems, making stakeholder collaboration more critical than ever (Bryson, 2004). Public organizations, in particular, depend on the support and satisfaction of key stakeholders for both their success and their legitimacy (Bryson, 2004).

However, public authorities often downplay the importance of stakeholder involvement, either due to the belief that transport decisions are primarily technical and should be made by experts, or because local politicians assume they already represent all relevant interests. This top-down approach is often referred to in the literature as the Decide, Announce, Defend (DAD) model (Cascetta & Pagliara, 2013). First, the actions to be taken are Decided by the administration and its experts; then the decision is Announced to the public; and finally, the administration seeks to Defend the decision against any criticism, rather than involving stakeholders from the outset. This approach, neglecting to involve stakeholders throughout the project, often results in the so-called NIMBY ('not in my backyard') syndrome.

Cascetta and Pagliara (2013) highlight the complexity of stakeholder engagement in transport decision-making processes, as it involves conflicting interests across different levels of government. They can be vulnerable to fragmented decision-making and stakeholder misalignment. Since mobility projects are typically initiated, funded, and/or governed by public organizations operating across these layers, they are especially prone to the challenges described above. This reinforces the importance of understanding why effective stakeholder collaboration is both difficult and essential in such contexts.

Following the discussion on its importance, the focus now shifts to defining the goal of effective stakeholder collaboration and understanding what it should ideally achieve within mobility projects.

Early and meaningful stakeholder involvement helps ensure that diverse expectations and concerns are addressed throughout the process. Shivanagouda (2024) argues that this leads to more success-

ful project outcomes, while Cascetta and Pagliara (2013) and Shivanagouda (2024) emphasize that greater stakeholder input also increases transparency and long-term support. These benefits include:

- Improved decision-making processes and higher-quality implementations
- More informed policy directions that reflect the needs of local communities
- Greater acceptance of implemented policies, reducing resistance and friction
- Helps to set objectives which are relevant and which need to be pursued

Beyond these advantages, Chetouani (2021) takes it one step further by stating that the success of logistical enhancements in transport networks is directly dependent on stakeholder involvement. Similarly, findings from Calleo et al. (2023) highlight the critical role of stakeholder collaboration in the successful implementation of new transport concepts. Their research underscores the importance of structured participatory planning, stressing that effective stakeholder engagement requires careful selection and involvement strategies to maximize impact. Lastly, referring back to one of the goals of mobility hubs, namely a more sustainable transportation system; Freeman et al. (2010) state that to achieve social and environmental sustainability, collaboration between companies and their stakeholders is essential.

Thus, effectively engaging stakeholders in transport projects not only enhances decision-making and policy acceptance but also plays a crucial role in achieving broader sustainability goals, making structured collaboration an essential component of successful transport planning.

4.2. Stakeholders in mobility projects

Building on the goals of stakeholder collaboration, it is first essential to define what is meant by stakeholders in transport projects before exploring the frameworks that structure their collaboration. Stakeholders in transport projects are broadly defined as any individuals, groups, or organizations that have an interest in or are affected by decisions made within a project (Pira et al., 2020). This aligns with the stakeholder theory introduced by Freeman et al. (2010), which emphasizes that organizations should consider the interests of all stakeholders affected by their actions, rather than focusing solely on shareholders. To better understand the role of stakeholders in transport projects, the following sections will discuss their categorization and classification, providing insight into how different stakeholders can be identified, prioritized, and effectively engaged in decision-making processes.

4.2.1. Stakeholder categorization

Many different methods for stakeholder categorization exist, aiming to identify who the stakeholders in a specific context are. A commonly used approach in transport planning is to categorize stakeholders based on their roles and responsibilities within a project. Pira et al. (2020) identifies four primary groups. Cascetta and Pagliara (2013) extends this classification by including additional groups such as transport users, labor unions, media, and financial institutions. These categories provide an initial structure for identifying stakeholders, offering a broad overview of the different parties involved in transport projects. The two forms of categorization are given below:

Pira et al. (2020):
- Government and authorities
- Business and operators
- Communities and local neighborhoods
- Others

Cascetta and Pagliara (2013):
- Institutions and authorities
- Users
- Transport operators
- Business and unions
- Local communities
- Media
- Financial institutions

These categorizations help in identifying the key stakeholders involved in transport projects and provide a structured approach for analyzing their roles and influence. Based on these stakeholder categories, they can be further classified according to the main role they play in a specific plan or project.

4.2.2. Stakeholder classification

As discussed in the previous section, stakeholder involvement is a critical factor in the success of mobility projects. Stakeholder categorization enables the identification of all relevant actors involved. However, as Bryson (2004) argue, projects often fail not due to technical shortcomings, but because

decision-makers overlook the knowledge and interests of key stakeholders. This is especially relevant in public sector initiatives, where multiple layers of government intersect and various interests are at stake. In such complex environments, identifying and involving the right stakeholders is essential to navigate conflicting interests, build legitimacy, and increase the chances of successful implementation.

Ackermann and Eden (2011) reinforce this point by emphasizing that effective stakeholder engagement depends not on engaging all stakeholders equally, but on strategically identifying those whose involvement is most critical to achieving the project's objectives. Their research warns against generic or one-size-fits-all approaches, arguing that successful engagement must be tailored to the specific political, social, and technological dynamics of the project context.

In short, these scholars stress that understanding which stakeholders matter most and how to engage them appropriately, is a fundamental step in designing effective collaboration strategies and ensuring both strategic alignment and long-term project success.

A basic distinction is made by Shivanagouda (2024), who classifies stakeholders into two types: primary stakeholders; who have a direct role in the transport system, with direct interest and impact, and secondary stakeholders; who do not participate directly but are still affected and have indirect stake in the outcome, and indirect impact (Figure 4.1).
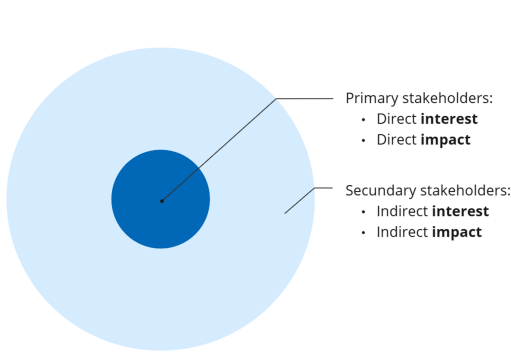

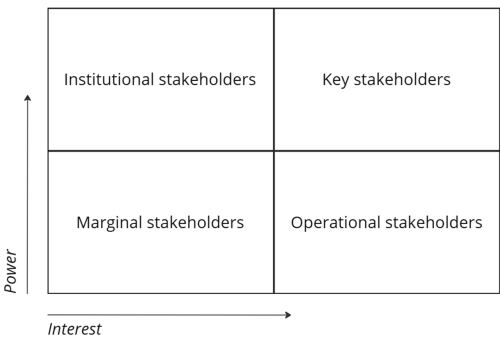**Figure 4.1:** Classification method Shivanagouda (2024)

Figure 4.2: Power-interest grid (Gardner et al., 1986)

A more detailed classification method is provided by the power-interest (PI) grid, introduced by Gardner et al. (1986) and widely applied in public management (Przybylska et al., 2023). This method maps stakeholders along two axes: their power to influence project decisions and their interest in the project's outcomes. The PI matrix results in four categories of stakeholders (Figure 4.2).

Beyond categorization alone, each of these groups requires a tailored engagement strategy. Both Thompson (2012) and Pichler (2024) propose concrete strategies for each stakeholder type, offering practical guidance on how to engage them effectively (Table 4.1).

While the terminology differs, both sources underline the same principle: stakeholder engagement should be proportional to their salience. Aligning the level of effort with a stakeholder's position in the matrix increases efficiency and ensures that resources are directed where they matter most.

While the PI matrix serves as a valuable foundation for stakeholder analysis, it falls short in capturing the dynamic and often informal relationships that exist between stakeholders. In practice, one stakeholder's actions can trigger a chain of responses among others, creating patterns of influence that extend beyond simple categorizations of power and interest. Understanding these interactions is crucial for identifying where support must be built to form and sustain effective stakeholder coalitions.

To address this limitation, stakeholder Ackermann and Eden (2011) have developed the concept of stakeholder influence networks, a method rooted in social network theory. This approach builds upon the PI matrix by mapping not only the stakeholders involved but also the connections between them. These diagrams visualize influence using directional arrows: a link from one stakeholder to another indicates the direction of influence, while double-headed arrows signify mutual influence. As Freeman et al. (2010) emphasize, identifying both stakeholders and their interrelationships is a vital step in understanding stakeholder environments.

Table 4.1: Engagement strategies per stakeholder category based on Thompson (2012) and Pichler (2024)

Stakeholder category	Thompson (2012)	Pichler (2020)
Key stakeholders (High power, high interest)	Manage closely; involve in co-decision-making	Secure buy-in; engage throughout the process
Operational stakeholders/ subjects (Low power, high interest)	Keep informed and engaged through regular updates	Maintain feedback loops (e.g., sprint reviews)
Institutional stakeholders/ context setters (High power, low interest)	Keep satisfied; consult at key stages	Consult periodically to acknowledge their views
Marginal stakeholders/ crowd (Low power, low interest)	Monitor with limited interaction	Communicate minimally; low-priority engagement

The strength of this networked view lies in its ability to reveal structural positions that influence stakeholder behavior. For instance, a stakeholder with many incoming links is likely to gather valuable information and hold significant indirect power. Conversely, those with many outgoing connections can influence others' perspectives and act as central connectors within the system. Such insights are often missed in static tools like the PI matrix.

As network theory states, stakeholder influence should be seen as a system of interactions rather than isolated attributes. Rowley (1997) further highlights that organizations operate within unique stakeholder environments made up of interdependent relationships. Understanding these patterns can reveal hidden power structures and help managers identify key actors to form or strengthen coalitions.

Moreover, the practical value of stakeholder influence networks extends beyond analysis. According to Ackermann and Eden (2011), visualizing these inter-dependencies can directly inform stakeholder management strategies. Rather than engaging stakeholders based solely on their position in a static matrix, network insights allow project teams to strategically influence stakeholder positioning, mobilizing alliances, minimizing resistance, and navigating evolving project dynamics. This shift broadens the traditional question from "who holds power?" to the more nuanced "how is power distributed and exercised through relationships?"

In this way, stakeholder influence networks add a valuable layer to the PI matrix and contribute to a more relational, dynamic view of stakeholder management, especially relevant in complex, multi-actor environments like regional mobility hubs.

Government classification
Since this research specifically focuses on government stakeholders in improving collaboration, the framework of Claassens and Maas (2021) is examined to classify government roles. For the classification of different government roles, this research adopts a framework that distinguishes four quadrants: the performing government, the collaborative government, the legitimate government, and the responsive government. These roles are positioned along two axes (see Figure 4.3): one axis moves from government-driven approaches to society-driven approaches, while the other axis shifts from setting preconditions towards achieving results.
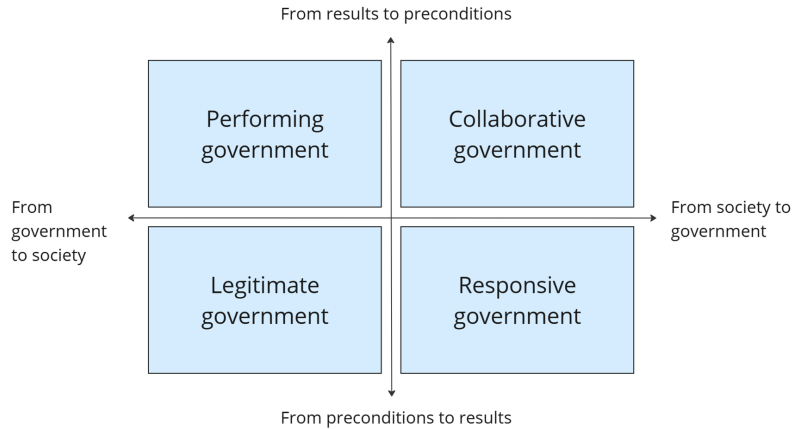
From results to preconditions

Performing government	Collaborative government
Legitimate government	Responsive government

From government to society ← → From society to government

From preconditions to results

Figure 4.3: Government role quadrant (Claassens & Maas, 2021)

The classification not only categorizes government roles conceptually but also specifies concrete tasks and responsibilities associated with each role. These tasks reflect how governments engage with other stakeholders, regulate processes, or adapt to societal dynamics, depending on the quadrant they operate within.

Figure 4.4 provides an overview of the key functions for each government role, as derived from the framework of Claassens and Maas (2021) (Claassens & Maas, 2021). These functions illustrate how governmental behavior shifts across the axes—from controlling to facilitating, and from rule-based to result-oriented approaches.

Performing government	Collaborative government
- Determine efficiency - Measure results - Monitor planning - Report porgress - Provide accountability - Perform control	- Identify stakeholders - Approach parties - Organize consultations - Take the lead - Negotiate - Conclude cooperation agreements
Legitimate government	**Responsive government**
- Safeguard legality and equality - Monitor rights and duties - Oversee political process - Implement policies carefully - Follow procedures	- Step into the real world - Meet openly - Govern based on initiative - Recognize potential - Stand empty-handed (be open to not having the answers) - Connect internally

Figure 4.4: Tasks government role (Claassens & Maas, 2021)

4.3. Theoretical frameworks for stakeholder collaboration

Building on the identification and classification of stakeholders, several theoretical frameworks have been developed to support not only structured stakeholder engagement, but also the dynamic nature of stakeholder interactions. While the power-interest matrix and influence networks already highlight the need to understand stakeholder interdependencies, the following frameworks further explore how to foster collaboration over time in complex, evolving project environments.

Building on the categorization and classification of stakeholders, various theoretical frameworks have been developed to provide structured approaches for managing and improving stakeholder collaboration. These frameworks not only emphasize the identification and classification of stakeholders, but also address the dynamics of their interactions and the strategies needed to foster effective collaboration throughout a project.

A key point raised by several scholars is the importance of early stakeholder involvement. Cuppen et al. (2016) and Rajablu et al. (2014) highlight that understanding stakeholders' priorities and engaging them from the early stages of a project is crucial for successful collaboration. Early involvement helps to align objectives, build trust, and prevent conflicts later in the process.

In the context of transport projects, particularly in public-private partnerships (PPPs) which often form the backbone of mobility hubs, stakeholder management becomes even more complex. De Schepper et al. (2014) investigates stakeholder management within PPPs and notes that such arrangements amplify the complexity of the stakeholder environment. De Schepper et al. (2014) introduces three ways of relating to stakeholders: (1) informing, (2) involving, and (3) collaborating. This progression reflects a shift in stakeholder theory, recognizing that stakeholder positions and roles are not static but dynamic, evolving throughout the lifecycle of a project. This aligns with findings from Xiong et al. (2018), who stress that successful PPP governance depends on cooperation, trust, communication, capability, risk allocation and sharing, competition, and transparency in governance. They also critique traditional governance practices that focus predominantly on dominant and direct factors while neglecting less visible but equally impactful indirect factors. They argue that such an approach can hinder project success, highlighting the need for a more holistic, adaptable, and responsive governance model.

While public-private partnerships (PPPs) are commonly discussed in the context of transport infrastructure, an alternative form of collaboration worth noting is the public-public partnership (PUP). PUPs refer to cooperative arrangements between public sector organizations, such as municipalities, agencies, or state-owned entities, without the involvement of private actors or profit-driven goals (Silvestre et al., 2018). These partnerships are typically applied in sectors with weak or non-competitive markets, such as public water management in Europe, but their principles are also relevant for mobility hubs and other shared public infrastructure (Boag & McDonald, 2009).

PUPs are centered on mutual capacity-building, shared objectives, and public value delivery. As Greasley et al. (2008) point out, local interpersonal relationships play a critical role in the development and success of these partnerships. However, a lack of perceived ownership or participation among individuals within the collaborating organizations can hinder trust and communication, two essential elements for partnership sustainability. Without explicitly addressing how individuals experience and interpret the collaboration, important relational aspects such as openness, shared ethos, and alignment of expectations may be overlooked.

The relevance of PUPs for this study lies in their emphasis on non-commercial collaboration, long-term public value, and the relational dynamics between public entities. These aspects complement existing stakeholder frameworks by highlighting that effective collaboration is not only about structure and governance, but also about perception, trust, and local connectivity. Particularly in multi-governmental mobility projects, where public actors must align across jurisdictions and mandates, the relational logic of PUPs can offer valuable guidance.

Research of Aaltonen and Kujala (2016) further elaborates on the concept of dynamism in stakeholder roles, in the form of a stakeholder landscape framework. This framework supports the idea that stakeholder relationships operate in a dynamic environment. Aaltonen and Kujala (2016) suggests that project managers must not only manage individual stakeholders but also the broader landscape of interactions and relationships. The framework identifies four key dimensions that characterize stakeholder landscapes, further detailed in Figure 4.5:

- **Complexity:** The number and diversity of stakeholders and the complexity of their interrelations.
- **Uncertainty:** The availability and ambiguity of information about stakeholders and their behavior.
- **Dynamism:** How stakeholders' attributes, positions, and relationships evolve over time.
- **Institutional Context:** Formal and informal rules, norms, and governance structures shaping stakeholder behavior.

These dimensions are interdependent; for instance, high complexity may increase dynamism, which in turn heightens uncertainty. By applying this framework, Aaltonen and Kujala (2016) states that project managers can assess the stakeholder landscape holistically, anticipate potential shifts in stakeholder roles, and adapt their collaboration strategies accordingly.

Complexity	Uncertainty	Dynamism	Institutional context
• **Stakeholder element complexity** • Number of project stakeholders • Variety of project stakeholders and their goals • Stakeholders' internal complexity • **Stakeholder relationship complexity** • Number of relationships among stakeholders • Variety of relationships • Patterns of relationships • Relationships' internal complexity • External stakeholder relationships	• Lack of information related to stakeholders and their relationships • Project management's experience with respect to stakeholders and stakeholder analysis • Analyzability of the stakeholder environment • Ambiguous information concerning stakeholders	• Changes in stakeholders' attributes • Changes in stakeholders' position • Changes in relationships among stakeholders • Emergent stakeholders and relationships • Changes in appropriate ways of engaging stakeholders • Changes in stakeholders' influence strategies	• Stakeholders' local embeddedness • Legitimized structures and processes for stakeholder engagement • The nature of stakeholders' legitimized influence strategies • Multiplicity of institutional environments • Complexity of the stakeholders' interpretation process

Figure 4.5: Stakeholder landscape (Aaltonen & Kujala, 2016)

Additionally, Erkul et al. (2019) and Rajablu et al. (2014) also stress the need for flexibility and dynamism in stakeholder management. They state stakeholder dynamics is about how stakeholders collaborate, interact and compete, and how these interactions influence the project's direction. Therefore, Erkul et al. (2019) emphasizes the importance of stakeholder engagement and its direct impact on stakeholder satisfaction and project success (Figure 4.6). Their findings show that the more frequent and dynamic the stakeholder engagement, the higher the stakeholder satisfaction. This relationship is key to the success of projects in the MTIP (Multi-Transport Infrastructure Project) lifecycle, according to Erkul et al. (2019). By integrating these dynamics, collaboration is enhanced, fostering greater engagement and stakeholder satisfaction are more chance to succeed. This further underscores the need for an adaptable and responsive stakeholder management approach in complex settings such as mobility hubs.
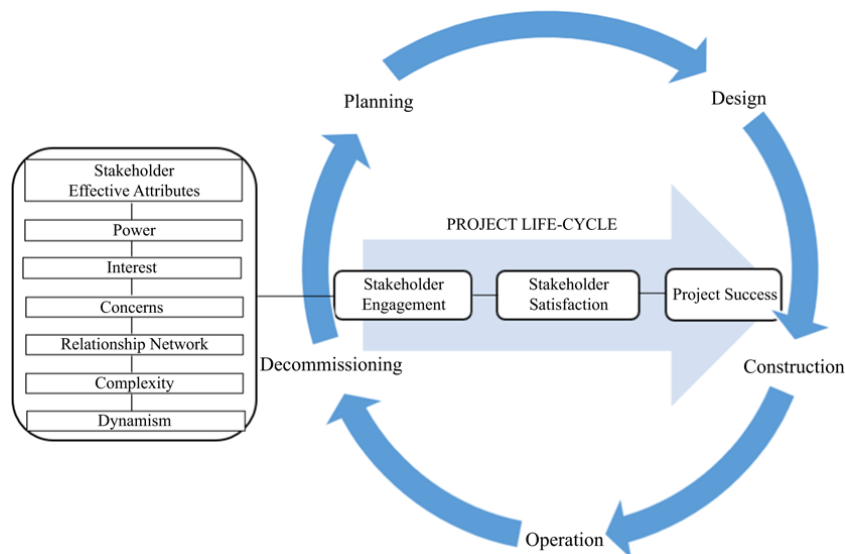

Figure 4.6: Stakeholder framework (Erkul et al., 2019)

The Integrated Framework for Stakeholder Identification, Understanding, Engagement, and Role Management (IFSIUER) developed by Kua (2016) also supports the dynamic nature of stakeholder collaboration. This framework outlines four chronological steps: stakeholder identification, understanding their interests and positions, tailoring engagement strategies, and managing stakeholder roles throughout the process. Originally developed in the context of sustainability policymaking, IFSIUER is particularly relevant for transport projects, where multi-stakeholder involvement is inherent. It emphasizes the ne-

cessity of a structured yet flexible approach to ensure that stakeholder engagement is meaningful and that collaboration efforts are sustained over time.

Taken together, these frameworks underline the importance of not only identifying and classifying stakeholders but also understanding the evolving dynamics of their relationships and the necessity of tailored engagement strategies. The frameworks advocate for a flexible, adaptive approach to collaboration that is responsive to the shifting roles, interests, and power dynamics of stakeholders. This conceptual foundation provides a comprehensive lens through which to navigate the complexities of stakeholder collaboration, particularly in multi-actor environments such as mobility hubs and PPPs, forming a solid theoretical foundation for this research.

4.4. Key Insights from the Conceptual Foundation

The importance of effective stakeholder collaboration in transport projects has been extensively explored in the literature. Several frameworks and theories have been developed to aid in understanding and managing the complexities of stakeholder engagement, particularly in multi-actor environments such as mobility hubs, public-private partnerships (PPPs), and public–public partnerships (PUPs).

The key findings from the reviewed literature are:

- **Early stakeholder involvement** is crucial for success. Cuppen et al. (2016) and Rajablu et al. (2014) highlight that engaging stakeholders from the early stages allows for better alignment of objectives, prevents conflicts, and builds long-term trust. This insight is stated by many other scholars, including Erkul et al. (2019), Chetouani (2021), Calleo et al. (2023), Shivanagouda (2024), and Bryson (2004), who emphasize that timely engagement contributes to improved decision-making, increased transparency, and broader stakeholder support throughout the project. In mobility projects this entails including stakeholders in the planning phase.

- **Stakeholder categorization and classification** methods, such as those proposed by Pira et al. (2020), Cascetta and Pagliara (2013), and Shivanagouda (2024), help in identifying, grouping, and prioritizing stakeholders based on their roles, interests, and power. Pira et al. (2020) and Cascetta and Pagliara (2013) propose categories for identifying involved stakeholders in mobility projects, while Shivanagouda (2024) offers a method classifying these in primary and secondary stakeholders by looking at the level of interest and impact. These methods form the foundation for understanding the different actors involved and how their interests and influence should be managed.

- **Power-interest matrix and engagement strategies** emphasize the importance of tailoring communication and involvement efforts to stakeholder salience. As discussed by Thompson (2012) and Pichler (2024), stakeholders with high power and high interest require close management, while those with lower salience need lighter-touch engagement.

- **Stakeholder influence networks** offer a more relational and dynamic view of stakeholder power. Introduced by Ackermann and Eden (2011) and grounded in social network theory, these networks visualize how influence flows through formal and informal relationships, revealing hidden power structures and coalition dynamics.

- Aaltonen and Kujala (2016), De Schepper et al. (2014), Rajablu et al. (2014), and Erkul et al. (2019) emphasize that stakeholder roles and relationships are not static, but evolve throughout a project's lifecycle. These evolving roles introduce **stakeholder dynamics** that can significantly influence the project's direction. As a result, it is essential for managers to account for this fluidity by continuously reassessing the stakeholder landscape and adapting their strategies accordingly.

- The complexity of managing stakeholders is compounded in **public-private partnerships (PPPs)**, where governance becomes more challenging due to the varying interests of multiple actors. As noted by De Schepper et al. (2014) and Xiong et al. (2018), successful PPP governance requires cooperation, trust, communication, risk allocation, and transparency.

- **Public–public partnerships (PUPs)** offer an alternative collaboration model for non-competitive or public-focused projects. As described by Silvestre et al. (2018) and Greasley et al. (2008), PUPs highlight the importance of mutual trust, shared public goals, and interpersonal relationships between public actors, which are especially relevant for multi-governmental mobility projects.

- **The stakeholder landscapes framework** introduced by Aaltonen and Kujala (2016) provides a holistic lens by identifying four interdependent dimensions: complexity, uncertainty, dynamism, and institutional context. This framework helps anticipate changes and guide strategic responses in evolving stakeholder environments.

- **The IFSIUER framework** developed by Kua (2016) presents a structured and chronological method for stakeholder collaboration. It emphasizes the iterative management of stakeholder roles through identification, understanding, tailored engagement, and role adaptation, making it particularly useful for long-term, multi-actor transport initiatives.

Together, these insights emphasize that stakeholder collaboration should be approached as a dynamic, adaptive, and important to include process. Successful collaboration depends not only on recognizing who the stakeholders are, but also on understanding how their roles shift over time and how their relationships shape project outcomes.

4.5. Synthesis

To translate the theoretical insights into a coherent conceptual lens, this section presents a synthesized framework for stakeholder collaboration in mobility projects. A combination of theories, methods and frameworks discussed in this chapter is chosen, as some partially overlap and each of the chosen methods included offer valuable approaches to ensuring stakeholder collaboration in mobility projects. The conceptual framework is depicted in Figure 4.7.
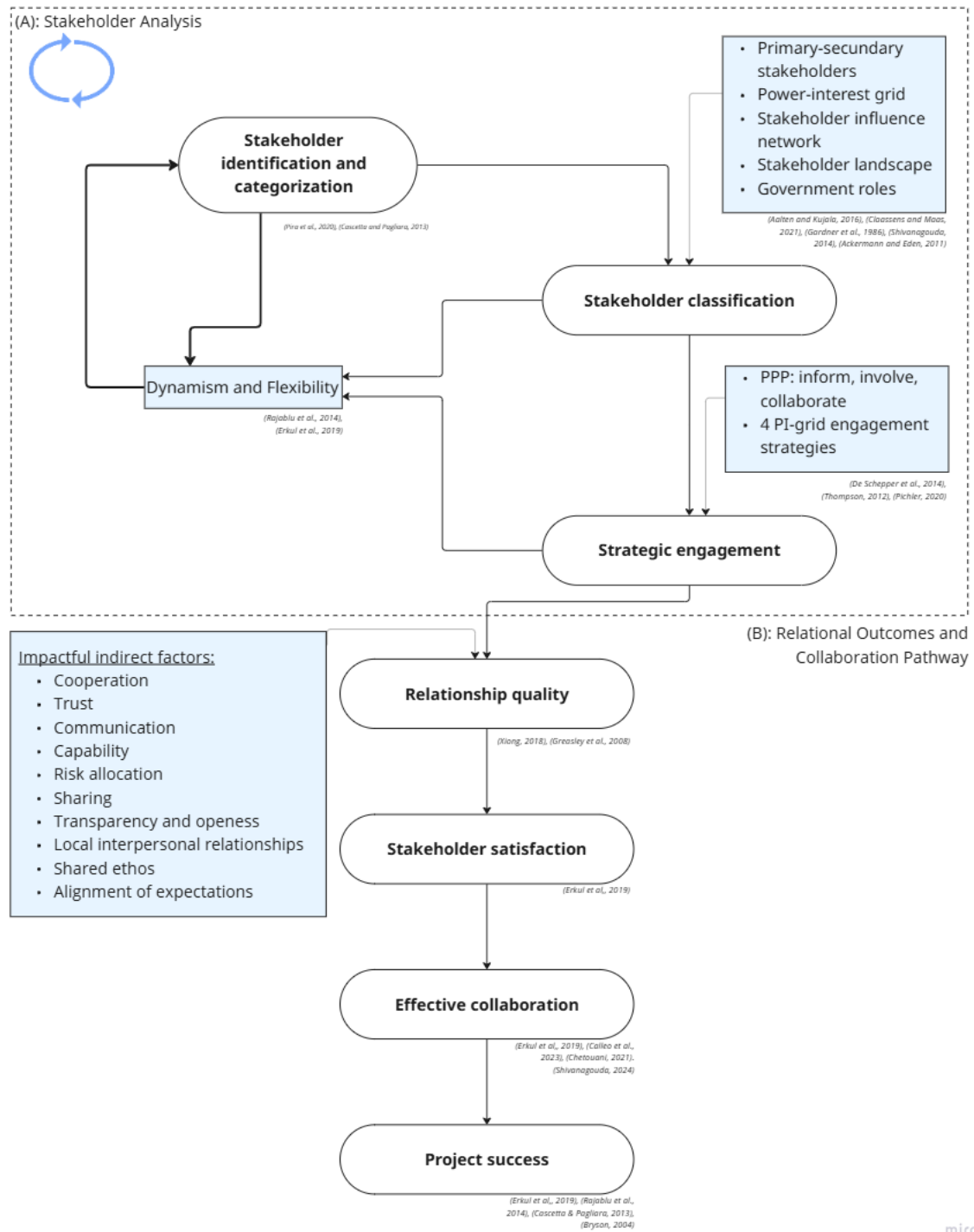
Figure 4.7: Conceptual Collaboration Framework

In the conceptual framework, the blue rectangular blocks reflect key concepts, methods, and theoretical tools derived from the literature. They serve as input for analysis and inform the practitioner on how to conduct each step effectively.

In contrast, the white oval blocks represent the core process components of the framework; concrete steps or design actions that practitioners undertake in order to build effective stakeholder collaboration. These include stakeholder identification, classification, engagement strategy development, relationship

building, and ultimately, collaboration and implementation. While "actions" may not fully capture their strategic nature, they represent the procedural backbone of the framework that links theory to practice.

This visual layering reflects how theoretical tools (blue) are applied within practical processes (white) to enable relational outcomes and successful project execution.

The framework is structured around two interlinked components: (A) the iterative process of stakeholder analysis, in which the theoretical tools are used to iteratively analyze and position stakeholders and define appropriate engagement strategies. The second component is the relational and collaborative outcomes (B), which unfold as a result of applying these strategies in practice. Both dimensions are explained in more detail below.

A. Stakeholder Analysis (iterative and adaptive)
The foundation of effective collaboration lies in a structured stakeholder analysis process that continuously adapts to evolving dynamics (Aaltonen & Kujala, 2016; Erkul et al., 2019; Rajablu et al., 2014; Xiong et al., 2018). This begins with the identification and categorization of all relevant stakeholders. Foundational categorizations, such as those by Pira et al. (2020) and Cascetta and Pagliara (2013), help distinguish key actor groups, including public authorities, operators, users, and communities.

After identification, stakeholder classification provides insight into their power, interest, roles, and relational position. The power-interest grid (Gardner et al., 1986) is a commonly used method to map salience, while public-specific refinements, such as government role quadrants (Claassens & Maas, 2021) and the stakeholder landscape model (Aaltonen & Kujala, 2016), account for institutional complexity, uncertainty, and dynamism.

To enhance this classification, stakeholder network theory adds a relational perspective. Stakeholder influence networks (Ackermann & Eden, 2011) enable practitioners to visualize the connectivity between stakeholders and how influence flows through relationships, revealing indirect power, coalition potential, or isolation.

The stakeholder classification directly informs strategic engagement. Depending on their profile, stakeholders may be informed, involved, or actively collaborated with, according to (De Schepper et al., 2014). Thompson (2012) and Pichler (2024) offer engagement strategies tailored to power-interest positions, ranging from close co-decision-making to light-touch updates.

A key insight from the literature is that stakeholder positions and interests are not static. Aaltonen and Kujala (2016), Rajablu et al. (2014), Erkul et al. (2019) and Xiong et al. (2018) all emphasize the need for flexibility, responsiveness, and iteration in engagement. Therefore, dynamism and flexibility are critical elements in stakeholder analysis, ensuring the approach evolves with the project environment and supports long-term adaptability.

B. Relational Outcomes and Collaboration Pathway
Strategic and adaptive engagement alone is not sufficient. The success of stakeholder collaboration also depends on the quality of the relationships that emerge through interaction. Factors such as trust, mutual understanding, communication, transparency, and shared values all play an essential role in shaping relationship quality (Greasley et al., 2008; Xiong et al., 2018).

When relationship quality is high, stakeholders are more likely to feel recognized and involved. This is referred to as stakeholder satisfaction, which Erkul et al. (2019) identifies as a key determinant of collaboration readiness. Satisfaction is not only a result of procedural inclusion but also of alignment with stakeholder expectations and values.

Satisfaction lays the groundwork for effective collaboration, where actors are willing to share responsibilities, engage in joint problem solving, and form coalitions. Calleo et al. (2023), Chetouani (2021), and Shivanagouda (2024) underline the importance of this phase in achieving broader system goals.

Ultimately, effective collaboration leads to project success, especially in complex mobility projects. It contributes to smoother implementation, better alignment with public needs, reduced resistance, and improved legitimacy of outcomes (Bryson, 2004; Cascetta & Pagliara, 2013).

This chain of effects forms the backbone of the conceptual model (Figure 4.7) and will guide the empirical case study analysis.

5

Case Study: Brainport Mobility Hubs

This chapter explores how stakeholder collaboration unfolds during the development and implementation of regional mobility hubs, using the Brainport region as a case study. This analysis is structured around the collaboration framework developed in Chapter 4. This enables a focused exploration of stakeholder roles, relationships, and collaboration dynamics in each phase.

The chapter begins with a context analysis of the Brainport region. This section outlines the geographical and institutional setting of the case study, including the current governance structure and relevant ongoing planning and programs related to regional mobility hubs. It provides a foundational understanding of the environment in which collaboration occurs.

Following the context analysis, the framework is iteratively applied to both the development and implementation phases. In doing so, the first part of the analysis (Section 5.2) identifies the stakeholders involved and examines how their roles differ across the two phases. This directly addresses the **second sub-research question:**:

Which stakeholders are involved in the development and implementation of mobility hubs in the case study, and how do their roles differ between these phases?

The second part of the analysis (Section 5.3) focuses on the quality of collaboration between stakeholders. It examines perceived barriers and opportunities in their working relationships, based on qualitative data from interviews. This part responds to the **third sub-research question:**

What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?

By structuring the case study through the lens of the collaboration framework, this chapter aims to generate both theoretical and practical insights into how stakeholder collaboration can be improved in complex, multi-actor governance settings such as regional mobility hubs.

5.1. Context Analysis

This section explores the geographical, institutional and strategic context in which the Brainporthubs are being developed. It begins by introducing the Brainport region and its multi-level governance structure, followed by an overview of the regional and national programs shaping the mobility transitions. Together, these elements provide the necessary background to understand the environment in which stakeholder collaboration takes place.

5.1.1. Introduction to the Region

Brainport Eindhoven is a high-tech region located in the province of Noord-Brabant, surrounding the city of Eindhoven (Figure 5.1). It consists of 21 municipalities and is home to more than 800,000 residents. Despite its relatively small size, the region has a significant economic impact, with its economy growing faster than the national average for over a decade (Brainport Eindhoven, 2023b). Brainport

is recognized as a leading knowledge and technology hub (Figure 5.2) where groundbreaking innovations contribute to solving global challenges across industries such as energy, healthcare, and mobility (Figure 5.2). It is not only a regional success story—it is a key economic engine for the Netherlands and strategically important for Europe's technological autonomy. Because of this vital contribution to the Dutch economy, its continued growth is now seen as essential to national economic security and strategic independence ("Afsprakenlijst Bestuurlijke Overleggen MIRT 2022", 2022).
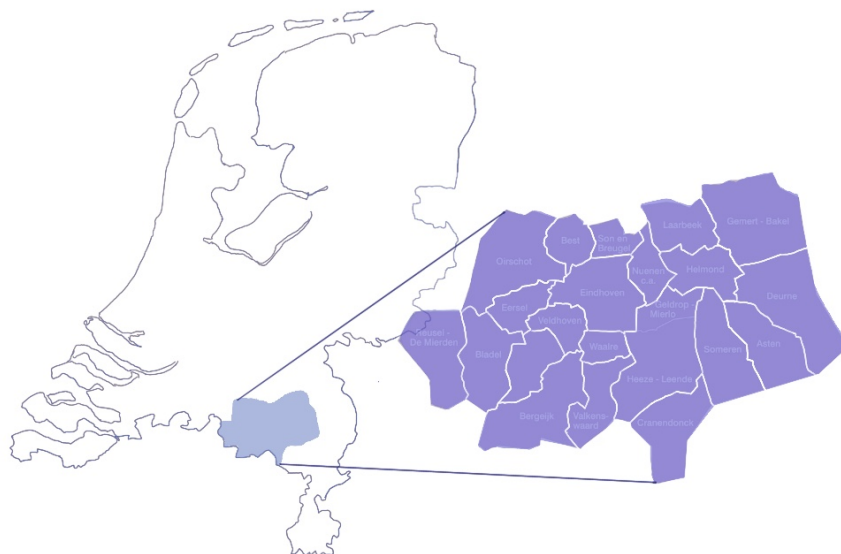

Figure 5.1: Brainport Eindhoven region

This economic success, however, comes with complex spatial and infrastructural challenges. The region is growing faster than expected, creating increasing pressure on housing, public services, and especially mobility systems ("Schaalsprong and Beethoven", 2025). Unlike more urbanized regions such as the Randstad, Brainport has historically been shaped by a car-centric mobility culture. In 2023, 50.2% of all kilometers traveled in Noord-Brabant were by car (as driver or passenger), while only 2.8% were by public transport, well below the national average (Brainport Eindhoven, 2023a). These conditions make the transition to more sustainable and multimodal mobility both urgent and complex. With forecasts predicting 62,000 new homes and 72,000 additional jobs by 2040, it is evident that the current mobility infrastructure and mindset cannot accommodate the region's projected growth (Metropool Regio Eindhoven, 2024).

These developments have triggered a push for coordinated public investment to ensure that growth results in broader societal value rather than bottlenecks ("Schaalsprong and Beethoven", 2025). The region is actively pursuing a transition toward more sustainable and multimodal mobility with national and regional plans ("Afsprakenlijst Bestuurlijke Overleggen MIRT 2022", 2022; Brainport Eindhoven, 2023a). The governance structures, planning programs, and stakeholder roles that shape this transition will be elaborated in the following sections.
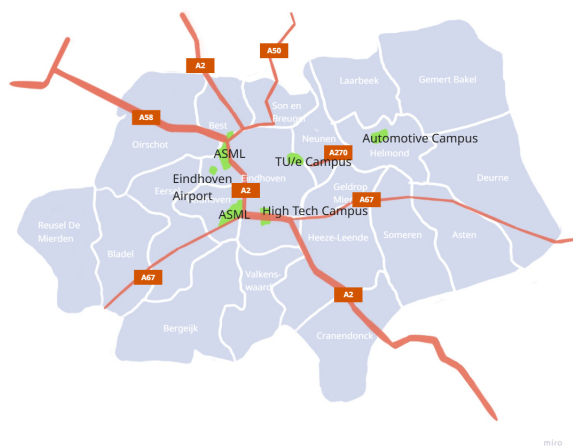
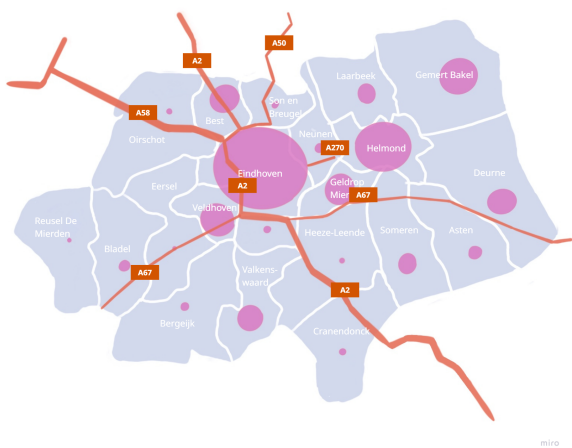**Figure 5.2:** Brainport Region Knowledge and Technology Locations

Figure 5.3: Additional Housing by 2030 (Metropool Regio Eindhoven, 2024)

5.1.2. Current State Analysis

The focus now shifts to the regional governance structure. The different administrative layers in the Brainport region are discovered, alongside with the consultation structures. Next, the planning and program structure is explored, eventually leading to the project of the Brainporthubs. Information on this current state, the involved stakeholders and their relationships has been gathered through document analysis and interviews (Appendix C. Interviews were conducted with 12 participants, until saturation was reached. The interview participants' roles with a brief explanation on how this is relevant for the case study is depicted in Table 5.1.

Organization	Interviewee Role
Municipality of Helmond	Project lead for shared mobility and hubs
VrijNieuw	Project lead for Brainporthubs
Brainport Bereikbaar	Project lead for shared mobility and hubs
Province of North Brabant	Program lead for mobility policy and regional cooperation
Municipality of Eindhoven	Policy officer for regional accessibility
Municipality of Amsterdam	Program manager for hubs, shared mobility, and MaaS
Municipal Council of hub municipality	Participant in local political discussion on hubs and housing (February 2025)
Ministry of I&W	Program manager of mobility hubs at I&W and well informed on corridor hubs (i.e. regional mobility hubs)
Municipality of Utrecht	Advisor mobility within municipality of Utrecht. Elaboration of locations and boundary conditions for 'corridor hubs' within the regional partnership Uned.
ASML	Global mobility manager and mobility expert ASML, based in Veldhoven
Brainport Bereikbaar & Bizart	Strategy and project lead new mobility
Brainporthub Projectgroup	Project lead Brainporthub, MRE

Table 5.1: Interviewed parties and their roles in the Brainporthubs context

Figure 5.4: Four regions Brainport area

Governance
The governance structure within this area involves several layers, as illustrated in Figure 5.5 on the left side. Stakeholders are positioned at their respective levels of administration, shown as squares on the left. Their participation in various consultation structures is visualized on the right. Dotted arrows represent communication flows, while solid arrows indicate formal membership across layers.

Civil servants operate within multiple groups. Each potential Brainporthub location has its own *project group*, in which the respective municipalities of where the hub might be located collaborate with the **Province of North Brabant** and **Rijkswaterstaat (RWS)**. In addition to that, a coordinating body exists at the regional civil service level: the *Kernteam*. This team comprises designated civil servants from each of the four subregions (Figure 5.4), plus separate representatives from **Eindhoven** and **Helmond**. It is chaired by the program director of the Brainporthubs and is responsible for day-to-day coordination. The *Kernteam* prepares meetings of the *Ambtelijke Begeleidingsgroep Brainporthubs (ABG)*, where representatives from the **Province**, the **Metropolitan Region Eindhoven (MRE)**, the municipalities of **Eindhoven**, **Helmond**, **Veldhoven**, the six hub municipalities, **RWS**, and the **business sector** are present (Gemeente Eindhoven, 2025; MRE, 2025). Both the *Kernteam* and the *ABG* are chaired by the program director (MRE, 2025). Outcomes of these meetings are summarized and passed on to the **aldermen** (Gemeente Helmond, 2025).

Above the *Kernteam*, the *Stuurgroep* meets at the administrative level with the same participants. In parallel, aldermen meet in the *BBG Brainporthubs* (Bestuurlijke Begeleidingsgroep), which includes the **Province**, aldermen from **Eindhoven**, **Helmond**, and **Veldhoven**, and from the six hub municipalities. The *BBG* is co-chaired by the alderman of **Veldhoven** and the provincial executive of **North Brabant** (MRE, 2025). This group is advisory to, and prepares the agenda for the *Portefeuillehoudersoverleg (PoHo) Mobility MRE*, in which aldermen from all 21 municipalities align on regional mobility issues and decisions are made (Bakermans, 2025; Gemeente Eindhoven, 2025). The *PoHo* is also a decision-making body. When consensus is reached, proposals are forwarded to the respective **municipal councils**, whose agendas are largely shaped by their aldermen (Gemeente Helmond, 2025).

When proposals require discussion beyond the regional level, they are escalated from the PoHo to the *BAG Mobility* (Bestuurlijke Adviesgroep Mobiliteit), which serves as the advisory platform before reaching the *BOs*. The *BAG* is connected to the national MIRT research program and includes representatives from **I&W**, **RWS**, the municipality of **Eindhoven**, the **MRE**, and the **business sector**. It is chaired by the alderman of **Eindhoven** (Gemeente Eindhoven, 2025).

Each municipality is formally represented in the **MRE** by one alderman. Within the *MRE*, regional proposals are prepared and aligned, with the ultimate goal of strengthening the mainport status and creating the right conditions for this, while staying in touch with the 21 municipalities ("Werken bij MRE", 2022). These proposals are then presented to the *Raadstafel 21*, a consultative body with two coun-

cilors from each municipal council. This platform forwards proposals to the councils. If any council disagrees, it can respond with a formal opinion (*zienswijze*), which is then returned to the *MRE* for consideration (Gemeente Eersel, 2025).

In parallel, the **business sector** plays a role in shaping developments, particularly in terms of co-financing the Brainporthubs (Figure 5.8). With the business sector is meant businesses amd talent locatoins in the region, as depicted in Figure 5.2. Agreements on financial contributions by the business sector are made by **Brainport Development**. Companies can also contribute to *flanking policies* that promote the use of hubs, for example by increasing parking fees, reducing parking availability, or offering financial incentives to travelers using a hub. These agreements, regarding behavioral change among employees, are coordinated by the operational organization **Brainport Bereikbaar** (Bakermans, 2025; Brainport Bereikbaar, 2025b). The business sector is closely aligned with the municipality of **Eindhoven** and is represented in both the *ABG* and at strategic level in the *BAG* (Bakermans, 2025; Gemeente Eindhoven, 2025; MRE, 2025).

At the provincial level, the **Province of North Brabant** acts as the concession-granting authority for regional public transport via busses (Provincie Noord-Brabant, n.d.). Public transport services are operated under multiple concessions in the region, and in South-east Brabant Hermes takes care of the bus transport until 2029 (Gemeente Helmond, 2025; MRE, 2025; Provincie Noord-Brabant, 2024, 2025). When a hub requires a new or adapted bus connection, the province must approve and make sure Hermes facilitates this.

At the national level, several governmental bodies are involved. The **Ministry of Infrastructure and Water Management (InW)** is responsible for policy and decisions at the national level, while **Rijkswaterstaat (RWS)** operates as its executive agency (Bakermans, 2025). **RWS** is responsible for national road construction and maintenance (Gemeente Helmond, 2025; Informatiepunt Leefomgeving, n.d.). **RWS** becomes involved when highway access to a hub must be developed or when high-quality public transport (HOV) will be developed, as that uses the safety lane. **InW** also provides funding and formally includes **RWS** as part of its operational domain.

In addition to **I&W**, other ministries are involved in consultation structures such as the *BOs*. These include the **Ministry of Economic Affairs and Climate Policy (EZK)**, the **Ministry of Housing and Spatial Planning (VRO)**, and the **Ministry of Education, Culture and Science (OCW)**. Each ministry contributes authority and expertise related to economic development, spatial planning, and the knowledge economy.

The *BO Brainport* is a platform for alignment between the national government and regional actors on topics including the economy, talent development, innovation, the built environment, and accessibility ("Bestuurlijk overleg Brainport", n.d.). Discussions on spatial planning and mobility transitions continue within the *BO MIRT* (Administrative Consultation on the Multi-Year Program for Infrastructure, Spatial Planning, and Transport) (MRE, 2022).
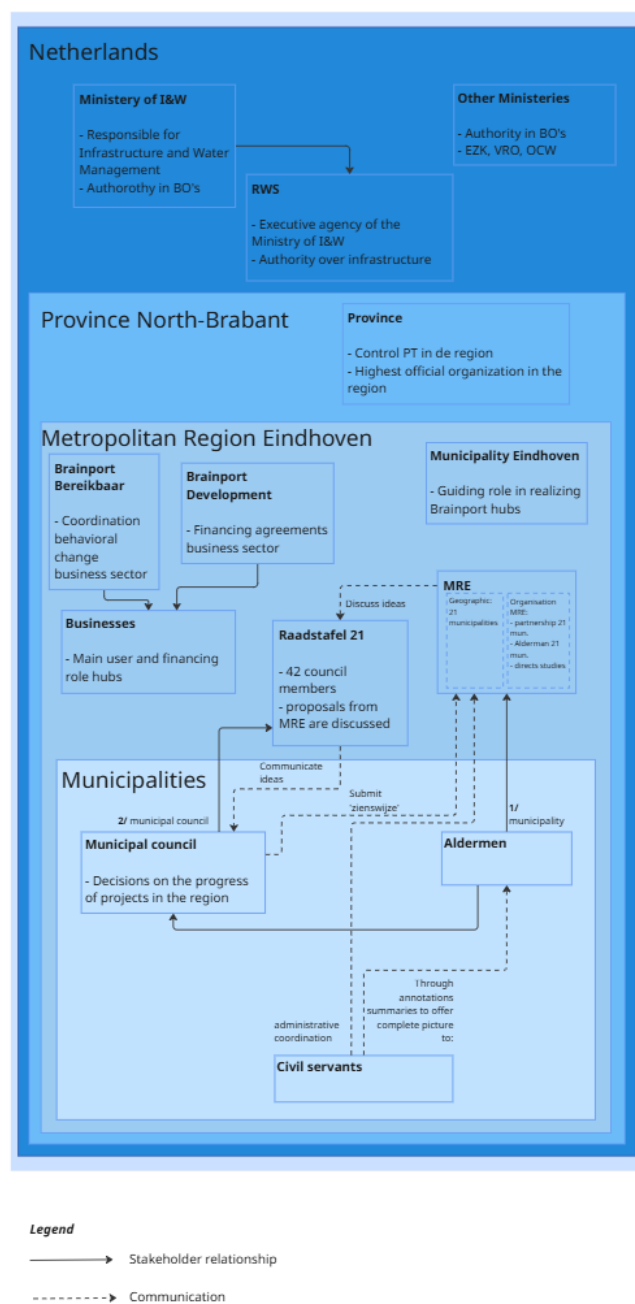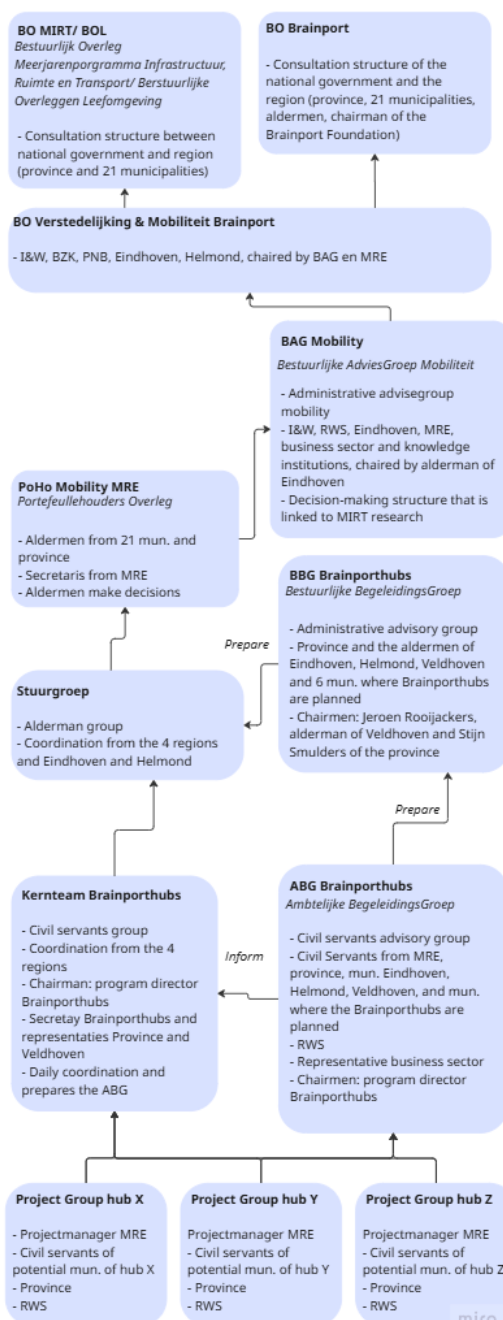
Figure 5.5: Governance structure

Planning and program Structure
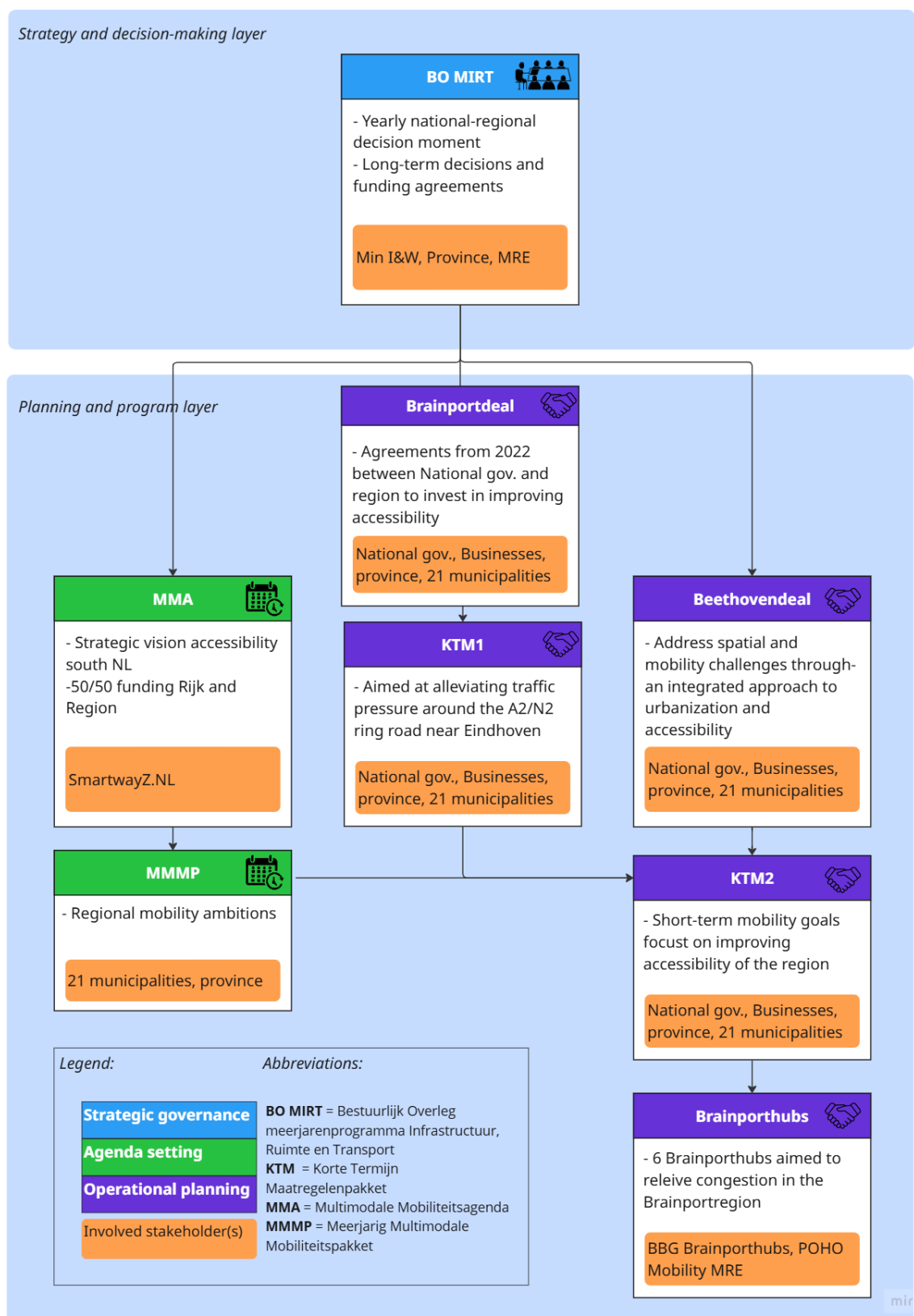This subsection presents the Planning and Program structure, depicted in Figure 5.6.

Figure 5.6: Infographic Planning and Program Structure

In the strategy and decision making layer, the **BO MIRT** (Administrative Consultation on the Multi-Year

Program for Infrastructure, Spatial Planning, and Transport) serves as a recurring formal platforms in which representatives of the national government, provinces and municipalities, and water authorities align strategic goals (MRE, 2024). This platforms addresses topics such as accessibility, safety, and spatial development, and function as gateways to jointly funded programs and decisions.

At the 2023 BO MIRT, the national government and the Brainport region jointly initiated the **Meerjarige Multimodale Agenda (MMA)**, which outlines a shared vision for accessibility in the southern Netherlands. The MMA aims to create a shared understanding between the national and regional governments about the urgency, scale, substantiation, and approach of interconnected accessibility challenges, with a focus on promoting broad societal prosperity (MIRT, 2024). This vision is jointly commissioned by the Ministry of Infrastructure and Water Management and the region, with each contributing €100,000 (MIRT, 2024). The development of the MMA is commisioned to SmartwayZ.NL. The agenda provides strategic guidance and is supported by the **Meerjarige Multimodale Mobiliteitspakketten (MMMP)**, a regional agenda defining mobility goals until 2040, coordinated by the 21 municipalities and the Province of North Brabant, in coordination with the Ministry of I&W (Metropool Regio Eindhoven, 2024).

To translate long-term ambitions into near-term action, the region developed the **Korte Termijn Maatregelenpakket 2 (KTM2)**. KTM2 builds on the previous KTM1, which emerged from the 2020 MIRT study and focused on relieving pressure on the A2/N2 ring road near Eindhoven (MIRT, 2024). While KTM1 was project-specific, KTM2 expands to include a wider set of accessibility challenges across the Brainport region, supported by the **Beethovendeal**—an integrated investment package between the state, the province, and the region (MRE, 2024).

A pillar of KTM2 is the realization of six **Brainporthubs**, strategically positioned multimodal transfer points aimed at reducing car dependency and promoting seamless transitions to public or shared transport. Based on discussions in the BBG and POHO platforms, six priority locations were selected for Brainporthub development:

- A2 North
- A58
- A67 West
- A2 South
- A67 East
- A50
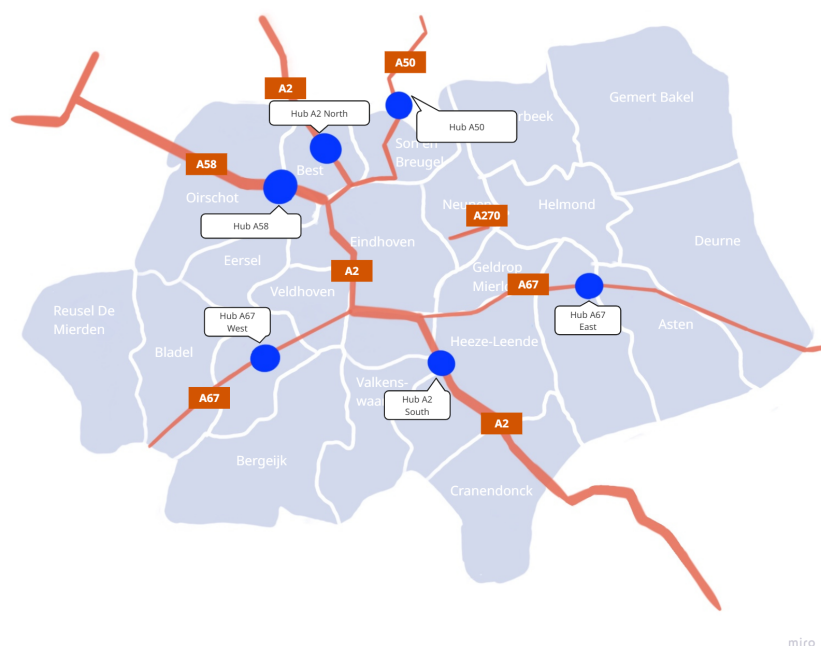
Figure 5.7: Brainporthubs

The hubs A2 North, A58, and A67 West have been prioritized for early implementation (Metropool Regio Eindhoven, 2024; Provincie Noord-Brabant, 2025). Together, these three locations are expected to require an investment of approximately €172 million. However, in February 2025, the municipal council in of the municipality Hub A67 was planned in opposed to the hub plans. The BBG has been formally tasked with drafting a detailed expenditure proposal for the Brainporthubs under KTM2 (Metropool Regio Eindhoven, 2024). The complete financial flows leading to the development of the Brainporthubs are depicted in Figure 5.8

Figure 5.8: Beethovendeal and KTM2 funding (millions) (Eindhoven, 2023; MRE, 2024)

The BO MIRT marked the start of formal acknowledgment of mobility challenges in the region. Multiple deals were signed within this platform:
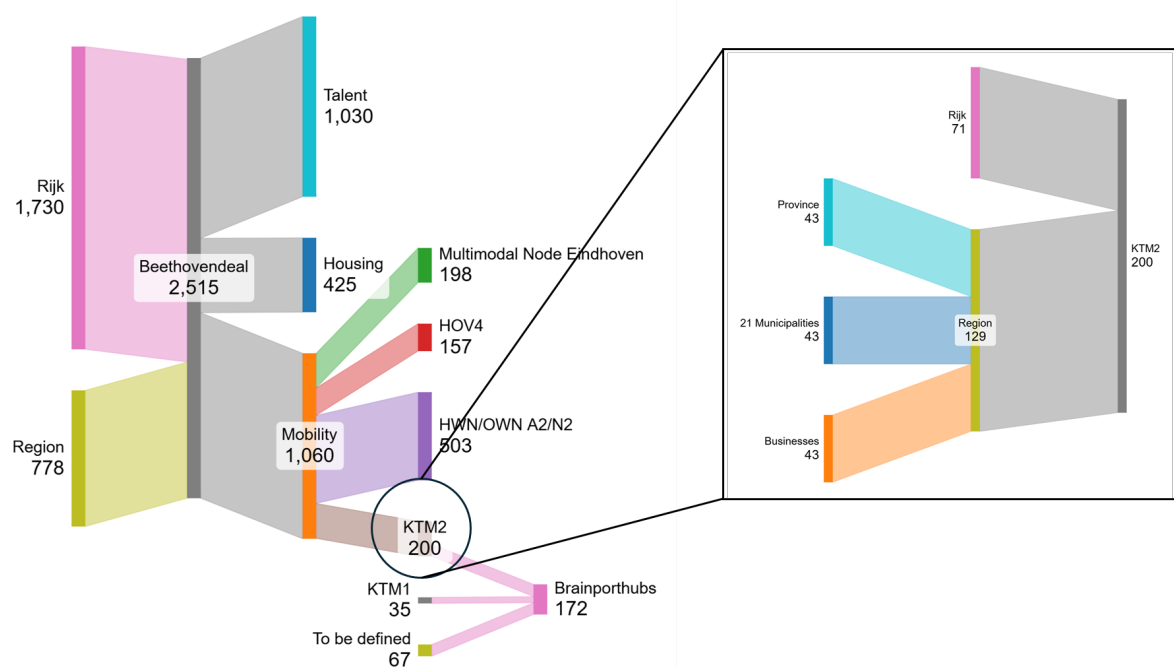
- The **Brainportdeal 2022**, containing **Korte Termijn Maatregelen (KTM1)**, which included €35 million allocated for Brainporthubs.
- The **Beethovendeal 2024**, covering **KTM2**, was developed to prioritise short-term mobility measures, in which an additional €70 million was reserved for the Brainporthubs (Bakermans, 2025).

These measures are coordinated within a broader policy framework: the **Meerjarige Multimodale Agenda (MMA)** and its regional elaboration, the **MMMP**. The strategic coordination and financing between the national government, the Province of North Brabant, and regional partners ensure long-term support for the Brainporthubs as integral mobility measures (Metropool Regio Eindhoven, 2024; MIRT, 2024).

Conclusion current state

In this section, the context of the case study area and the current state of the Brainporthub project have been explored. This offers an understanding of the environment in which the stakeholder analysis will take place.

After the area has been explored geographically, the governance of the region has been researched, using policy documents and information from the interviews (Table 5.1). The multi-layered governance structure and the consultation structures guiding the regional mobility discussions is structured in Figure 5.5. The administrative layers are structured geographically, from the municipal to the national level. Within each layer, key actors involved in the development of regional mobility hubs are positioned and their relationships (if present) visualized. On the right-hand side of the figure, the consultation and coordination groups are shown.

The Figure illustrates a predominantly bottom-up consultation structure, in which planning and decision-making processes move upward through several layers—from project groups, through the kernteam, stuurgroep, ABG, and BBG, up to the PoHo. From there, proposals are either adopted, rejected, or further discussed via the BAG before reaching the BOs (Bestuurlijk Overleggen).

Several regional mobility plans have already been developed, as shown in Figure 5.6. All regional mobility plans in this case study originate from the BO MIRT (Bestuurlijk Overleg Meerjarenprogramma

Infrastructuur, Ruimte en Transport). This figure situates the Brainport Mobility Hub program within the broader planning landscape, showing the governance layers it relates to and the financial flows (Figure 5.8) that support its implementation. Together, these visualizations clarify the region's strategic vision and planning structure.

What becomes apparent is that the governance approach combines both top-down and bottom-up elements. However, before assessing how this structure influences stakeholder collaboration, a stakeholder analysis is first conducted to clarify the specific roles, responsibilities, and interrelations of the actors involved.

5.2. Stakeholder Analysis

Having outlined the formal structures and planning responsibilities, the analysis now turns to the stakeholder landscape surrounding the development and implementation of the Brainport mobility hubs. This analysis follows the collaboration framework introduced in Chapter 4, which provides a structured yet flexible pathway for examining stakeholder interactions.

By applying the first part of framework, the stakeholder analysis (Figure 5.9), we systematically assess which stakeholders are involved, what roles they play in each phase, and how their positions and relationships shift as the project progresses. This forms the foundation for understanding the governance dynamics in the case study and directly contributes to answering the second sub-research question.
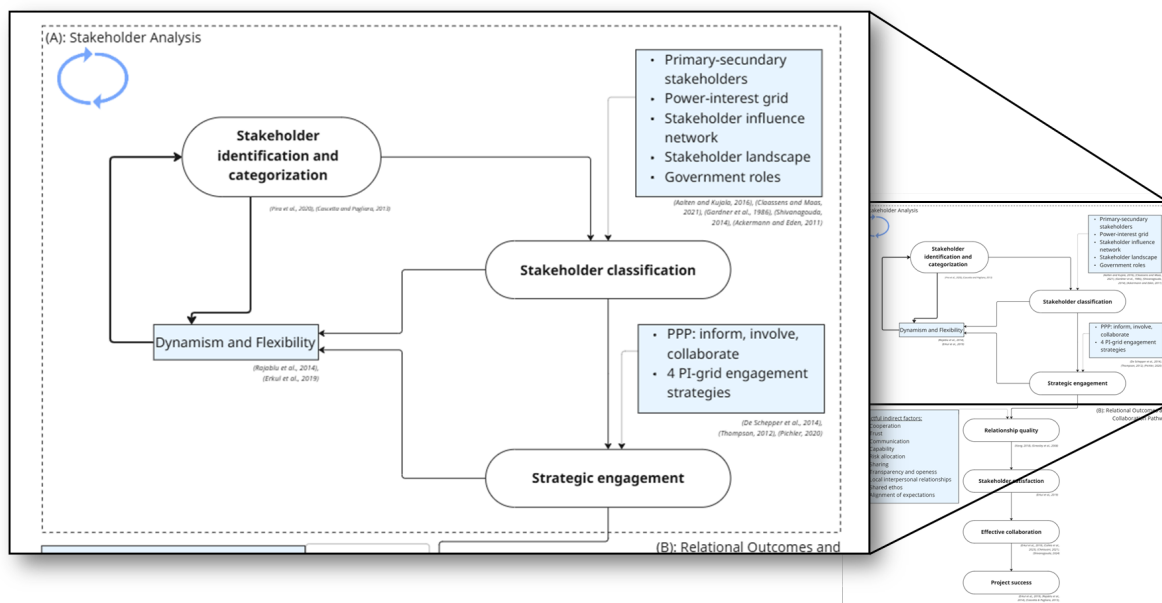
Figure 5.9: Part A of Conceptual Collaboration Framework: Stakeholder Analysis

5.2.1. Iterative approach

As emphasized by the framework, the stakeholder analysis continuously accounts for dynamics and flexibility. This is particularly important given the two-phased focus of this research. To meaningfully explore these dynamics, it is first necessary to distinguish between two key project phases: the development phase and the implementation phase. As discussed in Section 1.2, the transition between these phases represents a central bottleneck in the delivery of regional mobility hubs. The full process, including this transition, is illustrated in Figure 5.10, as previously introduced.

Planning Phase
Concept generation and early exploitation

- Identifying mobility bottlenecks
- Exploring potential locations and conducting preliminary spatial analysis
- Defining high-level ambitions and design principles

Development Phase
Strategic preparation and decision-making

- Strategic alignment
- Role definition
- Administrative preparatory phase
- Secure funding plan

Implemenation Phase
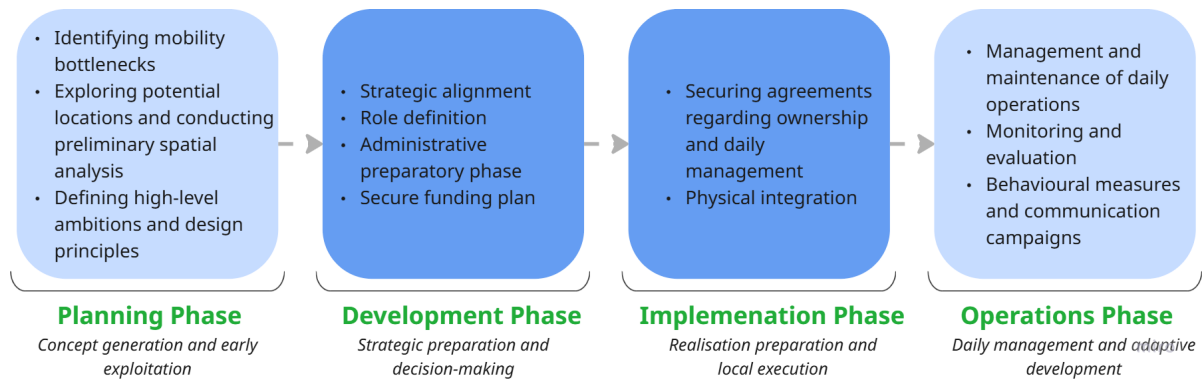*Realisation preparation and local execution*

- Securing agreements regarding ownership and daily management
- Physical integration

Operations Phase
Daily management and adaptive development

- Management and maintenance of daily operations
- Monitoring and evaluation
- Behavioural measures and communication campaigns

Figure 5.10: Phases of a mobility hub

5.2.2. Stakeholder Identification and categorization

The stakeholder analysis begins with the identification of relevant actors involved in or affected by the development and implementation of the Brainport mobility hubs. As Pira et al. (2020) states; stakeholders in transport projects are broadly defined as any individuals, groups, or organizations that have an interest in or are affected by decisions made within a project. As the primary focus of this research lies with governmental organizations, the stakeholder categorization proposed by Pira et al. (2020) is used as a guiding structure.

The first category, governments and authorities, forms the core of the analysis and is derived from the governance and consultation structures mapped in Figure 5.5. This includes municipalities, provincial institutions, national ministries, and associated public agencies.

However, the analysis also includes the second category of businesses, specifically those actively involved in the consultation structures. Given their strategic and financial influence, depicted in Figures 5.5 and 5.8, these actors play a significant role in the regional mobility ecosystem.

Finally, the category of communities and neighborhoods is included, represented in this study by commuters and citizens. Although they may not be formally involved in governance processes, their mobility behavior and accessibility needs are directly shaped by the outcomes of the Brainport mobility hub strategy.

Together, these categories capture the full range of stakeholders relevant to the case study and serve as the basis for the subsequent analysis. The final list of stakeholders included consists of the following actors:

- Municipality of Eindhoven
- Municipality of Helmond
- Municipality of Veldhoven
- Brainporthub Municipalities
- Province of North Brabant
- MRE (Metropolitan Region Eindhoven the organization)

- Ministry of Infrastructure and Water Management (I&W)
- Rijkswaterstaat (RWS)
- Other Ministries (EZK, VRO, OCW)
- Business sector
- Commuters
- Citizens

5.2.3. Stakeholder Classification

With the relevant stakeholders identified, the next step is to classify them according to their roles and influence. The collaboration framework provides several possible methods for stakeholder classification. Two complementary methods are applied: the Power-Interest (PI) grid, to compare how the stakeholder roles evolve between the development and implementation phases, and the Stakeholder Influence Network approach (Ackermann & Eden, 2011), to map relationships and identify structural power within the governance system. The following sections elaborate on each method and their application in this case study.

Power-Interest Grid
As earlier introduced in Section 4.2.2, a PI-grid is a simple analytical tool used to position stakeholders based on their relative power and interest. It helps distinguish between different types of stakeholders, each requiring a tailored engagement approach. For instance, stakeholders with both high power and interest must be actively involved and supported throughout the process. As noted by Bryson (2004), the success of public sector initiatives often depends on addressing the expectations of key stakeholders based on their own definitions of value. A PI-grid helps to identify those stakeholders, after which their definitions of value can be indicated. In addition, the PI-grid can reveal opportunities for collaboration, indicating whose support should be secured and which actors might need to be strategically involved or integrated into the process.

The following sections present the PI-grids for the development and implementation phases.

Development phase:

During the development phase, power is primarily concentrated in the hands of institutional actors who are responsible for long-term strategy, funding, and regional vision. Interest levels vary, with some stakeholders highly involved in visioning processes and others remaining on the periphery. The PI grid in Figure 5.11 illustrates the relative positioning of key stakeholders during this phase. The coloring of stakeholders in the PI grids correspond to the colors in the legend, representing the administrative levels of Figure 5.5. This allows for a clearer understanding of how influence and interest are distributed across different layers of governance.
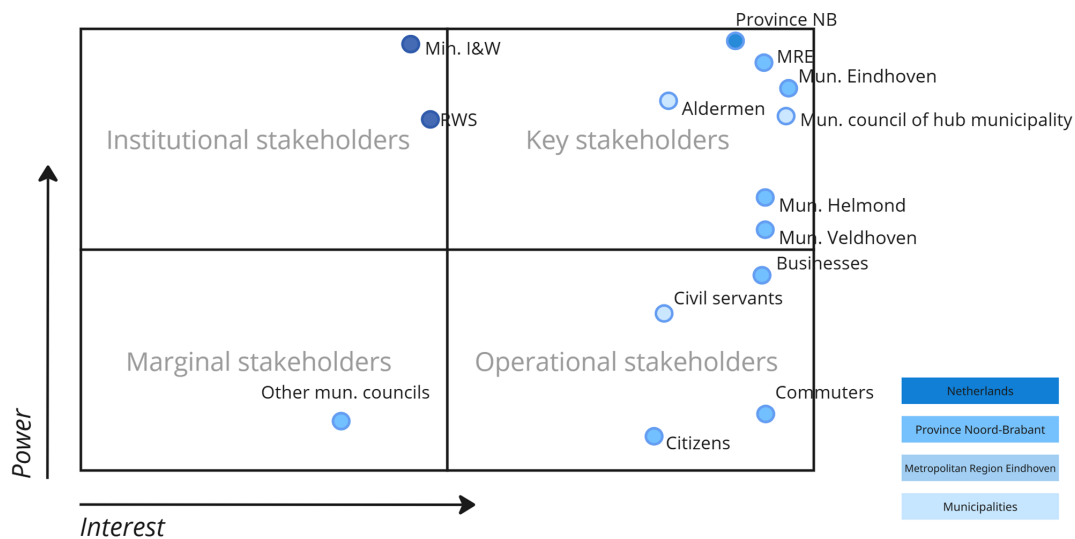
Figure 5.11: PI-grid development phase Brainporthubs

An explanation on the positions of the stakeholders is given in Appendix C.3.

Implementation phase:

As the Brainporthubs transition from regional vision planning to local execution, the stakeholder dynamics shift accordingly. The implementation phase focuses on operational realization, infrastructure delivery, and the practical alignment of involved parties. Figure 5.12 shows how stakeholder positioning evolves in this stage, with an explanation of the new stakeholder positions again in Appendix C.3.

Figure 5.12: PI-grid implementation phase Brainporthubs
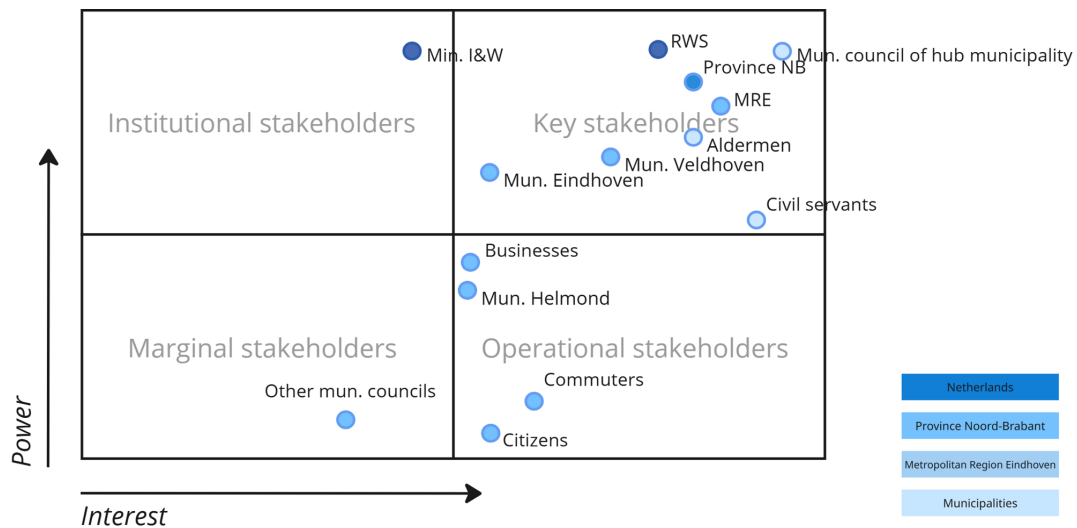
Stakeholder influence network

In addition to the PI-grid, another classification method is applied: the Stakeholder Influence Network theory, by Ackermann and Eden (2011). The goal of this method is to reveal not only which stakeholders are involved, but also the connections between them, offering insight into where structural power resides within the governance system.

Stakeholders or stakeholder groups are connected when one can influence, represents, or includes the other. Actors with many incoming links often hold more indirect power through information access, while those with many outgoing links shape others' perspectives and serve as system connectors.

Unlike the power-interest grid, this network does not vary by phase, as the underlying architecture of governance remains stable. What changes, is the relative importance of actors. For example, project teams become more central in later phases, even if their formal links remain unchanged. Including both actors and consultation structures allows us to identify bottlenecks, central nodes, and coalition-building opportunities.

Performing the Stakeholder Influence Network analysis results in a stakeholder network graph, depicted in Figure 5.13. This visualizes how influence is structurally distributed. The squares represent the stakeholder(groups), where orange represents actors and blue represents consultation groups. The stakeholders are connected with arrows, indicating one stakeholder holds influence, represents or is included in the other stakeholder(group). For example, the MRE is represented in the BO V&M, the BAG, the PoHo and the ABG. Table 5.2 summarizes the number of incoming and outgoing connections per stakeholder, allowing for a quick identification of key information holders and influencers within the network. The MRE has in this Table 4 outgoing arrows and 0 incoming.
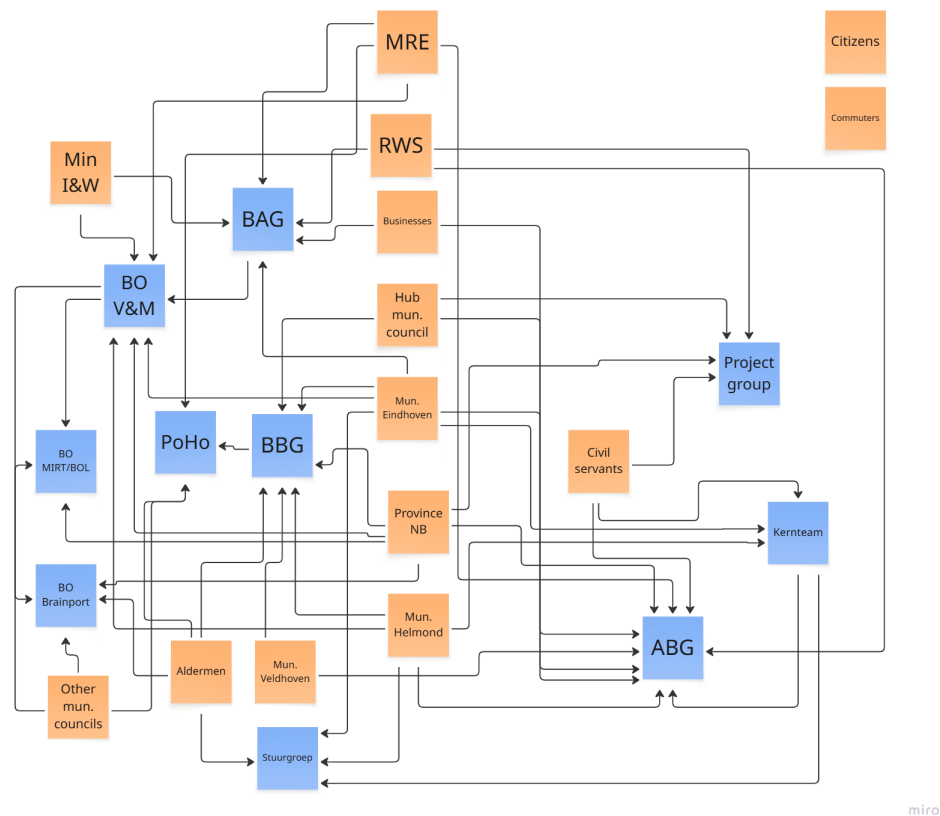
Figure 5.13: Stakeholder Influence Network

The Stakeholder Influence Network analysis highlights key patterns in governance influence and reflects the complexity created by the multi-layered consultation group structure, as shown in Figure 5.13. The ABG Brainporthub consultation group receives the most incoming connections, indicating strong representation and access to diverse perspectives. This suggests it plays a central role in aggregating information. Notably, as consultation groups gain decision-making power, like the BO's or the POHO, their representation diminishes. This is partly a limitation to this approach as the POHO consists of every municipality, but those are not included into the governance model of this thesis. But for the other consultation organs this does account.

The stakeholders with the most outgoing connections; Eindhoven municipality, the Province of Noord-Brabant, and Helmond municipality, are present in the most consultation groups. Their broad representation suggests they have significant influence over governance decisions, which is also reflected in their higher level of power and interest in the PI grids. This distribution of connections underscores the central role of these actors in shaping governance outcomes.

Table 5.2: Number of incoming and outgoing influence relations per stakeholder

Stakeholder	Outgoing arrows	Incoming arrows
ABG Brainporthubs	0	10
BBG Brainporthubs	1	6
BO VM	2	6
BAG Mobility	1	5
Stuurgroep	0	4
BO Brainport	0	4
Project group	0	4
POHO Mobility MRE	1	3
BO MIRT / BOL	0	3
Kernteam	3	2
Businesses	2	0
Ministry of I&W	2	0
Municipality of Veldhoven	2	0
Municipal council of hub municipality	3	0
Other municipal councils	3	0
Civil servants	3	0
Rijkswaterstaat (RWS)	3	0
Aldermen	4	0
MRE	4	0
Municipality of Helmond	5	0
Province of North Brabant	6	0
Municipality of Eindhoven	6	0

5.2.4. Strategic Engagement

After stakeholders have been classified using several methods, indicating their levels of power, involvement, and interest, the framework proceeds to the strategic engagement step. It offers two possible approaches for determining appropriate engagement strategies, one of which is directly linked to the PI-grid method, namely the four PI-grid engagement strategies.

Four PI-grid Engagement Strategies
Based on the PI-grids developed for both the development and implementation phases, stakeholders can be grouped according to strategic engagement approaches. As discussed in Section 4.2.2, Thompson (2012) and Pichler (2024) provide concrete engagement strategies for each stakeholder type, depending on their relative levels of power and interest.

Development phase:

Based on their relative power and interest in the development phase, stakeholders can be grouped according to the four standard engagement strategies, based on the theories of Thompson (2012) and Pichler (2024), elaborated on in Section 4.2.2. used in strategic stakeholder management.

Manage closely and secure buy-in
- Province Noord-Brabant
- Municipality of Eindhoven
- MRE
- Aldermen
- Municipal council of hub municipality
- Municipality of Helmond
- Municipality of Veldhoven

Keep satisfied and consult
- Ministry of I&W
- RWS

Keep informed regularly
- Civil servants
- Commuters
- Citizens
- Businesses

Monitor
- Other municipal councils

Implementation phase:

The stakeholders involved in the implementation phase are subsequently grouped according to the PI

grid, with each stakeholder placed in one of the four quadrants and linked to a corresponding engagement strategy, based on theories of Pichler (2024) and Thompson (2012).

Manage closely and secure buy-in
- Province Noord-Brabant
- Municipality of Eindhoven
- MRE
- Aldermen
- Municipal council of hub municipality
- Municipality of Veldhoven
- RWS
- Civil servants

Keep satisfied and consult
- Ministry of I&W

Keep informed regularly
- Municipality of Helmond
- Commuters
- Citizens
- Businesses

Monitor
- Other municipal councils

Gaps Between Formal Engagement and Stakeholder Influence

By combining the engagement strategies derived from the PI-grid with the structural positions revealed through the Stakeholder Influence Network, several notable insights emerge. While the PI grid classifies stakeholders based on their formal power and interest, the network analysis highlights how influence actually flows within the governance system.

A clear example of misalignment is the municipal council of the hub municipality. According to the PI grid, this actor should be closely managed and actively engaged due to its high power and interest in both phases. However, the influence network shows that this stakeholder is among the least connected, suggesting limited influence and a marginal role in shaping hub-related decisions.

In contrast, the Province of North Brabant is both formally powerful and structurally well-connected, confirming that in this case, engagement strategy and actual influence align.

These comparisons underline the value of combining classification methods: while the PI grid offers a normative engagement approach, the influence network reveals how governance functions in practice, exposing potential gaps between intended and actual stakeholder involvement.

5.2.5. Stakeholder Dynamics

To understand how evolving roles, priorities and influence patterns affect collaboration and decision-making, the stakeholder dynamics between the project phases are examined. Such insights are essential to identify which actors need to be more actively engaged or strategically repositioned over time to ensure continued alignment with project goals.

To better understand the stakeholder dynamics between the development and implementation phases, shifts in both power and interest were mapped across the full stakeholder field. Table 5.3 summarizes which actors gained or lost power and interest, as seen in the comparison in the PI-grids below, offering a global view of how the governance focus evolved over time. In-depth elaboration on the changes in position per actor and why are found in Appendix C.3.
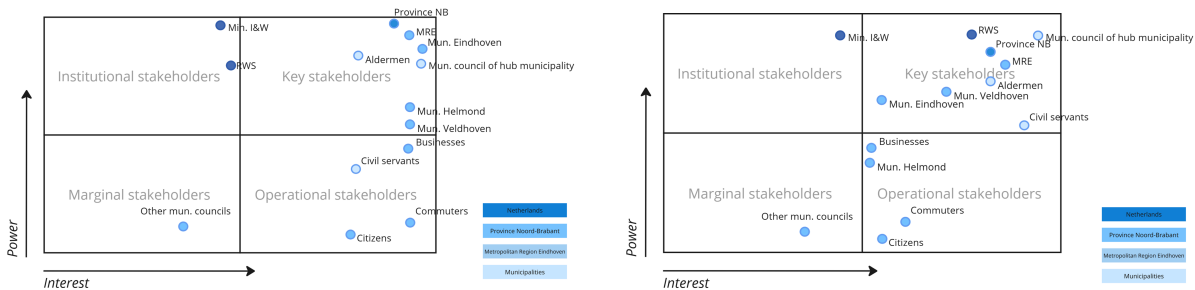

Figure 5.14: PI-grid development phase

Figure 5.15: PI-grid implementation phase

Table 5.3: Observed shifts in stakeholder power and interest

Decrease in Power ↓	Increase in Power ↑	No change
Province of North Brabant	Municipal council of hub municipality	Commuters
MRE	RWS	Citizens
Municipality of Eindhoven	Civil servants	
Aldermen	Municipality of Veldhoven	
Municipality of Helmond		
Ministry of I&W		

Decrease in Interest ↓	Increase in Interest ↑	No change
Province of North Brabant	Civil servants	Ministry of I&W
MRE	RWS	
Municipality of Veldhoven	Municipal council of hub municipality	
Municipality of Helmond		
Businesses		
Commuters		
Citizens		
Municipality of Eindhoven		

Table 5.3 illustrates how stakeholder power and interest shift between the development and implementation phases. A clear pattern emerges: operational stakeholders, such as the hub municipalities, RWS, and civil servants, gain influence as the project moves toward local execution. In contrast, strategic actors like the Province, MRE, and larger municipalities see a decline in both power and interest. Notably, many stakeholders who were highly involved during the planning stage show reduced interest once implementation begins, suggesting a disengagement as responsibilities shift to the local level.

While the previous Table highlights overall shifts in stakeholder power and interest, changes in engagement strategy depend especially on who is considered a key stakeholder in each phase. These are the actors that require the most active involvement and strategic alignment (Pichler, 2024; Thompson, 2012). Table 5.4 compares the key stakeholders in the development and implementation phases, showing which actors remained central, which lost their key status, and which became newly prominent.

For example, RWS and civil servants enter the key stakeholder group during implementation, reflecting their growing operational relevance. Meanwhile, the municipality of Helmond steps out of the key field, as its role diminishes once strategic decisions have been made.

Table 5.4: Key stakeholder comparison between development and implementation phase

Key stakeholders	
Development phase	**Implementation phase**
Province of North Brabant	Province of North Brabant
Municipality of Eindhoven	Municipality of Eindhoven
Metropoolregio Eindhoven (MRE)	Metropoolregio Eindhoven (MRE)
Aldermen	Aldermen
Municipal council of hub municipality	Municipal council of hub municipality
Municipality of Helmond	Municipality of Helmond
Municipality of Veldhoven	Municipality of Veldhoven
Rijkswaterstaat (RWS)	Rijkswaterstaat (RWS)
Civil servants	Civil servants

However, this comparison does not yet reflect the internal dynamics within the key stakeholder group itself, such as who holds most power or has the highest interest. The next figure visualizes these shifts within the key field and provides insight into how influence relations evolve among the central actors.
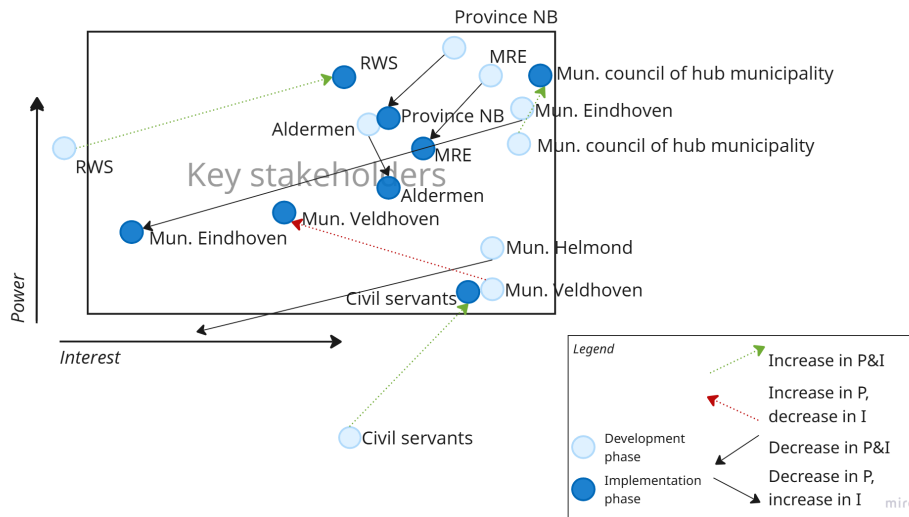
Figure 5.16: Dynamics within key stakeholder field

Figure 5.16 shows the internal shifts within the group of key stakeholders between the development and implementation phases. Within this core group, three stakeholders gain power *and* interest: the municipal council of the hub municipality, RWS, and civil servants. The latter two were previously not part of the key stakeholder group, reflecting how operational relevance becomes more decisive as the project moves toward implementation.

The municipal council gains both interest and power, primarily because spatial and political decisions now directly affect their local territory. While they may not become the formal owner of the hub, they inevitability carry consequences of the hub and their approval is required for local planning decisions, making their involvement essential. RWS, on the other hand, becomes more central due to its technical role in highway access and potential adaptation of emergency lanes for public transport. Civil servants gain prominence as they coordinate planning efforts through the project groups, shaping how implementation unfolds in practice.

Notably, most other key stakeholders show a slight decline in either power or interest, especially those involved in strategic visioning, such as the province, MRE, and the Municipality of Eindhoven. The Municipality of Veldhoven, while still formally key, becomes less interested now that core planning decisions have been made; however, their power slightly increases since the use of the hub partly depends on flanking policies implemented by parking restrictions within the municipality.

These dynamics illustrate a gradual shift in the governance focus: from long-term regional strategy to local execution and technical realization. It highlights the need to re-align collaboration and engagement strategies accordingly, ensuring that newly prominent actors are adequately supported and those stepping back are kept sufficiently involved to maintain strategic coherence.

5.2.6. Conclusion Stakeholder Analysis
This section has completed part A of the collaboration framework: the stakeholder analysis. Starting with the identification and categorization of stakeholders, a structured classification was conducted using both the Power-Interest (PI) grid and the Stakeholder Influence Network approach. These methods provided complementary insights into who holds influence, power and interest, and how stakeholders are embedded within the governance structure of the Brainport mobility hubs.

Based on the classification outcomes, engagement strategies were derived for each stakeholder, following the theoretical guidance of Thompson (2012) and Pichler (2024). These strategies indicate how different stakeholders *should* be engaged based on their relative power and interest. However, it is important to emphasize that this analysis reflects the actual situation as observed in the case study, not an ideal or normative model. For instance, certain actors, such as the hub municipalities, are positioned

as key stakeholders in the PI-grid due to their high interest and power over their region. Therefore, their engagement strategy falls under 'Manage closely and secure buy-in'. Yet in practice, their involvement during the development phase remains limited, revealing a gap between theoretical engagement strategies and actual governance practice. The analysis of this misalignment is based on the current state and confirmed through the stakeholder influence network.

The stakeholder influence network added structural depth to the analysis by visualizing which actors are connected through consultation platforms. It highlighted that actors like the Municipality of Eindhoven and the Province of North Brabant maintain a strong structural presence across governance layers, regardless of their formal role in a specific phase.

The stakeholder analysis also demonstrated the dynamic nature of stakeholder roles across project phases. By comparing the development and implementation stages, notable shifts in power and interest were observed, such as the rise of RWS and civil servants as key actors during implementation. These dynamics underline the importance of regularly reassessing stakeholder positions and relationships as the project evolves.

This stakeholder analysis directly contributes to answering the **second sub-research question:**

Which stakeholders are involved in the development and implementation of mobility hubs in the case study, and how do their roles differ between these phases?

The analysis has identified the key actors in each phase, mapped their influence and interest, and revealed how and why their roles shift as the project moves forward. These findings form the foundation for the next step in the framework: examining the relational outcomes of collaboration, including the barriers and opportunities experienced by stakeholders in practice.

5.3. Relational Outcomes

This section will explore the second part of the collaboration framework; the Relational Outcomes (Figure 5.17). In this part, we will walk through the relational outcomes of the stakeholder analysis in the case study. For assessing the relationship quality in the case study, and the following stakeholder satisfaction and effective collaboration, barriers and opportunities regarding collaboration in the case study were formed based on the interviews with stakeholders across different governance layers (Table 5.1).
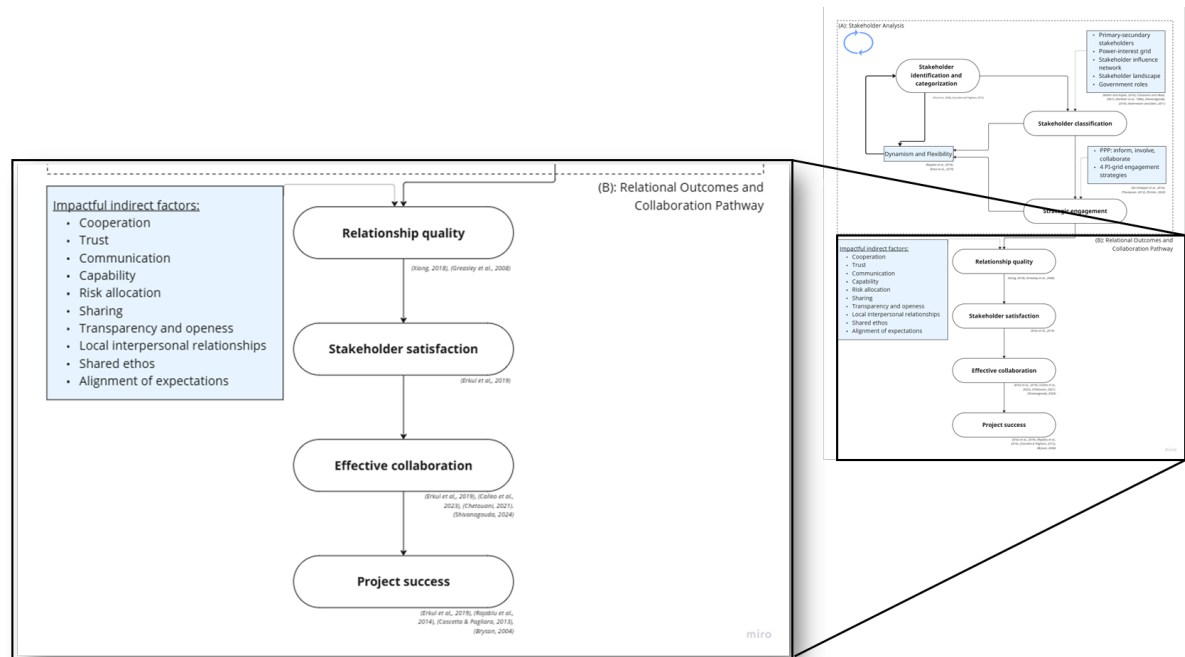
Figure 5.17: Part B of Conceptual Collaboration Framework: Relational Outcomes

5.3.1. Barriers

This section presents the main barriers that undermine effective stakeholder collaboration during the development and implementation phases of regional mobility hubs. Based on interviews with key stakeholders, three central categories were identified: misalignment of problem ownership and solution implementation, lack of clarity in governance and roles, and lack of a shared and compelling vision.

1. Misalignment of problem ownership and solution implementation
Strategic friction: Mismatch between regional problem placement and local execution of solution

One of the most pressing challenges is the perceived disconnect between where problems are concentrated and where solutions are implemented. While the need for mobility hubs often stems from regional congestion and accessibility concerns—particularly in areas around Eindhoven and key employers such as ASML—the hubs themselves are typically placed in smaller municipalities. These municipalities bear the local costs, such as increased traffic, nitrogen emissions, and spatial impact, while the benefits are dispersed across the wider region. This creates resistance on the ground, especially in cases where the urgency or reciprocal benefit is unclear.

Key tensions include:

- A "not in my backyard" (NIMBY) attitude among municipalities asked to host a hub
  - "Once a hub is planned in a municipality, the conversation shifts from regional to local interests. That's when you get NIMBY-like situations." -Provincie Noord-Brabant, 2025
  - "Municipalities interfering with each other's decisions is a sensitive topic." -Gemeente Amsterdam, 2025
- Lack of visible return on investment or reciprocal benefits
  - "There's a sense of one-sided entrepreneurship. If something happens at ASML, the consequences can be large for us. How many people truly benefit from this ambition?" -Gemeente Eersel, 2025
  - "What's in it for them? What do they get in return besides co-financing?" -MRE, 2025
  - "You are actually building for the businesses." - Provincie Noord-Brabant, 2025

- "Project Beethoven will strengthen the Dutch microchip sector and invest in housing, accessibility and facilities in Brainport." -Eindhoven, 2023
  - Nitrogen legislation complicates implementation in municipalities not facing the original problem
    - "One of the biggest problems is that we must comply with the nitrogen legislation" -Gemeente Eersel, 2025
    - "The nitrogen rules don't help. They've made everything more complex." (ASML, 2025)

2. Governance opacity and power concentration
Institutional friction: collaboration stalls due to unclear division of roles, uneven power relations, and lack of timely involvement.

Although the Brainporthubs are embedded in a multilayered governance system with various consultation structures, many interviewees described the process as opaque and top-heavy. Strategic decisions are often made by a small number of powerful actors, such as the Province and the Municipality of Eindhoven, before broader consultation occurs. This undermines genuine stakeholder involvement and creates a disconnect between formal participation and actual influence.

Specific barriers include:

- Fragmented governance: lack of clarity in ownership and responsibilities and unclear distributed power
  - "We co-funded the project, so we also expect to have influence. Besides, we see ourselves— and I think all parties do—as the main client." -ASML, 2025
  - "No, I don't think the one who pays the most gets to decide the most." -Provincie Noord-Brabant, 2025
  - "It's always the question: if you don't know who makes the decision, follow the money." -Gemeente Eindhoven, 2025
  - "These are all separate working groups that need to be connected to make sure the right people work on the right things at the right time." -Gemeente Helmond, 2025
  - "You can ask yourself: who actually decides here? Sometimes there is simply no clear decision point. I have the feeling here that no one makes a decision, but that the project just continues." -Gemeente Eindhoven, 2025
  - "Who has authoroty over what, where does it all come together? That is quite a difficult puzzle, yes." -Gemeente Helmond, 2025
- Strategic decisions are made early on by central actors, before broader involvement
- A formal bottom-up structure that operates de facto top-down
  - "Eindhoven and ASML push their plans through and dominate the conversation." -Gemeente Eersel, 2025
  - "This isn't really about the region but about facilitating the private sector. The idea of 'broad prosperity' is just a narrative." -Gemeente Eersel, 2025
  - "Business and Eindhoven are taming the lead. That's where the power sits." -Gemeente Eindhoven, 2025

3. Lack of a shared vision
Conceptual friction: collaboration is hindered by differing expectations and lack of shared urgency and vision.

A third major barrier relates to the content of the hub proposition itself. Stakeholders do not always share a clear understanding of what a mobility hub should be, what services it should include, how it should function and why it matters. These differences in interpretation create confusion and reduce momentum during both planning and implementation.

Key aspects include:

- Absence of a clearly articulated vision or concrete hub design

  - "You have to do this together or it won't work. There needs to be a really strong story." -Gemeente Amsterdam, 2025

  - "We don't want a hub, but there will be a few more parking spots and shared bikes next to the bus stop." -Gemeente Eersel, 2025

  - "We are talking about a scalable design for the hubs, so scaling it up in the height to 600 parking places or staying low are certainly possibilities." -MRE, 2025

- Lack of a compelling business case

  - "A park-and-ride doesn't pay for itself financially. Maybe socially it does, but even then you're paying into it." (Gemeente Amsterdam, 2025)

- Disconnect between hub design ambitions and real-world developments

  - "Due to changes, the hub East may no longer be in the right place, past the congestion point (BIC North)." -Gemeente Eindhoven, 2025

  - "Hub East A67 isn't suitable for HOV. The A67 won't be widened and doesn't have an emergency lane. It also has a weak PT connection" -Gemeente Eindhoven, 2025; MRE, 2025

  - Municipality of high potential hub A76 South voted against.

- Differing interpretations of value and long-term impact

  - "A hub is just relocating the problem, because people still drive to the hub with a car. You don't decrease car-movements" -Gemeente Eersel, 2025

  - "We have lost faith a bit. Because it is taking so long now. We want to see it before we believe it." -ASML, 2025

  - "With the test-hub, it was very empty. No one came." -ASML, 2025; Brainport Bereikbaar, 2025a; Gemeente Eersel, 2025

  - "The A67 is packed with freight traffic from Antwerp to Düsseldorf. A hub won't help there." -Gemeente Eersel, 2025

- Sense of urgency and necessity often not clearly demonstrated

  - "I think the biggest barrier is the lack of demonstrated necessity and urgency." -MRE, 2025

  - "Sometimes with things like these, its a lack of momentum... The danger of getting paralyzed in the decision-making process and with that a negative attitude develops." -Gemeente Utrecht, 2025

5.3.2. Opportunities

While there are significant barriers, interviews also revealed promising opportunities that can accelerate hub development. These opportunities relate to both the social context—such as interpersonal trust and shared understanding—and structural or institutional factors like national support or smart framing of the hubs.

1. Social enablers

Opportunities in this category are related to how actors relate to one another. Trust, mutual respect, and understanding of institutional limitations can help unlock collaboration, even when formal structures fall short.

- Mutual trust and respect among actors

  - "All parties must respect each other's positions and truly listen. Only by building a shared story can you make progress." (Gemeente Amsterdam, 2025)

  - "We've made good progress in building trust and listening to each other's arguments and interests. That's a fundamental need if you really want to realize these plans." (Gemeente Amsterdam, 2025)

- Understanding each other's limitations

    – "You need to be aware of what the other side can't deliver, due to legal or political limits. That creates room for compromise." (Gemeente Amsterdam, 2025)

2. Structural enablers
These opportunities are embedded in the institutional setup or the way hubs are positioned within larger frameworks. They can provide concrete leverage to speed up decision-making and improve alignment across scales and sectors.

- A strong link with the national government can provide momentum

  – "The national government can play a role because it's responsible for the national highway network and relieving pressure on it fits that role." (Gemeente Amsterdam, 2025)

- Framing hubs as multifunctional solutions strengthens buy-in

  – "I think the biggest opportunity lies in creating a hub that also solves other problems. That way it can serve a double purpose." (MRE, 2025)

  – "If you frame the hub through the lens of housing development, it becomes easier to involve the Ministry of Infrastructure." (Gemeente Utrecht, 2025; Ministry of I&W, 2025)

- Tangible advantages in time or cost are convincing to decision-makers

  – "Time and money are always the biggest drivers. A hub has to either save time or cut costs to be successful." (ASML, 2025)

  – "You have to scale it up. Otherwise, people will ask, why build parking spaces here for Eindhoven's problem? But we're a region with an integrated economic function, and in that sense, the national government should also think along as a partner." (Ministry of I&W, 2025)

  – "The national government has limited capacity, so it must be selective. Which projects truly serve a national interest? In Eindhoven's case, they often do choose to engage, because of the extra economic value there." (Ministry of I&W, 2025)

  – "Sometimes you can't expand a highway due to nitrogen restrictions. Then you start thinking about alternatives like a hub that can help reduce pressure on that highway." (Ministry of I&W, 2025)

- Flanking policies support behavioural change and improve business cases

  – "People usually want to drive all the way to their destination, unless something discourages them, like a policy from their employer saying you can't park at work anymore." (MRE, 2025)

  – "As long as you can drive to certain destinations and still park for an affordable tariff, nobody will make the transition." -Brainport Bereikbaar, 2025a; Provincie Noord-Brabant, 2025

- A shared story and regional framing help align actors

  – "Because of all these different interests, a regional approach is the only way to deal with the complexity." (Gemeente Amsterdam, 2025)

- Standardisation of hubs improves usability and network thinking

  – "If hubs become more standardised, they can be better integrated into navigation systems and become more recognisable to users. Standardised policies can then follow a more coherent network approach, with more leadership from the Ministry." (Ministry of I&W, 2025)

  – "I've looked into whether we could standardise hubs in the long run. That requires cooperation, and it's not easy. But it's something worth exploring." (Gemeente Amsterdam, 2025)

Using stakeholder interviews, the quality of collaboration was assessed through identified barriers and opportunities, providing a grounded perspective on what enables or hinders cooperation in practice. Now, the relational outcomes of part B of the collaboration framework can be analyzed.

5.3.3. Relationship quality
After performing the barriers and opportunities analysis, the quality of stakeholder relationships can be evaluated by examining the indirect factors identified in the conceptual framework. The analysis of interview data revealed that many of these elements were either underdeveloped or missing in the current collaboration context.

Several interviewees highlighted relational breakdowns that strongly align with known risks in the literature, revealing poor relationship quality:

A central issue was the lack of early involvement. Multiple interviewees described how strategic decisions were made early in the process by a small group of central actors, with broader engagement occurring only later. This contradicts the recommendations of Cuppen et al. (2016) and Rajablu et al. (2014), who argue that early engagement is essential to build mutual understanding, trust, and stronger relationship quality. The absence of such early involvement had a cascading effect: without early dialogue, a shared vision failed to form. This was reflected in barriers such as the "Lack of shared vision", containing the aspect "Absence of a clearly articulated vision or concrete hub design", pointing to an actual lack of shared vision on what the hubs are meant to become. Also "Lack of visible return on investment or reciprocal benefits", shows that stakeholders have a different view of value in the project, indicating a lack of shared vision.

This problem was further exacerbated by how the governance structure was experienced. While formally designed as a bottom-up process, many stakeholders perceived the project as top-down in practice. This perception aligns with the "Decide, Announce, Defend" (DAD) model described by Cascetta and Pagliara (2013). According to Cascetta and Pagliara (2013), this governance style increases the likelihood of fragmented decision-making and NIMBY (Not In My Backyard) behavior — both of which were identified as barriers in the case study. The barrier "Lack of clarity in ownership and coordination responsibilities" illustrates fragmented governance, while local opposition from hub municipalities exemplifies the NIMBY dynamic. The fragmented governance structure is also quite literally exhibited in the governance framework of the case study, depicted in Figure 5.5, and is well illustrated by the following quote:

> "I get the sense that nobody really makes the decision, but at some point, it's just made. And when you ask who decided it, nobody can say. Sometimes you haven't even been asked to approve anything—just informed after the fact." (Gemeente Eindhoven, 2025)

Taken together, these findings illustrate a breakdown of relationship quality that is not only evident in the case study but also predicted by literature. The identified indirect factors for relationship quality are found laregely missing in the relationships in the case study.

5.3.4. Stakeholder satisfaction
The absence of these relational enablers appears to be reflected in lower levels of stakeholder satisfaction, as expressed in several interviews. Stakeholders described confusion about decision-making, frustration over engagement timing, and skepticism about project goals and coordination. These indicators align with known signs of limited satisfaction in collaborative processes.

5.3.5. Effective collaboration and project success
The project success strongly dependent on the preceding elements. In the Brainporthubs case study, however, the relational foundations were weak. The absence of early engagement, perceived top-down decision-making, lack of shared vision, and fragmented governance undermined the impactful indirect factors shaping the quality of relations, resulting in decreased stakeholder satisfaction, reduced collaboration and thus diminished project success.

This outlook is not only supported by theory but is also echoed in the words of stakeholders themselves:

> "Right now, everything just feels very vague. It's unclear what the goal is, who decides what, and when things will actually move forward." (Brainport Bereikbaar, 2025b)

These findings suggest that without deliberate improvements in stakeholder collaboration, the Brainporthubs project risks falling short of its strategic ambitions, despite broad alignment on its potential value.

5.3.6. Conclusion Relational Outcomes

When comparing these findings to the of the collaboration framework, it becomes clear that several key conditions for achieving high relational quality, and thereby stakeholder satisfaction, effective collaboration, and ultimately project success, are not fully met in the Brainporthubs case. While there are promising enablers, the presence of persistent barriers in governance clarity, power alignment, and shared vision limit the extent to which collaboration can be considered effective in practice. As such, part B of the framework proves to be a critical point of tension in this case study. These findings highlight the importance of investing not only in formal structures, but also in building trust, clarifying roles, and fostering a shared narrative to improve stakeholder collaboration.

These insights directly answer the **third sub-research question:**

What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?

5.4. Conclusion

This chapter has applied the collaboration framework to the Brainporthubs case study and, through a combination of stakeholder analysis and relational assessment, has provided structured and grounded answers to the second and third sub-research questions.

Part A of the framework mapped the key stakeholders across both the development and implementation phases, using the Power-Interest grid and the Stakeholder Influence Network. This revealed how stakeholder roles shift over time, and how discrepancies exist between theoretical engagement strategies and actual influence within the governance structure.

Part B of the framework examined the relational quality of stakeholder collaboration. It identified persistent barriers, such as unclear governance, lack of shared vision, and limited local buy-in—that undermine trust, alignment, and transparency. Interestingly, these findings confirm the predictive power of the framework: it not only diagnoses but the theory also anticipates the consequences of underdeveloped relationships, as presented in the barriers. According to the framework, such relational deficits are directly linked to low stakeholder satisfaction, weak collaboration, and reduced project success, patterns that are clearly observable in the case study.

Taken together, these findings show that both structural and relational elements of stakeholder collaboration fall short of what the framework defines as effective. While the framework has helped reveal where misalignments and collaboration issues occur, a deeper diagnosis of these tensions, how and why they emerge, will be the focus of the next chapter.

In doing so, this chapter provides clear answers to the following sub-research questions:

Sub-question 2:

Which stakeholders are involved in the development and implementation of mobility hubs in the case study, and how do their roles differ between these phases?

Sub-question 3:

What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?

6

Evaluation and Refinement

Having applied the collaboration framework to the Brainporthubs case study, this chapter reflects on its practical validity and identifies where it can be refined. By confronting theoretical assumptions with empirical findings, the framework is critically evaluated and refined. This analytical step ensures that the resulting strategies are not only grounded in academic theory but also reflect the realities and complexities of collaboration as experienced in practice.

In doing so, this chapter also addresses the **fourth sub-question** of this thesis:

How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?

These improvements are developed based on the combined insights of the previous chapter and the stakeholder perspectives gathered through interviews. The aim is to arrive at a refined, evidence-based collaboration framework that supports effective stakeholder collaboration in future hub projects.

6.1. Evaluating the Framework in Practice

This section evaluates how the conceptual collaboration framework held up when applied to the Brainporthubs case study. By comparing the theoretical steps to real-world dynamics, it becomes clear which parts of the framework proved useful, where assumptions did not hold in practice, and what adaptations are necessary for it to function effectively in similar governance contexts.

6.1.1. Part A: Stakeholder Analysis

The first part of the framework focuses on stakeholder-oriented practices: identifying, classifying, and engaging relevant actors, maintaining flexibility throughout the analysis and looking at the stakeholder dynamics. In the case study, this analytical path was followed, but several shortcomings emerged when theory met practice.

To start off, when applying the framework in practice, it became clear that starting with stakeholder identification, as the framework suggests, is not sufficient in complex governance contexts. Rather than relying solely on theoretical classifications, by Cascetta and Pagliara (2013) and Pira et al. (2020), the process started by mapping the actual governance structures, existing consultation bodies, and active stakeholders involved in the Brainporthubs project. This context-driven approach ensured that the identification was rooted in the practical realities of the region. The resulting stakeholder list was then iteratively refined and validated through interviews. While literature provides solid methodological tools for stakeholder identification, the case study shows that theory alone cannot capture the complexity of real-world actor constellations without this preparatory step.

Stakeholder classification via the Power-Interest (PI) grid revealed shifting roles between the development and implementation phases. This revealed:

- Institutional actors such as the Province of North Brabant and Metropoolregio Eindhoven (MRE) remained consistently involved across both phases.
- The most powerful and interested stakeholder shifted from the Municipality of Eindhoven in the development phase to the respective hub municipalities in the implementation phase.

To gain a deeper understanding of the collaborative structure, an influence network analysis was performed. Unlike the PI grids, this network included not only named stakeholders but also formal consultation structures. The goal was to identify which actors or groups served as central information nodes or decision-making bottlenecks.

Key findings included:

- **ABG Brainporthubs** had the highest number of incoming connections, suggesting its role as a major recipient of information.
- **Province of North Brabant** and **Municipality of Eindhoven** had the highest number of outgoing connections, indicating their central presence over the governance structure of the case study.
- The presence of many bodies with high incoming but low outgoing influence (e.g., the project group and various steering committees) indicates a top-heavy structure that centralizes input but limits bottom-up feedback.

In the collaboration framework, stakeholder classification provides the necessary foundation for tailored engagement strategies. However, the translation from stakeholder classification to impactful engagement did not unfold as theory would suggest. When comparing the theoretically derived engagement strategies with the actual structure of stakeholder involvement, as visualized through the Stakeholder Influence Network, several discrepancies become apparent.

For instance, the hub municipalities, classified in both phases as key stakeholders who should be "managed closely," show substantially lower connectivity in the stakeholder influence network. This means that they participate in relatively few formal consultation groups, resulting in limited opportunities to exchange information, influence decisions, or coordinate with other actors. In network terms, low connectivity reflects a marginal position within the governance structure, which reduces their capacity to shape the collaborative process, despite their formally important role.

Conversely, the Municipality of Eindhoven, whose power and interest decrease as the process moves into the implementation phase, maintains a high number of outgoing connections. This indicates continued involvement in multiple decision-making arenas and, consequently, a relatively high level of influence throughout the entire process.

These mismatches reveal a structural gap between the expected level of stakeholder engagement based on classification and the actual engagement observed in practice.

6.1.2. Part B: Relational Outcomes
The second part of the framework theorizes that effective engagement enhances relationship quality, which in turn improves stakeholder satisfaction, collaboration, and project success. However, empirical findings suggest that this sequence does not hold in the Brainporthubs case.

As discussed in Section 5.3.3, the interview data revealed a number of barriers that point to a lack of relationship quality. These points are not only evident in the case study but also predicted by literature. These include a lack of early involvement, which literature identifies as essential for trust-building and alignment (Cuppen et al., 2016; Rajablu et al., 2014). This absence had visible consequences in the form of a missing shared vision, unclear value distribution, and a lack of perceived reciprocal benefits, all of which are well-documented relational risks in collaborative governance literature.

Additionally, the way governance was experienced in the case study, formally bottom-up but perceived as top-down, aligns with the "Decide, Announce, Defend" model discussed by Cascetta and Pagliara (2013). According to Cascetta and Pagliara (2013), such a model increases the likelihood of fragmented governance and local resistance in the form of 'Not in my backyard' behavior. Both patterns were clearly reflected in the stakeholder interviews and confirmed as major barriers to collaboration.

Taken together, these findings support the conclusion that relationship quality was not sufficiently present in the case study. This is not only visible in practice but also theoretically underpinned by the literature. Because relationship quality serves as a foundation for stakeholder satisfaction and effective collaboration, its absence in the case study helps to explain why these subsequent outcomes were also lacking. While the case study does not contradict the causal link proposed by the framework, it shows that the necessary relational conditions were simply not in place for this sequence to unfold.

6.2. Pinpointing Leverage Points for Improvement

The preceding analysis revealed that although the conceptual framework offers a useful structure for collaborative governance, several of its assumptions do not hold when applied in practice. Particularly, the Brainporthubs case study exposed three core weaknesses in the framework's sequence and emphasis:

1. The framework begins with stakeholder identification, but in complex governance settings this step must be preceded by a contextual current state analysis. Without understanding the existing governance structures and actor dynamics, identification risks being incomplete or misaligned with reality.

2. The transition from stakeholder classification to engagement is fragile in practice. The PI-grid correctly classifies key stakeholders, yet these actors were not engaged in accordance with their assigned role. This indicates that strategic engagement does not follow automatically from classification alone, especially without clarity about roles and shared purpose and expectations. This means engagement strategies are not failing, but the conditions for meaningful engagement were never fully established.

3. Relationship quality is a crucial prerequisite for strategic stakeholder engagement. Before engagement strategies can be applied, there must be clarity about who is responsible for what. This role division is itself dependent on a basis of relationship quality, particularly mutual trust, alignment on vision and communication. Without these prerequisites, effective engagement simply cannot take root.
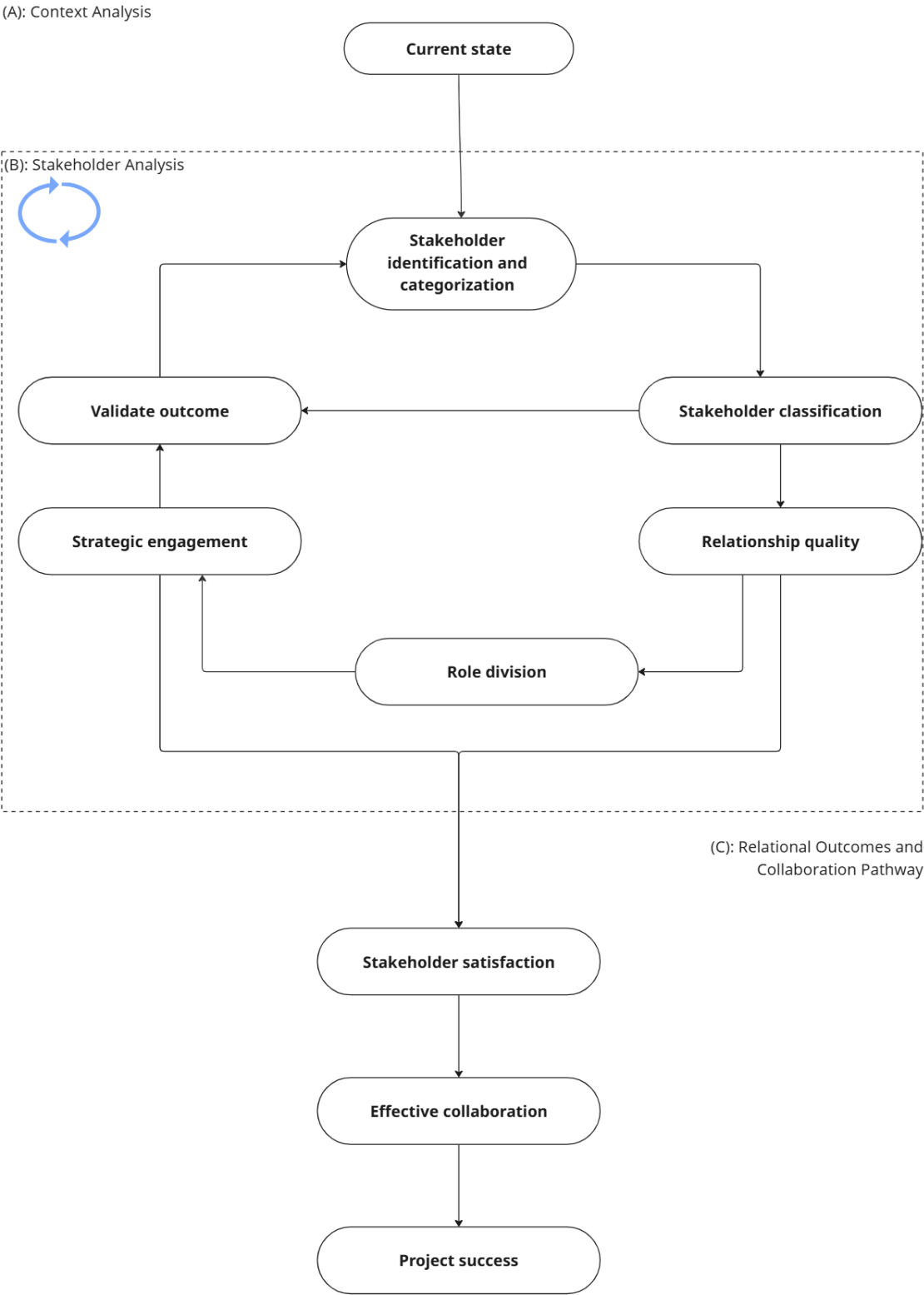
These findings point to a necessary reconceptualization of the collaboration process. In the next section, these insights are used to revise the original conceptual framework into an improved, evidence-based version. This revised framework introduces three concrete improvements:

- **Context analysis** as a foundational step prior to stakeholder identification;
- **Relationship quality** positioned as a prerequisite of strategic engagement, rather than as an outcome of it;
- **Role division** as an intermediate step between relationship quality and engagement, ensuring clarity and alignment before participation is expected.

This shift is supported by literature. As Cuppen et al. (2016) and Rajablu et al. (2014) argue, early involvement and trust-building enhance relationship quality and stakeholder alignment. Similarly, Cascetta and Pagliara (2013) warns that without attention to relational dynamics, governance can unintentionally slide into "Decide, Announce, Defend" patterns, fueling resistance and undermining collaboration.

In sum, the framework now recognizes that effective collaboration does not begin with deciding who to engage and how, but rather with establishing the relational conditions that make engagement meaningful, for both key stakeholders and the broader network. This insight directly reflects the findings from the chapter connecting the conceptual framework and the case study: strong stakeholder relationships are not the result of collaboration, but the prerequisite for it. These adjustments also resolve the key barriers in the case study, such as unclear responsibilities, fragmented governance and lack or early involvement.

The additions proposed in this chapter, most notably the role of early relationship building, clear role division, and contextual stakeholder analysis, are grounded in real-world dynamics observed in the Brainporthubs case. They lead to a revised, evidence-based collaboration framework that integrates both theoretical principles and empirical evidence, as shown in Figure 6.1.

(A): Context Analysis

Current state

(B): Stakeholder Analysis

Stakeholder identification and categorization

Validate outcome

Stakeholder classification

Strategic engagement

Relationship quality

Role division

(C): Relational Outcomes and Collaboration Pathway

Stakeholder satisfaction

Effective collaboration

Project success

miro

Figure 6.1: Evidence-Based Collaboration Framework

6.3. Conclusion

This chapter addressed the **fourth sub-question** of this thesis:

What strategies do stakeholders propose to improve collaboration in both the development and implementation phases?

To answer this question, the conceptual collaboration framework was used as a structure to interpret and synthesize the empirical findings of the Brainporthubs case study. Rather than reapplying the full framework, the aim was to evaluate where its assumptions did not align with practical realities, and how it could be improved to better guide collaboration in similar multi-actor contexts.

This analysis revealed several critical weaknesses in the original framework. The first finding was that stakeholder identification must be preceded by a contextual current state analysis. But, the main friction point in the conceptual framework emerged at the transition from stakeholder classification to engagement. This is where several barriers and misalignments became apparent in the case study, revealing that the assumed progression from classification to engagement does not hold in practice. To address this, it is essential to recognize that relationship quality and role division must be established before effective engagement strategies can be developed and implemented.

So, the second addition is that the relationship quality must be treated as a precondition of strategic engagement, not an outcome. After this, the role division must be determined. Based on this, targeted engagement strategies can then be effectively applied.

The result is an evidence-based collaboration framework, grounded in both theory and empirical findings. It offers a more realistic sequence and highlights where attention must be focused to support collaborative governance in regional mobility hub projects. In short, this new framework serves as a high-over strategy to obtain effective stakeholder collaboration and acquire project success in regional mobility hub projects.

7

Strategy Development

Having now established an evidence-based collaboration framework, the focus shifts from a general strategy to concrete, targeted recommendations that can guide stakeholders in practice. Doing so, this chapter proposes recommendations to enhance collaboration among stakeholders involved in the development and implementation of regional mobility hubs, thereby answering the **Main Research Question** of this thesis:

How can collaboration be improved in the development and implementation phases of regional mobility hubs?

This chapter represents the translation of the revised framework, together with the findings from the case study interviews and reference cases into practice. It answers the main research question by presenting concrete, actionable collaboration recommendations that are directly derived from both the framework analysis and the (reference) case study analyses. As such, it serves as the practical manifestation of the theoretical model.

First, context-sensitive strategies for the Brainport case study are presented, followed by generalizable guidelines for future regional mobility hub projects. Each part is divided into phase-independent recommendations, and the development and implementation phases. While there is overlap between the Brainport and generic recommendations, they are presented on their own for full clarity.

7.1. Case-specific strategies for improving collaboration in the Brainporthub project

The case-specific strategy map for the Brainporthubs focuses primarily on strengthening relationship quality and role clarity, acknowledging that the planning phase has already passed and shared value redesign is no longer feasible. The strategies are divided into phase-independent, development phase and implementation phase recommendations. A visual representation of the strategy map is given in Figure 7.1.

7.1.1. Phase-independent: From Divergence to Convergence

Core Problem:
Stakeholders hold misaligned views on the project's status, phase, and their own roles and responsibilities, while also showing limited awareness or consideration of each other's perspectives.

Strategic Recommendations:
Improve process clarity and alignment through independent facilitation and structured tracking, by:

Appoint a neutral process facilitator

- Guides the process independently of stakeholder interests.

- Ensures all actors have a shared understanding of the project's status, phase, and their roles and responsibilities.
- Acts as a central point for process clarity and continuity.

Ensure transparent documentation

- Records key milestones, decisions, and deliverables to avoid misunderstandings and shifting interpretations.
- Provides a clear reference point for all stakeholders throughout the process.

Utilize project management tools

- Tracks progress and responsibilities in a shared environment.
- Facilitates communication between stakeholders.
- Supports timely and informed decision-making.

7.1.2. Development Phase: From Power Imbalance to Shared Vision

Core Problem:
The current situation in the Brainport region is characterized by power concentration among provincial and central stakeholders, unclear role divisions, and a top-down visioning process. These factors limit buy-in, ownership and local commitment from key stakeholders, and stalls progress in shaping a shared foundation for the hubs.

Strategic Recommendations:
Start Small: Select a Motivated Pilot Location

- Currently, three hub locations are identified as high-potential opportunities. However, one municipality has formally opposed the plans, and another location requires reconsideration due to regional developments.
- Choose one location where the preconditions are already in place and the municipality is motivated to participate. It does not have to be the location with the most impactful traffic effects. The aim is to set an example, demonstrate viability, and build confidence across the network.

Strengthen Relationship Quality Before Governance Decisions

- Currently, the hub development process is progressing without a solid collaborative foundation. It is unclear who leads or owns the process.
- Trust-building and early dialogue must precede formal decision-making. This includes informal cross-level meetings and workshops centered on shared objectives.
- Create low-threshold opportunities for engagement before defining roles or mandates.

Co-Create a Shared Vision

- Involve the key stakeholders in co-creation sessions to define the hub's purpose and design, ensuring co-ownership rather than passive consultation.
- Co-creation will encourage shared benefit of a hub.
- Ensure clear expectations of the hub.
- Avoid outsourcing the vision to consultants; future operators should feel responsible for and invested in the outcome. External facilitation can support, but not replace, ownership.

Clarify Roles and Reduce Governance Uncertainty

- Clearly define and communicate the responsibilities, mandates, and expected contributions of each stakeholder. Avoid role ambiguity and document (role) decisions, potentially by facilitator.
- Creating a structure of shared ownership requires acknowledging different forms of contribution. Strategic decisions and funding structures may rest with regional actors, but planning, integration, and execution must be done in co-creation with the hub municipality. This dual dynamic ensures both regional efficiency and local legitimacy.

7.1.3. Implementation Phase: From Concept to Commitment

Core Problem:

There is a lack of concrete translation from strategic vision to operational reality. Responsibilities related to ownership and daily management remain unclear, and engagement processes are not re-evaluated during implementation milestones.

Strategic Recommendations:

Maintain Relationship Quality Throughout Execution

- Continue investing in trust and transparency as the project moves into execution.
- Establish feedback loops at key project milestones and maintain open communication between stakeholders.

Secure Ownership Through Iterative Role Negotiation

- Reassess and confirm stakeholder responsibilities before each major implementation step.
- Provide municipalities with autonomy over design decisions and contextual integration to strengthen local commitment.

7.2. Generalizable Recommendations for Future Hub Projects in the Netherlands

The generalizable strategy map offers a more comprehensive approach for new projects, including the design of shared benefits through spatial policy alignment (e.g., housing) and the early institutionalization of trust and reciprocity mechanisms, visually shown in Figure 7.2.

7.2.1. Phase-independent: Laying the Groundwork for Effective Collaboration

Core Problem:

The core phase-independent problem is misalignment on perspectives, project status, phase, and roles and responsibilities.

Strategic Recommendations:

Establish a shared foundation early through structured process management and role clarity.

Appoint a neutral facilitator from the start

- Ensure process guidance is not biased by stakeholder interests.
- Support transparent planning and dialogue from the outset.

Align on project goals, phases, and expectations

- Organize early workshops to clarify what the goal of the project is and what lies ahead.
- Make process phases and responsibilities visible to all parties.

Document decisions and responsibilities clearly

- Track and share key decisions, milestones, and stakeholder roles.
- Use shared tools (dashboards, action trackers) to ensure continuity despite turnover or long timelines.

7.2.2. Development Phase: Strategically Align on Interest

Core Problem:

The main pitfall of the development phase is the lack of strategic alignment and unclear role division.

Strategic Recommendtions:

Strategically Link Hub Locations to Housing and Regional Development

- Integrate hubs with housing development agendas to attract national involvement from IenW.
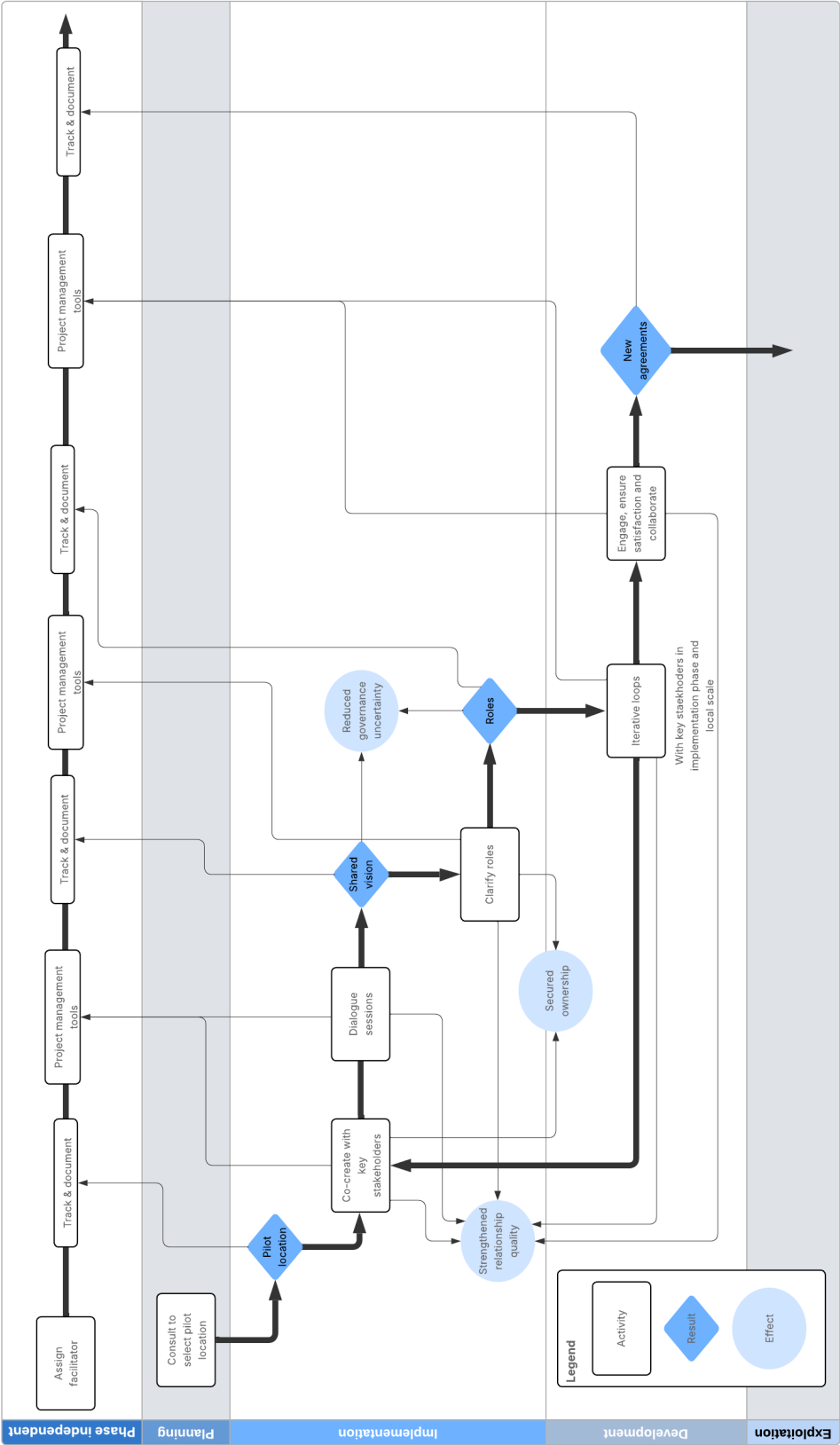
Figure 7.1: Visual Case study Recommendations

- This link increases both urgency and the chance of extra national funding, while making the hub relevant for local spatial policy.
- Increased influence from IenW leads to more standardization of hubs, inclusion in navigational systems, economy-of-scale opportunities and increased use.

Build a Shared Vision Through Co-Creation

- Treat visioning as a collaborative act. Involve municipalities, employers, transport operators, and even residents to explore expectations, concerns, and goals.
- Clarify what a hub is, and what it is not, to reduce resistance (e.g., fears of a giant parking structure).
- Strengthens commitment and generates buy-in.
- Encourages design with reciprocity.

7.2.3. Implementation Phase: Executing With Adaptability

Core Problem:
After strategic plans are formed, local execution often falters as key stakeholders withdraw, lacking a sense of urgency, ownership, or interest in the further implementation plans of the hub.

Strategic Recommendations:
Institutionalize Iterative Collaboration Loops

- Build in structured reflection and re-engagement moments during implementation.
- Use adaptive tools (e.g., shared dashboards or feedback instruments) to ensure continued alignment.

Ensure Local Autonomy in Physical Design

- Allow municipalities to shape the hub's core layout, local services, and public space integration.
- Meanwhile, regional actors can coordinate flanking policies, regional functionalities, and financing strategies.

Include Stakeholder Satisfaction as a Success Metric

- Go beyond infrastructure KPIs. Measure the quality of collaboration, perceived fairness, and stakeholder satisfaction as indicators of success.

7.3. Conclusion

The recommendations were split into Brainport case study recommendations and general regional hub recommendations. This is because the case study is already in development and involved in the aforementioned complexities. This is why they need other recommendations then an arbitrary region starting a regional mobility hub project.

The Brainport case highlights the importance of an independent facilitator, guiding and tracking processes. Advising to start with a pilot location, co-creation and dialogue sessions lead to a shared vision, guided and documented by the facilitator. These actions strengthen relationship quality and reduce governance uncertainty. This is further reduced by the clarification of roles, also securing ownership and buy-in. By looping these steps with the key stakeholders in the implementation phase, engagement and satisfaction is ensured, leading to more effective collaboration and a smooth transition to the exploitation phase.

The general recommendations roughly walk to the same steps, only a blanco case still has the opportunity to link to housing or regional development. Following, the shared vision and roles are formed under guidance of the facilitator, and an iterative loop is present for the implementation phase.

In summary, development-phase strategies emphasize relationship-building, shared vision formation, and role clarification as foundations for collaborative hub development.
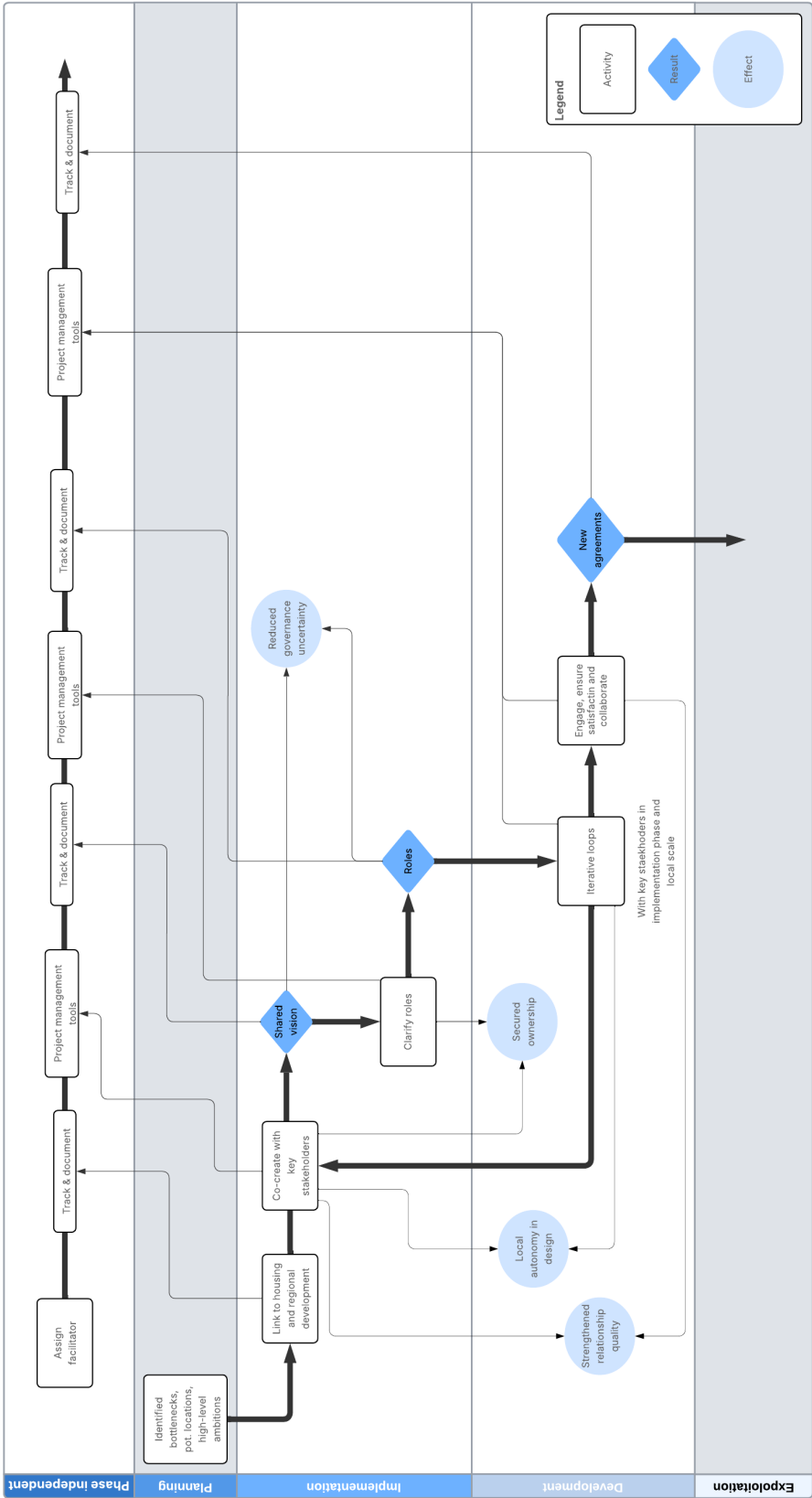
Figure 7.2: Visual General Recommendations

Implementation-phase strategies focus on iterative coordination, local design autonomy, and trust maintenance throughout execution.

Together, these recommendations answer the **main research question:**

What improvement opportunities can be identified to enhance collaboration in the development and implementation phases of regional mobility hubs?

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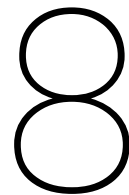
Discussion

This thesis began from the observation that regional mobility hubs could play a role in the broader mobility transition, which is increasingly needed due to challenges such as growing congestion, urbanization, and the persistent climate impact of passenger cars. While regional hubs promise to reduce car dependency and improve accessibility, their development and implementation phases often stagnate due to lacking stakeholder alignment and ineffective collaboration. To address this, the central aim of this study was to explore how collaboration between stakeholders in these crucial phases can be improved. In this chapter, the findings of the research are critically assessed. It reflects on their meaning, scientific and practical relevance, and outlines possible directions for further research and application.

8.1. Reflection on Key Findings

One of the main contributions of this thesis is the development of a collaboration framework, first derived from theory and then refined through empirical validation in the Brainporthubs case study. The final, evidence-based framework provides insight into how collaborative processes in regional mobility hub projects can be strengthened. In doing so, the framework does not simply structure stakeholder interaction, but redefines the foundations upon which engagement becomes possible.

A key insight is that relational quality should not be treated as a consequence of effective engagement, but as a precondition for it. While literature often presents stakeholder classification as the start of engagement, the case study shows that in fragmented, multi-actor governance settings, this assumption breaks down. Trust, mutual understanding, and clear expectations are essential before any meaningful collaboration can occur. In the absence of these foundations, efforts to engage stakeholders, no matter how well designed, will likely fail. This reframing shifts the focus from 'how to engage' to 'what needs to be in place before engagement is even possible.'

The second insight expands on this by showing that reciprocity must be actively designed into the hub project. In the Brainporthub case, local stakeholders were asked to implement solutions for regionally defined problems, often without experiencing corresponding benefits. This disconnect led to disengagement, resistance, and stagnation. The research highlights that collaboration improves significantly when hubs are connected to broader societal goals that create shared value, such as housing development, sustainability ambitions, or local livability improvements. In that context, the hub is no longer just a technical intervention, but a method for mutual gain. Designing this reciprocity from the outset should not be an option but a requirement.

Lastly, the case study exposes a gap between collaborative ambition and the governance structures needed to support it. While the project was formally organized around a bottom-up consultation model, many stakeholders experienced the process as opaque and top-down. This mismatch undermines trust and reinforces the idea that decisions are made by a small core of powerful actors. For collaboration to be effective, governance must be transparent, role divisions must be explicit, and involvement must be timely and continuous. Structural complexity should not be an excuse for relational neglect.

Together, these insights form the empirical foundation for the revised collaboration framework. They reveal that improving stakeholder collaboration in regional mobility hubs is not simply a matter of better coordination, but of redesigning the conditions under which collaboration becomes meaningful. In addition to the framework, the strategies developed in this research go one step further. They provide concrete, phase-specific recommendations for how to foster shared vision and ensure reciprocity throughout the development and implementation of regional mobility hubs. These strategies are based on theory, anchored in practice and informed by stakeholders. They translate the abstract requirements of collaboration into practical, context-aware actions that address the specific misalignments observed in the case study.

8.2. Contribution to Scientific Literature

This research contributes to the scientific literature on collaborative governance in mobility hub projects in several ways.

First, it addresses a gap in the academic discourse: stakeholder collaboration in regional mobility hubs has so far received little attention. This is surprising, given that regional hubs differ significantly from city-level mobility hubs (for hub-classification overview, see Table B.1). Whereas neighborhood hubs are typically initiated, executed, and managed by the same municipality that directly benefits from them, regional mobility hubs are characterized by a spatial mismatch between the location of the hub and the area of effect. This disconnect creates friction between regional planning and local implementation, and exposes conflicting stakeholder interests.

To begin unpacking this complexity, the research first identified four general phases in the development of a regional mobility hub. Through this analytical breakdown, the development and implementation phases were found to be the most critical, as they mark the transition from regional vision to local execution. These two phases became the focus of the study, given that it is precisely at this point, where strategic planning must translate into concrete action, that collaboration tends to falter and stakeholder alignment becomes essential.

To address this challenge, the collaboration framework was developed based on existing literature on stakeholder collaboration in mobility projects. This framework was then applied to a case study of the Brainport Mobility Hubs, which served to critically assess its validity in practice. By confronting theory with empirical findings, the framework was refined into an evidence-based version, offering more grounded guidance for future projects.

By analyzing this complexity through a collaboration lens, this research not only reveals why collaboration often breaks down in the critical middle phases of hub development and implementation, but also what is needed to overcome these obstacles. The two-phase lens adopted in this thesis provides a clearer understanding of how shifting roles and responsibilities between strategic (regional) actors and operational (local) actors can create friction if not properly anticipated.

In short, this study sheds light on the "softer" side of regional mobility infrastructure, without which hard infrastructure is unlikely to materialize. Given that mobility systems inherently rely on networked, interdependent actors, collaborative governance and focus on relational quality is not an optional layer, but a core condition for success. This research contributes new theoretical tools and practical insights for making that collaboration work.

8.3. Limitations

While this research offers valuable insights into stakeholder collaboration for regional mobility hubs, several limitations must be acknowledged.

8.3.1. Interview Method

First, the qualitative nature of the research, primarily based on semi-structured interviews, makes the findings sensitive to interpretation. Although triangulation with policy documents and governance structures was used to strengthen validity, the manual thematic coding process, revealing the barriers and opportunities, remains susceptible to researcher bias. Stakeholder narratives are inherently contextual, and what is interpreted as a collaboration barrier or opportunity may be shaped by the interview

setting, phrasing, or even institutional position of the respondent. More extensive methods such as follow-up interviews, workshops, or surveys could have provided further validation and increased the generalizability of the findings.

In addition, while the interviews were conducted until saturation of information was reached, which is indicated in Section 5.1.2, the distribution of respondents across stakeholder groups could be further optimized. One 'hub municipality' was included, which provided a valuable perspective into the local implementation dynamics. However, municipalities where no hub was planned were not interviewed due to time constraints. This could have offered a more balanced view on regional concerns and perspectives against the mobility hubs.

8.3.2. Practical Impact and Scope
While the research offers a clear analytical structure and actionable insights, its practical impact may be more implicit.

The key finding of the importance of reciprocity emerged clearly from the case study. In particular, aligning mobility hub development with shared local priorities, such as housing or livability goals, was repeatedly mentioned as a potential enabler for collaboration. However, these considerations typically belong to the earlier planning phase, which falls outside the scope of this thesis. As a result, while the concept of reciprocity was highlighted and its strategic relevance discussed, the thesis falls short in providing operational recommendations on how to implement this in practice.

Moreover, although the thesis concludes with concrete strategies for enhancing collaboration, the adoption of such strategies depends on political will, available resources, and perceived benefits by local stakeholders. Municipalities often prioritize visible outcomes and funding security over abstract collaborative processes. In that sense, the practical impact of this research relies on how well its strategic insights are translated into shared, tangible gains, something this study identifies, but does not fully develop.

8.4. Recommendations
This section presents recommendations for future research and practice.

8.4.1. Future Research
Considering the outcomes, the limitations and the scope of the research, several recommendations can be made for future work.

First, while this thesis emphasizes the importance of relational quality and introduces reciprocity as a missing but vital component, it remains at a strategic level. Future research could explore this concept in more depth by investigating concrete ways to operationalize reciprocity, particularly in how hubs might be tied to broader governmental agendas such as housing development. This would help to understand not only how collaboration improves, but how the perceived value of the hub increases when it contributes to multiple policy goals.

To do this, future work should broaden the scope beyond the current two phases. A longitudinal study that follows all four phases of a hub project, from planning to operation, would allow for insights into how collaboration needs and stakeholder roles evolve over time, and when specific interventions are most effective. Especially the final phase, in which the hub becomes operational, deserves more attention. Challenges around long-term commitment, usage, and non-profitable business models may emerge there, requiring ongoing coordination and trust.

Beyond temporal scope, future research should also consider broader governance levels. While this thesis focuses on regional collaboration, the role of national actors, especially the Ministry of Infrastructure and Water Management, could be crucial. Exploring how national-level involvement can support standardization, funding, and integration with national goals (e.g., housing and climate targets) would provide a more systemic view of how regional hubs gain traction.

Lastly, although the proposed framework and strategies are grounded in both theory and practice, they have not yet been directly validated in real-world settings. Future research could support this by organizing co-creation workshops with stakeholders, where the framework is used as a process tool in

pilot projects. This would allow the approach to be tested, refined, and further grounded in practitioner experience.

8.4.2. Practice

For municipalities, public transport regions, and regional authorities working on mobility transitions, this research provides several actionable takeaways.

The first is to recognize that regional mobility hubs require more than just technical planning, they demand deliberate and early collaboration. Particularly in projects where the hub's benefits and burdens are unevenly distributed, trust-building and reciprocity require active effort and intentional design. This means involving hub municipalities not only after a regional vision has been developed, but during its creation, to ensure local legitimacy and commitment.

Relationship quality should not be seen as a soft or optional component, it is a precondition for project progress. Time invested early in the process, through informal dialogue, co-creation sessions, and alignment workshops, reduces delays later. This applies especially to the development phase, where unclear mandates and top-down messaging can cause stakeholders to disengage.

Next, ensure the hub is embedded in broader regional development agendas. A standalone hub risks becoming little more than a limited-capacity Park and Ride, ultimately marginal in addressing urban congestion or accessibility inequality. Its transformative potential only materializes when the hub is aligned with shared regional goals and supported by multi-level governance. Integrating mobility hubs into spatial development strategies, such as housing or livability agendas, creates shared value and attracts broader institutional support. These links increase the chances of attracting national funding, and more importantly, give host municipalities a tangible reason to support and enable the hub.

Finally, treat collaboration as an iterative process. As the project moves from development into implementation, stakeholder roles evolve. Use the framework's logic to re-evaluate the stakeholder landscape, reaffirm shared goals, and re-align on roles and expectations. Ownership is not a one-time decision, but something that must be maintained and renegotiated throughout.

By following these principles, early trust-building, embedded reciprocity, integration with local agendas, and continuous collaboration, practitioners can increase the chances of successful regional hub implementation, even in complex multi-actor environments.

9

Conclusion

Mobility is undergoing a major transition. In the face of climate targets, urbanisation, spatial scarcity, and regional inequality, new solutions are needed to ensure both sustainability and accessibility. Regional mobility hubs offer a promising response, as they aim to reduce car dependency, relieve pressure on cities, and improve rural connectivity. However, their delivery faces a structural challenge: the goals are regional, but the implementation is local. This misalignment creates friction—between ambition and execution, between strategic vision and local support.

As outlined in the introduction, regional mobility hubs operate in a multi-actor context where collaboration is not just helpful, but essential. Still, practice shows that stakeholder collaboration is often fragmented, formalised too late, or reduced to procedural consultation. The critical handoff, from development to implementation, is where this misalignment becomes most visible, and where many projects get delayed or derailed.

This thesis set out to understand and address this problem. By combining theory and empirical evidence from the Brainporthubs case study, it developed a refined, practical framework and concrete strategies for regional hub projects, to improve collaboration in precisely these two phases; development and implementation.

9.1. Addressing the Research Questions
To answer the main research question, four sub-questions were formulated and addressed sequentially.

1. What defines effective stakeholder collaboration in mobility projects, according to the literature?
Key insights from the literature underline the importance of early stakeholder involvement as a crucial success factor. Its benefits include improved alignment of objectives, conflict prevention, enhanced long-term trust, better decision-making, increased transparency, and broader stakeholder support. In short, early and effective stakeholder engagement is fundamental. The question of *how* to involve the right stakeholders in the right way is addressed through classification methods, which evaluate stakeholders based on their power, interest, and connectivity within the broader stakeholder network.

In addition, the literature emphasizes the need for dynamism and flexibility throughout the collaboration process. Effective collaboration is not static; it requires continuous adjustment and responsiveness to changing conditions.

The resulting conceptual framework integrates these findings, combining an iterative approach to stakeholder analysis, followed by a focus on relational outcomes and collaborative pathways. It moves from mapping and structuring the stakeholder landscape, while remaining adaptive, to fostering relationship quality. This relational approach is essential to achieving effective collaboration, which is in turn critical to project success.

2. Which stakeholders are involved in the development and implementation of regional mobility hubs, and how do their roles differ across phases?

The core stakeholders across both phases are the Province of Noord-Brabant, the Municipality of Eindhoven, the hub municipality, and MRE. In the development phase, strategic power lies with the Province and MRE, who coordinate regional ambitions. In the implementation phase, power shifts to more operational actors: the hub municipality, via its council, gains authority, and RWS and civil servants become more influential due to their role in execution.

Beyond individual actors, formal consultation groups strongly shape the process. The ABG Brainporthubs, in particular, plays a key role due to its diverse composition and access to regional knowledge. Stakeholder network analysis shows that actors like the Province and Municipality of Eindhoven are structurally influential across both phases, due to their presence in multiple governance bodies.

3. What are the main barriers and opportunities for stakeholder collaboration during the development and implementation phases in the case study?

Three key barriers emerged:

- Misalignment between problem ownership and solution implementation;
- Governance opacity and power concentration
- Lack of a shared vision

These barriers led to mistrust, delayed decisions, and lack of commitment. At the same time, the study identified opportunities: building trust through early and equal engagement; framing hubs as multifunctional solutions linked to housing or livability; and creating stronger connections to national policy and funding structures.

4. How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?

By applying the conceptual framework to the case study, refinements were made based on empirical findings. Three critical adjustments were made:

1. **Context analysis** was added as a starting point to map the current governance setting;
2. **Relationship quality** was reframed as a precondition, not an outcome;
3. **Role division** was added as a necessary bridge before strategic engagement can be meaningful.

The updated framework offers a more realistic strategy for enhancing collaboration: one that still maintains the dynamic and flexibility for the phased approach, but also recognizes that meaningful engagement only becomes possible once the right foundations; relationships, roles, and mutual understanding, are in place. This new framework, therefore, forms the core strategy informed by the stakeholder dynamics in the case study and offers practical guidance on when and how to invest in collaboration to support project success. The revised steps are visible in Figures 9.1, 9.2.
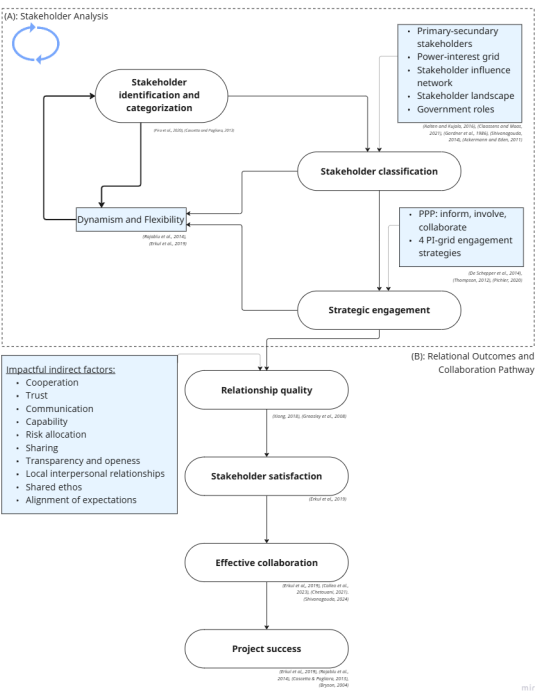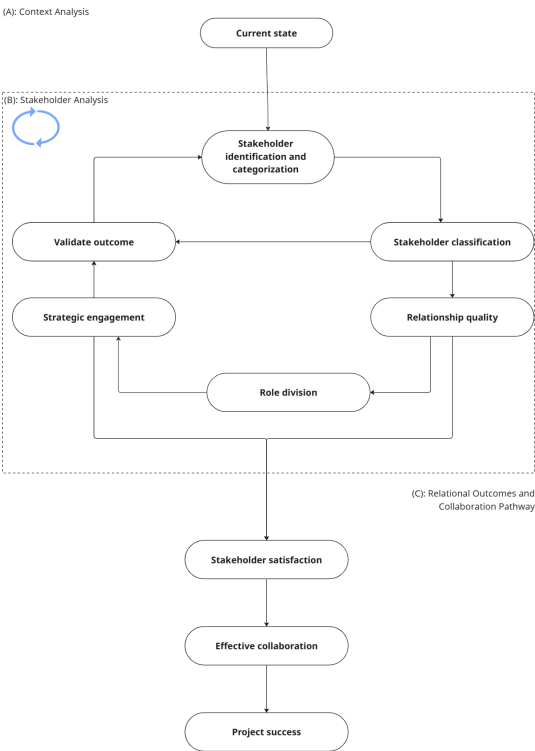
Figure 9.1: Conceptual Collaboration Framework

Figure 9.2: Revised Evidence-Based Framework

9.2. Main Research Question

After answering these sub-questions, the main research question is addressed by synthesizing the findings and translating them into a set of generalizable strategies:

How can collaboration be improved in the development and implementation phases of regional mobility hubs?

Collaboration can be improved by redesigning it from a procedural step into a strategic and relational process. The revised framework shows that effective collaboration does not begin with stakeholder classification or engagement strategies, but with understanding the institutional context, building trust, and agreeing on roles. Only then can engagement be meaningful and shared goals achievable.

In addition, collaboration is more likely to succeed when the hub itself is not framed as a top-down regional solution, but as a locally relevant, shared opportunity. This requires designing reciprocity into the project from the outset: aligning the hub with broader societal goals such as housing, sustainability, and spatial quality. By doing so, projects become more meaningful for all parties, especially for municipalities that would otherwise bear the costs without seeing the benefits.

To ensure that these insights are actionable, this thesis translated the revised framework and the findings from both the case study and the reference cases into a set of concrete strategies. These are captured in two tailored collaboration maps: one focused on the specific needs of the Brainporthubs case, and one offering general guidance for other regional hub initiatives (Figures 9.3, 9.4). Together, these strategies form a practical link between theory and implementation, helping project teams to strengthen trust, design for reciprocity, and build shared ownership into the collaborative process.
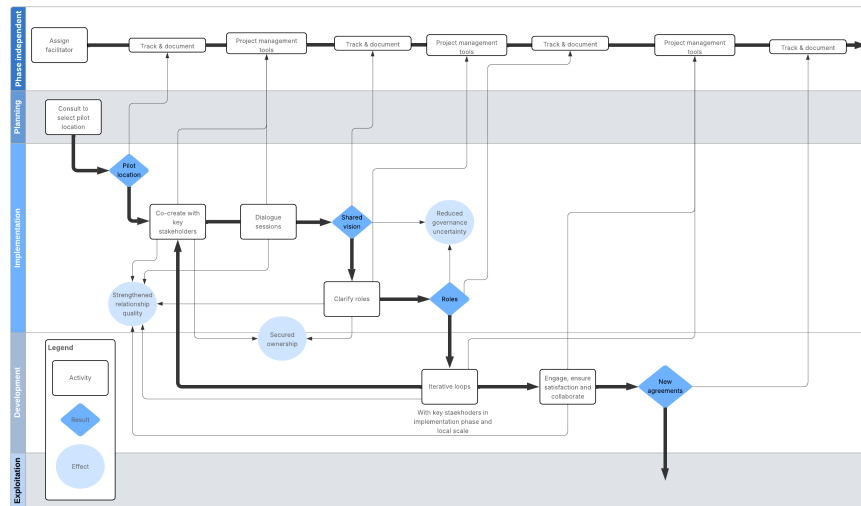
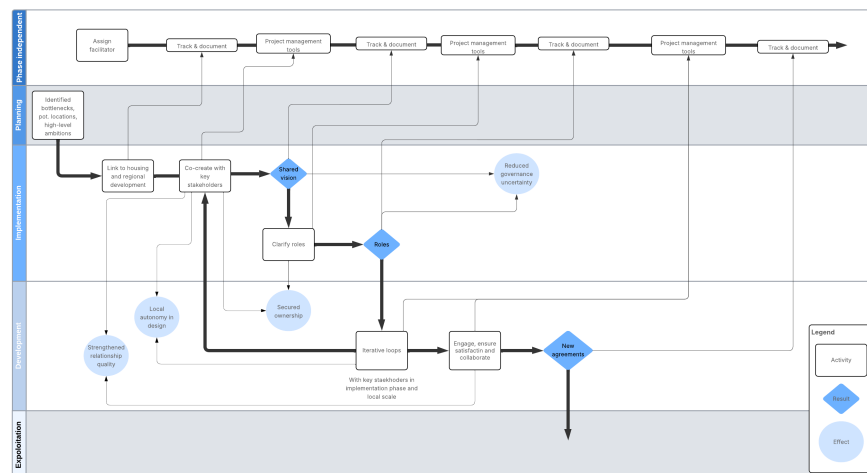**Figure 9.3:** Case Study Recommendations

Figure 9.4: General Recommendations

9.3. Closing Reflection

The goal of this research was not just to improve collaboration for its own sake, but to support the successful realization of regional mobility hubs, one of many tools to guide the transition to a more sustainable, inclusive and regionally connected mobility system. Regional mobilty hubs are designed to link places, people, and modes of transport across jurisdictions. As such, their delivery inherently depends on the ability of actors to work together across institutional, spatial, and political boundaries.

Yet collaboration often breaks down at the most critical moments: when strategic ambitions must be translated into local action. This is where development shifts to implementation, and where regional coordination meets local decision-making. The result is friction, between ambitions and mandates, between benefits and burdens, between planning and execution.

This research set out to make that collaborative handoff more effective. By analyzing how stakeholder collaboration unfolds in these two phases, it became clear that existing theories treat engagement as a procedural step, rather than as a relational process. The revised framework, grounded in both theory and empirical validation, repositions collaboration as a strategic design element. Trust, reciprocity,

and shared goals must be embedded at the outset, not as soft factors, but as structural conditions for progress.

Ultimately, improving collaboration means enabling regional mobility hubs to do what they are meant to do: connect. Not just in a spatial or technical sense, but as a shared endeavor that aligns actors behind a common purpose. If hubs are to fulfill their promise of easing congestion, reducing emissions, and improving accessibility for all, then collaboration must no longer be an afterthought, but the foundation.

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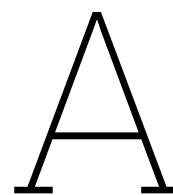
Scientific Report

Improving Collaboration in the Development and Implementation Phases of Regional Mobility Hubs

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Abstract—**Regional mobility hubs offer a promising solution to address growing mobility demands and sustainability challenges across urban and rural areas. While their potential is widely recognized, regional hubs often face the challenge of solving urban problems, such as congestion, through interventions located outside the city, leading to a mismatch between problem and solution space. This misalignment complicates local buy-in and contributes to fragmented stakeholder collaboration across multiple governance levels. This research investigates how collaboration can be improved during the development and implementation phases of regional mobility hubs. A conceptual collaboration framework was developed from literature and applied to a case study of the Brainporthubs in the Eindhoven region. The findings reveal that relationship quality is a critical prerequisite for effective engagement, eventually leading to successful collaboration. Additionally, shared value creation, especially through integrated policy agendas, emerges as a key driver for stakeholder commitment. Based on these insights, the original framework was refined and translated into actionable strategies for both existing and future hub projects. This study contributes an evidence-based model and concrete strategies to enhance collaborative governance in complex transport initiatives.**

Index Terms—**Regional mobility hubs, stakeholder collaboration, multi-level governance, stakeholder collaboration framework, implementation barriers, shared value creation, transport planning.**

I. INTRODUCTION

A. Context

With the adoption of the Paris Agreement and the European Green Deal, reducing greenhouse gas (GHG) emissions has become a global priority [1], [2]. While emissions are declining across most major sectors in the European Union (EU), the transportation sector remains the least improved, continuing to be a significant contributor to overall emissions [3]. In the Netherlands too, domestic transport accounts for a substantial share of the total CO_2 emissions, with passenger cars alone responsible for nearly half of these emissions [4].

Simultaneously, the Dutch population continues to grow, and this mobility demand is expected to keep rising, particularly in urban areas. However, rural regions are experiencing population decline [5]. This shift presents distinct mobility challenges for both urban and rural areas [6]. Cities must balance limited space between housing, green areas, and transport infrastructure [7], [8], [9], while rural areas must maintain accessibility even though the demand for public transport is declining. [10].

This calls for mobility solutions that ensure equal accessibility in both urban and rural areas while addressing the transport sector's significant contribution to overall emissions in the Netherlands [5].
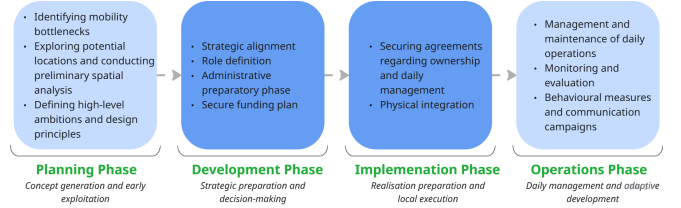

Fig. 1. Phases Delivery Regional Mobility Hub

One promising approach to tackling these challenges is the use of regional mobility hubs. These hubs integrate public transport, shared mobility, and active travel options at key locations to promote multimodal travel and reduce car dependency [11], [12]. Unlike local mobility hubs, regional hubs focus on improving accessibility across both urban centers and their surrounding rural areas [9]. By offering seamless connections and alternatives to car use, they help reduce emissions, ease urban congestion, and make mobility more efficient and sustainable [10], [13], [14]. As such, regional mobility hubs could contribute to building a more accessible, low-emission transport system.

B. Problem Definition

Although regional mobility hubs offer promising potential to address mobility and sustainability challenges, their successful delivery faces a key obstacle: the inherent tension between regional ambition and local execution. Regional mobility goals are often framed at a higher strategic level, yet must ultimately be implemented by individual municipalities, each with its own political priorities, spatial constraints, and institutional frameworks. This misalignment often complicates collaboration, delays decisions, or even stalls projects altogether [15], [16], [17], [18].

To understand where this friction emerges, the delivery of regional mobility hubs can be divided into four conceptual phases: planning, development, implementation, and operation (Figure 1). Planning is typically well-supported by visions and studies at the regional level, while operation is often managed by external parties and works operates through market forces [19], [20], [15]. However, the critical bottleneck lies in the transition from development to implementation, the point where strategic regional plans must be translated into concrete, local action, under alignment of all involved stakeholders. It is precisely in this handoff that political, institutional, and spatial tensions arise, and increased collaboration is crucial, but complex [15], [16], [17], [18].

C. State-of-the-Art

To better understand why collaboration in the development and implementation of regional mobility hubs is so challenging, this section reviews the current state of the art. This synthesizes existing academic knowledge on mobility hubs, governance structures, and stakeholder collaboration, in order to identify what is already known and where important gaps remain.

The systematic literature review was conducted using Google Scholar, the university repository, and the snowballing technique, with selected peer-reviewed studies analyzed for relevance to the research themes and identification of the knowledge gap. The different keywords and truncations used are summarized in Table I. First, research on the definitions, objectives, and typologies of mobility hubs is reviewed, followed by an exploration of existing literature on their governance. Subsequently, the extent to which stakeholder collaboration in mobility hub projects has been studied is assessed. This leads to the identification of a research gap, which this study aims to address.

Concept groups	Mobility hubs; Implementation challenges; Governance structures; Stakeholder collaboration
Keywords	*Mobility hubs:* definition; typology; multimodal transport; shared mobility; transport integration. *Governance structures:* institutional frameworks; public-private partnerships; policy alignment. *Stakeholder collaboration:* multi-actor coordination; decision-making processes; power dynamics; engagement strategies. *Implementation challenges:* barriers; regulatory complexity; funding mechanisms; planning strategies.
Truncation (search logic)	(Mobility hubs) OR (Mobility hubs AND Typology) OR (Mobility hubs AND Implementation) OR (Mobility hubs AND Governance structures) OR (Mobility hubs AND Stakeholder collaboration) OR (Mobility hubs AND Governance structures AND Stakeholder collaboration) OR (Governance structures AND Stakeholder collaboration)

TABLE I
CONCEPTUAL AND METHODOLOGICAL FRAMEWORK FOR THE LITERATURE REVIEW

What are Mobility Hubs

The definition of mobility hubs varies across the literature. However, a core characteristic that consistently emerges is that a mobility hub is always a physical, recognizable location designed to connect multiple transport modes and facilitate seamless multimodal travel. In essence, it serves as a transfer point that enables integrated mobility chains [6], [21], [7]. Mobility hubs aim to achieve a range of policy and planning objectives beyond modal integration. A central goal is the reduction of private car use and ownership, contributing to lower emissions, reduced congestion, and more sustainable transport behavior [6], [7], [13].

Additional objectives include:
- Stimulating multimodal travel, particularly through improved first- and last-mile connectivity [22].
- Optimizing transport networks by strategically integrating hubs within public transport systems [6].
- Enhancing accessibility, especially for users without private vehicles [21].
- Supporting urban development by reducing parking demand and repurposing public space [23].
- Facilitating zero-emission logistics, where applicable [6].

Typologies of mobility hubs vary significantly depending on the lens through which they are analyzed—scale, location, function, or modal integration [24], [9], [7]. One frequently used approach is the scale-function typology, distinguishing between small-scale neighborhood or community hubs, mid-sized urban and district hubs, and large-scale regional or peripheral hubs [24], [9], [25]. These categories reflect increasing complexity: as hubs grow in scale and catchment area, they integrate more transport modes and serve more diverse user groups.

From a modal integration perspective, hubs are classified based on the presence and combination of shared mobility, public transport, and active travel infrastructure [12]. Some frameworks additionally account for urban context (e.g., city center vs. business park) or operational role in the transport network [6], [26], [21]. [21] emphasizes that multiple classification logics coexist in the literature—based on location, services, governance, and function—yet are often presented in isolation.

However, while these typologies offer valuable insights into the spatial and functional diversity of hubs, they generally underrepresent the governance and stakeholder dimensions. Few studies explicitly address how different types of hubs entail varying levels of institutional coordination, actor complexity, or governance challenges. This is a significant gap, as the degree of stakeholder interdependence directly affects both the development and implementation phases.

Governance

Existing research consistently underscores the importance of clear governance structures for the successful development and implementation of mobility hubs [22]. However, most studies do not distinguish between the governance needs of the development phase versus the implementation and operational phase, even though each stage involves distinct actors, challenges, and coordination mechanisms.

One of the few studies that explicitly address the delivery process of mobility hubs identifies four key domains in the implementation phase: (1) planning, (2) services and operational elements, (3) spatial development, and (4) funding [11]. Effective implementation in this context is shown to depend heavily on public-private partnerships, as hubs often combine public transport with privately operated services.

The complexity of mobility hubs, and the resulting need for multi-actor and multi-level governance, is further emphasized in recent work [27]. Fragmented institutional responsibilities across different governance levels are found to impede coordinated planning. By distinguishing between organizational dimensions (actors, resources, instruments) and ideational dimensions (policy narratives, discursive strategies), this study shows how ambiguity in roles and institutional fragmentation can hamper effective governance.

National-level analyses also highlight that practical experience with mobility hub development is still relatively limited [28]. These findings stress the importance of aligning hub development with broader policy instruments, planning frameworks, and mobility strategies.

Although the literature frequently points to governance as a key factor, most contributions remain focused on abstract role descriptions or general coordination principles. There is a notable lack of detailed insight into the concrete governance mechanisms and collaboration strategies that shape stakeholder interaction across the development and implementation phases. Studies that systematically investigate decision-making structures, actor roles, and governance challenges throughout the life cycle of mobility hubs remain scarce.

Stakeholder Collaboration

Although stakeholder collaboration is widely recognized as essential in sustainable transport planning, few studies address it in the specific context of mobility hub governance. In other contexts, such as energy policy, this has been touched on through the development of structured approaches to engagement and coordination [29]. This research introduces the IFSIUER framework, outlining a structured four-step process—identification, understanding, engagement, and role management—originally developed for energy policy but applicable to transport projects.

A comparable method is used in urban logistics planning, where a power-interest analysis is applied to tailor engagement strategies to different stakeholder groups [30]. However, such approaches have not yet been directly applied to the governance of mobility hubs.

A governance model that categorizes public roles and emphasizes the importance of adaptive role reassessment during complex projects has also been proposed [31]. Yet this model remains abstract regarding practical engagement between public and private stakeholders in hub development.

Additionally, a practical framework for multi-stakeholder partnerships (MSPs) has been developed, combining iterative collaboration phases with actionable tools [32]. While this is useful for early-stage engagement, it does not sufficiently address phase-specific governance challenges in infrastructure projects like mobility hubs.

In summary, while valuable frameworks exist for stakeholder engagement in adjacent domains, there is a clear gap in their application to mobility hub development and implementation, particularly regarding phase-specific roles, coordination mechanisms, and decision-making structures. This research addresses that gap by examining how collaboration strategies can be adapted to the governance needs of mobility hubs across both phases.

Research Gap

While mobility hubs have been studied extensively in terms of definitions, typologies, and transport functions, research on governance and stakeholder collaboration in combination with regional mobility hubs remains limited, particularly across both the development and implementation phases. Existing studies acknowledge the need for public-private cooperation but lack concrete insights into how stakeholder roles evolve, how coordination mechanisms should adapt, and how governance challenges differ between phases within the context of mobility hubs. Moreover, while broader governance frameworks exist, few have been applied or tailored to the specific complexities of mobility hub projects. This research addresses that gap by examining phase-specific governance structures and stakeholder collaboration strategies to improve implementation feasibility and long-term success.

D. Research Objectives

In response to the problem definition and the identified gap in the literature, this study aims to explore how collaboration can be improved in the development and implementation of regional mobility hubs. Regional hubs are chosen because they inherently involve high stakeholder complexity, combining multiple jurisdictions and governance layers, and often experience stagnation due to coordination challenges.

By focusing on both phases and the transition between them, this research contributes to a better understanding of how collaboration mechanisms can enhance the feasibility and long-term success of regional mobility hubs.

The main research question for this research is as follows:

How can collaboration be improved in the development and implementation phases of regional mobility hubs?

To answer this question, the following sub-questions are addressed:
1) What defines effective stakeholder collaboration in mobility projects, according to the literature?
2) Which stakeholders are involved in the development and implementation of regional mobility hubs, and how do their roles differ across phases?
3) What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?
4) How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?

II. Methodology

To answer the research questions, a qualitative research design is used, combining a case study approach with a targeted literature study. This combination allows for both empirical exploration and theoretical grounding of stakeholder collaboration in the context of regional mobility hubs. The methodology focuses on both the development and implementation phases of such hubs. In the following sections, the case study and literature study components are explained in more detail.

A. Case Study

A single case study in the Brainport Eindhoven region was conducted, given its active regional mobility hub development and stakeholder diversity. Data was collected using:

- **Semi-structured interviews** with public and private stakeholders (e.g., municipalities, planners, mobility providers).
- **Policy document analysis**, including strategic plans, project reports, and governance frameworks.
- **Field observations** in meetings and planning sessions.

This triangulation enhances the validity and contextual depth of findings.

Semi-structured interviews were conducted to explore key themes such as governance structures, collaboration challenges, and implementation strategies. This format provided flexibility while ensuring consistency across participants. Interviews continued until thematic saturation was reached.

An inductive thematic analysis was used to identify recurring patterns in stakeholder responses, without relying on a predefined theoretical framework [33]. The resulting themes formed the empirical basis for answering sub-question 3.

In addition, expert interviews were held to gain deeper insights into specific governance topics. These followed a more structured format and served a dual purpose: generating specialized input and validating preliminary findings from earlier interviews in an iterative process [34]. This approach strengthened both the depth and reliability of the results.

B. Literature Study

A targeted literature study was conducted to form a conceptual basis for effective stakeholder collaboration in transport governance. This review helped define key collaboration principles and guided the development of the case study instruments.

C. Approach

This research combines theoretical exploration with empirical validation to develop a collaboration framework and strategic recommendations for enhanced collaboration in the two middle phases of the delivery of regional mobility hubs.

A literature study on stakeholder collaboration in transport projects forms the basis for constructing a conceptual collaboration framework.

The framework is then applied to a case study. Data is collected through semi-structured interviews, document analysis,
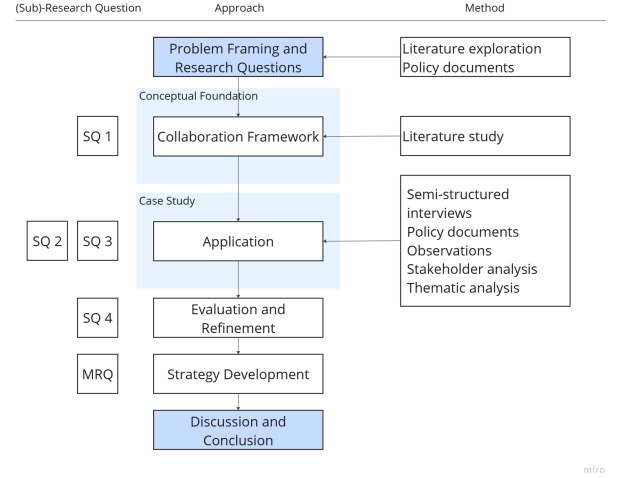

Fig. 2. Research Approach

and field observations. The empirical findings are compared to the theoretical model to identify misalignments and context-specific challenges.

These insights inform targeted refinements to the framework and result in an evidence-based collaboration model.

Additionally, practical strategies are developed to improve collaboration during both the development and implementation phases, applicable to the case study and to regional mobility hubs more broadly. These strategies are derived from case study insights, reference cases, and components of the refined framework.

This approach is visually depicted in Figure 2.

III. Application

A. Conceptual Foundation

To understand how collaboration between stakeholders can be improved in regional mobility hub projects, it is important to first define what effective stakeholder collaboration entails. This chapter provides the theoretical foundation for the research by answering the **first sub-question**:

According to the literature, what defines effective stakeholder collaboration in mobility projects?

This study addresses this foundational question by drawing from literature on collaborative governance, stakeholder theory, and inter-organizational dynamics. In large-scale mobility projects, particularly those governed across multiple public institutions, stakeholder alignment is both essential and difficult to achieve.

To develop the conceptual collaboration framework, key components of effective stakeholder collaboration were identified and structured into an actionable model.

The framework synthesizes literature and structures it for clarity, resulting in the following two interlinked components:

1) Stakeholder Analysis: Effective collaboration starts with structured stakeholder analysis. This involves identifying relevant actors, categorizing their roles, and classifying them based on power, interest, and institutional roles [35], [36], [31]. To tailor engagement, the framework integrates adaptive strategies based on salience [37], [38] and emphasizes the need for iterative assessment, as stakeholder positions and incentives evolve over time [39].

In addition to formal roles, stakeholder influence networks [40] are used to reveal relational power, highlighting informal connections, coalition potential, and inter-dependencies that may not be visible in static matrices. This enables a more dynamic and system-oriented perspective on who matters, and why.

2) Relational Outcomes: After the basis of stakeholder analysis, the second half of the framework depict the relational outcomes and consequences of the stakeholder interactions. Effective engagement influences relational quality, according to literature [41]. Trust, reciprocity, and mutual understanding form the basis for sustained cooperation [42], [43]. When stakeholders perceive the process as fair and their interests as represented, this increases stakeholder satisfaction, which in turn fosters ownership, reduces friction, and enables more effective joint decision-making [41], [24].

3) Conceptual Collaboration Framework: The result of this literature study is a synthesized concptual collaboration framework. This framework thus conceptualizes collaboration not as a fixed process, but as a dynamic pathway: moving from strategic structuring to adaptive engagement, which in turn enables relational outcomes and collaborative capacity. Ultimately, successful collaboration leads to smoother implementation, greater public legitimacy, and higher project success rates, especially in complex, multi-actor environments such as regional mobility hubs.

Based on this conceptual foundation, the collaboration framework is developed (Figure 9, Appendix A), grounded in the literature and designed to clarify how effective stakeholder engagement can be structured, maintained, and improved throughout the lifecycle of mobility projects. In the framework, the white ovals represent the steps in the stakeholder collaboration process, and the blue rectangles represent theoretical methods and tools derived from literature, which can be applied to effectively carry out each step.

B. Case Study

To translate the conceptual collaboration framework into practice, the framework was applied to a real-world case study: the Brainporthubs in the Metropolitan Region of Eindhoven in the Netherlands.

The Brainport region is a fast-growing high-tech area facing urgent mobility challenges due to rapid urbanization. In response, six regional mobility hubs, Brainporthubs, are being developed through a multi-level governance structure involving municipalities, the Province of North Brabant, national ministries, and private actors. The governance is characterized by layered consultation platforms (Figure 10, Appendix B) and coordinated regional planning programs (Figure 11, Appendix B). This complex institutional environment forms the backdrop for the stakeholder collaboration assessed in this case study. This case offered a relevant context due to its ambition to develop a network of regional mobility hubs in a complex multi-stakeholder setting.

The goal of this case study was to explore how collaboration unfolded in the development and implementation phases of regional hub projects, and to evaluate whether and how the proposed framework could explain observed challenges and opportunities in stakeholder collaboration.

This approach simultaneously provided the input to answer the following sub-questions:

Sub-question 2:

Which stakeholders are involved in the development and implementation of regional mobility hubs, and how do their roles differ across phases?

And **Sub-question 3:**

What are the main barriers and opportunities for stakeholder collaboration during the development and implementation of regional mobility hubs in the case study?

The case study analysis was structured according to the main components of the framework:

I: Stakeholder Analysis

The stakeholder analysis consisted of three steps: identification, classification, and engagement strategy formulation. Each step followed predefined methods from the collaboration framework.

a) Identification and Categorization: Stakeholders were identified using policy documents and consultation structures, categorized following [36] into:

1) Governments and authorities,
2) Businesses involved in the consultation process, and
3) Communities (citizens and commuters).

This resulted in the following list of stakeholders:

- Municipality of Eindhoven
- Municipality of Helmond
- Municipality of Veldhoven
- Hub municipalities
- Province of North Brabant
- MRE (Metropoolregio Eindhoven)
- Ministry of Infrastructure and Water Management (I&W)
- Rijkswaterstaat (RWS)
- Other national ministries (EZK, VRO, OCW)
- Businesses
- Citizens
- Commuters

b) Classification Methods: Two classification methods were applied:

- The Power-Interest (PI) grid, to assess stakeholder relevance across development and implementation phases [35].

- The Stakeholder Influence Network [40], to identify structural influence and interdependencies within governance structures.

The PI-grid was constructed for both the development and the implementation phase to show shifts in formal power and interest (Figures 3, 4). The Influence Network visualized connection density among stakeholders and consultation groups. In the Influence Network (Figure 5), the squares represent the stakeholder(groups), where orange represents actors and blue represents consultation groups. The stakeholders are connected with arrows, indicating one stakeholder holds influence, represents or is included in the other stakeholder(group). These connections are summarized in Table II, showing the number of incoming and outgoing connections per stakeholder, allowing for a quick identification of key information holders and influencers within the network. For example, the MRE is represented in the BO V&M, the BAG, the PoHo and the ABG in the Influence Network, and therefore has 4 outgoing arrows, which is clearly readable in the Table II.
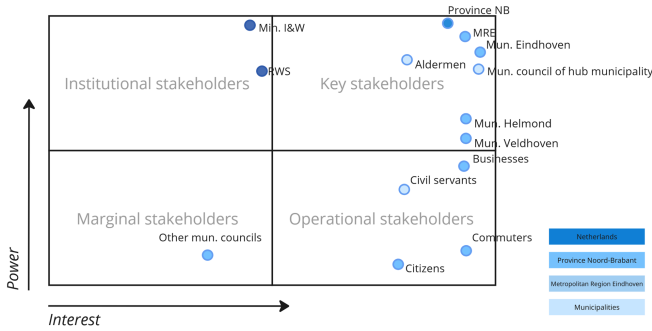

Fig. 5.   Stakeholder Influence Network

TABLE II
NUMBER OF INCOMING AND OUTGOING INFLUENCE RELATIONS PER STAKEHOLDER

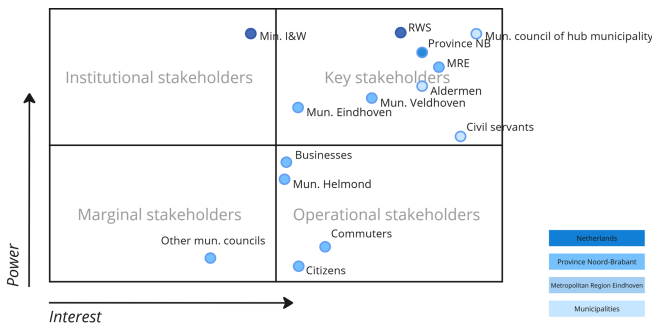| Stakeholder	Outgoing	Incoming
ABG Brainporthubs	0	10
BBG Brainporthubs	1	6
BO VM	2	6
BAG Mobility	1	5
Stuurgroep	0	4
BO Brainport	0	4
Project group	0	4
POHO Mobility MRE	1	3
BO MIRT / BOL	0	3
Kernteam	3	2
Businesses	2	0
Ministry of I&W	2	0
Municipality of Veldhoven	2	0
Municipal council of hub municipality	3	0
Other municipal councils	3	0
Civil servants	3	0
Rijkswaterstaat (RWS)	3	0
Aldermen	4	0
MRE	4	0
Municipality of Helmond	5	0
Province of North Brabant	6	0
Municipality of Eindhoven	6	0

Fig. 3.   PI-grid Development Phase

Fig. 4.   PI-grid Implementation Phase

c) Engagement Strategy: Based on their position in the PI-grid, stakeholders were assigned to one of four engagement strategies: Manage closely, Keep satisfied, Keep informed, or Monitor. These groupings were made for both project phases using guidelines from [37] and [38]. The strategies and assigned stakeholders are shown in Table III and IV (see Appendix B).

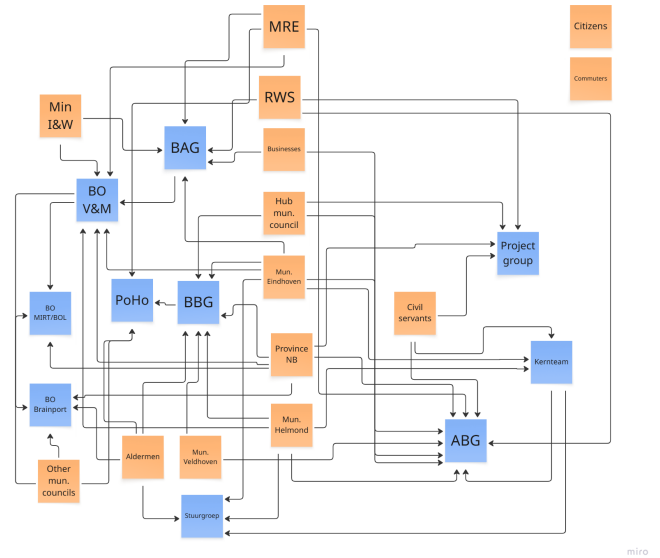*d) Stakeholder Dynamics:* The comparison between the development and implementation phases shows clear shifts in stakeholder roles. As the project transitions toward local execution, operational stakeholders—such as RWS, civil servants, and hub municipal councils—gain power and interest. Meanwhile, strategic actors like the Province, MRE, and the Municipality of Eindhoven become less central. These shifts reflect a broader governance transition from regional visioning to local delivery, emphasizing the need to adapt coordination and engagement accordingly. These shifts in positions of the key stakeholders are visualized in Figure 6.

II: Relational Outcomes

e) Relationship Quality, Satisfaction and Effective Collaboration: The quality of stakeholder relationships was as-
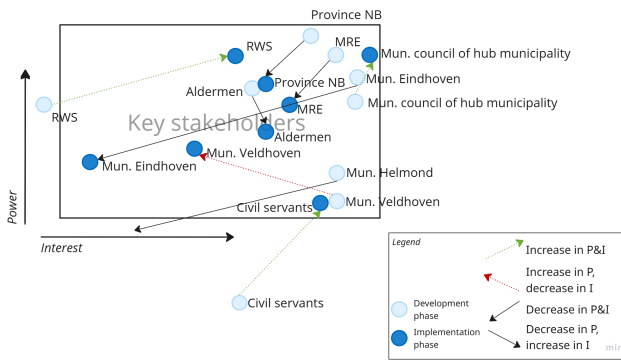
Fig. 6. Key Stakeholder Dynamics

sessed by analyzing collaboration barriers and opportunities identified during the case study. The analysis revealed that several foundational enablers of strong relational quality, such as early engagement, shared vision, and reciprocity, were largely absent. Strategic actors were often involved early without sufficient inclusion of key stakeholders in the implementation phase, leading to misalignment and limited mutual understanding. Although formally framed as a bottom-up process, stakeholders perceived the governance structure as fragmented and top-down in practice. This perception contributed to mistrust, role confusion, and uneven ownership, undermining collaboration.

These relational deficiencies were reflected in low levels of stakeholder satisfaction. Interviews indicated frustration with decision-making clarity, timing of engagement, and doubts about coordination effectiveness. Ultimately, the absence of relational preconditions constrained effective collaboration and weakened prospects for successful project implementation.

To better understand these dynamics, the identified barriers and opportunities were grouped into three categories: strategic, institutional, and conceptual.

Barriers to Collaboration

- **Misalignment of problem ownership and solution implementation:** Regional problems (e.g., congestion) are addressed through local infrastructure, often placing the burden on municipalities that do not directly benefit from the solution. This creates friction, resistance, and a lack of perceived reciprocity [18], [20], [44], [45], [46], [47].
- **Governance opacity and concentrated power:** The formal governance model was experienced as fragmented and non-transparent. Strategic decisions were often made before inclusive consultation, leading to uneven ownership and diminished legitimacy [48], [47], [44], [49], [18].
- **Lack of a shared and compelling vision:** Stakeholders lacked a common understanding of what the hub is, should do, and why it matters. This included uncertainty about design, business case, public transport integration, and long-term value creation [20], [44], [45], [48], [16], [50], [17].

Opportunities for Strengthening Collaboration

- **Social enablers:** Trust, respect, and empathy for institutional limitations were seen as prerequisites for alignment. A willingness to listen and co-create was present among many actors, offering a foundation for improved collaboration [20].
- **Structural enablers:** National involvement (e.g., in financing or policy alignment), strategic framing of hubs as multifunctional solutions, and supportive flanking policies were highlighted as key mechanisms for improving legitimacy and stakeholder commitment [16], [45], [17], [18], [50], [47].
- **Standardisation and regional framing:** A regional narrative and potential for hub standardisation were viewed as promising levers for scalability, user adoption, and cross-level coordination [20], [16].

Together, these findings indicate that effective collaboration requires more than technical alignment or procedural coordination. It depends on fostering shared purpose, tangible reciprocity, and meaningful participation across governance levels.

C. Conclusion

a) Part 1 – Stakeholder Analysis: Applying the first part of the collaboration framework identified the key stakeholders in both the development and implementation phases of the Brainporthubs. The analysis showed that while formal engagement strategies exist, actual involvement did not always align with stakeholder power and interest. For instance, certain actors, such as the hub municipalities, are positioned as key stakeholders in the PI-grid due to their high interest and power over their region. Therefore, their engagement strategy falls under 'Manage closely and secure buy-in'. Yet in practice, their involvement during the development phase remains limited, revealing a gap between theoretical engagement strategies and actual governance practice. The analysis of this misalignment is based on the current state and confirmed through the stakeholder influence network. The PI-grids revealed dynamic shifts in roles between project phases, emphasizing the need for adaptive engagement. These insights answer sub-question 2 by clarifying who is involved, how their roles evolve, and the insights add to the refinement of the framework by identifying where mismatches occur in practice.

b) Part 2 - Relational Output: Part 2 assessed the relational quality among stakeholders through a barriers and opportunities analysis. It found that trust, shared vision, and perceived reciprocity were often lacking, leading to low stakeholder satisfaction and fragmented collaboration. These shortcomings—predicted by the framework—were clearly evident in the case study. The findings answer sub-question 3 by identifying the relational factors that hinder collaboration and illustrating how poor relationship quality can undermine project success.

IV. Framework Evaluation and Refinement

The conceptual collaboration framework developed in this study offered a structured approach to stakeholder collaboration in regional mobility hub projects. However, applying the framework to the Brainporthubs case revealed several inconsistencies between theoretical assumptions and practical realities. This section evaluates the framework's performance and presents an improved, evidence-based version, grounded in empirical findings and supported by literature.

In doing so, this chapter also addresses the **fourth sub-question** of this thesis:

How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?

These improvements are developed based on the combined insights of the previous chapter and the stakeholder perspectives gathered through interviews. The aim is to arrive at a refined, evidence-based collaboration framework that supports more effective stakeholder collaboration in future hub projects.

A. Limitations of Conceptual Framework

Three core limitations were identified:

1) **Lack of contextual grounding:** The original framework starts with stakeholder identification. Yet in fragmented, multi-level governance contexts, this step cannot be meaningfully executed without a prior assessment of the existing institutional landscape. Without such context analysis, stakeholder roles and influence may be misunderstood or overlooked.

2) **Unstable link between classification and engagement:** Although stakeholder classification was achieved through the Power-Interest Grid, engagement did not naturally follow. The case study demonstrated that formal classification alone is insufficient. In practice, engagement requires a clear sense of shared purpose, mutual expectations, and alignment; conditions that were often missing.

3) **Relationship quality as a prerequisite, not a result:** Relationship quality is a crucial prerequisite for strategic stakeholder engagement. Before engagement strategies can be applied, there must be clarity about who is responsible for what. This role division is itself dependent on a basis of relationship quality, particularly mutual trust, alignment on vision and communication. Without these prerequisites, effective engagement simply cannot take root.

These findings reveal that the original framework overemphasized procedural steps and underappreciated the relational and contextual groundwork needed for collaboration to succeed. As a result, collaboration often failed to materialize, or was perceived as externally imposed and misaligned with local priorities.

B. Evidence-Based Collaboration Framework

In response to these limitations, the framework is revised to reflect a more realistic and empirically grounded process. Three key improvements were integrated:

1) **Context analysis** was added as a foundational step to assess existing governance structures and actor dynamics before stakeholder identification.

2) **Relationship quality** was repositioned as a prerequisite for engagement, rather than an outcome of it, encompassing trust, shared vision, and early alignment.

3) **Role division** was added as an intermediate step, ensuring clarity and accountability before engagement strategies are designed.

These adjustments are supported by collaboration literature. Studies have shown that early trust-building and mutual understanding are essential to successful collaboration in multi-actor projects [51], [52], and that failing to address these relational dynamics can lead to "Decide, Announce, Defend" patterns of governance [53], which reduce stakeholder buy-in and project legitimacy.

The revised, evidence-based collaboration framework (Figure 12, Appendix B) better captures the conditions under which stakeholder collaboration can succeed in complex regional projects. It serves as a high-level strategic model that connects theory with practice and highlights the often-overlooked importance of relational and contextual foundations. Rather than assuming collaboration emerges from procedural alignment, it reorients the process toward enabling conditions—clarity, trust, and shared value.

This refined framework directly addresses the fourth sub-question of the research:

How can collaboration be improved during the development and implementation phases, based on stakeholder dynamics in the case study?

It shows that improvement strategies should not start with engagement tactics, but with enabling the conditions that make engagement meaningful. This insight not only strengthens the analytical power of the framework but also enhances its practical relevance for stakeholders navigating regional mobility hub projects.

V. Results

This research aimed to answer the **main research question:**
How can collaboration be improved in the development and implementation phases of regional mobility hubs?

The comparison between the conceptual collaboration framework and the Brainporthubs case study revealed two core findings that underpin improved collaboration in practice.

A. Finding 1: Relationship Quality as a Strategic Prerequisite

First, relationship quality must be actively fostered early in the process, not treated as a by-product of engagement, but as a foundational condition for collaboration to succeed. The case study demonstrated that many collaboration

barriers stemmed from unclear responsibilities, limited trust, and diverging expectations. These symptoms all trace back to insufficient investment in relationship quality during the development phase.

This insight led to a critical revision of the original framework, positioning trust, alignment, and communication clarity as strategic prerequisites for effective stakeholder engagement. Without these relational conditions in place, even well-designed engagement strategies fail to gain traction or legitimacy. This finding is supported both by the Brainporthubs case and the reference studies, and has been embedded into the revised, evidence-based framework.

B. Finding 2: The Importance of Shared Value Through Reciprocity

Second, the research highlights the importance of shared value creation as a driver of stakeholder alignment. In the Brainporthubs project, the hubs are currently positioned as single-function park-and-ride facilities. This limited functionality weakens their relevance for surrounding municipalities, making reciprocity difficult to establish. As a result, municipalities do not perceive enough benefit to justify taking on local responsibilities, which stalls collaboration.

By contrast, reference cases and literature suggest that linking mobility hubs to broader spatial development—such as housing or livability agendas—can enhance shared value. These links not only attract national funding and political support (e.g., from the Ministry of Infrastructure and Water Management), but also give host municipalities a tangible reason to support the hub. Reciprocity thus becomes a mechanism for both stakeholder motivation and policy integration.

This insight has strategic consequences. In blank-slate projects, reciprocity should be a design principle from the start, embedded in both the visioning process and role division. While this may no longer be feasible in the Brainport region, where the planning phase is already concluded, it remains a key strategy for future hub development.

C. Strategic Translation: Two Collaboration Strategy Maps

Together, these two findings form the backbone of the strategic recommendations developed in this report. They are translated into two distinct but related strategy maps:

- **The case-specific strategy map** (Figure 7) for the Brainporthubs focuses primarily on strengthening relationship quality and role clarity, acknowledging that the planning phase has already passed and shared value redesign is no longer feasible.
- **The generalizable strategy map** (Figure 8) offers a more comprehensive approach for new projects, including the design of shared benefits through spatial policy alignment (e.g., housing) and the early institutionalization of trust and reciprocity mechanisms.

In both strategies, improved collaboration is no longer treated as a procedural exercise, but as an outcome of deliberate relational and strategic groundwork. The results demonstrate that collaborative governance is not only about process

design, but about crafting mutual commitment, through increased relational quality and reciprocity, as a structural part of project development.
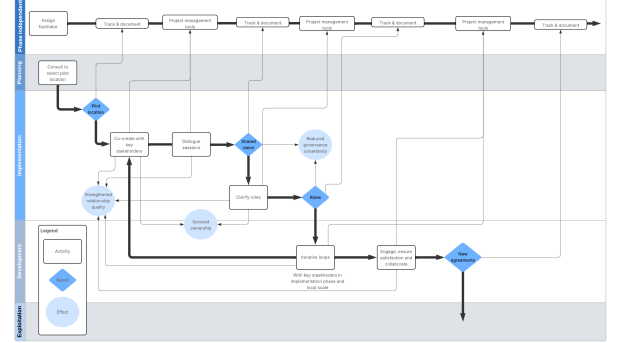

Fig. 7.   Case-specific Strategy Map
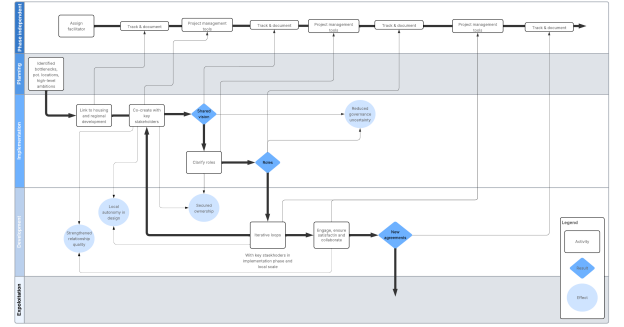
Fig. 8.   Generalizable Strategy Map

VI. DISCUSSION

A. Reflection on Findings

Regional mobility hubs confront a core governance tension: the problem and solution spaces are often misaligned. While the congestion problems often arise in urban nodes, the regional hub solutions are implemented in the rural areas surrounding that node. In addition to that, the infrastructural and societal need for such hubs are defined at the regional level, while the implementation must occur locally. This disconnect makes collaboration not just desirable, but essential. Yet, collaboration is often undervalued or treated as secondary to technical or financial planning.

This research addressed this challenge by focusing on how collaboration can be improved during the development and implementation phases of regional mobility hubs, critical moments when strategic intent must be translated into operational commitment. These phases are particularly vulnerable to friction: divergent interests, unclear roles, and limited perceived benefits converge just as concrete decisions must be made. Municipalities are asked to free up space and commit resources, even when the benefits result elsewhere. In such

a context, resistance is a rational response unless relational dynamics and mutual value creation are explicitly prioritized.

A key insight from this research is that the perception of shared benefit must be intentionally embedded in the hub's design and framing. The Brainport case illustrates how single-function, park-and-ride style hubs lack the relevance and reciprocity needed to gain local traction. Expert interviews and reference cases show that collaboration becomes far more effective when hubs are linked to broader agendas, such as housing, sustainability, or livability, thereby transforming them into shared solutions rather than imposed infrastructure. These integrated strategies also open the door to national support through funding and standardization.

In essence, collaboration is not simply about stakeholder engagement, it is about justifying that engagement. This means acknowledging power asymmetries, ensuring clarity of roles, and aligning on shared outcomes. The revised collaboration framework proposed in this research reflects this approach by emphasizing relationship quality, role division, and contextual understanding as prerequisites for meaningful engagement.

B. Limitations

While this research offers valuable insights into stakeholder collaboration, several limitations must be acknowledged. First, the qualitative approach, based primarily on semi-structured interviews, introduces a degree of interpretive bias. Although triangulated with policy documents and governance structures, the manual thematic analysis relied on subjective judgement. Further methods such as follow-up interviews, workshops, or surveys could enhance the generalizability and robustness of findings.

Second, while interviews continued until saturation, the distribution across stakeholder groups was uneven. Only one municipality hosting a planned hub was included in the study; municipalities without planned hubs were not interviewed. Their perspectives could have offered critical insight into regional alignment and resistance patterns.

Third, the research was intentionally scoped around the development and implementation phases of regional mobility hubs. As a result, more upstream planning and agenda-setting, where shared value propositions such as housing integration or nitrogen legislation alignment are first formulated, remained outside the core analysis. The finding that shared benefits are key to collaboration was thus acknowledged, but not elaborated into a fully developed implementation strategy within this thesis.

C. Suggestions for Future Research

a) Scientific Recommendations: This research contributes to collaboration theory by refining the sequencing of stakeholder engagement, looking at relationship quality as a prerequisite of it rather than a consequence, and introducing reciprocity as a structural condition. However, further work is needed to increase practical applicability and broaden theoretical scope.

First, future research should examine how reciprocity can be actively designed into mobility projects. This includes exploring policy linkages, such as to housing development or environmental goals, that enhance shared value across governance levels.

Second, expanding the temporal scope to include the planning and operational phases would provide insight into when and how collaborative dynamics shift. A longitudinal study could help identify critical intervention points for stakeholder alignment. Especially the final phase, in which the hub becomes operational, deserves more attention. Challenges around long-term commitment, usage, and non-profitable business models may emerge there, requiring ongoing coordination and trust.

Third, the role of national actors warrants further investigation. National ministries and agencies influence regional mobility through funding, standards, and regulatory frameworks. Studying their involvement can clarify how multi-level collaboration can be better coordinated.

Finally, the framework's usability would benefit from real-world testing. Applying it in practice, for instance through design workshops or decision-support tools in pilot projects, would allow for further refinement based on practitioner feedback.

b) Practice Recommendations: For municipalities, public transport regions, and other regional authorities, this study underscores that collaboration is not an add-on to technical planning—it is foundational.

First, invest early in building relational conditions. Trust, shared understanding, and clear role division are essential prerequisites for meaningful engagement. This is particularly important in regional projects where implementation responsibilities and strategic benefits are unequally distributed.

Second, embed hubs into broader development agendas. A standalone hub risks limited functionality and weak local support. By linking hubs to spatial, housing, or sustainability goals, shared value is created that can mobilize both local commitment and national support.

Third, revisit collaboration continuously. As a project moves from vision to delivery, stakeholder roles and needs evolve. Reassessing these transitions ensures that ownership remains clear and engagement remains relevant throughout.

Lastly, treat reciprocity as a deliberate strategy. Involve municipalities not only in executing plans, but in shaping shared ambitions. Collaboration improves when all actors see direct value and purpose in their participation.

VII. CONCLUSION

The purpose of this research was to help stakeholders recognize that collaboration is not optional in regional mobility transitions, it is foundational. Mobility, by its very nature, is about connection. A person's journey rarely starts and ends in the same jurisdiction. The mobility system is therefore inherently regional, intermodal, and cross-sectoral. Only through collaboration can the system be planned, implemented, and maintained in a way that is effective and equitable.

Regional mobility hubs offer a promising step toward a more connected, inclusive, and sustainable mobility network. They relieve pressure from urban centers and enhance access in peripheral areas. But their success depends on how they are approached. When treated narrowly, focused only on traffic effects or physical infrastructure, hubs are unlikely to gain widespread support or make structural impact. When embedded in broader development strategies, they gain relevance, traction, and resilience.

This research contributes an evidence-based collaboration framework and actionable strategies for improving stakeholder cooperation in two of the most sensitive phases of hub development: the development and implementation phases. Its insights are grounded in theory, but tested in practice. Ultimately, the message is clear: collaboration does not emerge naturally, it must be designed, negotiated, and continuously invested in. Only then can regional mobility hubs live up to their full transformative potential.

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APPENDIX A
CONCEPTUAL COLLABORATION FRAMEWORK

APPENDIX B
CASE STUDY DOCUMENTS

TABLE III
ENGAGEMENT STRATEGIES PER STAKEHOLDER – DEVELOPMENT PHASE

Engagement Strategy	Stakeholders
Manage closely and secure buy-in	Province Noord-Brabant, Municipality of Eindhoven, MRE, Aldermen, Municipal council of hub municipality, Municipality of Helmond, Municipality of Veldhoven
Keep satisfied and consult	Ministry of I&W, RWS
Keep informed regularly	Civil servants, Commuters, Citizens, Businesses
Monitor	Other municipal councils

TABLE IV
ENGAGEMENT STRATEGIES PER STAKEHOLDER – IMPLEMENTATION PHASE

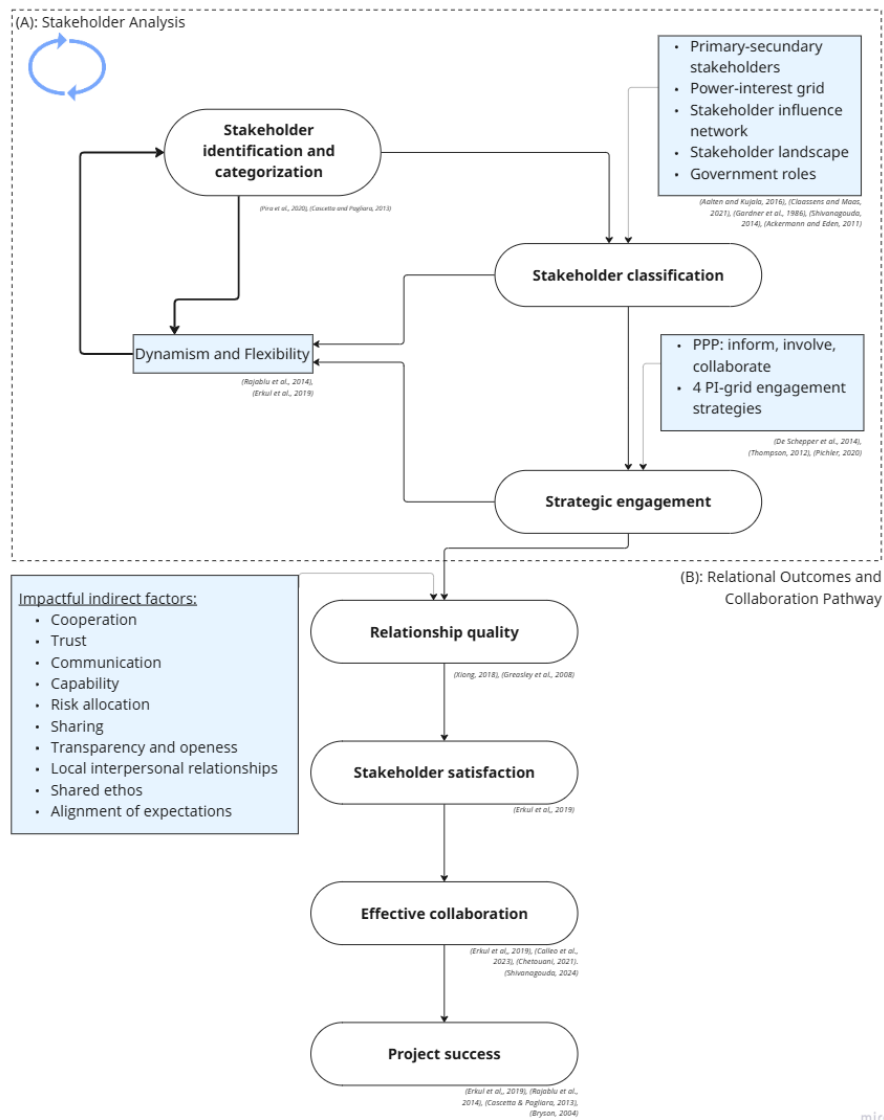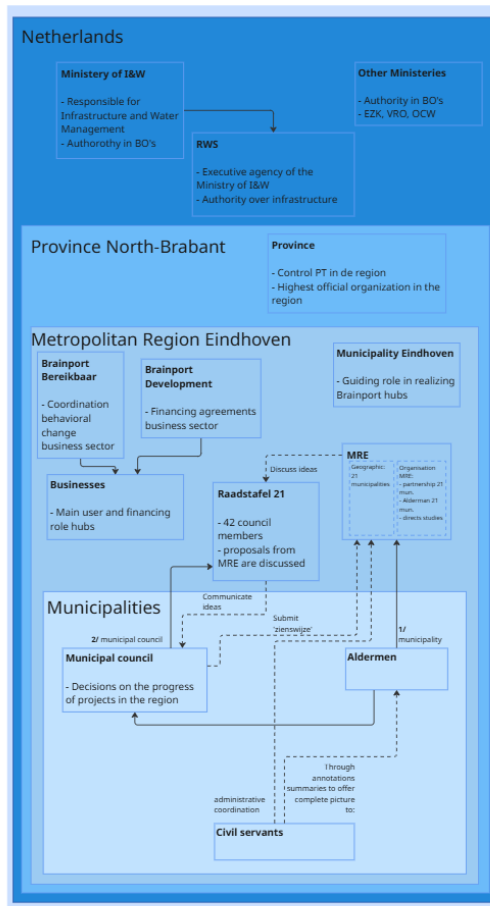| Engagement Strategy	Stakeholders
Manage closely and secure buy-in	Province Noord-Brabant, Municipality of Eindhoven, MRE, Aldermen, Municipal council of hub municipality, Municipality of Veldhoven, RWS, Civil servants
Keep satisfied and consult	Ministry of I&W
Keep informed regularly	Municipality of Helmond, Commuters, Citizens, Businesses
Monitor	Other municipal councils

Fig. 9. Conceptual Collaboration Framework

Fig. 10. Governance Case Study Area

Strategy and decision-making layer

BO MIRT
- Yearly national-regional decision moment
- Long-term decisions and funding agreements

Min I&W, Province, MRE

Planning and program layer

Brainportdeal
- Agreements from 2022 between National gov. and region to invest in improving accessibility

National gov., Businesses, province, 21 municipalities

MMA
- Strategic vision accessibility south NL
- 50/50 funding Rijk and Region

SmartwayZ.NL

KTM1
- Aimed at alleviating traffic pressure around the A2/N2 ring road near Eindhoven

National gov., Businesses, province, 21 municipalities

Beethovendeal
- Address spatial and mobility challenges through an integrated approach to urbanization and accessibility

National gov., Businesses, province, 21 municipalities

MMMP
- Regional mobility ambitions

21 municipalities, province

KTM2
- Short-term mobility goals focust on improving accessibility of the region

National gov., Businesses, province, 21 municipalities

Brainporthubs
- 6 Brainporthubs aimed to releive congestion in the Brainportregion

BBG Brainporthubs, POHO Mobility MRE

Legend: Abbreviations:

Strategic governance   **BO MIRT** = Bestuurlijk Overleg meerjarenprogramma Infrastructuur, Ruimte en Transport
Agenda setting   **KTM** = Korte Termijn Maatregelenpakket
Operational planning   **MMA** = Multimodale Mobiliteitsagenda
Involved stakeholder(s)   **MMMP** = Meerjarig Multimodale Mobiliteitspakket

Fig. 11.   Planning and Programs Case Study Area

(A): Context Analysis

Current state

(B): Stakeholder Analysis

Stakeholder identification and categorization

Validate outcome

Stakeholder classification

Strategic engagement

Relationship quality

Role division

(C): Relational Outcomes and Collaboration Pathway

Stakeholder satisfaction

Effective collaboration

Project success
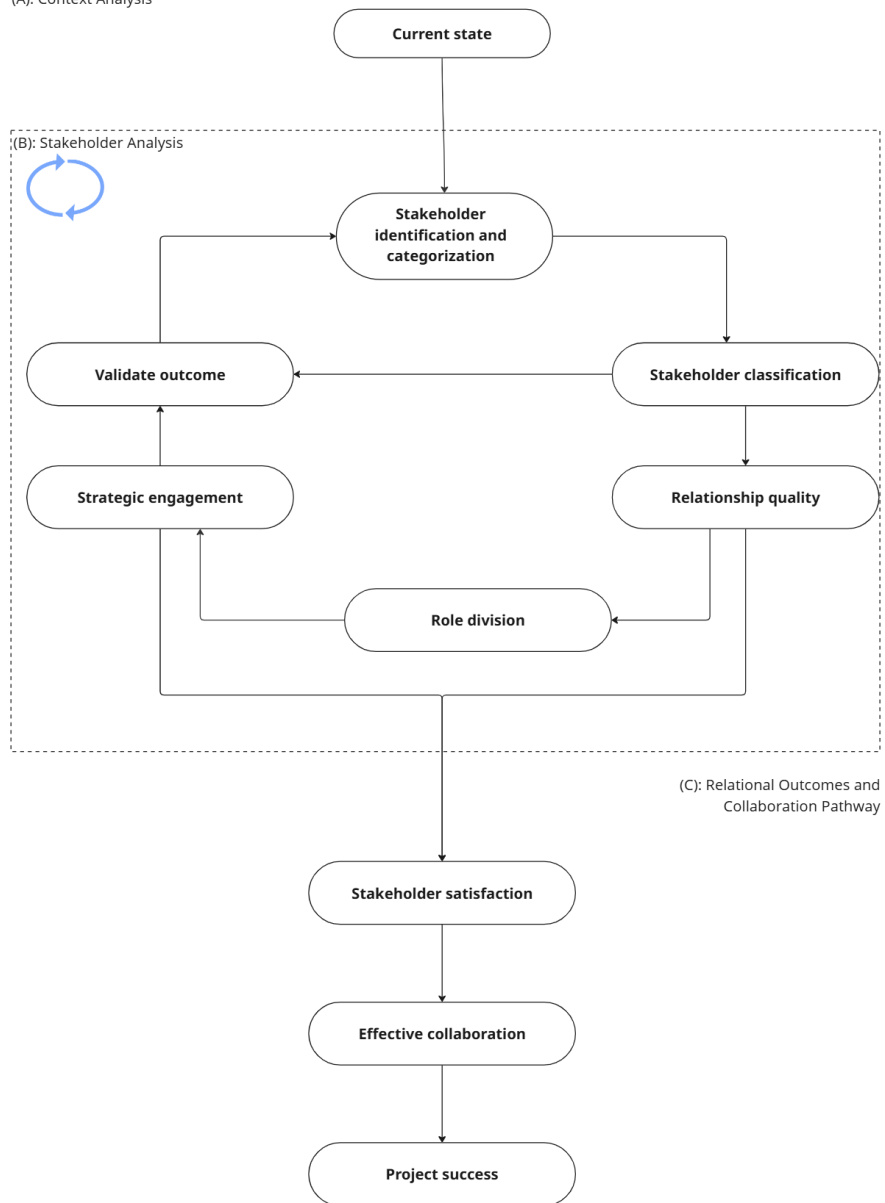
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Fig. 12.   Evidence-Based Collaboration Framework

B

Mobility hub definitions

## B.1. Comparison of Mobility Hub Definitions

Table B.1: Key characteristics of mobility hub definitions

Definition	Multimodal transport	Shared mobility	Public transport	Amenities and services	Governance	Source
A shared mobility hub is defined as a physical point in which a convenient *transfer* is offered between the *available modalities*, which includes in any case *shared mobility*, and possibly other private and public transportation	✓	✓	✓	✓		Blad et al. (2022)
An *urban infrastructure* providing *shared transport modes* (at least two) in one place, where integration with *public transport* is recommended.	✓	✓	(✓)			Hached et al. (2023)
A *multimodal space* facilitating *transport connections* while providing *amenities* such as *workspaces*, *package pickup*, and *kiosks*.	✓	✓	✓	✓		van den Berg (2020)
A physical link between multiple *transport modes* that also functions as a concentration point for *spatial development*.	✓		✓		✓	Witte et al. (2021)
A recognizable location where *transport modes* integrate with added *information and facilities* for an improved user experience.	✓			✓		Arnold et al. (2023)
A place where *transport mode transfers* require *multi-actor and multi-level governance arrangements*.	✓		✓		✓	Hansel (2025)
Mobility hubs require the *integration of land use, infrastructure, and shared mobility*, necessitating *strong partnerships*.	✓	✓			✓	Aono (2019)
A recognisable place with an offer of *different and connected transport modes* supplemented with *enhanced facilities* and information features to both attract and benefit the traveller.	✓			✓		CoMoUK (2019)
A *multimodal transport hub* described as a physical location or node with a variety of *(shared) transport modes*.	✓	✓				van Gerrevink et al. (2021)

B.2. Comparison of Mobility Hub Classifications

Table B.2: Typologies of Mobility Hubs Based on Different Classification Approaches

Classification Basis	Typologies (from small to large scale)	Source
Based on urban context and function	**Neighborhood hub**: Small-scale, within residential areas, serving local needs. **Urban hub**: Medium-scale, integrated into city transport systems. **Peripheral hub**: Large-scale, positioned at urban edges for regional connectivity.	Chetouani (2021)
Based on transport integration	**Residential shared mobility hub**: Provides shared mobility but not directly linked to public transport. **City and regional shared mobility hub**: Connected to public transport, catering to multiple user groups. **Regional shared mobility hub**: Located outside cities, offering car parking for intermodal chains.	Blad et al. (2022)
Based on network role	**Access hub**: Small-scale, first-mile/last-mile connection to main transport networks. **Anchor hub**: Large-scale, central interchange for multiple modes of transport.	Hached et al. (2023)
Based on urban scale and services	**Community hub**: Small, neighborhood-based, focused on local accessibility. **City district hub**: Medium-sized, integrates multimodal transport options within districts. **City center hub**: Large-scale, key interchange in dense urban environments.	Weustenenk and Mingardo (2023)
Based on location-specific categories	**Neighborhood hub**: Localized, serves residential mobility and car-sharing. **District hub**: Medium-scale, integrates shared mobility and public transport. **City hub**: Large-scale, central urban hub for multimodal transfers.	van den Berg (2020)
Based on urban context and transport demand	**City center**, **urban transit node**, **emerging urban growth centers**, **historic city centers**, **suburban transit nodes**, **single destinations**.	Hached et al. (2023)
Based on services provided	**Entry hub**: First access point to transport networks. **Transfer hub**: Facilitates mode transitions. **Destination hub**: Integrated into key destinations such as business districts.	Hached et al. (2023)
Based on size, location, and services provided	**Large interchange**, **city hubs**, **transport corridors**, **linking hubs**, **key destinations** (e.g., business parks, hospitals), **minihubs**, **market towns**, **village hubs**. **E-hubs**: Electric mobility hubs, categorized into *minimalist*, *light*, *medium*, and *large*.	Hached et al. (2023)
Based on practical application in urban planning	**Neighborhood hub**: Small-scale, aimed at reducing congestion within residential areas. **District hub**: Larger than neighborhood hubs, integrates public transport and shared mobility. **City hub**: Large-scale, central urban hub combining multiple transport modes. **City edge hub**: Located at the city's edge, often used as transfer points (e.g., P+R). **Transfer hub**: Designed to facilitate modal shifts between different networks. **Goods hub**: Focused on freight and logistics, reducing urban congestion.	Goudappel (n.d.)

C
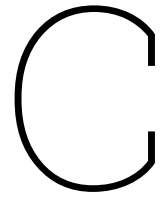
Case study documents

C.1. Interviews

Organization	Interviewee Role
Municipality of Helmond	Project lead for shared mobility and hubs
VrijNieuw	Project lead for Brainporthubs
Brainport Bereikbaar	Project lead for shared mobility and hubs
Province of North Brabant	Program lead for mobility policy and regional cooperation
Municipality of Eindhoven	Policy officer for regional accessibility
Municipality of Amsterdam	Program manager for hubs, shared mobility, and MaaS
Municipal Council of hub municipality	Participant in local political discussion on hubs and housing (February 2025)
Ministry of I&W	Program manager of mobility hubs at I&W and well informed on corridor hubs (i.e. regional mobility hubs)
Municipality of Utrecht	Advisor mobility within municipality of Utrecht. Elaboration of locations and boundary conditions for 'corridor hubs' within the regional partnership Uned.
ASML	Global mobility manager and mobility expert ASML, based in Veldhoven
Brainport Bereikbaar & Bizart	Strategy and project lead new mobility
Brainporthub Projectgroup	Project lead Brainporthub, MRE

Table C.1: Interviewed parties and their roles in the Brainporthubs context
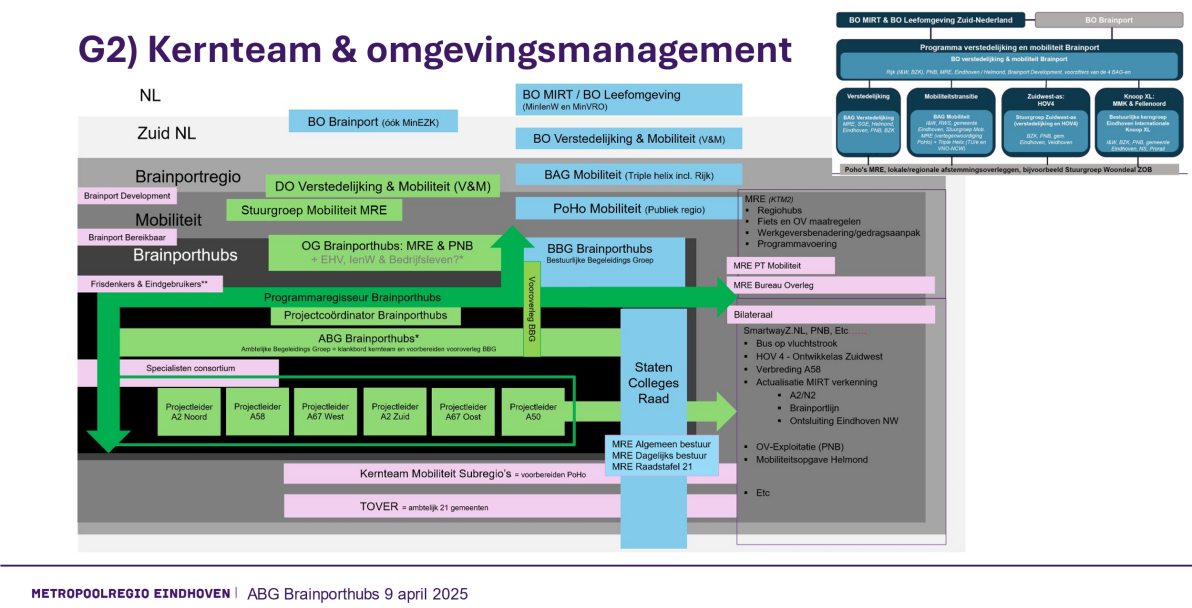
C.2. Brainporthubs organizational structure

Figure C.1: Organizational structure Brainport (Bakermans, 2025)

C.3. Power-Interest Grid
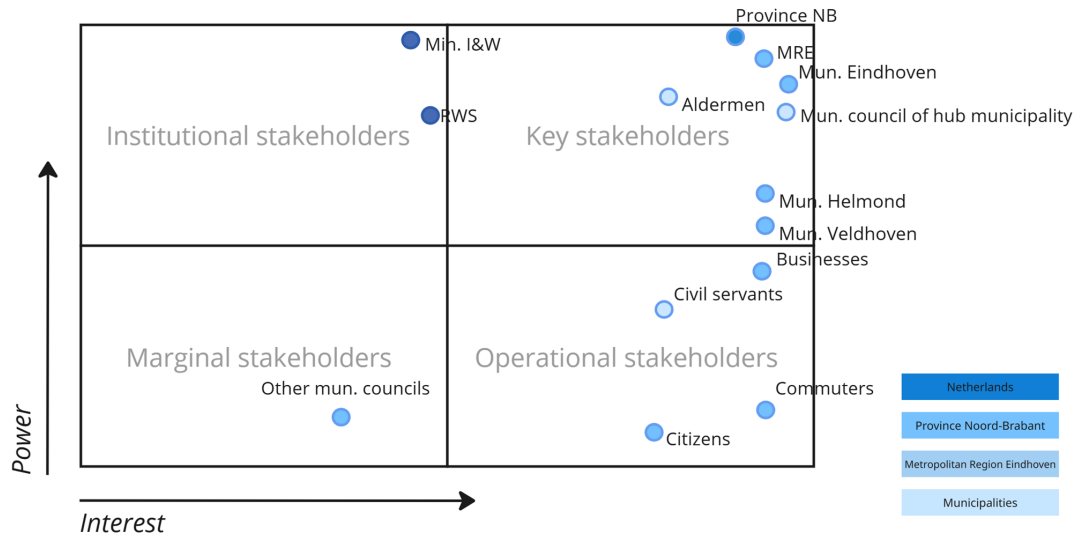## C.3.1. Development phase

Figure C.2: PI-grid development phase Brainporthubs

Key stakeholders:
This quadrant mainly consists of stakeholders involved in shaping the regional vision. The most powerful actor in this group is the **Province of North Brabant**, which plays a central role in both the long-term planning and funding of the Brainporthubs. As noted by MRE (2025), the province acts as the driving force behind the initiative, guiding strategic direction and ensuring regional alignment across administrative levels. The province also holds a certain amount of power as it operates as the concession-

granting authoroty for regional public transport. When a hub requires a new or adapted bus connection, the province is in charge to enable this.

Close to the province is the **Municipality of Eindhoven**, which holds a prominent position within the MRE due to its scale and political weight. Eindhoven regularly takes the lead in both content and agenda-setting, shaping discussions on regional mobility and infrastructure through its active role in intermunicipal coordination platforms.

The **MRE** itself also belongs to this quadrant. As the regional coordination body, it brings together 21 municipalities and forms a bridge between local needs and provincial or national mobility programs. The MRE plays a key role in drafting overarching mobility strategies such as the MMMP and facilitating agreement among its members.

Also positioned in this quadrant are the **aldermen**, who collectively shape regional priorities through the BBG and, more formally, within the POHO Mobility MRE. While they hold collective decision-making power, the level of individual interest among aldermen varies. Those representing hub municipalities, or larger cities such as Eindhoven and Helmond, tend to be more invested in the development of the Brainporthubs due to their direct spatial and political implications.

The **municipal council of the hub municipality** is placed higher in terms of interest, but holds less formal power than the aldermen, as the aldermen collectively have more decision-making power than the municipal council of the hub municipality. Nonetheless, this stakeholder is considered key due to its dual position in the governance structure: it is involved both at higher administrative levels—through representation in consultation groups like the BO's—and at the operational level, for instance through representation in local project groups (Figure **??**). Most importantly, the municipal council ultimately holds the legal authority to approve or reject spatial decisions within its territory, such as zoning plans or infrastructural developments related to the hub.

The municipalitie of Helmond and **municipality Veldhoven** are also considered key players due to their active presence in several consultation structures. These municipalities are frequently involved in regional coordination and decision-making processes related to the Brainporthubs.

Institutional stakeholders:
In this quadrant, the **Ministry of Infrastructure and Water Management (I&W)** and **Rijkswaterstaat (RWS)** are positioned. I&W holds the highest level of formal power, as it is responsible for national mobility policy and co-finances strategic infrastructure programs. RWS, operating under the authority of I&W, has slightly less power but shows a higher degree of interest due to its direct involvement in implementation tasks.

RWS plays a critical role in enabling infrastructure connections to the hubs, particularly when it comes to highway access, on- and off-ramps, and the provision of High-Quality Public Transport (HOV) over emergency lanes. In addition, RWS holds valuable technical knowledge regarding road network performance and flow management, making it a potentially influential actor in the success of the Brainporthubs. According to interviews with Gemeente Utrecht (2025) and Gemeente Amsterdam (2025), RWS has not yet taken a strong leading role in this project, but is seen as a stakeholder with significant untapped potential to become more proactive in shaping infrastructure-related decisions.

Operational stakeholders:
The **business sector** is positioned as an operational stakeholder. While they do not have formal decision-making authority, their level of interest is high, as employers and employees form a key user group for the hubs. Moreover, the business community contributes financially to the Brainporthubs (see Figure 5.8) and is expected to support complementary flanking policies, such as parking restrictions or employer incentives, to help ensure the hubs' success. Businesses are also formally involved in consultation structures such as the BAG and the ABG, which grants them a degree of influence.

The **civil servants** also fall within this category. Their influence lies primarily in preparing content and coordinating administrative work across governance layers. Civil servants from municipalities involved in a specific hub are present in the respective project group for that hub. In addition, they are represented in both the Kernteam and the ABG. At the administrative level, civil servants are responsible for preparing and coordinating proposals and agenda items that are later discussed and decided at the

political level (e.g., in the Stuurgroep or the BBG). For this reason, they are considered operational stakeholders with high interest and indirect influence.

Commuters and citizens are located slightly lower within this quadrant. While their formal power is limited, their interest is substantial. As future users of the hubs (commuters) or residents of nearby areas (citizens), they are directly affected by both the advantages and drawbacks of the hub developments. Despite their lack of involvement in formal decision-making, their stake in the outcome makes them important to consider in planning and communication strategies.

Marginal stakeholders:
Finally, in the bottom-left quadrant, we find the **other municipal councils**—those not directly involved in the hosting or realisation of a Brainporthub. While they are part of the MRE and may become more active in later phases, their current influence and interest in this project remain limited, particularly during the initial stages of hub selection and design.
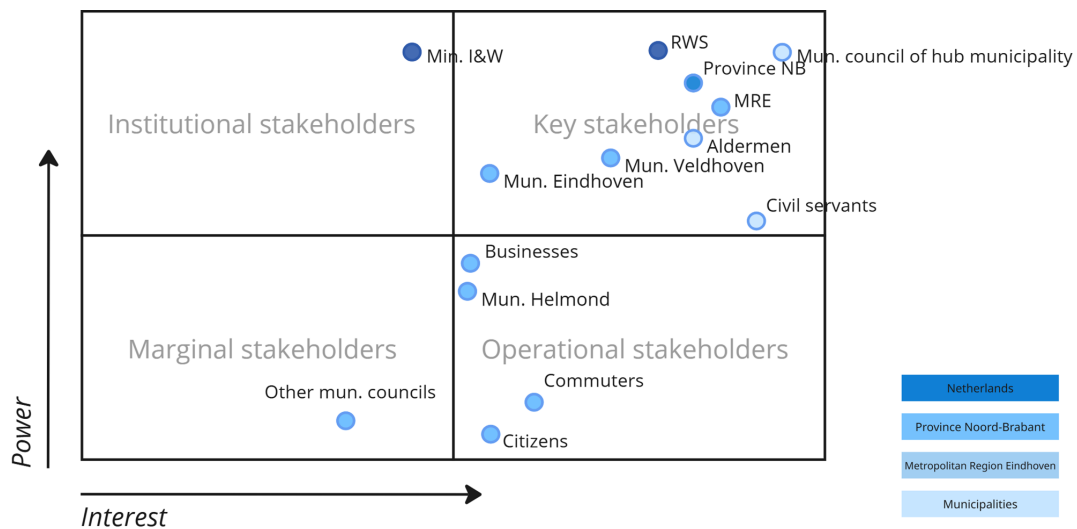
C.3.2. Implementation Phase

Figure C.3: PI-grid implementation phase Brainporthubs

Key stakeholders:
In the top-right quadrant, we find the **municipal council of the hub municipality**. Their power remains high, as they hold the authority to formally approve zoning plans, spatial integration, and budget allocations. Their interest further increases in the implementation phase, as the direct political and legal consequences of hub realization become more tangible. Also positioned in this quadrant is **RWS**, with both increased power and interest compared to the development phase, particularly in cases where the hub requires infrastructure such as new highway exits or the use of the emergency lane for HOV. However, if neither of these elements is relevant for a specific hub, the role of RWS becomes less critical.

The **Province of North Brabant** continues to be a key stakeholder, although its level of power has slightly decreased in comparison to the development phase. As a coordinating body, the province is more prominent in the strategic visioning stage than in the detailed execution phase. Nevertheless, it remains highly influential. The province is still represented in nearly all consultation groups, including the project groups, and it holds formal responsibility as the public transport concession authority, ensuring, for instance, that bus services are connected to the hubs.

The **MRE** also retains a place in this quadrant. As a coordinating body with the mission of promoting regional welfare, the MRE maintains significant influence. While its formal presence in consultation groups is less extensive than that of the province, its strategic position ensures that its input remains relevant throughout implementation.

The **aldermen** also remain key stakeholders due to their continued decision-making role in the POHO and BBG structures. Additionally, the **civil servants** gain more prominence in this phase because of their involvement in project groups. These groups handle hub-specific planning and coordination at the municipal level, granting civil servants more direct influence over local implementation decisions.

The **Municipality of Eindhoven** is still considered a key stakeholder, although its relative power and interest have declined. As the project moves from strategic planning into local implementation, Eindhoven's role becomes less central, especially since none of the hubs are located within its borders. However, due to its involvement in several consultation structures, it remains an influential actor.

The **Municipality of Veldhoven** has gained slightly more power in the implementation phase due to its ability to influence flanking policies that can support or restrict hub use, such as parking regulations or accessibility measures. However, its level of interest has decreased now that the core planning decisions have been made and the direct benefits for the municipality have already been secured.

Institutional stakeholders:
The **Ministry of Infrastructure and Water Management (I&W)** remains in this quadrant, with no significant change in position. As the commissioning authority of RWS and co-funder of national mobility programs, it continues to play a regulatory and supervisory role.

Operational stakeholders:
The **business sector** remains in this category. While their formal power has not changed, their interest in the project has slightly decreased compared to the development phase. Now that the strategic outline of the hubs is in place, the local implementation details are of less immediate concern to them. Nevertheless, businesses still bear financial responsibility and are in this phase even more expected to contribute through flanking measures.

The **Municipality of Helmond**, on the other hand, has seen a decline in both power and interest. Since most of the Brainporthubs are located on the western side of the region, the direct impact on Helmond's local mobility network is limited. As a result, the municipality's relevance in implementation decisions has diminished compared to the earlier development phase.

The interest of **commuters and citizens** has also declined. While they remain affected by the eventual use and design of the hubs, the technical and procedural focus of the implementation phase is less directly relevant to them.

Marginal stakeholders:
In this quadrant, we still find the **other municipal councils** not directly involved in hosting a Brainporthub. Their power remains low, as does their ability to influence current implementation efforts. However, their interest has slightly increased, given that regional hub infrastructure may affect the broader mobility network and generate indirect consequences for their local context.

C.4. Reference Cases

Table C.2: Overview of Reference Cases: Mobility Hubs

Location	Key Characteristics	Lessons Learned
Westraven, Utrecht	P+R hub with strong shared benefits: parking is linked to public transport use, making travel to the city both cheaper and more attractive	Functional integration increases usage and public acceptance
Groningen–Assen	Hub includes a public library; subsidies are linked to hub-related functions	Embedding public services strengthens local support, enables co-financing, and improves social safety
Groningen–Drenthe	Central hub website provides an overview of all regional hubs, available facilities, and suggested walking and cycling routes via hubs ("Wandel via hub - Reisviahub.nl", 2022)	Designing around everyday use and active travel makes hubs more relatable and regionally relevant
Mobility region Noord-Holland	In negotiation phase for a regional hub network	Putting a lot of focus on relational quality (Gemeente Amsterdam, 2025): • No single party makes final decisions—broad alignment is essential • Strong collaboration and a shared narrative are crucial for progress • Regional mapping helped identify opportunities and build collective purpose
National practice	"Start small, then scale up" principle (Brainport Bereikbaar, 2025a; Gemeente Utrecht, 2025)	Pilots in motivated areas create early successes and help build momentum
Paris periphery	Extensive network of P+R locations connected to high-quality public transport (e.g. metro) (Saemes, 2018)	Seamless integration with rapid transit networks increases the appeal and effectiveness of park-and-ride strategies