

Revitalizing Private Intercity Rail in the U.S.

A Case Study of Brightline's Use of Development-Based Land Value Capture

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Abstract

Confronting the challenges of high transportation emissions, this thesis investigates development-based land value capture (DBLVC) as a pioneering and sustainable funding mechanism for private passenger rail initiatives in the U.S., particularly in contexts marked by a shortage of public financial support. This research centers on the Florida East Coast Industries' Brightline project, exemplifying private investment innovation within U.S. transportation infrastructure—a sector traditionally reliant on public funds. The primary aim is to evaluate how DBLVC strategies can promote sustainable urban development and profitable passenger rail operations without substantial public subsidies. The specific research inquiries focus on the efficacy of DBLVC in private rail financing, the role of transit-oriented development (TOD) in enhancing economic sustainability, and the implementation of risk management strategies within DBLVC frameworks. Employing a qualitative case study approach, this study analyzes data from corporate reports, stakeholder interviews, and project documentation to examine the financial arrangements and partnership dynamics of the Brightline initiative. Findings indicate that DBLVC, when integrated with strategic stakeholder partnerships and TOD, effectively mitigates financial risks and bolsters project viability, demonstrating that private rail projects can attain financial sustainability and contribute to urban development while minimizing reliance on public funding. The research concludes that DBLVC represents a feasible model for financing transportation infrastructure, with recommendations for further comparative studies across various markets and regulatory settings to broaden these insights. Future recommendations suggest that firms leverage DBLVC strategies to foster private investment in TOD infrastructure projects, thus advancing broader economic and environmental benefits. This thesis lays a foundational framework for understanding the potential of private funding in passenger rail projects, providing significant implications for future transportation planning and policymaking.

Keywords: Private rail, land value capture, transit-oriented development, risk mitigation, synergistic business models

Executive Summary

Problem definition

Despite over 100 billion dollars allocated for PR development within five years, funding remains insufficient for sustainable rail transport (Eno Center for Transportation, 2021; Lazo & Guskin, 2019; The White House, 2023b). The recent Bipartisan Infrastructure Law highlights the need for sustainable transportation solutions like intercity PR projects (Federal Railroad Administration, 2023). Researchers suggest exploring alternative funding to facilitate a swift transition (OECD, 2015). This scenario necessitates innovative financing mechanisms to support sustainable rail projects crucial for meeting environmental and urban development goals. The private sector can play a crucial role, despite high initial costs and liquidity constraints (OECD, 2015, p. 8).

The success of the Brightline case in using development-based land value capture (DBLVC) strategies to finance a rail project is noteworthy. Limited research exists on DBLVC in passenger rail projects, necessitating exploring success factors to assess private sector contributions to reducing carbon footprints and achieving the U.S.'s 2030 emissions target. Academic literature highlights a gap in understanding DBLVC's practical implementation for private rail ventures, especially value capture mechanisms and risk mitigation strategies. This research is essential for businesses, policymakers, urban planners, financiers, and environmental scientists, providing insights to facilitate collaboration, shape transportation plans, spur economic development, and aid climate change efforts.

Aim and research questions

This study aims to explore and advance the understanding of potential pathways for financing the development of intercity PR corridors in the United States. The primary goal is to contribute qualitative evidence regarding the *success factors* of private passenger rail (PR) initiatives utilizing DBLVC strategies for funding rail infrastructure capital costs. Additionally, this study aims to explore strategies employed by FECI to successfully mitigate risks during the development of their Brightline passenger rail. By doing so, this research has the potential to contribute to understanding how DBLVC strategies could be feasible for private companies by examining how FECI navigated the well-established aspects of *regulatory, economic, collaborative, and technical* dimensions in the Miami-Orlando corridor, as identified in Li & Love (2022). Based on the research aim, three questions were answered:

- RQ1:** What specific factors, including regulatory, economic, collaborative, and technical considerations, did FECI, a private company, consider to ensure the completion of an intercity passenger rail project using a DBLVC strategy?
- RQ2:** How did FECI effectively employ TOD to help finance an intercity private passenger rail development project in the U.S.?
- RQ3:** What risks did FECI encounter during the implementation of their DBLVC strategies, and how were these risks mitigated?

Research Design

The framework by Li & Love (2022) was selected and adapted to assess the success factors for private PR initiatives by integrating value capture and risk mitigation for public-private partnerships in transit-oriented development (TOD) contexts. This framework evaluates four critical dimensions: regulatory, economic, collaborative, and technical considerations to analyze findings for RQ1 and RQ2. Additionally, an analytical framework was developed from the literature review to identify risk factors in DBLVC PR projects for RQ3. Given the novelty of DBLVC strategies in U.S. rail, a qualitative exploratory case study of FECI's Brightline was

employed. Specifically, eight semi-structured online interviews were conducted with stakeholders associated with the Brightline project or professionals with experience in TOD. Concurrently, 14 secondary documents related to the finances of FECI and their subsidiary, Brightline, were reviewed to support the interview findings. Document analysis was conducted first to prepare for interviews and provide in-depth insights. The documents and interviews allowed for triangulation and reliability. Data from both were transcribed, coded, and analyzed using thematic analysis within an abductive approach, with codes from both frameworks. These codes were derived from Li & Love's (2022) framework and DBLVC risk factors to guide the analysis. Findings were presented thematically, assessing success factors, TOD strategies, and risk mitigation.

Results

RQ1: Success factors of FECI's DBLVC strategy

The study's results indicate that while Brightline was founded as a private venture without public sector involvement or subsidies, the effective employment of a DBLVC strategy necessitated collaboration with the public sector. This collaboration was crucial for securing rights-of-way, integrating infrastructure with existing public systems, and leveraging tax-exempt bonds, which collectively enhanced the project's financial viability and operational success. Brightline's strategic formation of agreements with freight lines, government agencies, developers, and regional transit authorities was pivotal in securing long-term viability, diversifying revenue streams, and ensuring mutual benefits from service integration.

Regarding the collaborative dimension, Brightline's formation of agreements with various stakeholders ensured long-term viability. Technically, utilizing existing tracks and infrastructure significantly reduced capital expenditures, emphasizing detailed planning and resource optimization. Economically, integrating transit services with real estate development maximized land value around transit hubs, providing a stable financial base. Navigating the regulatory dimension involved active collaboration with legislators to amend codes for denser development, ensuring compliance with legal and strategic requirements. These four dimensions collectively facilitated Brightline's successful implementation of the DBLVC strategy, highlighting the importance of public-private partnerships in transit development.

RQ2: Effective transit-oriented development to create synergy

Brightline's TOD initiatives are integrated financial viability with sustainable urban development, fostering urban revitalization and maximizing property utility near transit stations. By utilizing joint development schemes, Brightline coordinates with transit agencies and developers to physically and financially contribute to the construction of station facilities and adjacent properties. This includes agreements where Brightline's transit infrastructure improvements directly benefit from increased land value, enabling the development of high-density, mixed-use properties that enhance the surrounding areas and support sustainable urban growth. The strategic application of TOD is pivotal in not only enhancing land value but also in crafting vibrant, well-connected urban environments that cater to both the immediate needs and long-term sustainability of communities and Brightline. These findings underscore the importance of collaboration, detailed planning, and regulatory navigation in implementing successful DBLVC strategies for private rail projects.

RQ3: DBLVC risks and mitigation strategies

FECI encountered several key challenges, including market dependency, regulatory, zoning, political and public opposition, and overreliance on real estate value increases. They mitigated

these risks through strategic property acquisitions, proactive legislative engagement, and securing diverse revenue streams such as tax-exempt green bonds, mixed-use properties generating sustained revenue through retail, residential, and office spaces, and revenue from selling rights to access rail. A significant advantage was their prior ownership of the rail and property, minimizing risks and costs associated with land acquisition and infrastructure development. Additionally, Brightline's approach to shared infrastructure agreements and performance-based contracts ensured operational efficiency and conflict resolution. The formation of a special purpose vehicle (see Chapter 6.1.6) helped manage financial risks by isolating liabilities, ensuring project viability in a dynamic economic and regulatory environment.

Conclusions and recommendations

This study concludes that FECI's successful implementation of a DBLVC strategy for private passenger rail development highlights the importance of integrating diverse funding mechanisms and strategic urban planning. Brightline's success factors include forming strategic partnerships, phased development, leveraging existing infrastructure, and creating land value around transit hubs. Collaboration with public sector entities was essential for securing rights-of-way, leveraging tax-exempt bonds, and ensuring financial stability. The research highlights challenges such as regulatory navigation, dependency on land value increases, and managing shared infrastructure. The findings demonstrate that proactive legislative engagement, strategic property acquisitions, and diversified revenue streams are crucial for mitigating risks and enhancing the project's viability. The study underscores that Brightline's prior ownership of rail and property was a significant advantage in minimizing risks and costs, demonstrating that private rail projects can thrive with limited direct public subsidies given the right conditions, although replicability in different contexts remains uncertain.

In addition to these findings, a list of recommendations is provided for FECI, the private and public sectors, and researchers to enhance passenger rail and the intended outcome of the decarbonization of the U.S. transport sector (see Chapter 8).

A few practitioner recommendations include: 1) Enhancing multi-modality and connectivity by integrating regional lines with intercity public transportation networks. 2) Developing comprehensive regional transport plans anticipating integration with private transportation expansions. 3) Fostering stakeholder collaboration by facilitating regular meetings among freight operators, public transportation entities, developers, and urban planners to align interests and address TOD project feasibility. 4) Ensuring population density which is critical in making DBLVC profitable by focusing on corridors with significant or anticipated population growth to support transit ridership and economic vitality. 5) Streamlining zoning legislation by lobbying for denser zoning statutes to accommodate high-density, mixed-use developments to reduce urban sprawl. 6) Integrating transportation and land use planning by influencing Department of Transportation infrastructure plans to prioritize TOD initiatives over highway-centric approaches.

A few future research recommendations include: 1) Evaluating the resilience of DBLVC during economic downturns to assess the sustainability of DBLVC when the real estate market is down. 2) Compare DBLVC applications in diverse settings and study the strategies in different geographic, regulatory, and political contexts to understand their adaptability and effectiveness and how these factors influence the implementation and success of DBLVC projects. Finally, 3) explore public vs. private benefits and assess if private passenger rail developments sufficiently serve the public good or primarily for-profit motives, considering social justice aspects.

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Abbreviations

BIL	Bipartisan Infrastructure Law
DBLVC	Development-based land value capture
DOT	Department of Transportation
FDOT	Florida Department of Transportation
FECI	Florida East Coast Industries
FECR	Florida East Coast Railway
FRA	Federal Railroad Administration
GHGs	Greenhouse gas emissions
IRA	Inflation Reduction Act
LVC	Land value capture
PPP	Public Private Partnerships
PR	Passenger Rail
SEC	U.S. Securities and Exchange Commission
SPV	Special purpose vehicle
RQ	Research question
TIF	Tax-increment financing
rTOD	Rail Transit-oriented development
RTZ	Rapid Transit Zone
SFRTA	South Florida Regional Transportation Authority
TOD	Transit-oriented development

1 Introduction

In the landscape of American transportation, the reliance on vehicles for both daily commutes and long-distance intercity travel has given rise to significant challenges, including pollution, congestion, and a considerable carbon footprint (EIA, 2023). The transportation sector accounts for approximately 28% of total U.S. greenhouse gas emissions (GHGs), with road transportation contributing the lion's share (US EPA, 2015). Furthermore, the predominant alternative—air travel—contributes substantially to CO₂ emissions (US EPA, 2020). Rail development would aid the U.S. in reaching its climate target to cut overall greenhouse gas emissions by 50-52% by 2030 relative to 2005 levels (US Department of State, 2023). Against the backdrop of the United States' current commitment to a green transition, highlighted by initiatives like the Inflation Reduction Act (IRA), the imperative to electrify and invest in sustainable transportation emerges as a priority aligning with public interests.

The United States holds the position of the world's largest oil consumer, with the transportation sector consuming an estimated 72% of this total due to their significant reliance on road vehicles (Kamga, 2015). Passenger vehicles alone contribute to 63% of the GHGs within the transportation sector, while rail is the most energy-efficient form of motorized passenger transportation, using twelve times less energy and emitting 7 to 11 times fewer GHGs per passenger-km than cars and airplanes (Ahsan et al., 2023). It can also be concluded based on Kamga (2015), the ongoing electrification and embrace of alternative fuels by passenger rail (PR) offer a promising pathway to diminish car dependency, reduce oil consumption, and consequently address greenhouse gas emissions, aligning with the nation's climate targets. In order to make urban passenger transport more sustainable and help the U.S. reach its climate target, a modal shift, i.e. shifting car traffic to the environmentally friendly transport modes, like public transport, needs to be implemented (Müller & Reutter, 2022, p. 719). However, the development of PR has faced significant challenges, largely due to the high costs involved (Thompson, 1994). This sets the stage for a comprehensive exploration of the funding mechanisms needed to advance PR projects in the U.S.

As many U.S. cities grapple with funding constraints and budgetary limitations hindering the development of inner-city rail infrastructure, the case for intercity rail becomes more compelling. Consider the economic toll of congestion: the time Americans spend in traffic annually costs the nation over \$160 billion in wasted time and fuel (Peshek, 2019). The potential benefits of reducing travel times, congestion, and dependence on oil while improving connectivity through rail travel present a strong case for its resurgence. However, the landscape of rail options in the U.S. remains sparse, with Amtrak being the solitary national PR provider, characterized by high prices, limited routes, and infrequent services (Tiffany, 2023; US General Accounting Office, 2001).

In 2017, Brightline emerged as a potentially pivotal player, becoming the first privately owned intercity PR service to begin operations in the U.S. in a century (Saginer, 2018). The resurgence of private entities within PR development, exemplified by Brightline, not only has the potential to reinvigorate a dormant industry in the US but also initiates a reevaluation of the dynamics propelling sustainable and efficient intercity transportation. As the U.S. aligns with green initiatives with the new IRA and Bipartisan Infrastructure Law (BIL), sustainable transport solutions take the spotlight (USDOT, 2023). The BIL, passed in 2021, prioritizes climate change mitigation with a substantial \$102 billion allocation for rail funding over five years.

In this context, prioritizing electrification and investment in sustainable transportation aligns with both environmental goals and public interests. While inner-city rail network development in U.S. cities face challenges due to local political and financial constraints, the potential for

intercity rail gains prominence due to its potential to be supported by existing freight rail infrastructure, less resistance from local municipalities, and the broader regional collaboration typically associated with connecting major cities (Eno Center for Transportation, 2021).

Background

The Federal Railroad Administration has identified 69 potential rail corridors, emphasizing the vast opportunities for rail feasibility on a national scale (Federal Railroad Administration, 2022). Given that a rail corridor connects two or more large metropolitan areas in a country where cities are typically vast distances apart, the financial magnitude of these projects presents a significant challenge, as government funding alone is insufficient to cover even a fraction of these corridors (ASCE, 2017; Federal Railroad Administration, 2005). Currently, \$30 billion has been allocated to advance the development of these corridors, with \$16.4 billion designated for the Northeast Corridor and \$6 billion earmarked for two projects in California. Local officials in these highly populated regions have pledged state support which mitigates certain risks (CalSTA, 2023; The White House, 2023b). However, the majority of identified corridors require additional state support for financing (Lassen, 2023).

According to Chen (2017), to be competitive with air and vehicular modes of travel, an intercity rail trip travel time should span one to four hours. This translates to rail corridors between cities spaced 160 to 800 km apart (100 to 500 miles). Unfortunately, this distance criterion falls below Amtrak's mandate, as the sole public PR provider in the U.S., which requires a corridor to be at least 1200 km (750 miles) to receive federal funds without state funding (Lazo et al., 2021). This requirement creates challenges for local legislators aiming to secure state funding due to political resistance and the predominant allocation of transportation funds to highways in most states. Additionally, public sector-led rail projects often encounter delays and budget overruns, which heightens the perceived risks associated with such ventures (Winston, 2006). These challenges contribute to a limited investment in rail from public government entities, emphasizing the pivotal role of private investment in the PR sector.

Florida East Coast Industries (FECI) has successfully implemented a private PR initiative, Brightline, utilizing a unique integrated model that incorporates Development Based Land Value Capture (DBLVC). As interpreted from Li & Love (2022), DBLVC is a type of land value capture (LVC) that involves strategic investments in commercial, residential, or mixed-use developments around rail infrastructure. This enhances the economic value of the land, creating opportunities to generate funds and offset rail investment costs. In the case of Brightline, transit-oriented development (TOD), which focuses on creating compact, mixed-use communities centered around public transportation hubs to encourage sustainable and accessible urban living, was used as it can have positive impacts on land values and urban regeneration (Sharma & Newman, 2020).

With minimal government funding and record speed, FECI leverages value capture from land development around the PR to offset capital costs (Mattar, 2023). As FECI plans to undertake another project in a different corridor, it is crucial to explore how companies can successfully develop private PR in a given corridor, strategically mitigating costs and risks without immediate reliance on government grants. This paper outlines the research design and methodology for a comprehensive investigation into the conditions under which private U.S. railroad companies can achieve economic, collaborative, regulatory, and technical viability in PR projects using DBLVC within TOD models.

Exploring the success factors of Brightline, the first U.S. private PR venture to begin operations in a century, is a central inquiry in this research (Spencer & Kozin, 2023). The focus is on

unraveling FECP's integrated business models, identifying pivotal synergy factors, and examining the potential extension of the DBLVC model in regions beyond Florida.

Assessing the feasibility of private companies using DBLVC to finance rail projects in potential U.S. rail corridors is crucial for increased investment in sustainable transportation infrastructure. Successful rail projects, exemplified by Zhao & Shen (2019), showcase how intercity rail can catalyze denser land development, attract business and talent, stimulate economic growth, alleviate congestion, enhance urban planning, foster regional connectivity, reduce emissions, and improve air quality. This research has the potential to contribute to unlocking the economic and environmental vitality of cities through private rail TOD investment.

The practical dilemma lies in the finance gap within intercity rail projects, necessitating private investment to make PR feasible. Insights need to be gained by examining successful models like FECP and Brightline on how TODs can make PR financially viable beyond Florida. This research extends beyond academia, aligning with sustainability challenges, political interests, and financial considerations. Understanding the balance between private investment, real estate dynamics, and intercity rail is crucial in reshaping the future of the U.S. transportation system towards more sustainable modes.

Problem Definition

Despite the federal government's allocation of over 100 billion dollars for PR development within five years, funding remains inadequate to support the corridor development necessary for a sustainable transition to rail transport (Eno Center for Transportation, 2021; Lazo & Guskin, 2019; The White House, 2023b). The BIL underscores the current U.S. government's prioritization of sustainability initiatives, highlighting the imperative to fund the adoption of sustainable transportation solutions such as intercity PR projects (Federal Railroad Administration, 2023). Researchers increasingly recommend exploring alternative funding sources to facilitate the swift transition to sustainable transportation modes (OECD, 2015). Here, the private sector can assume a decisive role. Historically, the substantial initial capital requirements and liquidity constraints of rail ventures have deterred private investment (OECD, 2015, p. 8). Consequently, the challenge lies in how private entities can employ more diverse strategies to make PR investments financially viable. The success of the Brightline case in financing a rail project using DBLVC strategies is noteworthy, overcoming the common funding, technical, and political constraints faced by the public sector in PR development.

Moreover, the novelty of utilizing DBLVC in PR projects has led to limited research in this area. It is crucial to explore the success factors to assess the private sector's potential contribution to reducing the government's carbon footprint and achieving its 2030 domestic emissions reduction target. Currently, academic literature underscores a critical gap in understanding the practical implementation of DBLVC for private rail ventures, particularly regarding value capture mechanisms and risk mitigation strategies. This research is relevant not only for businesses funding rail but also for policymakers, residents, urban planners, financiers, and environmental scientists. Policymakers can use these findings to shape sustainable transportation policies and spur economic development, while researchers can gain insights into the environmental impact of private sector involvement, aiding interdisciplinary efforts to combat climate change.

Aim and Research Questions

The aim of this research is to explore and advance the understanding of potential pathways for financing the development of intercity PR corridors in the United States. The primary aim is to contribute qualitative evidence regarding the *success factors* of private passenger rail initiatives utilizing DBLVC strategies for funding rail infrastructure capital costs. Additionally,

this study aims to explore strategies employed by FECI to successfully mitigate risks during the development of their Brightline passenger rail. By doing so, this research has the potential to contribute to understanding how DBLVC strategies could be feasible for private companies by examining how FECI navigated the well-established aspects of *regulatory, economic, collaborative, and technical* dimensions in the Miami-Orlando corridor, as identified in Li & Love (2022). The research questions (RQ) are presented below.

RQ1: What specific factors, including regulatory, economic, collaborative, and technical considerations, did FECI, a private company, consider to ensure the completion of an intercity passenger rail project using a DBLVC strategy?

RQ2: How did FECI effectively employ TOD to help finance an intercity private passenger rail development project in the US?

RQ3: What risks did FECI encounter during the implementation of their DBLVC strategies, and how were these risks mitigated?

Utilizing an explorative case study approach, this research will analyze a successful privately funded intercity PR project, FECI's Brightline. As a result of this analysis, a conceptual model of private rail development utilizing DBLVC strategies was developed. This model illustrates the key success factors employed by private entities in leveraging DBLVC for rail infrastructure financing. To ensure a comprehensive understanding of contextual factors in the United States for privately funded rail initiatives, the study extends its focus beyond the specific aspects identified in Li & Love (2022).

This research aims to make a dual contribution. Firstly, it seeks to contribute academically to the growing research on TOD as a value capture strategy for funding private rail projects. Secondly, the thesis aims to provide practical insights into how companies can both assess the regulatory, economic, collaborative, and technical feasibility of developing rail using DBLVC in a given corridor and mitigate risks effectively.

Scope and Delimitations

The scope and delimitations of this research project were crafted to establish clear boundaries and focus within the allocated time frame. Firstly, the geographical scope of this study is exclusively the United States. This decision is driven by the presence of the novel case study, Florida's Brightline, within the U.S. borders. As the only privately funded PR project utilizing non-tax-based value capture strategies for financing operating in the U.S. Brightline offers a rich context for examining such initiatives in a nation with a documented lag in PR development (Winston, 2006). Additionally, the country's unique legal, geographical, and political conditions further justify this focus. These conditions differ notably from regions like Hong Kong, where LVC strategies have been used for rail development in partnership with the government. Understanding these distinct conditions is crucial for assessing the applicability and success factors of DBLVC strategies in the U.S. context, especially when analyzing data through Li & Love (2022)'s conceptual model, which focuses on regulatory, economic, collaborative, and technical aspects.

This research explicitly focuses on understanding the success factors, decision-making processes, and risk mitigation strategies employed by private companies to assess the viability of corridor development using DBLVC without immediate government funding. Therefore, the scope is narrowed to the planning and implementation stages, aiming to uncover the key factors guiding private entities in initiating corridor development independently of immediate government support. Additionally, environmental consequences and policy implications are considered alongside business aspects, with a specific focus on financing and construction phases rather than factors like ticket sales or ridership.

Lastly, a potential limitation of this research lies in the fact that it is based on a single-case study, which may restrict the direct applicability of the findings to other private rail ventures due to context-specific factors. External validity, defined as the extent to which research findings from one study can be generalized to other relevant contexts (Saunders et al., 2023) p. 216), could be impacted by this limitation. However, this study addresses this concern by including interviews with various stakeholders, such as freight line owners, urban planners, and policymakers, to ensure a comprehensive understanding of the requirements and generalizable factors for similar projects.

Ethical Considerations

This research was conducted independently without external funding, ensuring the integrity of the research process and study outcomes (Creswell, 2018). The involvement of the case company was limited to providing data, and the interviews conducted did not influence the research conduct.

Participation in the interviews was voluntary, with informed consent forms provided to participants or verbal consent obtained, outlining the research's aim, and guaranteeing confidentiality (see Appendix A). These consent forms detailed the research project's purpose, its voluntary nature, and the potential benefits of participation. Only the position titles of the interviewees were stored; names were not retained to ensure anonymity.

Data obtained from interviews and databases are securely stored, accessible only to the researcher and Lund University, in compliance with GDPR regulations for protecting personal identifiers and sensitive information (Lund University, 2023). Upon transcription of the interviews, audio recordings were deleted, and transcripts were securely stored on a password-protected hard drive.

Furthermore, participants were informed about the possibility of artificial intelligence being used to synthesize transcripts, ensuring transparency, and providing an opportunity for participants to raise any concerns regarding the use of AI technology.

Recognizing the possibility of personal biases affecting the research, it is recognized that the researcher is from the region under study. Therefore, a commitment to mitigating these biases was made through triangulation—considering multiple perspectives and sources. Reflexivity was maintained throughout the research process to address personal biases effectively.

Ultimately, the outcomes of this research do not compromise the reputation, dignity, or privacy of any participants involved.

Audience

The findings of this study are expected to significantly contribute to the academic research community focusing on rail projects utilizing LVC strategies, particularly in the context of private businesses and public-private partnerships (PPPs), as well as TOD. This research aims to enhance the discourse within this field by building upon Li & Love (2022)'s conceptual framework, particularly in the realm of private sector involvement.

The insights derived from this study are anticipated to be valuable for a diverse range of stakeholders, including businesses, residents, urban planners, financiers, and policymakers involved in potential corridor developments. For both businesses and policymakers, this research provides valuable insights into the success factors and barriers associated with implementing DBLVC strategies for PR projects. By understanding these dynamics, policymakers at various governance levels can potentially encourage private funding and

implementation of rail TOD projects within their jurisdictions, thereby promoting a sustainable transition from car-centric to rail-centric transportation systems.

Additionally, the findings of this study hold practical implications for rail companies like Brightline and freight lines that possess existing assets conducive to DBLVC strategies. By illustrating success factors and offering strategies to mitigate risks, this research aims to inspire business organizations to invest in more sustainable transport methods and TOD through integrated business models.

The intended audience of this research also extends to prospective or current companies interested in private PR projects, local governments seeking to support sustainable transportation initiatives, and academics in the field of LVC strategies. For businesses, understanding the factors that ensure the effectiveness of their rail TOD (rTOD) business model is crucial for mitigating risks associated with significant capital investments.

Furthermore, researchers examining LVC strategies in business models will find value in the insights generated by this study. By exploring the planning and implementation stages of privately funded rail projects and their implications, this research lays a foundation for further investigation into DBLVC strategies. Overall, this study aims to not only advance academic knowledge but also inform practical decision-making and inspire sustainable transportation initiatives.

Disposition

Chapter 1 provides the initial background and research problem. This is followed by the study's aim and related research questions, along with scope, ethical considerations, and the target audience.

Chapter 2 details the background information on the characteristics of PR in the U.S. and the primary policy objectives concerning sustainable transport modes. It focuses on the most pertinent aspects for this thesis, avoiding a comprehensive overview prior to the analysis.

Chapter 3 provides the conceptual foundations for LVC strategies in rail, risk mitigation for rail projects, and the success factors for public-private partnerships for rail developments. It summarizes current academic understanding of private PR initiatives using DBLVC and analyzes research gaps.

Chapter 4 chapter presents relevant frameworks, describes their dimensions, and explains how they will inform data analysis of DBLVC strategies for private entities in rTOD.

Chapter 5 outlines the research design, including the methods used to collect and analyze the data.

Chapter 6 provides the results of the thematic analysis, the main findings of the research, and a new analytical framework for private PR using DBLVC.

Chapter 7 discusses the implications of the main results. It also notes methodological and data limitations, along with the study's generalizability.

Chapter 8 concludes the study findings and provides practical applications for the intended audience and potential avenues for future research.

2 Literature Review

Background

This section offers background information on the characteristics of PR in the U.S. and the primary policy objectives concerning sustainable transport modes. The chapter concentrates on the most pertinent aspects for this thesis, avoiding a comprehensive overview prior to the analysis.

2.1.1 The downturn of intercity passenger traffic

For nearly a century, beginning in the mid-1800s, railways dominated transport in the United States (Cohen, 2009). By the mid 19th century, large private institutions controlled most of the external rail financing. However, this trend shifted during the Great Depression when new federal regulations enabled financial institutions to divest rail debt, marking a significant departure from private PR ownership.

By the 1900s century, rail transported nearly all intercity passenger traffic in the US (Winston, 2006). However, private divestment in rail, coupled with investment in the construction of the interstate highway system in the 1950s and the acceleration of air travel in the 1960s, led to a decline in rail's dominance in the transportation market. As shown in Figure 2-1, intercity railroad passenger miles plummeted from approximately 30 billion in the early 1950s to about 6 billion by the early 1970s. This decline in ridership, along with bankruptcy among some private-owned passenger rails, necessitated government intervention, resulting in the establishment of the publicly owned Amtrak as the sole remaining intercity PR service (Winston, 2006).

While Amtrak played a crucial role in salvaging the industry amidst the rise of highways and air travel, it often faces challenges such as missing deadlines, lack of profit pressure, and political scrutiny stemming from its reliance on taxpayer dollars, hindering expansion efforts (Winston, 2006). Additionally, the seismic shift towards cars, buses, and trucks as the primary modes of transportation, coupled with declining ridership, made private sector investment in PR seem risky (Cohen, 2009, p. 2), resulting in limited PR development in the U.S (Shipman, 1971).

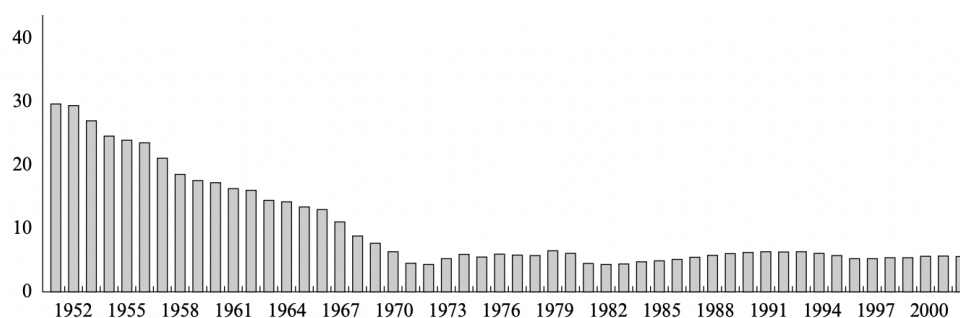


Figure 2-1. Intercity railroad passenger-miles, 1951-2002 (billions)

Source: Winston (2006)

In recent years, rail systems in the United States have grappled with financial deficits, relying significantly on ticket revenue and government subsidies (Sharma & Newman, 2020). The dependence on these traditional funding sources has exposed vulnerabilities, prompting a reevaluation of sustainable financing models and the potential renewed interest in private investment in intercity PR. Challenges in government funding for PR, exacerbated by controversies surrounding transit subsidies in the U.S. (Pucher et al., 1983, p.155), have

propelled conversations on the viability of private investment. The imperative to increase PR traffic to prevent operational deficits, alongside the U.S.'s climate targets and infrastructure initiatives (see Chapter 2.2), has reignited interest in investing in rail infrastructure (DeSimone, 2022).

2.1.2 Relevant policies

The passage of the U.S. Infrastructure Investment and Job Act, commonly referred to as the BIL and enacted in 2021, along with the IRA of 2022, signifies pivotal legislative efforts aimed at revitalizing and decarbonizing transportation infrastructure in the U.S (U.S. Department of Transportation, 2022). Since 2016, the transportation sector overtook the power sector as the primary source of GHGs in the U.S and must be a focus for future GHG mitigation efforts to meet the 2050 emissions target (see Chapter 1) (Bleviss, 2021). By fostering a regulatory environment that encourages investment in sustainable infrastructure and low-carbon transportation solutions, the IRA may create favorable conditions for companies to explore opportunities in private PR ventures. This shift towards environmentally conscious policies and investments could align with the goals and interests of businesses seeking to participate in initiatives that prioritize sustainability and address climate change. While the IRA mostly focuses on cleaner transportation fuels and vehicles ((The White House, 2023a), these two pieces of legislation make significant investments for a sustainable transition, with the BIL being the largest investment in transit in American history, incorporating mandatory transit funding and supplemental transit appropriations over five years (U.S. Department of Transportation, 2022). The BIL grants, subsidies, and tax incentives support surface transportation projects with climate benefits, and their emissions-reducing provisions all operate via federal spending (Orford, 2023, p. 7).

As the BIL and IRA incentivize private sector involvement in PR ventures through regulatory and financial mechanisms, reducing the financial risk of undertaking an infrastructure venture (Li & Love, 2022). And in an economically rational world, BIL and IRA's pricing interventions (subsidies, grants, tax incentives) would have enormous impacts on sustainable transport investment by local governments and the private sector. However, the world is not economically rational, and prices alone do not predict the future. Numerous non-price factors pose additional barriers to the shift that BIL and IRA hope to promote, and they do little to address these constraints (Orford, 2023, p. 40). Despite government funding, regulatory hurdles within bureaucratic processes, technological limitations, infrastructure constraints, politics, behavior and demographic norms, and limited local funding/support are some non-price factors that could impede sustainable PR initiatives.

2.1.3 Private failures

In the past, both price factors and non-price factors have significantly limited the growth of publicly owned Amtrak initiatives, as well as private ventures. Despite being the first intercity passenger private rail to open in the US in a century, Brightline's success contrasts with the challenges and failures of previous initiatives (Tubb, 2016).

A recent comparable case is the Texas Central project, which operates intrastate over a distance similar to Brightline's Florida project. Texas Central has faced persistent challenges, including significant local opposition, unresolved questions about demand forecasts, and doubts about the private sector's ability to carry out the project. The owners, Texas Central Partners, initially underestimated construction costs and ridership figures, with experts estimating the actual cost to be significantly higher (Gleason, 2018). Despite these challenges, the project lacks necessary support from federal and state governments. The CEO emphasized before resigning that the project's launch depended on the BIL's passage, underscoring how, despite its initial focus on private funding, government subsidies were essential to overcoming setbacks (Gleason, 2018;

Luczak, 2021). The project's pause underscores the need for clear financial planning and collaboration between public and private sectors for success. Inadequate government support has been a common factor in failed US private PR initiatives, stressing the importance of effective collaboration to address associated risks (Thompson, 1994, p. 34).

2.1.4 Florida East Coast Industries and Brightline

Florida East Coast Industries (FECI) is a multifaceted transportation, infrastructure, and commercial real estate conglomerate (Florida East Coast Industries, 2024). Of particular relevance to this research is its subsidiary, Brightline, the privately-owned inter-city rail service and TOD project connecting Miami to Orlando (see Appendix V). Brightline, launched in 2017, aims to establish upscale PR service between Miami and Orlando, two cities approximately 386 km apart (240 miles) (Railway, 2023). The project utilizes an existing freight rail line spanning 312 km, with an additional 64 km extension under construction to Orlando. While not classified as high-speed rail, Brightline trains operate at speeds ranging from 127 to 200 kilometers per hour (79- 125 miles per hour), slightly slower than Amtrak's Acela, the fastest PR in the U.S., which reaches speeds of up to 240 km/h (150 mph) (National Railroad Passenger Corporation, 2022).

FECI, backed by the resources of Fortress Investment Group, a leading global investor with approximately \$50 billion of assets under management as of September 30, 2020 (Bloomberg, 2024), operates primarily through two key business lines: Brightline Trains and Real Estate Development. FECI has an indirect 98.23% ownership of Brightline and ownership of real estate development companies as seen in Appendix VII (Florida Development Finance Corporation, 2020; Vogel, 2013).

A distinctive aspect of FECI's venture is its innovative integration of TOD as a means to independently finance its intercity private PR development project (Florida East Coast Industries, 2024). Leveraging Brightline's rail infrastructure, FECI strategically pursues real estate development opportunities around existing and future stations. By upgrading the freight lines owned by Grupo México 's Florida East Coast Railway (FECR), FECI influences operations and strategic direction within this innovative enterprise, assuming sole responsibility for financing the operation of its intercity passenger trains within Florida (FDOT Freight & Rail, 2023).

Project finance for Brightline was raised through a combination of debt, bonds, and equity, with private developers not reliant on public subsidies or grants, apart from federal low-interest private activity bonds providing a risk guarantee (Sharma & Newman, 2020). This financing structure has been made possible through TODs established at each of the four rail stations (Renne, 2017).

Central to Brightline's business model is its virtuous circle approach, where transportation and real estate development synergize to create value. By owning and developing TODs around its rail stations, FECI and Brightline enhances the passenger experience while generating additional revenue streams (Washington Economics Group, 2014). Economic studies project significant value creation through private investment and expertise in land development, as well as strong partnerships with county and local governments to facilitate urban development and integration with local transport (Sharma & Newman, 2020).

In implementing the DBLVC strategy and pioneering TOD as a financing mechanism (see Chapter 3.1.2), Brightline encountered various risks inherent to large-scale infrastructure projects. To mitigate these risks, the company employed a range of strategies, drawing upon its experience, industry expertise, and adaptive management practices. Analyzing Brightline's

venture sheds light on how private rail initiatives can minimize the risk of failure and maximize project success in the U.S. context.

Literature Review

The following chapter provides an overview of the relevant and contemporary literature and background knowledge essential for addressing the three RQs outlined in Chapter 1.3. Firstly, a literature review is conducted, focusing on success factors for PPPs in rail development and LVC, particularly within the realm of PR. Subsequently, it provides a general conceptualization of land-based value capture in PR, with a specific emphasis on private rail investment. Secondly, the chapter explores the concept of DBLVC in the absence of financial assistance from the public sector, synthesizing existing research on DBLVC, and examining success factors and risks encountered in private PR ventures.

Current knowledge related to land value capture in rail TOD

2.1.5 Methods of financing rail transit infrastructure

The development of transit infrastructure is crucial for urban growth and sustainability (Kamga, 2015; Zhu, 2021). Funding these large-scale projects presents a significant challenge due to extensive financial requirements and associated risks (Flyvberg et al., 2004). Various financing mechanisms tailored to the distinct economic, political, and social landscapes of different regions have been utilized globally (Li & Love, 2022; Suzuki et al., 2015). This review delves into these mechanisms, focusing on contributions from both public and private sectors, along with innovative financial models to gauge their implications and effectiveness in the development of transit infrastructure.

Public sector initiatives are fundamental in infrastructure financing (Ke et al., 2020). Property and land tax is a key method where taxes levied on property and land value increases—often resulting from infrastructure improvements—support general municipal needs or are earmarked for further development (Li & Love, 2022). These are forms of LVC, which refers to a set of mechanisms that aim to recover some of the increase in land value resulting from public infrastructure investments (Suzuki et al., 2015, p. 57). This is achieved through various instruments that leverage the enhanced value of surrounding properties to fund infrastructure projects. In the U.S., tax increment financing (TIF) is a popular method (see Chapter 3.1.2), funding projects through the expected increase in property tax revenues due to enhanced property values from new developments (Li & Love, 2022; Noring, 2019; Suzuki et al., 2015). This mechanism attracts private investment by guaranteeing returns through increased future tax revenues (Noring, 2019).

However, TIF has its limitations. Critics argue that it can lead to gentrification, displacing lower-income residents due to rising property values (Smith & Gihring, 2006). Additionally, the effectiveness of TIF is contingent on robust economic conditions and a stable real estate market, which are not always present (Levinson et al., 1997). In regions like the U.S., where economic conditions are less conducive compared to Europe or Japan, subsidies are crucial to offset the high costs and lower population densities. Levinson et al. (1997, p. 212) assert that “it is doubtful that without considerable subsidy high-speed rail could be constructed, much less profitable in the U.S.” This highlights the necessity of public financial support in less densely populated and economically variable regions.

Private sector contributions include direct revenue streams such as ticket sales and freight contracts. Private companies also leverage assets like stations and right-of-way to supplement funding, crucial for sustaining operations and infrastructure expansion (Lawrence, 2018). This

method of leveraging private assets is often seen in conjunction with public sector support, illustrating the hybrid nature of many successful rail financing models.

Government and private bonds highlight the distinction the U.S. federal tax code makes between governmental bonds, used for public projects, and private activity bonds, benefiting private entities. These bonds are particularly attractive due to tax exemptions that encourage infrastructure investment (Congressional Research Service, 2022). However, the effectiveness of private bonds is closely tied to market conditions and investor confidence, which can fluctuate based on broader economic trends (Flyvbjerg et al., 2004).

The literature reveals a complex landscape of financing mechanisms, each with its own set of advantages and limitations. The reliance on public subsidies and supportive policy frameworks underscores the challenges of financing high-cost infrastructure projects in less densely populated regions like the U.S. The hybrid models of funding, combining public and private investments, appear to offer the most resilient approach, balancing risk and leveraging diverse revenue streams. However, each method's effectiveness is highly context-dependent, necessitating tailored strategies to address specific economic, political, and social conditions.

2.1.6 Development based land value capture

DBLVC builds on the principles of general LVC but focuses specifically on leveraging public or private control over land to finance urban transit projects (Li & Love, 2022; Suzuki et al., 2015). DBLVC specifically relies on public or private control over land and the increment of land value through infrastructure investment, better site-level plans, and regulatory changes. The government, transit agency, or private investor captures the land value increment by either selling the serviced land or leasing the development or land use rights to other parties (Suzuki et al., 2015, p. 62).

A significant reason for the limited research on private companies utilizing DBLVC independently is the inherent complexity and risk associated with these projects. Public-Private Partnerships (PPPs) are more common because they allow for risk-sharing and leverage the strengths of both sectors (Tang & Lo, 2010; Liu & Wilkinson, 2013). Private companies face substantial barriers, such as high initial capital costs, long development timelines, and uncertain returns, which can be mitigated through public sector involvement (Smith & Gihring, 2006; Li & Love, 2022). Additionally, the success of DBLVC strategies often hinges on favorable regulatory and economic conditions, which are typically facilitated by public entities (Suzuki et al., 2015). This makes purely private initiatives less common and less studied, highlighting a gap in the current research that warrants further exploration.

DBLVC approaches underscore the fundamental role of strategic land use in financing urban rail projects and highlight the importance of effective land management practices. Bohman & Nilsson (2016) establish a positive correlation between population density at the municipal level and property prices, underscoring the role of rail in shaping land values. This relationship is pivotal for DBLVC instruments, which rely on the sale of land or leasing of development rights controlled by the state, including land assembled from private landholders (Suzuki et al., 2015, p. 62). Opportunities for LVC are market-driven, indicating that successful implementation hinges on robust market conditions and strategic urban planning.

For financing major urban transit projects, DBLVC instruments are useful but complex. Publicly owned land alone is insufficient to adopt development-based LVC instruments; the government must enhance land value before recapturing the increment for public investment (Suzuki et al., 2015, p. 62). This requires robust planning and regulatory frameworks to ensure that infrastructure investments lead to substantial land value increases.

Studying one of the few profitable PR projects worldwide employing DBLVC, Sharma & Newman (2020, p. 955) emphasize that its financial success hinges on initiating land development-based finances before rail line operation. This proactive strategy ensures adequate financial resources for project initiation, diminishing dependence on public funds and subsidies. Knudsen & Rich (2013), Lv et al. (2020), and Sharma & Newman (2020) scrutinize various models employed by governments to fund urban rail projects, providing a comprehensive understanding of financial mechanisms and their implications. These studies contribute to the discourse on the financial aspects of rail initiatives and explain the role of government funding in shaping the landscape of urban rail development. Findings indicate that, although government value capture mechanisms such as taxes are effective, private LVC strategies are more adept at capturing significant value (Sharma & Newman, 2020).

Figure 3-1 illustrates various land value capture instruments, highlighting the mechanisms through which land value can be leveraged to fund infrastructure projects. This figure underscores the diversity of LVC tools available, ranging from property and land taxes to joint development and air rights sales. The figure helps clarify the multifaceted approaches to LVC and their respective roles in funding urban rail projects.

Joint development, a well-coordinated development of transport facilities and adjacent private property between public agencies and developers, is a significant value capture strategy (Suzuki et al., 2015, p. 58). This collaboration allows private developers to contribute to infrastructure development, often by constructing facilities or financing part of the construction costs. However, this model requires careful negotiation to balance the interests of public and private stakeholders. Suzuki et al. (2015) illustrate the phased approach to financing DBLVC. Appendix VIII outlines the stages of planning, land coordination, development, operation and maintenance, and regeneration, highlighting the roles of government entities, transit agencies, developers, and local communities. They emphasize the importance of strategic land use planning, public-private partnerships, and the integration of various LVC tools to enhance user accessibility, agglomeration benefits, and sustainable urban growth.

Additionally, while LVC is also used in sectors such as mining and energy, where PPPs leverage land and resource value to fund infrastructure projects (Tang & Lo, 2010). These sectors demonstrate the versatility of LVC mechanisms but also highlight the complex regulatory and market conditions required for their success.

The literature reveals that while LVC is an effective tool for funding PR, it is filled with complexities and potential downsides. The financial viability and risks associated with transit projects, particularly urban rail transit, require comprehensive risk management strategies to ensure long-term viability (Li & Love, 2022). Additionally, LVC can exacerbate socio-economic inequalities by increasing property values and living costs in urban areas, which has consequences like gentrification (Smith & Gihring, 2006).

“Fully government LVC tools are rigid and may make development around stations less attractive for investment” (Sharma & Newman, 2020, p. 956). While land-based levies, tax increment financing, and special investment district levy tools help fund urban rail, these capture methods may not generate enough private investment to fully realize the economic potential of the infrastructure. “Relying entirely on development-based LVC instruments to generate funds for financing private rail is nonviable” (Suzuki et al., 2015, p. 62).

	Instrument	Description
Tax or fee-based	Property and land tax	Tax levied on estimated value of land or land and buildings combined, with revenues usually going into budgets for general purposes.
	Betterment charges and special assessments	Surtaxes imposed by governments on estimated benefits created by public investments, requiring property owners who benefit directly from public investments to pay for their costs.
	Tax increment financing	A surtax on properties within an area that will be redeveloped by public investment financed by municipal bonds against the expected increase in property taxes. Mainly used in the United States.
Development-based	Land sale or lease	Governments sell developers land or its development rights, whose values have increased thanks to a public investment or regulatory change, in return for an up-front payment, leasehold charge, or annual land rent payments through the term of the lease.
	Joint development	A well-coordinated development of transit station facilities and adjacent private properties between transit agencies and developers, where the latter usually contribute physically or financially to the construction of the station facilities, as their property value will increase thanks to the transit investment. Used in Japan, the United States, and other countries.
	Air rights sale	Governments sell development rights extended beyond the limits specified in land use regulations (such as floor area ratios [FARs]) or created by regulatory changes to raise funds to finance public infrastructure and services.
	Land readjustment	Landowners pool their land and contribute a portion of their land for sale to raise funds and partially defray public infrastructure development costs.
	Urban redevelopment schemes	Landowners and a developer establish a cooperative entity to consolidate piecemeal land parcels into a single site that they then develop (such as a high-rise mixed-use building) with new access roads and public open spaces. The local government modifies zoning codes and increases maximum FARs in the targeted redevelopment areas (typically around rail transit stations) and finances the infrastructure. Mainly used in Japan.

Figure 2-2. Land value capture instruments

Source: Adapted from Suzuki (2015)

2.1.7 Transit-oriented development

TOD is a strategy that integrates land use and transportation planning to create sustainable urban environments (Suzuki et al., 2015). With transit, the government or transit agencies can enhance land value in pursuing TOD principles and capture benefits from property-related revenues and increased ridership (Suzuki et al., 2015, p. 62). Population density at a municipal level shows a positive impact on property prices (Bohman & Nilsson, 2016). It is imperative to know beforehand if the value of the land offsets the cost of infrastructure (Zhang & Xu, 2016).

Accessibility to rail transit is not consistently capitalized into commercial property values, but station proximity positively influences redevelopment activity. Residential sites near stations are far more likely to be developed compared to commercial or industrial uses (Landis et al., 1995, p. 107).

Li & Love (2022), Zhao & Shen (2019), and Zhu (2021) delve into the transformative impact of rail on land use, revealing how rail projects influence and shape the surrounding urban landscape. These studies provide valuable perspectives on the broader spatial and developmental implications of rail initiatives. Zhu (2021) discovered that, on average, high-speed rail contributes to an 11.2% accelerated growth rate of urban built-up areas. However, the impact is heterogeneous and depends on the size and geographical location of cities. This prompts further research into the specific corridor factors that influence urban development surrounding rail.

By using DBLVC revenues for TOD investments in station areas (such as parks, streetlights, bike lanes, and pedestrian sidewalks), governments, transit agencies, developers, landowners,

and communities can jointly develop efficient, attractive, and safe public places in TOD areas. Development of such prime public spaces, in turn, increases property values in TOD areas (Suzuki et al., 2015, p. 37). Urban rail transit will significantly benefit land use and site rents only if a region's economy is growing and supportive programs such as permissive zoning are in place (Smith & Gihring, 2006).

The extent to which a station precinct is connected to an improved transport system that can save time and improve local amenities, thus enhancing the urban experience, is critical (Sharma & Newman, 2020, p. 946). The selection/designation of a TOD neighborhood entails more than just being in proximity to transit stations. It involves assessing urban structure elements such as existing levels of density (residential or employment), distance to transit, mix of land uses, and available housing options near transit stations. Higher densities lead to higher transit ridership, but a minimum density threshold is required to support transit systems and allow developers to determine appropriate development in a TOD area.

Stakeholders often debate the required density for supporting TODs (Kumar et al. 2021). However, a typical TOD neighborhood accomplishes at least 3,000 dwellings/sq.km in residential areas. Therefore, the selection of potential neighborhoods is a preliminary investigation of existing urban structures (Maurya et al., 2022).

According to Sharma & Newman (2020, p. 944), effective TOD requires encouraging an optimal mix of land uses through adaptive zoning and planning processes, designed to integrate seamlessly with both the broader transit system and emerging micro-mobility solutions. Connectivity and convenience are essential, with last-mile services crucial to making TODs effective. Bleviss (2021) argues that the private sector can provide these services more efficiently and cost-effectively, enhancing consumer use. Generally, passengers will not wait more than 10–15 minutes for a connection during peak travel periods and will walk no more than a quarter to half a mile to and from a transit stop. TOD should promote residents' quality of life, stimulate community consciousness, and enhance city attractiveness (Yu et al., 2022).

2.1.8 PPP

PPPs represent a collaborative approach where investment and risks are shared between the public and private sectors. This model leverages the strengths of both sectors, combining public benefits with private sector efficiency (Congressional Research Service, 2022; Bleviss, 2021). While there is no universally accepted definition of a PPP, the concept generally refers to a range of possible relationships between public and private actors for the delivery of a common goal (Gardiner et al., 2015). Liu et al. (2015) provide a more precise definition, stating that a PPP "involves the private sector in aspects of the provision of infrastructure assets or of new or existing infrastructure services that have traditionally been provided by government." Despite the variety of definitions, PPPs are commonly understood to incorporate three key elements: formalized partnerships, risk sharing, and financial rewards for private parties (Gardiner et al., 2015, p. 18).

Formalized Partnerships

PPPs offer formalized partnerships where both public and private sectors work towards common goals. These partnerships are supported by legal and contractual agreements that define the roles, responsibilities, and risk-sharing mechanisms for each party. Effective collaboration and communication among various entities involved in urban rail development are crucial for the success of PPPs. Studies by Sharma & Newman (2020) and Tang & Lo (2010) emphasize the importance of these social and organizational aspects. The public sector must provide the necessary legal, contractual, strategic, and regulatory framework to ensure that private partners can share risks fairly (Tang & Lo, 2010).

Risk Sharing

The involvement of the private sector in PPP projects can bring significant benefits, including reduced total project costs due to more efficient financial, operational, and labor management (Ke et al., 2020, p. 99). Effective risk allocation is crucial, with each risk ideally allocated to the party best able to manage it at the least cost (Ke et al., 2020, p. 99). PPPs have shown mixed results globally. Challenges such as misaligned incentives and risk allocation can undermine the effectiveness of PPPs (Tang & Lo, 2010; Ke et al., 2020). These issues suggest a need for clear regulatory frameworks and transparent contract structures to ensure the long-term viability of PPP projects (Ke et al., 2020, p. 101). Ensuring the participation of private investors requires the government to act as a guarantor, mitigating risks with funding and backing for these private projects, and providing assurance regarding right-of-way access and facilitating land development (Knudsen & Rich, 2013; Lv et al., 2020; Sharma & Newman, 2020). These studies provide a comprehensive understanding of financial mechanisms and their implications, contributing to the discourse on the financial aspects of rail initiatives and explaining the role of government funding in shaping the landscape of urban rail development.

Financial Rewards for Private Parties

PPPs offer financial rewards for private parties, which can enhance project viability. Private companies, because of their commercially oriented objectives, are often more operationally efficient and innovative in the use and management of assets and resources than public organizations (Tang & Lo, 2010, p. 124). The public sector and the private sector share the cost, risk, and returns of property development (Zhang & Xu, 2017). Involving private investors and developers early in the process is essential to leverage assets effectively and maximize revenue for further regeneration and infrastructure investments (Noring, 2019, p. 134).

Figure 3-2 illustrates how land value creation varies with the extent of private involvement. This figure highlights the diversity of LVC tools available, such as property and land taxes, joint development, and air rights sales (Sharma & Newman, 2020). It prompts consideration of the extent of public sector involvement necessary to effectively leverage LVC for value creation in PR projects.

2.1.9 Risks in Development-Based Land Value Capture

DBLVC presents significant risks that must be managed to ensure project viability. Li & Love's (2022) model, while aimed at policymakers, is still useful for private companies as it provides a framework for understanding these risks and implementing effective mitigation strategies.

Sharma & Newman (2020) highlight the significance of phased development in managing project risks and financial stability. Their research indicates that starting land development-based finances before the actual rail line operation is crucial for ensuring adequate financial resources for project initiation and reducing dependence on public funds and subsidies.

In addressing the intricate challenges of rail projects, Li & Love (2022) and Sarkar (2012) found that allocating the government's involvement to planning and regulatory aspects while predominantly engaging the private sector in finance and construction has proven to yield more successful projects. Jillella and Newman (2016, p. 63) identify several risks associated with DBLVC, including unpredictable volatile real-estate markets, gentrification, zoning regulations, political interference, forward-looking leadership, unwillingness to pay by stakeholders, long gestation periods, and revenue deficits. These risks highlight the need for comprehensive risk management strategies to ensure long-term project viability.

Li & Love (2022) introduce a novel model, forming the foundation of this thesis, concentrating on value capture in rTOD PPPs (see Chapter 4.1). This model explores value creation and risk

mitigation to guide companies in boosting land value in rail and real estate infrastructure projects. Aligned with the researcher's intent to explore critical factors through interviews, the plan was to investigate the model's real-world applications and implications through insights gathered from two case studies. This offers a novel perspective on private PR initiatives, considering regulatory, economic, collaborative, and technical aspects evident in PPP agreements, LVC, life-cycle processes, and governance under their model, recognizing their influential role in rail development within PPPs.

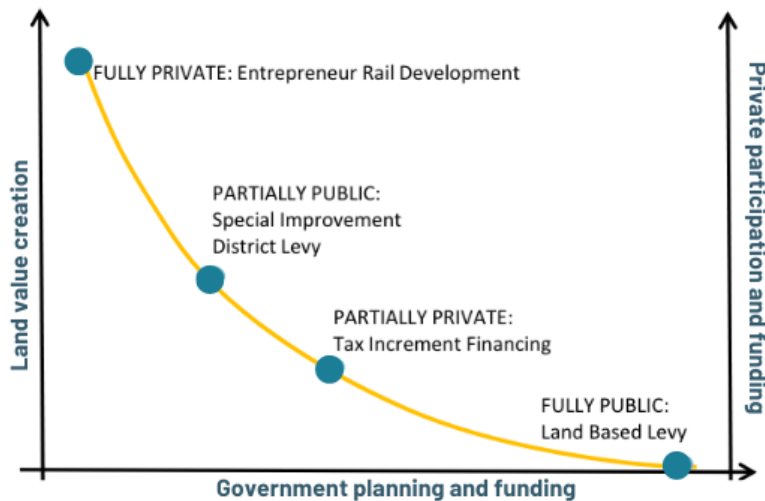


Figure 2-3. How land value creation varies with the extent of private involvement

Source: Adapted from (Sharma & Newman, 2020)

2.1.10 Key findings from literature review

The literature review highlights the importance of diverse financing mechanisms for rail transit infrastructure, including public initiatives like property and land taxes, and private sector contributions through revenue streams and asset leveraging. PPPs emerge as a crucial approach, blending public benefits with private sector efficiency and requiring robust legal, strategic, and regulatory frameworks, yet there is uncertainty if the private sector can take on a large infrastructure project without significant public financing. DBLVC is particularly significant for leveraging land value increments through infrastructure investment, although it presents substantial risks, including volatile real estate markets and political interference. Despite the extensive research on financing mechanisms, there is a notable gap in understanding the implementation and success factors of DBLVC in primarily private ventures, as most literature focuses on public sector-led land value retention. The research aims to address this gap by examining private rail initiatives like Brightline, which use DBLVC strategies independently to determine the viability of funding rail projects. Additionally, the need for more empirical studies comparing the long-term outcomes of different financing models in various geographic and economic contexts is underscored, providing essential insights for stakeholders in private PR projects and advancing sustainable transportation knowledge.

3 Conceptual and Analytical Frameworks

This chapter first explains the conceptual framework that informs RQ1 and RQ2. Secondly, it develops the analytical framework that informs RQ3. This framework is based on some of the key findings of the literature review and will be used to identify and analyze risks and mitigation strategies in DBLVC (RQ3). Chapter 4.2.1 first describes the process of developing the framework. Chapter 4.2.2 then outlines its respective risk factors.

Conceptual framework relevance to private passenger rail funding using DBLVC

In researching TOD and DBLVC, the conceptual framework introduced by Li & Love (2022) plays a crucial role. Although developed within the broader context of PPPs, this framework provides valuable insights for examining private PR initiatives, addressing RQs 1 and 2, which focus on LVC success factors and TOD life cycle. This adaptation is vital for understanding and implementing the practical elements of private sector involvement in TODs, even for projects like Brightline that have limited public sector involvement on the surface.

Li & Love's (2022) framework (see Appendix IX) systematically addresses the multifaceted nature of private PR ventures. Unlike many traditional models that focus primarily on the public sector's perspective, this framework includes private and public sector dynamics. However, the model has to be adapted to analyze the FECI case as this is not a contract agreement for a PR by the government, but a completely separate private project that had to develop financial strategies without significant public funding. It overcomes practical shortcomings found in existing LVC theories by providing a comprehensive approach that integrates theoretical concepts with practical implementation strategies. This is particularly relevant for understanding *how* to fund sustainable rail development in the U.S.

In practice, this framework serves as both a theoretical-analytical tool and a practical guide for stakeholders involved in private PR projects. By focusing on both macro and micro elements of project development, the framework ensures alignment with broader urban development goals while catering to specific project needs and contexts.

A notable aspect of this framework is the concept of the "bundled contract." This involves a single entity being responsible for various aspects of the project, including financing, infrastructure, rolling stock, line maintenance, and development-based land value capture. This approach helps reduce transaction costs, resolve conflicts among stakeholders, and lower overall life-cycle costs of the project (Li & Love, 2022, p. 5).

The revised conceptual framework for examining private DBLVC initiatives, as adapted for this study, emphasizes four critical components—Collaborative, Technical, Economic, and Regulatory. These components are designed to enhance the understanding of private ventures in the absence of direct government contracts:

The collaborative dimension focuses on cooperative aspects between the private sector and public entities, facilitating joint efforts in project planning and execution. This includes coordination needed to secure financing throughout the rail project's life. The technical dimension deals with technical challenges and innovations in rTOD development, ensuring that projects adhere to high standards of engineering and design. The economic dimension examines the financial viability and economic impacts of DBLVC initiatives, highlighting investment strategies, funding mechanisms like LVC, and economic benefits to the surrounding community. Lastly, the regulatory dimension considers the regulatory framework governing DBLVC projects, emphasizing policies that support effective collaboration between public and

private stakeholders while ensuring compliance with urban planning and environmental regulations. These four dimensions have subcategories that are detailed in Table 4-1.

The revised conceptual framework for examining private DBLVC initiatives, as adapted for this study, emphasizes four critical components—Collaborative, Technical, Economic, and Regulatory. These components are specifically designed to enhance the understanding of private ventures in the absence of direct government contracts:

Collaborative Component: Focuses on the cooperative aspects between the private sector and public entities, facilitating joint efforts in project planning and execution. While also considering the coordination needed to secure financing throughout the life of the rail project. The procurement arrangement aspect of their model was removed as this is a private project without a request from the public sector. **Technical Component:** Deals with the technical challenges and innovations in rTOD development, ensuring that projects adhere to the highest standards of engineering and design. **Economic Component:** Examines the financial viability and economic impacts of DBLVC initiatives, highlighting investment strategies, funding mechanisms like LVC, and economic benefits to the surrounding community. **Regulatory Component:** Considers the regulatory framework governing DBLVC projects, emphasizing the need for policies that support effective collaboration between public and private stakeholders while ensuring compliance with urban planning and environmental regulations.

Overall, Li & Love's (2022) framework offers a comprehensive and practically oriented approach to studying TOD and DBLVC in the context of private PR ventures. By filling a crucial gap in the literature with actionable insights and methodologies, this framework not only advances theoretical understanding but also enhances the practical implementation of DBLVC, making it highly applicable to innovative cases like the Brightline. This tailored approach ensures a thorough academic exploration and practical application in the context of DBLVC, providing a solid foundation for a literature review section dedicated to understanding the nuances of private sector participation in transit development.

Table 3-1. LVC in PPP considerations and their definitions

Dimension	Code	Rail Project Agreement Dimensions	Definition
C1 Collaborative	PPP1	Collaboration	How responsibilities, obligations, risks, and rewards of parties in a contract are delineated and if the arrangement allows for the flow of capital and information throughout the rail project's life cycle. Projects benefit from extensive collaboration with government and private developers as the structure of these arrangements aim to balance revenue and expenditures and ensure long-term viability.
C2 Technical	LC1	Technical Details	This encompasses the design, engineering, and construction of a PR system according to technical specifications for efficient operation. Factors to consider include the asset's technical capability, continuous improvement for vulnerability, collaboration between private and public sectors, and financial assurance.
C3 Economic	LVC1	Risk Mitigation	Implementing LVC carries inherent risks, as uplifts in land value are not guaranteed. Various factors, such as the type and term

			of land use and distance to stations can impact land value.
	LVC2	Value Creation	The success of LVC hinges on the increase in land values. Therefore, deliberate strategies to stimulate land value creation must be developed.
C4 Regulatory	G1	Regime	A systemic regime (e.g., incorporating legal, regulations, policies, and political supports) is needed to support the risk mitigation strategy adopted to regulate the project and its interactions with DBLVC. Establishing a regime helps align institutional factors to improve the performance.
	G2	Stakeholders' Management	Creating and sharing value between all stakeholders can help cement collaboration and successful project delivery.

Source: Modified from Li & Love (2022)

DBLVC Risk Factors analytical framework

3.1.1 Development of the analytical framework

As highlighted in the literature review, there currently exists no comprehensive framework that specifically identifies the main risk factors associated with a DBLVC project. Therefore, a analytical framework for DBLVC risk factors has been developed. This chapter describes the creation of the framework that will guide the data analysis for answering RQ3. The framework aims to consolidate frequently mentioned risk factors and considerations from TOD projects into relevant components of a private DBLVC strategy. This will enable a comparison of an organization's risk mitigation and allocation strategies in practice. Utilizing this framework will facilitate the identification of whether FECI encountered similar risks and how they addressed these through a thematic analysis (detailed in Chapter 5.3).

The framework was developed based on a synthesis of materials from the literature review, which covered four key typologies: PPP, TOD, LVC, and risk mitigation in infrastructure projects (see Chapter 3). These typologies provide the foundation for the DBLVC risk factor framework and were specifically tailored to the private rTOD context. Core themes emerging from the literature were collected, synthesized, and organized into eight pertinent factors that together constitute the DBLVC risk factor framework for private PR.

These factors were selected to span the planning to operation stages of a project, aiming to offer a comprehensive conceptualization that not only addresses the case organization but also the associated stakeholders. These eight factors draw on recurring themes found in the literature review but are primarily informed by the works of Flyvbjerg et al. (2003), Li & Love (2022), and Marques & Berg (2011). While Marques & Berg (2011) identify 20 risk factors for private sector participation in infrastructure construction, these dimensions were consolidated and adapted to better reflect the risks specifically associated with PPP projects in rail.

Although it is not expected that the case study will exhibit every risk identified in the framework, it is anticipated that if a risk is relevant, FECI would have implemented measures to mitigate it. The following subchapter provides a detailed account of these risk factors.

3.1.2 DBLVC risk factors framework

Table 3-2. DBLVC Risk Factors

DBLVC Risk Factors Framework for Private Passenger Rail Projects	
1. Market Dependency	2. Regulatory, Zoning, and Political and Public Opposition
3. Overreliance on DBLVC:	4. Complexity in Implementation
5. Land Acquisition Risks and Technical Feasibility	6. Integration with Urban Planning
7. Long-term Financial Sustainability	8. Cost Overruns and Infrastructure Maintenance

Source: Flyvbjerg et al. (2003); Li & Love (2022); and Marques & Berg (2011)

Risk factor 1) *Market Dependency*: DBLVC projects are tied to real estate market fluctuations (Jillella & Newman, 2016; Li & Love, 2022). Market downturns can reduce revenues (Flyvbjerg et al., 2003, p. 73). Accessibility affects property values and project timelines, with slumps causing delays (Tang & Lo, 2010, p. 122). Strategic risk mitigation is essential.

Risk factor 2) *Regulatory, Zoning, and Political and Public Opposition*: The success of DBLVC relies on supportive zoning laws and governmental approvals (Noring, 2019). Political changes and regulatory environments can significantly influence DBLVC initiatives (PM2). Higher population densities generally correlate with higher property values (Bohman & Nilsson, 2016). Effective DBLVC is enhanced by supportive land use policies (Landis et al., 1995, p. 109). Increased accessibility typically converts into higher land values within transit zones (McIntosh et al., 2017, p. 157).

Risk factor 3) *Overreliance on DBLVC*: DBLVC depends heavily on revenue from enhanced land values (Sharma & Newman, 2020). Deviations from expected market performance can lead to significant financial vulnerability (Li & Love, 2019). In depressed markets, liquidity issues may arise, necessitating diverse revenue streams (Florida Development Finance Corporation, 2023). Long-term financing and hedging strategies are crucial for ensuring financial stability and providing a buffer during the project's ramp-up period (Marques & Berg, 2011).

Risk factor 4) *Complexity in Implementation*: DBLVC involves coordinating multiple stakeholders, leading to potential disputes and delays (Jillella & Newman, 2016, p. 63). An integrated approach among all parties is essential (Noring, 2019, p. 129). The success of DBLVC strategies hinges on robust project design and planning phases (Marques & Berg, 2011).

Risk factor 5) *Land Acquisition Risks and Technical Feasibility*: Strategic procurement of land near rail stations is crucial but challenging (Berawi et al., 2020; Kilpatrick et al., 2007; Landis et al., 1995). Adapting land use regulations and rezoning protocols is vital for leveraging LVC effectively (Noring, 2019, p. 128). Detailed planning and collaboration with the public sector are necessary (Marques & Berg, 2011, p. 929).

Risk factor 6) *Integration with Urban Planning*: DBLVC must align with broader urban planning goals (Zhao & Shen, 2019). Misalignment can undermine LVC mechanisms (Landis et al., 1995, p. 107). Robust partnerships with local governments facilitate urban development and ensure integration with existing local transit systems (Sharma & Newman, 2020, p. 954).

Risk factor 7) *Long-term Financial Sustainability*: Value capture contributions often do not cover ongoing transit operations (Jillella & Newman, 2016, p. 63). Timely property development is essential to recoup infrastructure costs (Tang & Lo, 2010, p. 122). Stimulating demand and avoiding competition are key to project viability (Marques & Berg, 2011). Consistent usage over

time is crucial (Noring, 2019, p. 129). Leveraging TOD creates economic opportunities and capitalizes on connectivity benefits (Sharma & Newman, 2020, p. 946).

Risk factor 8) *Cost Overruns and Infrastructure Maintenance*. Rail projects often face cost overruns due to unforeseen challenges (Flyvbjerg et al., 2004; Flyvbjerg et al., 2003). Each year of delay increases costs significantly (Flyvbjerg et al., 2004, p. 28). Swift planning and execution are necessary to avoid exacerbating these risks. Including force majeure clauses in contracts and allocating risks among stakeholders help manage financial impacts (Marques & Berg, 2011; Li & Love, 2022).

The DBLVC risk factor framework will be employed to identify the risks encountered by FECCI and their corresponding mitigation strategies in Chapter 6.3.

The literature review underscores the importance of diverse financing mechanisms for rail transit infrastructure, including public initiatives like property and land taxes and private sector contributions through revenue streams and asset leveraging. PPPs emerge as a standard approach (see Chapter 3.1.4), blending public benefits with private sector efficiency and requiring robust legal, strategic, and regulatory frameworks. DBLVC is highlighted as a significant tool for leveraging land value increments through infrastructure investment, although it presents substantial risks such as volatile real estate markets and political interference (see Chapter 3.1.2). Despite extensive research on financing mechanisms, there is a notable gap in understanding the implementation and success factors of DBLVC in primarily private ventures, emphasizing the need for more empirical studies comparing the long-term outcomes of different financing models across various geographic and economic contexts.

This research aims to address this gap by examining FECCI's private rail initiative which utilizes DBLVC strategies independently to fund rail projects. The conceptual framework introduced by Li & Love (2022), though developed within the broader context of PPPs, provides valuable insights for examining private PR initiatives, addressing RQ1 and 2, which focus on LVC success factors and the TOD life cycle. This adaptation is vital for understanding and implementing the practical elements of private sector involvement in rTODs, even for projects like Brightline that have limited public sector involvement on the surface. By filling a crucial gap in the literature with actionable insights and methodologies, this research aims to advance theoretical understanding and enhance the practical implementation of DBLVC, making it highly applicable to innovative cases like Brightline. This tailored approach ensures a thorough academic exploration and practical application in the context of DBLVC, providing a solid foundation for understanding the nuances of private sector participation in transit development.

4 Research Design, Materials, and Methods

This chapter explains the methodological choices employed throughout this research study. It elaborates on the approach, data collection methods, materials collected, and their connection to Li & Love (2022)'s conceptual model. Additionally, it provides an overview of the data analysis, concluding with a discussion of considerations regarding the researcher's role, worldviews, and reflexivity within the research process.

Research design

This research design is shaped by three key characteristics of the research problem. Firstly, the use of DBLVC strategies for financing private PR capital costs is relatively new in the U.S. rail industry, despite other LVC strategies being applied in rail-based PPP partnerships (Saginer, 2018). Secondly, the literature review identified a significant research gap in understanding success factors specific to private PR ventures, particularly in risk mitigation strategies without government subsidies (see Chapter 3). Thirdly, limited academic research exists on the specific regulatory, economic, collaborative, and technical factors considered by FECCI for completing their intercity PR project using a DBLVC financing strategy (RQ1), how FECCI used TOD for PR financing (RQ2), and their risk mitigation strategies in DBLVC implementation (RQ3). This highlights the potential benefits for both researchers and relevant practitioner organizations to explore FECCI's success factors, TOD implementation, and risk mitigation strategies in DBLVC financing.

To address these gaps, a qualitative exploratory case study approach was employed as the most suitable methodological choice as this approach allows for an in-depth exploration and understanding of the complexities involved, offering contextual insights into Brightline's utilization of DBLVC, an aspect not previously addressed in the literature and partially applicable to existing theories (Creswell, 2018, p. 57; Saunders et al., 2023, p. 207; Verschuren, 2003). An analytical framework that agglomerated the risk factors in DBLVC was developed from a comprehensive literature review. This framework was designed to inform not only the data analysis for RQ3 but also the structure of interviews and data collection processes for all research questions. Additionally, Li & Love's (2022) conceptual model was also integrated into the research design, informing the interview structure, data collection, and analysis phases.

A qualitative, single-case study research method was employed to explore success factors, TOD strategies, and risk mitigation, with the study conducted in four phases: 1) establishing the research design, 2) data collection, 3) data analysis, and 4) interpretation using the developed analytical framework and Li & Love's (2022).

Figure 5-1 illustrates the chosen methodology broken into four distinct phases. Phase 1 involved designing the research, which included a comprehensive literature review to identify gaps and formulate research questions. The qualitative study followed an exploratory case study design. Phase 2 encompassed data collection through document analysis and semi-structured interviews with relevant stakeholders. The data analysis in Phase 3 used thematic coding based on Li and Love's (2022) framework and an analytical framework for DBLVC risk factors. The final phase interpreted these findings to address the RQs. The following sections will elaborate on the data collection and analysis phases.

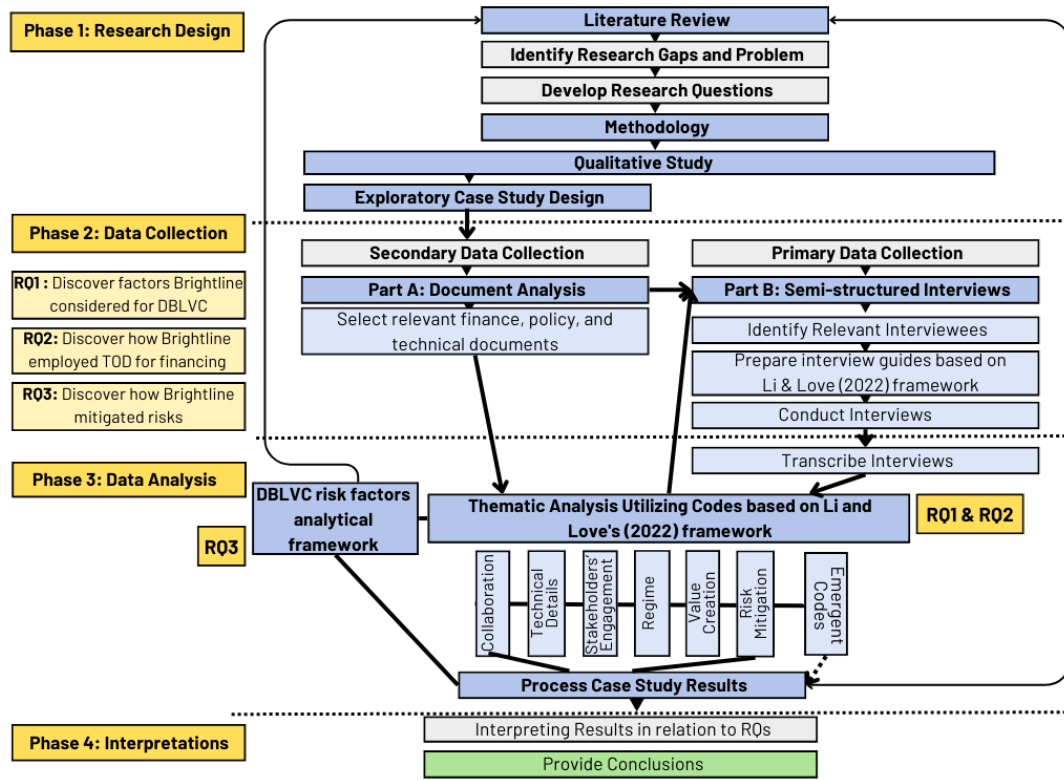


Figure 4-1. Visualization of research design

This case study focused on the novel Brightline to analyze contextual factors and the interrelationships among various criteria specific to FECI's stakeholders. Qualitative methods are particularly suited to gather detailed insights from these stakeholders in the real-world context (Saunders et al., 2023). The emergent nature of qualitative research allows for flexibility in the research plan; phases may shift as data collection begins, potentially altering the questions, methods, and focus, which is beneficial when exploring a novel case (Creswell, 2018, p. 258). Expert views on the application of LVC in rTOD projects were included, drawing from secondary documents and interviews with consultants. This enables comparisons that help contextualize FECI's practices within PPPs, thereby deepening the understanding of the complex dynamics involved (Saunders et al., 2023). Data triangulation, a key feature of case studies, combine multiple sources and methods to confirm the validity of the research data, analysis, and interpretation (Creswell, 2018; Saunders et al., 2023, p. 218). This approach is essential to accurately portray the intricate dynamics of a DBLVC strategy.

Methods for data collection and materials collected

This subchapter outlines the rationale for selecting the specific case study organization in this qualitative study. It further expounds on the two employed data collection methods: semi-structured interviews with FECI leadership, local stakeholders, and experts complemented by the collection of secondary data.

For data collection, this thesis utilized both interviews and secondary documents. Interviews were conducted with various organizations, including FECI, state officials, and urban planners (see Appendix VI), all with experience in the development or financing of rTOD or the Brightline project. The secondary documents collected include available FECI and Brightline financial reports, organizational structure communications, and various Florida government publications, along with news articles pertaining to the project, providing a broad spectrum of text, audio, and visual/audio-visual information that can be analyzed over time and in different

contexts (Saunders et al., 2023, p. 205). Being grey literature and not peer-reviewed, these sources were chosen for their credibility, with financial documents and official records offering reliability and accuracy, and news articles providing corroborated external narratives, collectively ensuring a multi-faceted and trustworthy foundation for the research (Saunders et al., 2023, p. 87).

These interviews and secondary documents were crucial for complementing the existing literature review by providing new information, especially given the recent emergence of DBLVC financing mechanisms for rail projects in the U.S. Consequently, the field is rapidly evolving, with most of the information disseminated through newly published grey literature, highlighting the importance of including these documents in the collection process.

Data was gathered from multiple sources in various formats, encompassing 14 reports, 19 websites, 14 news articles, 2 podcasts, and 10 interviews. For a comprehensive list of the interviewees involved in the study, please refer to Appendix II. Appendix IV contains a detailed inventory of the secondary documents utilized for data collection. Triangulating these diverse data sources was instrumental in mitigating bias and enhancing the validity of the results (Creswell, 2018, p. 302).

4.1.1 Selection of study participants

Potential interviewees were identified using online platforms listing the organizational structure or company role of stakeholders (e.g. OrgChart, Rocket Reach, LinkedIn). The official state website for the Florida Department of Transportation (FDOT) was used to collect the contacts of state employees whose positions related to ‘rail,’ ‘freight,’ ‘environmental management,’ ‘district planning,’ and ‘development.’ Additionally, potential interviewees were found through news articles in which they were featured by conducting a web search using keywords such as ‘Brightline development’ and ‘FECI real estate’ due to the research aim and questions. As qualitative studies should take a holistic approach, this research considers multiple perspectives as the interconnections between FECI, Brightline, and other involved actors, such as freight operators, developers, and local officials, help identify the many factors surrounding their integrated business strategy of rTOD (Creswell, 2018, p. 258). To ensure interviewees could provide insight relevant to the Brightline project, the following selection criteria were developed (see Table 5-1). Interviewees were contacted if they met at least *two* of the selection criteria.

Table 4-1. Selection criteria for case study interviewees

Interviewee Selection Criteria	
1)	Involved in the Florida Brightline project: Interviewees have direct experience with the project under study, providing firsthand insights and knowledge.
2)	Involved in TOD projects: TOD is a key aspect of the Brightline project, so including individuals with involvement in TOD ensures a holistic understanding of its impact and implementation.
3)	Involved in financing or strategy around the Brightline project: Understanding the financial and strategic aspects of the project is crucial for uncovering insights into its success factors and challenges. Interviewing individuals with expertise in these areas provides valuable insights into decision-making processes and risk allocation and mitigation.
4)	A consultant to PR using an LVC strategy: Expands the perspective beyond internal stakeholders and may offer broader industry insights and best practices.
5)	Eight plus years in rail development, construction, or urban planning: Experience in rail development or construction ensures that interviewees possess a deep understanding of the industry, its dynamics, and potential challenges.
6)	Regulatory expertise: Position requires knowledge of regulatory aspects related to transportation and infrastructure projects.

Initially, 42 potential interviewees who fulfilled the selection criteria in Table 5-1 were contacted. These interviewees were invited to participate in an online interview via email or LinkedIn messages. Ultimately, eight individuals accepted the interview requests and contributed to the case study. A detailed list of interviewees provided in Appendix II.

4.1.2 Qualitative, semi-structured interviews

Eight semi-structured qualitative interviews were conducted during April and May 2024 using online conferencing tools such as Microsoft Teams, Google Meet, and Zoom, with each lasting between 30 to 45 minutes. Following a structured interview guide informed by Li & Love's (2022) conceptual framework, these discussions were tailored to different stakeholders to help extract insights through open-ended questions. The topics probed included strategy, leadership, resource assets, collaborative endeavors with developers, freight logistics, risk mitigation, and local government interactions, all aimed at addressing the RQs (see Appendix III for the interview guide example). Qualitative interviews were chosen for their ability to gather in-depth information beyond publicly available material (Saunders et al., 2023), which is particularly relevant given the novelty of FECI's strategy in the U.S. context. The semi-structured format allowed for comparability across interviews based on role while providing space for participants to elaborate on their perspectives. Interviews with stakeholders external to the project enriched the understanding of the fundamental aspects of a TOD project gained from the literature review, including implementation challenges and mitigation strategies. This information was used as a point of reference during analysis.

Qualitative interviews have inherent limitations, including the potential for indirect information filtered through interviewees' views and the influence of researchers' presence on respondents' answers (Creswell, 2018; Saunders et al., 2023). To address these limitations and fill any data gaps, supplementary documents were collected to triangulate the data (see Chapter 5.2.2). To enhance research robustness, triangulation was employed to corroborate insights across different data sets, thereby strengthening validity.

4.1.3 Selection of complementary documents

To enhance the reliability and generalizability of the case study, financial and technical data were collected from involved organizations to support, dispute, or contextualize interview findings (Creswell, 2018). Recognizing the study's small sample size, focused on one company in one state, secondary data supplemented primary interviews. Stakeholder interviews with representatives in development, finance, and planning provided a holistic view of FECI's Brightline venture.

Documents concerning FECI, their subsidiaries, financing strategies, and rights agreements were sourced from three primary channels: 1) Government agencies like the U.S. Securities and Exchange Commission (SEC), chosen for their legal accountability. 2) Financial information from credit rating agencies such as Fitch Ratings and S&P Global Ratings, supplementing government data due to FECI's private status. 3) Additional financial and consultancy reports with explicit methodologies ensured data suitability and validity (Saunders et al., 2023, p. 371).

A comprehensive array of sources, including news articles, podcasts, and reports, was identified through targeted Google searches using keywords like "Brightline financing" and "FECI real estate development." These documents provided insights into key events, contextual factors, involved actors, and external pressures. A list of documents used is in Appendix IV.

To minimize bias and ensure sensitivity to the original purpose, the researcher used Harvard University's 'US Media Index' to identify political affiliations of outlets and independently assessed each article for reliance on company press releases and adherence to editorial standards. The news sources included Reuters, The Washington Post, and local media affiliates.

Data analysis methods

Data collection and analysis are conducted simultaneously and iteratively (Creswell, 2018, p. 289). Primary data from interviews were transcribed using the online tool 'Good Tape,' with transcripts subsequently converted to Word documents and manually checked for errors. These data were uploaded onto the secure online coding platform 'Quirkos,' where thematic analysis identified patterns and themes relevant to the RQs, allowing for interpretation of interviewees' perspectives and theme extraction (Saunders et al., 2023, p. 664).

An abductive approach was used in this analysis, starting with six deductive codes derived from Li & Love's (2022) theoretical framework and eight from the developed risk factor framework (see Tables 3-1 and 4-1 respectively). Codes were adjusted or expanded as new data were explored, facilitating the identification of emergent codes and sub-codes outside the established frameworks (Saunders et al., 2023, p. 665).

For RQ1 and RQ2, the analysis assessed the compatibility of the case study with Li & Love's (2022) conceptual framework, focusing on whether the success factors identified in this private rTOD venture align with those typical in projects where the public sector is a major actor. Findings were presented using themes derived from Li and Love's framework. For RQ3, deductive codes from the literature review identified relevant risk factors for a DBLVC strategy in rail (see Chapter 4). This part of the analysis clarified risk factors pertinent to the FECI case and provided an initial overview of the risks, examining their alignment with established risk factors and the mitigation strategies employed.

Concurrently, a document analysis involving both printed and electronic documents enhanced the study's validity by integrating multiple data sources, which were often combined with other qualitative methods such as interviews (Bowen, 2009; Creswell, 2018, p. 274). These documents were uploaded to the reference management software, 'Zotero,' and coded using the same fourteen codes derived from the two frameworks to consistently process the secondary data.

Researcher's role and reflexivity

In qualitative research, clarifying the researcher's biases is crucial, as their academic and professional backgrounds, along with personal values and worldviews, significantly influence the research process and outcomes (Creswell, 2018). Assertions and generalizations in case studies incorporate the researcher's interpretations and experiences, underscoring the need for critical reflexivity on these elements before conducting the study (Creswell, 2018, p. 109). As an American urbanist positively inclined toward rTOD and its funding, the researcher acknowledges a potential alignment with transformative views on changing transportation modes in the US. However, this study primarily adopts a pragmatic worldview, focusing on practical solutions (Creswell, 2018).

To ensure validity, the study employs several strategies: 1) triangulation of data sources; 2) explicit acknowledgement of researcher bias; and 3) member checking, which involves verifying the accuracy of findings from previous interviews with subsequent interview participants (Creswell, 2018, p. 274).

5 Findings

This chapter presents and analyzes the data collected to address the RQs. It includes findings from eight qualitative, semi-structured interviews and a document analysis. By employing Li & Love's (2022) frameworks and the specifically developed DBLVC risk factor analytical framework, central themes are identified, allowing for direct analytical conclusions and connections between FECI's DBLVC project and various framework aspects.

Initially, the chapter aims to identify the success factors for FECI's DBLVC project by comprehensively reviewing the results in comparison to the four DBLVC considerations (C1-C4, see Chapter 4.1) outlined in the framework. The analysis is structured according to Li & Love's (2022) framework to address RQs 1 and 2. Each section begins with a brief description of the relevant DBLVC consideration, followed by the presentation and analysis of findings specific to that consideration, and concludes with a summary of the key findings.

Subsequently, the same process is applied to address RQ3 using the DBLVC risk factor framework (see Chapter 4.2). RQ3 focuses on identifying key risks in FECI's venture and the mitigation measures implemented. The findings for RQ3 are presented in Chapter 6.3. It is noted that the risks often intersect or are integrated with more than one risk factor, leading to potential overlaps in how they connect to corresponding risk factors. Throughout this chapter, the interviews are referenced by their specific codes (e.g., VP1) as listed in Appendix II.

Considerations for completing an intercity passenger rail project using development-based land value capture

5.1.1 Collaboration Considerations (C1): Drive to collaborate between parties over a long period

a) Collaboration with FECR

The first DBLVC consideration assesses how Brightline's financial arrangements balance revenue and expenditures to ensure long-term viability. This involves a comprehensive review of financial responsibilities, risks, and rewards among stakeholders, and how these elements influence cash flows throughout the project lifecycle. In this investigation Grupo México's FECR, government agencies like FDOT, regional transportation agencies, and developers were identified as core stakeholders in this DBLVC strategy.

In 2017, FECI sold its freight railway, FECR, to Grupo México, which financed the acquisition with \$1.75 billion in debt and \$350 million in capital from Fortress Investment Group (D. A. Garcia, 2017). This strategic sale expanded Grupo México's access to the U.S. market and provided FECI with significant benefits, including additional revenue from access fees and the retention of exclusive passenger rights and significant real estate assets. Grupo México's disinterest in real estate allowed FECI to retain valuable collateral, thus reducing Brightline's initial capital needs and accelerating its market entry (VP1).

FECI retained critical assets, including the real estate asset for the corridor and the exclusive passenger rights easement. An easement is a legal right allowing one party to use part of a property owned by another for a specific purpose without owning the property itself (Cornell Law School, 2022). This particular easement stipulates that "*nobody else can run a passenger train inside our corridor without our permission*" (VP1, personal communication, April 17, 2024). The strategic control over these key resources significantly boosted investor confidence, enabling FECI to charge other rail operators for access to their tracks, which was crucial for securing initial capital through the issuance of green bonds (VP1) (See Chapter 6.1.1.b). Additionally, by maintaining ownership of critical infrastructure, including an exclusive easement, FECI can

restrict the operation of other passenger trains within their corridor, thus ensuring long-term viability by making it harder for competitors to enter the market.

Previously, the real estate around the corridor primarily supported industrial buildings and freight railroad operations (VP1). However, with the intention of establishing Brightline, FECI shifted strategies towards mixed-use developments to encourage increased population density, business growth, and developer interest, thereby enhancing revenue opportunities.

The partnership dramatically reduced the capital expenditures for Brightline by allowing the use of existing tracks instead of constructing new ones, substantially lowering costs and enhancing the project's attractiveness (Palm Beach Transportation Planning Agency, 2020). This strategic reduction of risks and costs not only facilitated a smoother entry into the market for Brightline but also improved the viability of securing non-subsidized public sector financing. This synergy created a favorable environment for innovative funding solutions, aligning FECI's interests with government financing options.

b) Collaboration with government agencies

FECI's collaboration with government agencies is characterized by strategic agreements in public funding mechanisms, easement and right-of-way coordination, and neighborhood revitalization strategies. This comprehensive approach enhances the project's viability and ensures long-term sustainability.

i) Public Funding Mechanisms

While Brightline operates as a private enterprise, it significantly relies on collaboration with regulatory bodies and benefits from government statutes that permit the use of tax-exempt bonds through state-sanctioned conduit issuers such as the Florida Development Finance Corporation, a nonprofit entity operating under state authorization but not as a public agency (The Florida Statutes: Title XIX, Public Business, Chapter 288, Commercial Development and Capital Improvements, 2023). Following the sale of Florida East Coast Railway, Brightline required additional capital to commence construction, leading to a financing mix of debt, bonds, and equity (Sharma & Newman, 2020, p. 954). Although Brightline does not receive direct government subsidies, it gains access to public financial support by securing tax-exempt bonds designed for private companies engaged in projects serving public interests (Florida Development Finance Corporation, 2020; Goldman, 2019, p. 92). This financing approach, enhanced by a federal income tax exemption on the interest from these bonds, effectively reduces borrowing costs and provides an indirect subsidy to the project (Goldman, 2019, p. 17). FDFC's primary business of issuing these bonds is allowed under U.S. Internal Revenue Service regulations and Florida statutes, enabling certain small manufacturers and nonprofits to finance capital assets with tax-exempt bond proceeds (Cherry Bekaert LLP, 2018, p. 9).

ii) Easement and Right-of-Way Coordination

Brightline's expansion into new corridors, particularly in Phases 2-3 between Orlando (see Appendix V) and Tampa, involves intricate coordination with federal and state agencies to secure the right of way on non-FECR tracks. The right of way grants the legal right to pass over or through real property owned by another party, crucial for Brightline's development of new tracks (Cornell Law School, 2021). This process requires Brightline to ensure that infrastructural modifications, such as passages built above or alongside public interstate highways, align with broader transportation goals and regulations. Additionally, Brightline's integration into state road medians necessitates rigorous environmental assessments and other preparatory activities to comply with regulatory standards (DE1). As they propose adjustments to interstate rights of way, detailed negotiations with agencies such as the FRA and FDOT are essential. These

discussions ensure that infrastructural changes, whether built above or alongside public interstate highways, align with broader transportation goals and regulations (DE1).

Frequent joint project meetings are essential for aligning construction and infrastructure improvement strategies along interstate corridors, particularly on the stretch along Interstate 4. These adjustments necessitate robust collaboration with both the state's head of federal highways and the Federal Railroad Administration (FRA), ensuring that Brightline's proposals are integrated with ongoing state projects (DE1, VP1). Meetings typically occur monthly, underpinning the critical integration of Brightline's developments with broader state infrastructure efforts (DE1). Furthermore, Brightline's inclusion in Florida's long-term transportation plans highlights the strategic alignment between state mobility strategies and private sector initiatives. FDOT recognizes Brightline's role in addressing future congestion and mobility challenges as the state grows (FDOT Freight & Rail, 2023). Effective collaboration between state agencies and private entities like Brightline is crucial for implementing TODs that benefit both public and private interests (CO2).

FDOT has proactively preserved rail corridors within interstate improvement plans, ensuring that infrastructure like bridges is designed not just for current needs but also for future multi-modal transport solutions. This foresight facilitates the integration of projects like Brightline, reducing potential disruptions and additional costs associated with retrofitting infrastructure to accommodate rail (DE1). Planning with Brightline in mind helps avoid unnecessary expenses and community pushback, aligning with environmental and technical requirements more efficiently. These comprehensive coordination efforts are vital not only for the immediate feasibility of transport projects like Brightline but also for enhancing long-term sustainability and adaptability in regional transport planning. By ensuring that new rail initiatives are effectively integrated into existing transport frameworks, these efforts support broader state and federal transportation objectives, paving the way for a more connected and efficient future in mobility.

"The relationship between the government and [FECI] is a cross-pollination of different ways." (VP1)

ii) Neighborhood Revitalization Strategies

FECI's collaboration with government agencies extends beyond transit solutions, engaging in significant development and revitalization efforts in areas like Overtown, Miami (VP1). Owning property in this historically neglected neighborhood, FECI has launched substantial infrastructure initiatives aimed at stimulating local economic activity and enhancing community engagement. In addition to the Brightline, FECI has developed or partnered with developers to create mixed-use buildings, which are detailed in Chapter 6.1.1.d. These developments not only meet community housing needs but also promote business growth, significantly enhancing station density and urban vibrancy. These efforts leverage the increase in land values, which benefits from the local government's use of TIF, discussed in Chapter 3.1.2. The government utilizes TIF to provide subsidies to FECI, thereby funding further construction projects aimed at enhancing regional transportation infrastructure (VP1).

Furthermore, FECI collaborates with community redevelopment agencies under the Community Redevelopment Act to utilize public investment for the redevelopment of urban core areas. This act facilitates the capture of increased tax revenues from property improvements, which the government then reallocates as subsidies to developers (Tampa Gov, 2020). Due to political concerns noted in Chapter 6.1.4, FECI strategically uses these funds to support infrastructural enhancements, including public projects like affordable housing and local commuter rail projects, thereby increasing connectivity with their Brightline service and fostering job creation and residential development.

These multifaceted strategies align with FECI's long-term objectives of integrating transportation infrastructure with community and economic development. By intertwining development initiatives with strategic partnerships and public funding mechanisms like TIF, FECI not only supports the financial structure of its transportation projects but also significantly contributes to community development and urban revitalization. This holistic approach demonstrates a robust model for addressing modern infrastructure challenges, promoting sustainable community growth, and enhancing overall quality of life.

ii) Collaboration with government transit agencies

Brightline's collaboration with government transit agencies is pivotal in securing significant financial support for developing new commuter train infrastructure along the Florida East Coast Railway. This involves a partnership with the South Florida Regional Transportation Authority (SFRTA), which facilitates the expansion of the Tri-Rail commuter rail service and the establishment of new services on Brightline's rail corridor. This initiative is expected to receive funding from federal, state, and local sources aimed specifically at building infrastructure and stations along the Northeast Corridor rail line (Florida Development Finance Corporation, 2020, p. 158).

Effective collaboration extends across various stakeholders, including FECR, Brightline, and local municipalities, to foster transit-oriented developments around these rail lines. For example, in the Cocoa-Orlando corridor, Brightline has established strategic lease and easement agreements with major entities like FDOT, the Greater Orlando Aviation Authority, and CFX, a freight rail owner. These agreements include a 50-year lease with FDOT with an option to renew for 49 years, a 99-year easement with the Greater Orlando Aviation Authority, and 50-year term easements with CFX, facilitating long-term infrastructure use and development (Florida Development Finance Corporation, 2020, p. 92).

Discussions regarding the integration of light rail services with Brightline's proposed extension to Tampa highlight the company's proactive engagement and adaptability. These conversations are critical for ensuring connections and securing future revenue streams from multimodal traffic (DE1). Operationally, Brightline maintains control over its stations and infrastructure, which enables them to charge other operators for access. Furthermore, the company has forged agreements with local transit authorities to integrate rail platforms within its developments, enhancing connectivity. Notably, Brightline secured \$70 million to connect Tri-Rail to their Miami Central development and received \$76 million from Miami-Dade County for constructing a train platform at their Aventura station (Erik Bojnansky, 2024; VP1).

These multifaceted partnerships are crucial for enhancing rail and bus ridership operated by local municipalities, allowing local transit to leverage private resources and capabilities for efficient infrastructure development. This symbiotic relationship promotes interconnectivity and mutual benefits in ridership and infrastructure utilization.

iii) Collaboration with developers

FECI, a prominent real estate and infrastructure developer, has a significant presence in Florida, managing extensive properties along the rail lines. According to the Florida Development Finance Corporation (2020, p. 54), FECI "owns, builds, and manages over 29 million square feet of real estate developments and has completed the infrastructure for more than 2,900 acres of developments." This extensive experience in real estate development is enhanced by FECI's expertise in navigating the intricate processes of obtaining entitlements, permits, and approvals necessary for infrastructure and real estate projects within Florida. Moreover, FECI is recognized as the largest industrial developer in the Miami market, with "8 million square feet

of industrial and logistics real estate in the area surrounding the rail corridor (Florida Development Finance Corporation, 2020, p. 68).

The collaboration extends to dealing with various stakeholders for the use of the rail corridor. Any entity, be it a company or a government body, wishing to install utilities or advertisements along the rail line, such as power lines above or sewer pipes below, must coordinate with Brightline and FEI. This interaction ensures that project sequencing, payment strategies, and environmental assessments are managed efficiently, maintaining a balance between operational needs and stakeholder interests.

One notable partnership involves Universal Studios and Orange County, where Brightline is leading the establishment of a standalone taxing district to develop a station near the Convention Center (High Speed Rail Alliance, 2024). This strategic initiative not only improves access to key tourist areas, as this region is recognized as hosting three of Central Florida's busiest centers of employment and visitation but also stimulates economic growth around these pivotal areas (Florida Development Finance Corporation, 2023, p. 52).

At the micro level, Brightline's real estate ventures, such as the ParkLine Miami, illustrate the financial potential of such collaborations. Here, FEI successfully sold a multifamily asset for approximately \$450 million (Monahan & Dinkova, 2022), showcasing the lucrative opportunities available through synergistic development around transit hubs.

Furthermore, the subsidiary of FEI, Flagler development, focuses on constructing office complexes primarily in suburban areas, enhancing the commercial viability of regions surrounding Brightline's stations. This strategy not only boosts local real estate markets but also supports community revitalization by introducing new workplaces and improving infrastructure. This development strategy is crucial for attracting a higher volume of traffic to both local and commuter rails, thereby benefiting the broader community.

These collaborative efforts are anticipated to yield long-term benefits for both Brightline and FEI by cultivating a synergistic model that integrates real estate with rail transport. This model not only boosts the value of adjacent properties but also supports local socio-economic growth through improved transportation options, job creation, and neighborhood revitalization. Detailed explanations of these partnerships' impacts on Brightline, FEI, and local communities are provided in Chapter 6.1.5 of this paper.

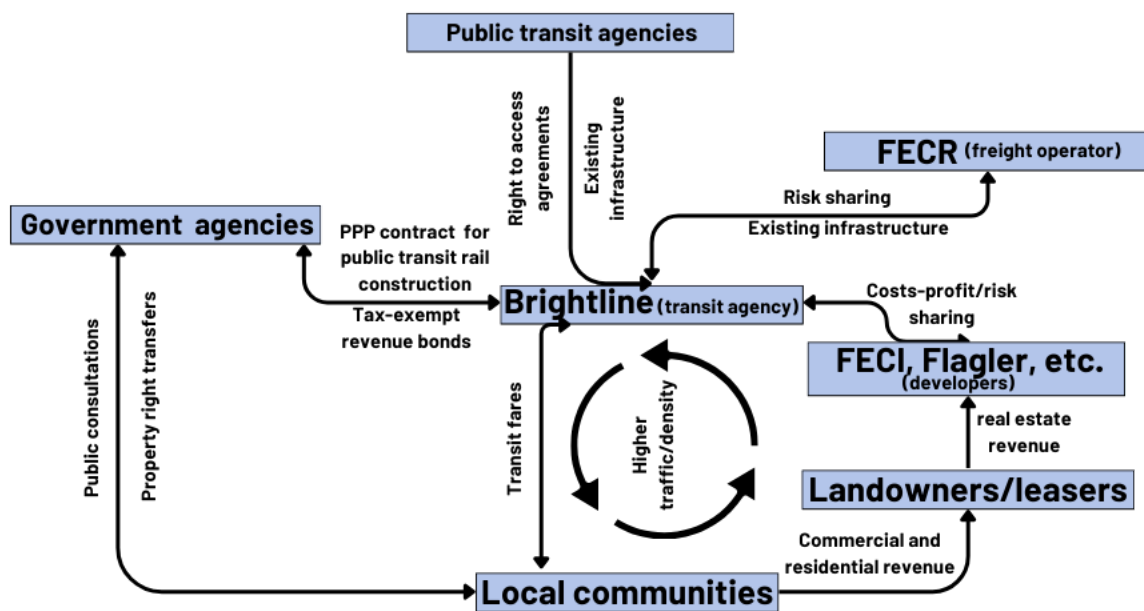
Strategic partnerships that lead to the construction of mixed-use developments and infrastructural improvements significantly enhance the appeal and functionality of Brightline's services. By making stations more accessible and visually appealing, these initiatives boost ridership and profitability. Ultimately, these developments sustain revenue generation from both rail services and real estate, establishing a robust financial foundation that supports extensive growth and continuous infrastructural enhancements.

As illustrated in Figure 6-1, these collaborative efforts notably advance local community development by driving economic revitalization and urban transformation. Through targeted initiatives in places like Overtown and along new commuter routes, Brightline and FEI are pivotal in upgrading underdeveloped or overlooked neighborhoods. These projects not only enhance community well-being but also create jobs and raise property values, enriching local economies. The addition of affordable housing and better transportation facilities increases the desirability of these areas, attracting a diverse populace and fostering community interaction. Moreover, improved public infrastructure promotes greater accessibility and connectivity, encouraging higher usage of both local and commuter rail services. Together, these improvements lead to a more built environment in regions serviced by Brightline and its partners (see Chapter 6.1.5).

Brightline's approach to implementing its rail project under a DBLVC strategy demonstrates a robust integration of financial structuring, stakeholder collaboration, and strategic infrastructure use with agreements. Each collaboration agreement is orchestrated to optimize project performance and ensure financial sustainability through stream diversification, illustrating a complex but effective framework for modern transportation infrastructure development.

The collaboration model illustrated in Figure 6-1 demonstrates the collaboration between FECI and Brightline, alongside both private and public entities, to optimize PR performance and ensure financial sustainability. Brightline plays a central role by providing right-of-access agreements to public transit agencies and coordinating with key stakeholders. Public transit agencies benefit from these agreements and the existing infrastructure of Brightline and FECR, which facilitates higher ridership and efficiency. Government agencies support FECI's initiatives by contracting Brightline and FECI to build public infrastructure, connecting commuter rails to Brightline, and utilizing TIF to fund both rail and TOD. The government also has statutes that allow Brightline to benefit from tax-exempt revenue bonds. FECR, as the freight operator, shares infrastructure and engages in cost-profit/risk sharing with Brightline, which assists with maintenance costs and dispatching. FECI, along with the developers they collaborate with, generates revenue through commercial and residential real estate. Local communities benefit from enhanced transit access and associated improvements. By leveraging land value increases from improved transportation access, they create diverse revenue streams, making projects viable and beneficial for all parties involved. This holistic approach illustrates how stakeholder collaboration helped effectively develop and fund TOD infrastructure.

Figure 5-1. Collaboration in FECI's DBLVC implementation



Source: Findings presented according to the roadmap for development-based land value capture implementation by Suzuki et al. (2015)

Table 5-1. Key findings for DBLVC consideration 6.1.1

6.1.1 Collaborative considerations	
Key Findings	- Brightline formed agreements with freight lines, government agencies, developers, and regional transit agencies to secure long-term viability and investor confidence, diversifying revenue streams through strategic control of passenger rights and real estate. - Leveraging existing tracks and infrastructure reduced Brightline's capital expenditures - The synergistic relationship between Brightline and FECI maximizes the utility and value of properties adjacent to rail services, creating a stable financial base for both entities and adds value for municipalities and users - Collaboration with various transit agencies ensures that all parties benefit traffic wise from service integration -Essential to secure liquidity and capital to reassure investors and facilitate investment. -TOD initiatives provide mutual benefits by improving living conditions and increasing property values. - Although direct subsidies are not provided, Brightline leverages public financial support through tax-exempt bonds, benefiting from governmental engagement that supports infrastructure development

5.1.2 Technical Considerations

The second DBLVC consideration emphasizes the technical aspects crucial for the design, engineering, and construction of a PR system that adheres to strict operational standards. It involves evaluating the system's technical capabilities and ensuring continuous improvements to address vulnerabilities, providing robust financial assurance.

Brightline independently manages its operations and maintains its infrastructure assets, with some subcontracting for maintenance duties on the Cocoa to Orlando line. This approach ensures that operational standards of quality and safety are met (S&P Global Ratings, 2024a). By utilizing existing routes, Brightline avoids the high costs associated with new land acquisitions, facilitating strategic, phased development. The Miami to West Palm Beach segment in Phase 1 exemplifies effective revenue generation using pre-existing infrastructure (Strupp, 2023).

Brightline's strategy includes maintaining exclusive rights over its corridors, preventing other operators from running passenger trains without permission (VP1). In partnership with FECR, Florida Dispatch Co., they effectively coordinate travel within their corridor, which is crucial for managing intersections and crossings in densely populated areas where high-speed rail could pose significant safety risks. However, the lines are built on existing freight tracks without the tunnels or specialized infrastructure typical of high-speed rail projects. As a result, it is imperative that the design and operational strategies are specifically tailored to prevent safety issues such as accidents at crossings, which remain a significant concern even without high-speed specifications (C. Garcia & Cashmere, 2023). Brightline's rolling stock—passenger cars—complies with both FRA safety regulations in the event of a collision, and the Positive Train Control standards, which require a centrally monitored and controlled system to bring trains safely to a stop if certain safety parameters are exceeded (Florida Development Finance Corporation, 2020, p. 72).

Collaboration with federal and state agencies, such as FDOT and FRA, is vital for integrating new rail services with existing infrastructure along key corridors like Interstate 4. This

collaboration ensures that rail enhancements, like new crossings and station developments, align with broader transportation goals and safety regulations (DE1, VP1). Brightline also engages in strategic planning sessions to discuss adjustments to interstate rights of way, critical for aligning construction efforts with ongoing infrastructure projects.

Brightline is being constructed in phases, featuring a shared-use section along the coast and dedicated east-west segments for passenger trains (see Appendix V) (High Speed Rail Alliance, 2024). This phased development strategy not only allows for the gradual generation of revenue but also enables Brightline to market the service progressively and identify necessary improvements as the network expands.

Brightline is expanding its transportation services by ordering additional passenger coaches from Siemens to meet increasing demand, demonstrating a commitment to enhancing service frequency and capacity (Florida Development Finance Corporation, 2023, p. 51, 82). This expansion adheres to the Buy America provisions, requiring the use of American-made materials in federally funded projects, thereby supporting domestic manufacturing sectors (Federal Railroad Administration, 2024).

Despite not meeting the criteria for true high-speed rail as the freight lines are not equipped for it, Brightline provides a compelling travel option from Miami to Orlando, completing the journey in approximately 3 hours and 15 minutes (Florida Development Finance Corporation, 2020, p. 62). This travel time stands in favorable comparison to the estimated 3 hours and 50 minutes to 5 hours it takes by car, depending on traffic conditions, and the 5 hours and 35 minutes required by Amtrak, which operates on limited routes, alleviating some competitive risks (see Chapter 6.3.2).

"The quality of service itself is most effective in increasing public transport ridership." (UP2)

Brightline's strategic enhancements to station design and connectivity with commuter rails are crucial for the evolution of Florida's transportation network and align with a new statewide vision for intercity PR services development (FDOT Freight & Rail, 2023, p. 34). These initiatives are particularly important in a state where budget constraints are frequent challenges (DE1). To counter Florida's harsh climate conditions, Brightline includes features like shaded stops and air-conditioned spaces in their infrastructure planning, enhancing passenger comfort and safety, thereby making public transit more attractive compared to private vehicle use, especially in car-dominant regions (DE1, CO2, UP2). This approach promotes climate resilience and encourages a shift towards public transit, aligning with broader goals of reducing car dependency and enhancing the effectiveness of transit-oriented developments (TODs) for daily commuting (DE1).

Efforts to limit parking spaces face regulatory challenges, as regulations mandate at least one space per resident in facilities (VP1). Additionally, implementing such measures can be challenging due to political concerns about discouraging established behaviors among constituents (CO2). To address this issue, Brightline constructs parking garages away from stations and coordinates with shuttle services and other transportation modes for first and last-mile connectivity (Brightline, 2024). They also offer a "Brightbikes" rental service to provide connectivity, reduced wait times, and alternative transportation options, enhancing the overall user experience. This holistic approach not only promotes public transport use but also contributes to improving the overall journey experience for passengers.

Brightline's transformation of its stations goes beyond mere transit hubs; they are envisioned as comprehensive experiences aimed at attracting and retaining riders (DE1, VP2). By placing a premium on connectivity, density, and accessibility to various destinations, these stations serve as vibrant community centers, offering amenities and services that enrich the overall experience.

Brightline leverages hospitality expertise within its organizational framework, employing professionals from the hospitality industry to curate and refine the user experience at their facilities (DE1). This approach not only ensures heightened customer satisfaction but also advances the broader objective of positioning public transit as a more appealing option for daily commutes (CO2).

Through meticulous planning, continuous improvement, and strategic partnerships, Brightline aims to set a benchmark in rail transportation for interconnectivity and long-term viability in the U.S.

Table 5-2. Key findings for DBLVC consideration 6.1.2

6.1.2 Technical considerations	
Key Findings	- Brightline maintains exclusive operational rights over its corridors, crucial for managing safety and connecting with local rails - Brightline adheres to Buy America provisions and expands its fleet to meet increasing demand -Facing urban planning and regulatory challenges, Brightline implements innovative connectivity solutions to enhance the user experience -Brightline's stations double as vibrant community centers, strategically enhancing passenger experience and incentivizing ridership -Utilizing freight tracks prevents Brightline from being a high-speed rail

5.1.3 Economic considerations

The third DBLVC consideration addresses the economic aspects vital for the viability of a PR system, focusing particularly on the financial models and market dynamics. The success of DBLVC initiatives heavily depends on the appreciation of land values. The implementation of LVC strategies involves inherent risks, as uplifts in land value are not guaranteed. Therefore, effective risk mitigation strategies are essential to navigate these uncertainties, and the ultimate success of DBLVC hinges on the ability to enhance land values deliberately.

In response to operating without public subsidies, Brightline adapted its financial strategy, generating capital through loans to support its infrastructure projects. This approach underscores a direct connection between TOD and economic viability, emphasizing strategic land use integration to enhance property values.

Empirical evidence demonstrates significant financial benefits of proximity to transit facilities. Properties near planned Brightline stations experienced a 13.4% increase in value post-announcement, with a further increase of 10.4% upon their opening, underscoring the direct impact of transit accessibility on real estate values (Mattar, 2023). The profitability of these developments is fundamentally linked to their ability to attract sufficient ridership and create dense, high-traffic areas, a key component in maximizing the returns from land value increases (Edens, 2024). This highlights strong market demand for accessible urban living and validating the model's emphasis on the economic potential of transit-oriented developments (Acosta, 2023).

Public-private partnerships and active government interaction play crucial roles in these developments. The integration of rail infrastructure with public spaces typically requires substantial economic support from the government. The strategic use TIF, facilitated by the Community Redevelopment Act, reallocates property tax revenue increases to fund public projects (see Chapter 6.1.4). This financial mechanism stimulates further development and

economic activity, thereby enhancing the overall economic landscape surrounding transit projects (VP1).

Brightline's financial commitments, including issuing \$3.65 billion in debt and investing approximately \$6 billion in their rail projects, cover the initial development, financing, and construction of their routes from Miami to West Palm Beach and Orlando. These investments are indicative of the substantial economic stakes involved and the expected returns from integrating LVC within PPP frameworks (S&P Global Ratings, 2024b).

In the discussion of economic considerations for the PR project, it is essential to consider the strategic land acquisitions and value uplift mechanisms utilized by the project's stakeholders. Specifically, low-density areas previously designated for industrial use near freight lines were acquired inexpensively and repurposed for higher value uses such as residential developments. An example of successful utilization of this strategy is the quick leasing of apartments built near stations during the pandemic—a period when it was uncertain whether new residential units would attract tenants. Despite initial concerns, these apartments were fully leased within six months, underscoring the strong demand for living spaces close to transit stations (VP1).

The economic impact of proximity to transit stations extends beyond immediate residential desirability. Stakeholders utilize a methodical approach to valuation, where the per square foot value in proximity to stations is blended across the entire corridor to create a valuation in the billions. This value is then used to determine the economic benefit per train trip, effectively quantifying the uplift and enabling stakeholders to use this enhanced value as collateral for further development (VP1).

Furthermore, the strategic positioning of land near transit stations not only increases its value but also makes it an attractive option for investors looking for growth in asset values. The importance of selecting the right developers for these parcels ensures that the developmental potential of these areas is fully realized, maximizing economic returns (PM1). Brightline's efforts in this domain, corroborated by the U.S. Department of Transportation, have significantly impacted Florida's economy, generating over 10,000 jobs and contributing more than \$6.4 billion in economic impact (VP1; Zukowski 2023, U.S. Department of Transportation, 2024).

Strategic land use planning near transit stations is pivotal in maximizing both land value and density. Brightline's development strategy around these stations is designed to create a critical mass that boosts property values and fosters mixed-use development. This approach aligns high-density commercial spaces with residential zones to optimize the use and value of the land, perfectly illustrating the practical application of theoretical models that advocate for the integration of financial mechanisms and urban development strategies to bolster rTOD projects (VP1, personal communication, April 17, 2024; UP2).

In summary, the economic considerations in transit-oriented developments undertaken by Brightline involve a complex interplay of strategic land use, public-private financial strategies, and significant influence over regional real estate markets through infrastructure development. This approach demonstrates the effectiveness of combining these financial and development strategies in urban rail projects.

Table 5-3. Key findings for DBLVC consideration 6.1.3

6.1.3 Economic considerations	
Key Findings	- Brightline's strategy heavily depends on land value increases, with securing properties near stations before announcing the rail projects -TOD and interconnectivity significantly increased property values and stimulating wider economic activities -Brightline's strategic land use near transit stations, integrating high-density commercial and residential spaces, maximizes land value and density, through mixed-use developments

5.1.4 Regulatory Considerations

In their strategic effort to facilitate rail development, FECI significantly shaped the regulatory and political landscapes. FECI's proactive lobbying led to a pivotal amendment in the RTZ laws, which are designed to promote optimal land uses around transit stations (VP1). This amendment they “wrote” shifted the permitting process from local municipalities, which frequently encountered substantial pushback, to the county level, thereby streamlining approvals and mitigating local resistance (VP1). A key aspect of this amendment was the significant increase in allowable density along the rail line from 125 to 500 units per acre, which was crucial for enhancing the feasibility of the DBLVC financing strategy (Chapter 33C - RAPID TRANSIT SYSTEM—DEVELOPMENT ZONE | Code of Ordinances | Miami - Dade County, FL | Municode Library, 2021; VP1). This regulatory change simplified permitting and created substantial opportunities for developers, evident from the rapid increase in construction near the stations—over a thousand units within a 12-year span (VP1, personal communication, April 17, 2024).

The legislative environment surrounding the project also plays a critical role. Despite the failure of the Florida High-Speed Passenger Rail Safety Act, which was stymied by concerns over the financial burdens of maintaining railway intersections, it highlighted the complex interplay between state legislation and local government responsibilities, leading to its downfall in the Transportation & Infrastructure Subcommittee (Broadt, 2017; Willhite & Sirois, 2019). Additionally, the enduring Community Redevelopment Act demonstrates a sustained commitment to infrastructural enhancement across the state through TIF. This legislative framework allows agencies to use TIF to invest in and build local infrastructure projects like Tri-rail, which Brightline would be partially compensated with the strategy if they receive the contract (Erik Bojnansky, 2024; VP1), reinforcing local redevelopment efforts (Tampa Gov, 2022; Section 163.387, Florida Statutes).

“Definitely the major obstacle is acceptance. Public acceptance, political acceptance, political fear for implementation” (CO1)

In 2011, then-Republican Governor Rick Scott's decision to reject \$2.4 billion in federal funds from then-President Obama to construct an intercity PR in Florida was based on political optics. Scott stated that they would only accept the money if the federal government paid for ongoing operational costs, which he knew the federal government would not, as they legally fund only capital improvements, not operations (Peltier, 2022; VP1). The Governor argued that if the project were profitable, a private company would have already undertaken it. This denial of funds to start a rail in the Miami corridor directly prompted FECI to consider the venture and start planning how they could finance it themselves.

Under Governor Ron DeSantis, the policy shifted towards ensuring that projects like Brightline's Phase 2 extension remain privately funded. DeSantis's stance is that state taxpayer funds should not be used for these projects, influencing recent legislative measures that prioritize road and bridge construction over state-funded rail services (Angelo, 2024). Moreover,

FDOT under recent guidance has focused more on traditional infrastructure, moving away from projects aimed at reducing carbon emissions, indicating less competition for Amtrak in securing local funds due to local political challenges (Perdue, 2023, p. 1).

The community and economic impacts also reveal significant changes. Martin County, which initially spent \$4.1 million opposing the Brightline rail line, shifted from litigation to actively seeking a partnership with Brightline. This shift from antagonism to cooperation demonstrates a strategic realignment, driven by continuous engagement from Brightline's public affairs team that underscored the project's benefits to local stakeholders, showcasing how local skepticism can transform into proactive support for enhancing local infrastructure (Burbank, 2023).

Through strategic lobbying, legislative adaptation, and responsive community engagement, stakeholders like FECI have navigated the complex landscape posed by ambitious infrastructure projects, shaping legislative, political, and community dynamics to their advantage.

Table 5-4. Key findings for DBLVC consideration 6.1.4

6.1.4 Regulatory considerations	
Key Findings	- Federal and local statutes allowed a private company to receive tax free or low interest bonds as the project the transport project benefits the public. - Navigating political - Zoning and regulatory frameworks play a critical role in the success of TODs and FECI actively collaborated with legislators to amend codes to favor denser development. - Navigating the political landscape is crucial to minimize opposition to these projects

In conclusion, the strategic sale of FECR to Grupo México by FECI, facilitated FECI's retention of essential real estate assets and exclusive passenger rights. This financial maneuver significantly reduced Brightline's initial capital needs and accelerated its market entry by leveraging existing infrastructure. Additionally, FECI's control over these critical assets enhanced investor confidence for other financing mechanisms and enabled the charging of access fees to other rail operators, which was vital for the project's early financial stability. The subsequent development strategy shifted focus from industrial uses to mixed-use properties around the rail corridor, transforming the area into vibrant residential and commercial hubs that increased property values and attracted substantial developer interest, further bolstering revenue streams crucial for sustaining the project. Strategic partnerships with government entities and regional developers, underpinned by the effective use of existing tracks, dramatically lowered capital expenditures, enabling Brightline to navigate financial challenges and align interests with public financing mechanisms.

Effective utilization of transit-oriented development for financing intercity private PR

This section examines Brightline's TOD initiatives to enhance revenue generation and mitigate construction costs. It delves into the financial structures, procurement arrangements, and revenue streams associated with TOD projects, demonstrating how TOD strategies have been effectively utilized to finance intercity private PR development.

5.1.5 Investigation of transit-oriented development initiatives

Brightline leverages real estate developments to activate and transform neighborhoods, employing a strategy that utilizes increased density allowances to enhance property values and attract a vibrant, round-the-clock population (VP1). This approach not only fosters urban revitalization but also maximizes the utility of properties near transit stations, aligning with

broader economic development goals. By utilizing joint development schemes, as described in Table 3-1, Brightline coordinates with transit agencies and developers to physically and financially contribute to the construction of station facilities and adjacent properties. This includes agreements where Brightline's transit infrastructure improvements directly benefit from increased land value, enabling the development of high-density, mixed-use properties that enhance the surrounding areas and support sustainable urban growth.

"Integrating transportation with sustainable urban development is crucial here, not just for reducing congestion but also for making sure that we're not exacerbating the environmental impact." (UP1)

The geographical and infrastructural constraints of Florida limit urban development and necessitate more efficient use of land (DE1, UP1). The state has a very limited amount of usable land, which is compounded by environmental restrictions due to wildlife protections and existing urban sprawl (UP1). Due to this their housing market can be categorized as low affordability and *lean supply* which creates a demand that FECI capitalizes on (Carbonaro, 2024). New developments must consider not just the immediate economic or transportation needs but also how efficiently the land is used. This directly relates to the necessity of TOD and can be used to discuss how Brightline's strategy fits into broader urban planning and sustainability goals.

Strategic infrastructure planning includes preserving rail corridors within interstate plans, ensuring easy access and future expansion possibilities. Brightline's projects often adapt to include intermodal facilities, combining light rail with existing interstate improvements to accommodate diverse transportation needs, which may reduce the necessity for extensive interchange improvements (DE1).

By securing critical mass at station locations, either through development or sales, and harnessing commercial real estate expertise via subsidiaries like Flagler, Brightline ensures sustained economic vibrancy along its corridors. The company's historical success in managing extensive real estate assets bolsters its ability to swiftly navigate entitlements and permits, essential for timely project execution (Florida Development Finance Corporation, 2020, p. 100).

TOD initiatives play a crucial role in community revitalization, exemplified by developments like Brightline Residences. These developments, totaling 609,381 square feet (56,605 square meters) in 40 stories, include residential units, commercial space, restaurants, and green space (Bandell, 2023). In 2018, neighborhood densities in the Miami area ranged from 8,000 to 53,000 people per square mile (Statistical Atlas, 2018), illustrating the varying urban fabric these projects engage with. Mixed-use projects like Brightline Residences not only boost local economies and attract a diverse demographic but also contribute to the enhancement of surrounding areas' value.

For instance, around Brightline's Miami station in the impoverished neighborhood of Overtown, which has struggled for decades to attract investment, many developers are now following suit. They are investing hundreds of millions in mixed-use developments that provide not only housing but also job opportunities (Butler, 2023; Viglucchi, 2020). CO1 and UP2 emphasize that effective TODs should be densely developed yet include green spaces and essential services, minimizing alleys where possible to enhance safety and security. This approach makes transit hubs more appealing and safer for visitors while accommodating the varied neighborhood densities observed in the Miami area.

When located within 800 meters of transit stations, development signify a robust dedication to sustainability and accessibility (UP2). People want to be near the stations (VP1, UP2, PM1, PM2). So, Brightline facilitated the sale of properties to developers who have constructed mixed-use facilities atop their transit stations (Harbor Group Management, 2024; Kalinoski,

2022). Concentrating on high-density and mixed-use development within this radius, Brightline ensures that residents can fulfill their daily needs within a walkable distance, diminishing reliance on cars and fostering a sustainable urban lifestyle (UP2).

Brightline's TOD initiatives are intricately designed to intertwine financial viability with sustainable urban development, illustrating an effective model for integrating transportation and real estate development to drive regional economic growth and enhance community living standards.

Table 5-5. Key findings for employing TOD

6.2.1 Successfully employing TOD requires:	
Key Findings	- Brightline's ability to rapidly navigate permits and entitlements, along with its focus on critical mass at transit locations, significantly accelerates community revitalization and economic growth in surrounding areas - Brightline emphasizes dense, mixed-use development within walkable distances of stations which encourages use of sustainable transport and reduces car dependency - Florida's limited usable land creates a high demand for housing, which aids Brightline's strategic planning to leverage TOD as a DBLVC strategy, preserving rail corridors, integrating intermodal facilities, and building dense communities for financing - Developments combine residential, commercial, and recreational spaces, fostering a 24/7 urban lifestyle that supports local economies - Effective TODs are designed to include green spaces and essential services while minimizing alleys to enhance safety and security, making transit hubs more appealing

5.1.6 Assessment of value creation strategies

This section provides an assessment of value creation strategies through rTOD. It includes an evaluation of property development, rental management, and commercial business profits, exploring how these elements contribute to overall value creation. Additionally, the section analyzes stakeholder management strategies that are critical for garnering support and ensuring community engagement in rTOD initiatives. This comprehensive assessment aims to understand how rTOD contributes effectively to the financing and success of infrastructure projects.

In the complex landscape of rTOD, a nuanced approach to zoning and property development is crucial. These zones aim to promote optimal land uses directly linked to the transit stations they surround, fostering a synergy that enhances property value and community functionality. In Florida, managing the balance between densely populated areas and rural spaces poses challenges for zoning practices (DE1). The key question is how to prioritize and integrate different transportation modes—buses, light rail, and micro-mobility systems—within these diverse environments, ensuring they effectively connect intra-city and inter-city areas (VP1, PM2, UP1, UP2, CO2).

A significant portion of the income from TOD initiatives derives from increases in land value, facilitated by strategic property acquisitions and development agreements. For instance, owning the land allows stakeholders like Brightline to control and capitalize on subsequent developments, enhancing the land's value for government partners and investors (PM2). The properties around the rail integrate with both the broader transit system and emerging micro-mobility solutions, and the amenities have attracted residents to the properties near the line. Property values near Brightline stations have significantly increased, with a 67% appreciation from 2018 to 2019 in Ft. Lauderdale, compared to a 33% median increase for the broader area (Acosta, 2023). Similarly, in Miami, properties near the station saw an 83% increase, compared to a 38% median rise for the overall Miami area.

Communication strategies also play a pivotal role. The dedication of full-time staff to articulate the project's benefits ensures sustained community and stakeholder engagement (PM1). Real estate is strategically used not only to drive the project but also to transform neighborhoods, leveraging the proximity to transit stations which inherently boosts land values and makes these locations more desirable (VP1).

In Miami, the challenge of implementing TOD was compounded by restrictive form-based codes, which limited the development of a major station in downtown Miami. These zoning challenges highlight the necessity for flexible planning that can adapt to the unique needs of urban growth and transit development (VP1).

“Imagine land value today was a dollar, when we announced it was \$1.30 next day right so that automatically land went up in valuation” (VP1)

A clear example of the economic impact TOD is the immediate uplift in land value following the announcement of Brightline's infrastructure projects (see Chapter 6.1.3). This rapid increase underscores the consistent pattern of asset value growth near transit stations, attracting both residents and investors seeking dependable real estate growth near well-connected transit hubs (VP1). Additionally, strategic real estate acquisitions were made before these public announcements (VP1), which maximized the delta between initial acquisition costs and the increased values post-announcement—highlighting the foresight in acquiring parcels at lower costs to capitalize on anticipated valuation surges.

Overall, the strategic application of TOD is pivotal in not only enhancing land value but also in crafting vibrant, well-connected urban environments that cater to both the immediate needs and long-term sustainability of communities and Brightline.

Table 5-6. Key findings for creating value

6.2.2 Value creation requires:	
Key Findings	-Acquiring land prior to announcing rail projects to capitalize on subsequent increases in property value -Developing zoning statutes that are responsive to the needs of urban growth -Implementing effective communication strategies to engage developers and spark community interest -Promoting mixed-use real estate developments to enhance the appeal of living and working in the area

Strategies for mitigating risks in development-based land value capture

In order to answer RQ3, this section focuses on the identification of risk factors associated with DBLVC (see Chapter 4.2). It provides a detailed analysis of the risks associated with regulatory compliance, financial management, and project execution from the DBLVC Risk Factors framework (Chapter 6.3.1). Additionally, the section examines the potential challenges and vulnerabilities arose during project execution and how FECI allocated or mitigated the risks in implementing and sustaining their DBLVC strategy (Chapter 6.3.2). This critical evaluation aims to provide insights into effectively mitigating risks in these DBLVC projects.

5.1.7 Identification of risk factors and mitigation strategies

Table 5-7. Key findings for DBLVC aspect

6.3.1 DBLVC risk factors and mitigation strategies for Brightline's private passenger rail project		
	Identified Risks	Mitigation Strategies
Market Dependency	-Competition from air travel and car habits.	- Lack of rail competition from the public sector “even with

	-Ramp-up risk: "Ridership risk: Long-term adoption rates of rail travel in the U.S. are somewhat uncertain, and for the target population, car travel has historically been the preferred mode of transport for medium-distance travel. As such, ramp-up risk is high" (S&P Global Ratings, 2024b). - Using freight tracks prevents Brightline from ever becoming true high-speed rail due to technical capacity and cost constraints (VP1), as true high-speed rail typically operates at speeds well between 200 km/h (124 mph) and 355 km/h (221 mph) (Britannica, 2024), while Brightline's top speed is about 124 mph (Brightline, 2023). This has the potential to make the PR less attractive to users seeking faster travel options. -With real estate serving as a crucial income stream during the phase of building ridership sales, it is imperative that they have incoming funds to repay bonds. Therefore, any unforeseen events could potentially affect their ability to fulfill their financial obligations.	increased State spending on rail in their new budget, only 6.4% of Florida's total transportation budget and there is limited Amtrak presence, and political willingness to invest in Amtrak" (Brezina-Smith, 2018; FDOT, 2024). - Focused on intercity travel segments "too long to drive, too short to fly" (US Securities and Exchange Commission, 2018). - Leveraged Florida's significant population growth and tourism to ensure initial demand; about 10 million residents living along the corridor where Brightline operates, 99 million annual out-of-state tourists, and a projected growth of 1,000 people daily over the next 30 years (FDOT, 2015; The Louis Berger U.S., Inc., 2018)(FDOT, 2023). - Positioned in densely populated areas like Miami and Fort Lauderdale, offering competitive travel times (Brezina-Smith, 2018; FDOT, 2023; US Securities and Exchange Commission, 2018). -While they cannot claim to be high-speed rail, Brightline strategically selected a corridor length where their travel time remains competitive with other transportation modes (Florida Development Finance Corporation, 2020, p. 62). - Utilized tax-exempt green bonds to enhance financial stability and reduce reliance on market fluctuations (Florida Development Finance Corporation, 2020). - Substantial liquidity to mitigate ramp-up risks (S&P Global Ratings, 2024b).
Regulatory, Zoning, and Political and Public Opposition	- The issuance and/or continued availability and maintenance of necessary permits, licenses, approvals, and agreements from governmental agencies and third parties as are required to construct and operate the rail line and the related facilities (US Securities and Exchange Commission, 2018). - Shared use of the Company's corridor with FECR could have an adverse effect on the Company's ability to establish the	-Proactive legislative engagement to influence zoning laws for denser TOD to navigate political and regulatory landscapes efficiently (VP1). -Partnerships with public entities for funding and project support, such as Miami-Dade County, further mitigates political and public opposition risks (Erik Bojnansky, 2024).

	Miami-Dade commuter rail service (Florida Development Finance Corporation, 2020, p. 158). -Navigating the political landscape to ensure projects are perceived as benefiting the public (VP1, PM1). - There is a prevailing car ownership culture in South Florida and the challenges this poses for public transportation acceptance (UP1).	-Marketing Brightline as a luxury experience to combat negative attitudes towards mass transit in regions with a strong car culture (VP1). -Collaboration with NGOs for community engagement and feedback, aligning the project with community needs and increasing positive public awareness (UP1).
Overreliance on DBLVC	-Their rail and real estate business strategy relies heavily on increased land values, which is providing dividends in the current housing market, but posing financial vulnerability in a recession or depression (UP2).	- Diversified revenue streams beyond just land value capture, including mixed-use properties generating sustained revenue through retail, residential, and office spaces (Florida Development Finance Corporation, 2020). - "Funding lasagna" approach, incorporating layers such as bonds, revenue from selling rights to access rail, developing commuter rail infrastructure through government contracts, prevent overreliance on real estate revenue (VP1).
Complexity in Implementation	-The nature of shared infrastructure agreements and real estate development diversification is complex (VP1). -FECR and Brightline occasionally have conflicting interests regarding the type of real estate development they pursue. -FECR and Brightline sometimes clash over their real estate development goals. Brightline prioritizes dense complexes with offices and apartments, while FECR needs space for smooth freight container movement (VP1). Disagreements over residential versus commercial or industrial development could strain their symbiotic relationship. -Siemens may fail to meet the performance standards promised, impacting service delivery (Florida Development Finance Corporation, 2023, p. 91). - Coordinating rail services on shared tracks with FECI requires complex operations to manage access effectively.	- Used a bundled contract approach (see Chapter 4), where Brightline is responsible for the financing, infrastructure, maintenance, and operation. This reduces transaction costs and limits conflicts among stakeholders. -Established Florida DispatchCo to manage and oversee rail service operations on shared tracks, ensuring effective access management, conflict resolution, and streamlined dispatching responsibilities. -To address conflicting real estate development interests, Brightline and FECR have established clear agreements and operational protocols that delineate the use of shared infrastructure and space requirements, ensuring both passenger and freight operations are optimized (VP1). -Implementing performance-based contracts with Siemens and other partners ensures accountability and adherence to agreed standards, thereby mitigating risks related to service

		delivery (Florida Development Finance Corporation, 2023, p. 91).
Land Acquisition Risks and Feasibility	-Risks associated with high property values in urban areas, which can limit potential profits. -Difficulties in obtaining easements from government entities and landowners. -Risks that high costs and lack of profitability could lead to bankruptcy and development failure. -In phases 2 and 3 (see Appendix V), land acquisition could continue to be a challenge as FECCI and Brightline did not initially own tracks or much property.	-Secured strategic property acquisitions early to avoid escalated costs post-announcement and utilized existing tracks to minimize new infrastructure needs (Florida Development Finance Corporation, 2023; VP1). -Owned property in former industrial sites and areas in urban decay (US Census Bureau, 2020). -Utilized existing tracks to reduce the need for new, costly infrastructure (Cohen, 2018). -Negotiating with state, local governments, and freight lines to secure rights-of-way and integrate their rail service with existing public infrastructure (Florida Development Finance Corporation, 2020) and working with amusement parks to align their rail service with key attractions (Florida Development Finance Corporation, 2020; VP1), helped navigate the lengthy and costly process of land acquisition. -Within Florida, FECCI's subsidiaries have owned, built and managed over 29 million square feet (2.69 million square meters) of real estate developments and has extensive experience in quick and efficient navigation of the necessary entitlements, permits and approvals needed to develop infrastructure and real estate in Florida (Florida Development Finance Corporation, 2020, p. 100).
Integration with Urban Planning	-Must integrate with local metropolitan planning organizations to address community growth and transportation needs over the next 20 years (DE1), which requires coordinating with many local agencies with different interests. -The dynamic and unique population considerations affecting transit usage, including seasonal and tourist fluctuations (DE1). - There is a risk that failing to integrate logistically and electronically with existing local transportation networks such as metro rail, ports, and airports could hinder the operational effectiveness and	-Close collaboration with metropolitan planning organizations to align the rail project with local development plans and transportation needs (DE1). - Engaged with local communities to ensure the rail project met the unique population and tourist demands (DE1).

	community support of the project (US Securities and Exchange Commission, 2018).	
Long-term Financial Sustainability	- Brightline's ability to receive one additional revenue stream from rTOD is contingent upon local transit agencies receiving funds from various local and state funding (VP1). However, there is a risk that a public agency's revenues may not sufficiently cover its funding commitments in future fiscal years (Florida Development Finance Corporation, 2020, p. 158).	-FECI formed Brightline which acts as a Special Purpose Vehicle (SPV) as a strategic financial mechanism within its operations. An SPV is a subsidiary company established by another firm for specific, limited purposes, in this instance PR (Estevez, 2021; Feng et al., 2009). This financial instrument serves to isolate certain risks associated with Brightline's operations and projects, offering protection to FECI from potential losses and liabilities (Saginer, 2018, p. 37). Essentially, the SPV acts as a distinct legal entity with its own balance sheet, separate from FECI, allowing it to undertake financial transactions and hold assets independently. -Bondholders have no claim on the real estate assets under FECI and its subsidiaries, as these assets are not encompassed under Brightline's operational structure (Florida Development Finance Corporation, 2020). -Transit ridership has increased and exceeded pre-pandemic levels which signals a shift (UP1). - Secured partnerships with local and state public agencies to create financial structures less reliant on inconsistent public funding subsidies (Erik Bojnansky, 2024). -Retain right of way ownership of tracks even if FECR goes bankrupt (Florida Development Finance Corporation; VP1). -Implemented force majeure clauses (see Chapter 4.1.2) in contracts to protect against unforeseen financial burdens (Florida Development Finance Corporation, 2020, p. 796).
Cost Overruns and Infrastructure Maintenance	-Shared infrastructure maintenance costs with FECR, and potential risks if FECR is unable to contribute to these costs (Florida Development Finance Corporation, 2020, p. 158). - In construction contracts where Brightline is tasked with building for local transit agencies using public funds to	- Shared infrastructure costs with partners like FECR and incorporated improvements into access fee costs, distributing financial risks and ensuring maintenance is manageable within the project's financial framework

	connect their lines with Brightline's, there is a risk that political shifts could affect funding availability, leading to potential shortfalls. -Constant need for infrastructure maintenance through the life cycle. -Potential to experience cost overruns when developing new tracks.	(Florida Development Finance Corporation, 2020). - Arrangement with government to receive financial support for public commuter line construction and surrounding TOD helps with maintenance costs by reducing the financial burden. -Brightline negotiated with a government agency after construction delays caused by the agency's failure and legal ability to provide right of way for laying new tracks (Bilbao, 2021). Following the delays, they negotiated to build along another highway to connect to the commuter rail and utilize existing regional transit tracks.
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The development and operation of Brightline's rail projects encompass a complex array of risks, including market dependency where fluctuating public transport preferences and minimal competition from public sector rail pose significant challenges. Regulatory, zoning, and political factors critically impact project progression, requiring continual negotiation for approvals and managing shared infrastructure use which can lead to operational conflicts. Similarly, the need for high density in TODs can encounter challenges when local statutes impose limitations on it. Overreliance on DBLVC strategies heightens financial risks, particularly in economic downturns when projected real estate revenue may falter. Additionally, complexities in implementing shared infrastructure agreements, divergent real estate interests, and stringent technical and planning requirements necessitate meticulous coordination. The project's financial sustainability is threatened by reliance on inconsistent public funding, compounding risks of cost overruns and ongoing infrastructure maintenance, which necessitates comprehensive and proactive risk management to ensure project viability and success.

To effectively manage and mitigate the multifaceted risks associated with the development and operation of Brightline's rail projects, the company utilized multiple strategies. Leveraging Florida's population growth, securing strategic property acquisitions, and diversifying revenue streams were key to ensuring the success of utilizing DBLVC. Additionally, by securing tax-exempt green bonds and engaging in proactive legislative and community efforts, Brightline enhanced its financial stability and public acceptance. These measures collectively ensure the project's resilience and viability in a dynamic economic and regulatory environment.

6 Discussion

This chapter critically reviews the findings of this thesis, laying the groundwork for the subsequent conclusion. First, the results are contextualized and discussed in terms of their significance and relevance to the research questions and aims of the thesis. Second, the suitability of the research methods in terms of design, implementation, validity, and generalizability is scrutinized, with limitations made explicit. Finally, after discussing the contributions and limitations of the findings, implications for research and practice are deduced, and starting points for further research and application are outlined.

Discussing the results in the light of previous research

Prompted by the need to better understand how private PR can be successfully developed using a DBLVC approach for financing without immediate dependence on government subsidies, this research aims to explore FECI's practices and context to better understand why it succeeded when other private attempts have failed in the U.S. The study examines the risks involved in the venture and how they were mitigated.

6.1.1 Success factors of FECI's DBLVC strategy

The study's results indicate that while Brightline was founded as a private venture without public sector involvement or subsidies due to the state's refusal to finance rail projects, the effective employment of a DBLVC strategy still necessitates collaboration with the public sector (see Chapter 6.1.4). This collaboration is essential for securing rights-of-way, integrating infrastructure with existing public systems, and leveraging tax-exempt bonds, which collectively enhance the project's financial viability and operational success.

Regarding the Collaborative Dimension (C1), Brightline's emphasis on forming exclusive passenger rights agreements and using these to boost investor confidence provides a new perspective on how private rail projects can leverage asset control to enhance financial stability (see Chapter 6.1.5). The importance of collaboration (PPP1), as emphasized by Li & Love (2022), is confirmed by Brightline's strategic formation of agreements with freight lines, government agencies, developers, and regional transit authorities. These collaborations were pivotal in securing long-term viability, diversifying revenue streams, and ensuring mutual benefits from service integration. These findings align with Suzuki et al. (2015), who emphasize the necessity of PPPs in transit development, and with Landis et al. (1995), who highlight the benefits of stakeholder collaboration for successful urban rail projects. However, in the context of Brightline's development and the DBLVC strategy, the role of the public sector appears more nuanced than Tang and Lo (2010) suggest. While Tang and Lo (2010) emphasize the public sector's crucial role in providing legal, contractual, strategic, and regulatory frameworks as well as fostering favorable economic and commercial environments, Brightline's experience illustrates that private sector initiatives can significantly advance with limited direct public sector intervention, given the right conditions (see Chapter 6.1.1).

For technical success (C2), Brightline's utilization of existing tracks and infrastructure significantly reduces capital expenditures, aligning with Li & Love's (2022) emphasis on detailed technical planning and resource optimization (LC1). This approach not only lowers the initial investment required but also accelerates project timelines, providing a quicker path to revenue generation. Brightline's phased development strategy and adaptation of existing freight infrastructure highlight an innovative approach to reducing initial capital expenditures and accelerating project timelines. Sharma and Newman (2020) emphasize the significance of phased development in managing project risks and ensuring financial stability, which parallels Brightline's incremental expansion to optimize resource use and project viability (see Chapter 6.1.5). This strategy could be valuable for future private PR ventures. While utilizing existing

rail infrastructure saves costs, it prevents Brightline from achieving true high-speed status. Therefore, it is crucial to ensure that travel times remain competitive with dominant modes of transportation, such as cars and airplanes (see Chapter 6.1.2).

A significant reason for FECI's economic success (C3) with the DBLVC strategy was their ability to create immense land value around their transit hubs (LVC2). Integrating transit services with real estate development supports the theoretical model emphasizing the significance of value creation in DBLVC strategies. The synergistic relationship between Brightline and FECI maximizes the utility and value of properties adjacent to rail services, creating a stable financial base for both entities and enhancing municipal and user value through improved living conditions and increased property values around transit hubs. However, this strategy heavily relies on land value increases, which pose inherent risks as such uplifts are not guaranteed (Sharma and Newman, 2020). Brightline mitigates these risks by developing mixed-use properties and securing early land acquisitions near stations, which aligns with Zhang & Xu's (2016) recommendations, underscoring the importance of strategic planning and risk management in DBLVC projects (LVC1). These findings align with Landis et al. (1995, p. 107), who noted that while accessibility to rail transit is not consistently capitalized into commercial property values, station proximity positively influences redevelopment activity.

Similar to Landis et al. (1995), FECI believed that sites near stations were far more likely to be developed for residential uses compared to commercial or industrial ones. This shift underscores the importance of collaboration and strategic urban planning in value creation, especially since FECI's interests don't fully align with FECI's goals for dense urban housing. Additionally, according to Suzuki et al. (2015, p. 49), population and economic growth are crucial for creating land value, and transit can only enhance land values where market demand exists. By focusing on a growing market, FECI developed rail and commercial and residential real estate to create a synergistic cycle where real estate demand boosts rail value and vice versa (see Chapter 6.1.3). The increased property values in this case support Liu et al.'s (2016) notion that integrated urban development around transit hubs can significantly boost local economies and property values.

Despite Brightline being a private project, it was inevitable to engage with the public sector. Although direct subsidies were minimal, Brightline's regulatory success (C4) is evident in their adept navigation of Florida's legal landscape. Their effective interaction with the political landscape and zoning regulations was vital for the success of their TODs (G1, G2). Active collaboration with legislators to amend codes for denser development reflects strategic governance and regulatory management, and regular meetings with local state and transit agencies to develop mobility plans show how Brightline influences the transportation direction in the state. These collaborations helped get rights of way in Phase 2 and 3, transform stations into vibrant community centers, and enhance passenger experiences to incentivize ridership (see Chapter 6.1.4). These findings emphasize the necessity for projects to align with governmental goals to secure such benefits. Brightline's strategy demonstrates that high-speed rail can be successfully developed without significant public subsidies in the U.S., challenging Levinson et al.'s (1997, p. 212) assertion. By fostering denser developments, Brightline addresses urban sprawl and promotes sustainable transportation solutions. This approach not only mitigates congestion but also supports sustainable development practices without the need for extensive public funding. However, the long-term viability and replicability of this model in different contexts remain to be seen (see Chapter 7.1.5).

6.1.2 Effective transit-oriented development is key to the synergy

Brightline's ability to efficiently navigate bureaucratic processes for permits and entitlements is a cornerstone of their strategy (see Chapter 6.3.1). This efficiency not only accelerates development timelines but also acts as a catalyst for quicker revitalization of communities

surrounding transit stations. Rapid handling of these processes can significantly reduce project delays, decrease costs, and enhance the attractiveness of the project to investors and other stakeholders (Smith & Gihring, 2006). The practice of acquiring land before announcing rail projects allows Brightline to capitalize on increases in property values that typically follow such announcements. Like Brightline's strategic early acquisition of key properties mitigates land acquisition risks and enhances technical feasibility and cost-effectiveness by utilizing existing infrastructure where possible. This approach aligns with the recommendations by Zhang & Xu (2016), highlighting the importance of strategic planning and risk management in DBLVC projects. However, this raises significant questions about the feasibility of this strategy in areas where they don't own preexisting property and rail, especially in already dense areas where property value is high. Profits from the strategy may not be sufficient to offset the high costs of property acquisition in such areas (see Chapter 6.1.6).

Again, Smith & Gihring's (2006) observation that developing responsive zoning statutes is crucial for supporting dense, mixed-use developments rings true in this case. Brightline advocates for zoning reforms to allow higher densities, creating vibrant, walkable communities around transit stations. This aligns with Suzuki et al. (2015), who emphasize integrating residential, commercial, and recreational spaces to enhance urban lifestyle sustainability and influence broader city planning goals. Choosing to develop in the Miami area where neighborhood densities range from 8,000 to 53,000 people per square mile (see Chapter 6.1.5), this aligns with the suggested minimum threshold for effective TOD implementation in Maurya et al. (2022). FECI also promotes dense, mixed-use development near transit stations, fostering a 24/7 lifestyle attractive to residents and businesses. This approach boosts local economies by increasing foot traffic and consumer spending.

Effective community engagement is pivotal in gaining support for TOD projects. Brightline's proactive engagement ensures that community needs are considered, fostering positive public perception and support. However, as Noring (2019, p.128) suggests, "harnessing land assets to deliver infrastructure [...] seeks to balance the rights of the individual landowner with the interest of the collective community to achieve an equitable outcome." UP1 discussed how the developments seem more targeted towards tourists; therefore, FECI and Brightline should be careful to balance profits from maximizing the offerings at a development while also making the spaces and properties accessible to lower-income individuals in the interest of an equitable outcome. As Smith & Gihring (2006) note, LVC runs the risk of exacerbating inequalities. This balance is crucial since the public government also aims to benefit from these infrastructural investments due to property value increases, job creation, and public living enhancements. Keeping the government satisfied can facilitate smoother implementation of future projects.

By aligning with these established principles, Brightline's TOD implementation demonstrates a successful model for future projects, offering valuable insights into the effective integration of transit infrastructure with urban development. This TOD approach is essential in making their integrated rail and real estate model profitable, showcasing the potential for similar projects to achieve financial sustainability through strategic land use and community-focused development.

6.1.3 Development-based land value capture risks and mitigation

FECI's strategic early acquisition of key properties mitigates land acquisition risks and enhances technical feasibility and cost-effectiveness by utilizing existing infrastructure where possible (see Chapter 6.1.5). This approach aligns with Zhang & Xu's (2016) emphasis on strategic planning and risk management in DBLVC projects. However, this raises significant questions about the feasibility of this strategy in areas where they do not already own property and rail, especially in

dense areas where property value is high, and profits from the strategy may not be enough to offset costs.

In phases 2 and 3 (see Chapter 6.1.4), Brightline did not own rail or significant land holdings and had to attain rights and land from the government and access through other freight operators to lay their tracks. This created issues with stakeholders like the public, government agencies, and legal troubles with eminent domain laws (Tubb, 2016). Cost overruns and slowdowns are common in other failed rail projects when attaining property (Flyvbjerg, 2003). While they were able to negotiate with transit agencies for a different highway right of way (Vazquez, 2024), the challenges and costs from eminent domain, for example, could have cost them \$750 million for the original right of way they wanted (Bilbao, 2021). In the future, this may cause financial and time troubles. However, the shared cost models for infrastructure maintenance and strategic partnerships reduce the risks of overruns for Brightline.

Brightline's proactive engagement in legislative processes and zoning law adaptations helps navigate complex regulatory landscapes and mitigate political and public opposition (see Chapter 6.1.1). This strategy ensures that the project aligns with public interests and urban development goals, facilitating smoother project progression and minimizing delays or conflicts that might arise from regulatory or public pushback. This supports Tang and Lo's (2010) emphasis on the public sector's crucial role in providing legal and regulatory frameworks.

To counterbalance the financial risks associated with heavy reliance on DBLVC, FECI diversified its revenue streams and developed in a high-density corridor (see Chapter 6.1.5). Brightline strategically positions itself to capitalize on Florida's robust population growth and substantial tourist influx, mitigating market dependency risks by tapping into growing demand for efficient transportation options. By targeting the travel segment "too long to drive, too short to fly," Brightline reduces reliance on volatile market conditions and encourages a modal shift from other forms of transportation, stabilizing its customer base against economic fluctuations (see Chapter 6.1.3). This is consistent with Yu et al.'s (2022) principles of creating TODs that cater to a diverse range of users and needs, enhancing urban vibrancy and economic stability. To hedge risks, future corridors should have high potential for density.

FECI's approach of bundling contracts simplifies project management and reduces complexities associated with multi-stakeholder coordination (see Chapter 6.3.1). This integrated project delivery method enhances efficiency by consolidating financing, construction, operation, and maintenance under a single contract, thereby lowering transaction costs and improving project coherence. However, the feasibility of this strategy in areas without pre-existing property and rail ownership, particularly in densely populated regions with high property values, remains questionable.

The formation of the SPV allowed FECI to manage financial risks more effectively by isolating liabilities and enabling focused financial management specific to the rail venture. This structure supports sustainable financial practices and shields the parent company from direct financial impacts of the rail project. However, there is a potential for misuse. In the past, some companies have used SPVs to hide financial losses, creating a false image of financial health (Feng et al., 2009). This can lead to significant problems for investors who may be misled by the company's apparent stability. However, this study could not confirm or negate this with simply SEC financial reports as these are private companies who can withhold their financial information.

Overall, Brightline's strategy demonstrates that high-speed rail can be successfully developed without the government acting as a guarantor with significant public subsidies or assurance of right of way access in the U.S., challenging Levinson et al.'s (1997, p. 212) assertion and Knudsen & Rich (2013), Lv et al. (2020), and Sharma & Newman (2020). By fostering denser

developments, Brightline addresses urban sprawl and promotes sustainable transportation solutions. This approach not only mitigates congestion but also supports sustainable development practices without the need for extensive public funding. However, the long-term viability and replicability of this model in different contexts remain to be seen. Integrating these findings with the work of Li & Love (2022) to adapt their framework to focus from primarily the private sector's perspective could provide further insights into the broader applicability and sustainability of Brightline's DBLVC strategy.

Reflections and Limitations

The choice of methods and theories significantly impacted the results of this study. The DBLVC framework and qualitative methodologies provided a structured approach to analyzing Brightline's strategies. However, this choice also introduced certain biases. For instance, relying on interviews as a primary data collection method could lead to respondent bias, where participants may provide socially desirable answers (Bowen, 2009). Interviews can also be limited by the availability and willingness of key stakeholders to participate, potentially skewing the data. To mitigate this, a diverse sample of stakeholders was interviewed, including members from various governance bodies and different sectors (see Chapter 5.1.1). Secondary documents were also collected to triangulate the data, helping to corroborate or refute stakeholder claims. Despite these efforts, the results might still be influenced by the inherent biases in qualitative research (Saunders et al., 2023). Additionally, the use of pre-determined frameworks for data analysis, while ensuring a structured approach, might have constrained the findings. While an abductive approach was taken, a more inductive approach could have revealed different insights.

The research question was *legitimate and relevant*, addressing the viability of DBLVC strategies in private rail projects. This legitimacy is evident from the growing interest in sustainable urban development and the need for innovative funding mechanisms for large-scale infrastructure projects (Zhao & Shen, 2019). The study successfully answered the RQs but also highlighted areas for further research. For instance, while the study focused on Brightline, comparing it with other rail projects that utilized DBLVC, both successful and failed, like in Hong Kong (Li and Love, 2022) and Texas (Tubb, 2016), respectively, could provide a more comprehensive understanding of the factors influencing its success. New research questions emerged regarding the long-term sustainability of the Brightline model and its applicability in different geographic and economic contexts. Further research is needed to explore these aspects and determine the broader applicability of the findings.

Several factors significantly affected the results *sensitivity*. The unique context of Florida, with its robust population growth and substantial tourist influx, played a crucial role in Brightline's success (see Chapter 6.1.3). Additionally, the pre-existing ownership of rail and property by FECI provided a unique advantage that may not be replicable in other contexts. These factors highlight the need for context-specific strategies when applying DBLVC models.

The *generalizability* of the findings is limited by the unique context of the Brightline project. The pre-existing infrastructure and property ownership by FECI, coupled with Florida's specific economic and demographic conditions, present a context that may not be easily replicated elsewhere. The findings might not be directly applicable to other regions where they have identified potential corridors as they have different regulatory, economic, and demographic environments. Additionally, a significant limitation of this research lies in the context-specific advantages possessed by FECI, particularly their ownership rights to the land surrounding the freight rail tracks they previously owned and the rights to utilize the freight line itself. This unique circumstance may not be replicable across other private PR initiatives, impacting the generalizability of the study's findings. This limitation can be viewed through the lens of the resource-based view of the firm, which emphasizes how a firm's unique

resources and capabilities contribute to its competitive advantage (Barney, 1991). In this case, FECCI's ownership rights to land and rail infrastructure provided them with distinct capabilities that facilitated the implementation of the Brightline project. Additionally, as Angelo (2024) suggests, FECCI's early success and head start in the industry, along with their unique capabilities, might allow them to maintain a competitive advantage and potentially develop a private monopoly in the U.S. private rail industry. The high capital costs and significant barriers to entry further reinforce this potential, making it difficult for new competitors to emerge.

The study contributes to the existing body of knowledge by demonstrating how a private rail project can successfully employ DBLVC strategies. It confirms the importance of strategic planning, risk management, and stakeholder collaboration, aligning with the findings of Zhang & Xu (2016) and Sharma and Newman (2020). However, it also raises concerns about the feasibility of replicating this model in different contexts, particularly in low densely populated areas with high property values, and without prior rail and real estate ownership.

Another reflection regards the formation of SPVs to manage financial risks presents both opportunities and risks. Brightline's financing model diverges from a traditional Public-Private Partnership (PPP), necessitating the implementation of alternative risk mitigation strategies, as it cannot solely rely on the effective risk allocation typically associated with government involvement, as recommended by Ke et al. (2020). While SPVs can effectively isolate liabilities and support financial management, there is a potential for misuse. Companies may use SPVs to hide financial losses, creating a false image of financial health (Feng et al., 2009). This study could not confirm or negate this potential misuse due to limited access to detailed financial information. FECCI, being a private entity, has limited public financial records, making it challenging to assess the full economic viability and transparency of the project. Future research should investigate this aspect more thoroughly, especially in private companies where transparency is limited. Additionally, this study primarily focused on using a DBLVC strategy to offset capital costs, as the company has yet to pay off their first rail line.

More longitudinal studies are needed to determine the sustainability of the Brightline model, especially to see how it withstands economic downturns and real estate market fluctuations. The potential for Brightline to develop a monopoly in the U.S. private rail industry if no other competitors emerge and local political entities do not support public rail initiatives highlights a strategic risk that could influence future regulatory and market responses.

When analyzing novel business strategies, Franklin & Blyton (2013) emphasize that these strategies may be limited to those in top organizational positions. These leaders possess exclusive knowledge that is not accessible to others in less influential roles. This exclusivity presents significant challenges for researchers, particularly when trying to access elite individuals for insights (Franklin & Blyton, 2013, p. 82). This difficulty was evident in the context of FECCI and Brightline, where key stakeholders crucial to understanding Brightline's strategy were unavailable for an interview, one not having availability until five months' time. There were also difficulties securing interviews within Grupo Mexico's transport division and FECCR as contacts there found it challenging to secure the right people within the limited time frame. This suggests the need for a longer data collection period and more extensive stakeholder engagement for future research.

Ultimately, researchers studying sustainable transport may have worldviews positively inclined towards such projects, potentially introducing bias. Efforts should be made to critically analyze the data and consider potential drawbacks and limitations of the strategies.

7 Conclusions

To achieve their 2030 GHG emissions targets, the U.S. must significantly reduce emissions in its largest contributing sector, transportation (US Department of State, 2023; US EPA, 2015). This necessitates a shift towards more sustainable transportation modes. Current research suggests exploring alternative funding strategies (OECD, 2015), noting that financing for PR in the U.S. has primarily relied on public funding mechanisms, including tax-based instruments and joint development projects requiring extensive public sector involvement (Suzuki et al., 2015). Despite recent allocations from the BIL, public funds remain insufficient to cover all potential PR projects, often hampered by political and local funding challenges.

Existing literature predominantly focuses on public funding for PR, often viewed as a public good, which consistently requires subsidies and lacks emphasis on how private companies can utilize DBLVC as a profitable strategy. Addressing this gap, this study explored a new venture by FECI's subsidiary, Brightline, which launched a private PR without government subsidies and using DBLVC. The objectives were to understand the success factors for PR initiatives using DBLVC (RQ1), examine the employment of TOD for financing (RQ2), and identify and mitigate risks associated with the DBLVC venture (RQ3). This chapter consolidates the study's main conclusions, reemphasizes its academic and practical implications, and outlines future research directions.

Conclusions on development-based land value capture

In this research, DBLVC is explored as a sustainable funding mechanism for private PR initiatives in the U.S., focusing on FECI's Brightline project in the Miami-Orlando corridor. The study reveals that when DBLVC is effectively integrated with diverse funding mechanisms and TOD, it can mitigate regulatory, economic, collaborative, and technical challenges, enhancing the financial viability and broader sustainability of PR projects. Key success factors identified include robust stakeholder engagement, strategic urban planning, and risk management strategies adaptable to economic fluctuations. This approach not only supports the financial structure of PR projects but also contributes to urban revitalization and reduced transportation emissions. The study underscores the importance of early and ongoing stakeholder engagement, supportive zoning laws, and the necessity for flexible financial models to manage risks. The findings advocate for further research on DBLVC's application under different economic conditions and regulatory environments to broaden its efficacy and adaptability.

Recommendations for future research

This research provides a detailed investigation of the success factors and risk mitigation strategies of FECI to further the understanding of private finance mechanisms of PR in the U.S., opening several avenues for further investigation. This thesis identifies areas where future research could deepen insights into the application of private finance in PR. Recommendations for future studies are categorized into context-related and methodological domains:

7.1.1 Context-related recommendations

For context-related recommendations, this research underscores the need for future studies to thoroughly evaluate the resilience of DBLVC strategies during economic downturns, such as recessions or depressions. This focus is critical in assessing the sustainability of DBLVC across various economic cycles. Notably, during the COVID-19 pandemic, while Brightline utilized this financing strategy, the stability of real estate prices may have obscured the true robustness of DBLVC under severe economic stress. Future research should, therefore, consider scenarios

where the real estate market faces significant downturns to better understand the vulnerability and adaptability of this strategy.

Expanding the analytical scope to include comparisons of DBLVC applications in diverse geographic and regulatory settings such as Tokyo, Hong Kong, and the recently initiated Brightline West project in the U.S. could provide further insights into the adaptability and effectiveness of DBLVC. These studies would help determine if these strategies can consistently support sustainable urban development and profitable PR operations under different global economic pressures.

Additionally, delving into the impact of regional economic, demographic, and political dynamics across different U.S. regions or states on the implementation and efficacy of DBLVC projects, particularly considering factors like tourism and political stability, can provide a more nuanced comprehension of contextual dependencies in private rail financing. Examining these regional disparities may unveil necessary adaptations or innovative approaches required in diverse contexts, thus enhancing the strategy's adaptability and informing tailored approaches for future endeavors. Researchers should also explore how the success of Florida's Brightline influenced investor and government confidence, as evidenced by their subsequent initiative, Brightline West, which secured \$6.5 billion in federal grants and financing via the BIL after they privately funded the initial phases (U.S. Department of Transportation, 2024). Understanding the implications of such projects on government investment attitudes and public perceptions is crucial for shaping future developments in the sector. Additionally, to enhance the robustness of research, future studies should aim to establish a more universal theoretical framework to provide a standardized basis for analysis and comparison across different projects and regions.

Further studies should also explore whether relying on private companies to develop PR in the U.S. contributes sufficiently to the public good or if it primarily serves for-profit motives without being accessible enough for citizens. A social justice lens during investigation could also be a potential research avenue as for-profit corporations potentially having majority control on urban redevelopment if the TODs are benefiting both the public and private sector (McIntosh et al., 2017).

This research would assess the economic and social value of public investments in privately led rail projects, crucial for policy-making and public funding strategies.

7.1.2 Methodological recommendations

Future research could benefit from broadening stakeholder involvement, particularly focusing on subsidiaries relevant to DBLVC projects. This expansion could provide a more nuanced understanding of the impacts and effectiveness of these financing strategies across different layers of project involvement. Additionally, comparative analyses between successful or failed projects in different regulatory and economic contexts, such as those involving different types of PPPs, would enhance understanding of DBLVC's adaptability and efficacy.

Methodological refinements should include a more in-depth examination of long-term impacts of DBLVC-financed rail projects on urban development, housing markets, and local economies. This approach would help assess the sustainability and equitable outcomes of these projects more comprehensively. Employing mixed methods to gather both qualitative insights from stakeholders and quantitative data to measure project outcomes can strengthen the validity and reliability of research results, providing a robust platform for assessing the broader implications of private finance in public rail infrastructure.

Recommendations for practitioners

Finally, the findings of this thesis offer crucial insights for both the private sector and public authorities planning to undertake PR projects utilizing DBLVC strategies. These insights are instrumental in guiding decision-making processes for implementing and facilitating intercity PR projects. The recommendations provided are applicable not only to projects like Brightline but could also be utilized to support the development of more PR projects across the 69 identified potential corridors, enhancing the overall framework and funding approach for such initiatives.

1. Enhance multi-modality and connectivity in transportation by integrating regional lines with intercity public transportation networks.
Elevate the appeal of public transportation by enhancing accessibility and convenience. Public agencies should develop comprehensive plans for regional transport and proactively anticipate integration with potential private transportation expansions.
2. Foster collaboration among various stakeholders including freight operators, public transportation entities, regional commuter lines, DOT, private developers, and urban planners.
Facilitate regular meetings and communications to address demands, interests, and feasibility of TOD projects. Ensure private PR is a part of the cohesive transportation vision for the state, emphasizing coordinated planning efforts.
3. Ensure significant population density or anticipated growth along transportation corridors.
Consider corridors that have shown continuous growth and development to support transit ridership and economic vitality. Focus on reducing urban sprawl and the potential for tourism.
4. Streamline zoning legislation to facilitate the construction of high-density, mixed-use developments.
Firms should lobby for, and the public sector should support denser zoning statutes that accommodate TODs with taller mixed-use buildings and increased population density, revitalizing neighborhoods and reducing sprawl.
5. Integrate transportation and land use planning strategies.
The public sector should alter the DOT's long-term infrastructure plans to prioritize TOD initiatives. Shift focus from solely highway-centric approaches to promoting denser developments around PR, revitalizing communities, and mitigating congestion.
6. Address equity considerations in rTOD projects, DBLVC strategies.
Recognize the potential for increased land values to contribute to gentrification and displacement of low-income residents and implement measures to mitigate adverse impacts and ensure equitable access to transit-oriented amenities.
7. Leverage DBLVC as a multifaceted risk mitigation strategy.
Integrate DBLVC strategies with diverse revenue streams including ticket sales, access agreements, bonds, etc. This approach not only stabilizes funding but also attracts a broader range of investors, enhancing the financial robustness and appeal of PR projects.

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Appendix

Appendix I – Interview consent form

This project is part of Master's thesis research at Lund University's International Institute for Industrial Environmental programme.

For more Information about the program: [Website](#)



LAND VALUE CAPTURE STRATEGIES FOR TRANSIT ORIENTED DEVELOPMENT PROJECTS (MASTER'S RESEARCH)

CONSENT FORM

This form is to ensure that you have been given information about the thesis project (see Information Sheet below) and to give you an opportunity to confirm that you are willing to take part in this research. For all activities below, please indicate which applies to you (*checked box indicates consent*):

☐	I have been familiarized with the thesis project, I have had the possibility to ask questions and I have received satisfactory answers to my questions before being interviewed
☐	As a research participant, I am aware of my right to withdraw participation at any time
☐	I give my consent that the interview can be recorded in writing , translated, and analyzed
☐	I give my consent that the interview can be audio- or video-recorded , transcribed, translated, and analyzed with assistance of artificial intelligence
☐	I give my consent to be identified by my organization
☐	I understand that the results of the research will be presented so that no information can be traced to me personally / I have been informed that pseudonymity of participants will be ensured
☐	I give my consent that a record of my interview can be safely stored for future reference
☐	I have been informed who will benefit from the participation
☐	I have been informed how data will be either destroyed or reused at the end of the research
☐	I have been informed of the secondary use of data

Note: Your participation is voluntary. As an interviewee, you do not have to answer all the questions that are asked; you reserve the right to refuse or cease participation in the interview process without stating your reason and may request to keep certain materials confidential. In addition, you have the right to review any summary or synthesis of the interview at any time up until the data is published.

Please, sign below to confirm your consent – digital signatures are possible:

	Participant(s)	Researcher
Name(s) + ID		Jonelle St. Lewis
Signature(s)		
Date(s)		

This project is part of Master's thesis research at Lund University's International Institute for Industrial Environmental programme.

For more Information about the program: [Website](#)



INFORMATION SHEET

This project takes place in Sweden with stakeholders interviewed in the United States.

Description of the Research Program

- This thesis project aims to explore the key success factors for private rail initiatives in specific corridors. Therefore, the project will a framework for actors based on scientific evidence on which political, economic, technical, and regulatory factors enable or constrain private rail using *development-based land value capture (DBLVC) strategies*. Thereby, the focus of this project relies mainly on the transit-oriented development and financing.

The research results benefit the general public and the society as a whole; they are not used to satisfy special interests of individuals.

Purpose of the Interview

As part of this research program, I invite you to participate in an interview. I would like to learn more about:

- *The factors including drivers, barriers, risks, and opportunities that influence the success of private rail using DBLVC.*
- The collected information will be used to produce a thesis. The research will be published in an academic publication.

Data Management

All the data for this project is collected and stored in accordance with the General Data Protection Regulation (GDPR) 2016/679 of the European Union, which entered into force in May 2018. The regulation protects individuals regarding the processing and collection of their personal data. All the research materials, including the participants' data will be securely stored for 10 years. After that period, any personal data collected will be deleted. In addition, data will be deleted at any time on request of the participant. From the beginning of the process, pseudonymization of personal data is applied. Pseudonyms will also be used for further processing the responses. Special attention is paid to direct quotes, for which we will use indirect identifiers (such as gender, region, role) in the transcription protocols, so that they cannot inadvertently identify respondents. The audio/video-recordings, if authorized by the interviewee, will be deleted after they have been transcribed and analyzed, hence they will not be stored for 10 years. At any stage of the research, the participants have a right to gain access to their own personal data, request data correction or limitations to how their data is processed. Participants can also file a complaint about how their personal data is used.

For any enquiries regarding this research, please contact:

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Appendix II – Overview of Interviewees included in this research

Organization	Code	Interviewee role	Organization type in the context of this project
Florida East Coast Industries	VP1	Senior Vice President, Corporate Development	Corporation
Florida Department of Transportation	DE1	Director of Environmental Management	Government Agency
Research Institutes of Sweden	CO1	Transport Planning Researcher	Research/Consultancy
Transit Alliance Miami	UP1	Urban Planner	NGO
Arup	UP2	Transport Planner	Consultancy
Lunds Kommun	PM1	Brunnshög Project Chief	Government Agency
Lunds Kommun	PM2	Fmr. Head of the road and traffic office	Government Agency
K2	CO2	Project Manager	Research/Consultancy

Appendix III – Interview guide

The interview guides were individualized for each interviewee's role. Below is an example of the guide provided to VP1, focusing on these elements: technical details (LC1), financial structure (PPP2), Risk Mitigation and Value Creation (LVC 1 and LVC 2), Regime (G1) and Collaboration (LC2).

Introduce the topic and get consent to record the interview.

1. What factors were considered when FECI decided to embark on the passenger rail venture, particularly in terms of environmental concerns, population density, tourism, and existing freight rail ownership?
2. Given that air travel is often subsidized, and many passenger rail routes operate at a loss, what factors or analyses gave FECI the confidence to take on the financial risk associated with Brightline?
3. With various stakeholders involved in the construction of Brightline, including the FRA, FECR, and state officials, what challenges and considerations did FECI face in terms of determining station locations, negotiating air rights, and ensuring regulatory compliance?
4. The development of stations such as Miami Central, West Palm Beach, and Ft. Lauderdale, along with property sales to developers like the Harbor Group (Park Line Miami), suggests an increase in property value along the Brightline tracks. Did you forecast the impact of Brightline on your property values, and does that help offset some of the capital costs of the Brightline?
5. How does FECI optimize land use to encourage density and foster development along the rail corridor? Specific TOD strategies?
6. Given Florida's focus on road transportation and refusal of federal funding for rail projects, did you encounter major challenges in navigating state policies and securing support for Brightline? Was the absence of government subsidies a choice?
7. Can you discuss FECI's approach to negotiating agreements with freight lines, considering the different track requirements for high-speed rail (HSR) and potential upgrades necessary to achieve HSR standards?
8. How does FECI collaborate with the Florida Department of Transportation (FDOT) to facilitate project ease and ensure successful outcomes, such as shared track access arrangements or close cooperation on infrastructure projects?
9. Can you elaborate on how FECI assembled its team for rail development projects, including the expertise and roles required to execute such initiatives effectively?

Appendix IV – Overview of secondary data used in this research

Document/Media	Source Organization	Organization Type	Document Type
Surface Transportation Facility Revenue Bonds Memorandum	Florida Development Finance Corporation	Bond Issuer	Financial Reports
Rating Action Commentaries	Fitch Ratings	Credit Rating Issuer	Financial Reports
Air Rights Sales Documents	United States Securities and Exchange Commission	Government	Financial Reports
Florida East Coast Railway Passenger Rail Service Report	Palm Beach Transportation Planning Agency	Government	Consultancy Report on financing and PPP agreements
Brightline Ridership and Revenue Feasibility Study	The Louis Berger U.S., Inc.	Infrastructure Development Firm	Finance and Ridership Forecast Study
Florida Rail System Plan	Florida Department of Transportation, Freight and Rail	Government	Statewide Rail Strategy Plan
Registration Statement Under the Securities Act of 1933	United States Securities and Exchange Commission	Government	Financial Report
Correspondence to US Department of Transportation	Florida Department of Transportation	Government	Letters
Executive Summary Economic Impacts of the All Aboard Florida Intercity Passenger Rail Project	The Washington Economics Group, Inc.	Economic Consulting Firm	Financial Report
Brightline Trains and the Business of Connecting Cities, Travel Bros interview with Brightline CEO	Podtail, Apple Podcasts	Transportation related Media	Podcasts
Project Overviews	ZYSCOVICH, Skidmore, Owings, & Merrill	Developers	Websites
All Aboard Florida Final Environmental Impact Assessment	Federal Railroad Administration	Government	Environmental Assessment
Reports on developments and local politics	Reuters, local news affiliates	News	News Articles

Private Activity Bonds Report	Congressional Research Service	Government	Non-partisan research policy document
Chapter 33C – Rapid Transit System—Development Zone Ordinance	Miami-Dade County	Government	Statutory Law

Appendix V – Brightline Trains Florida Route



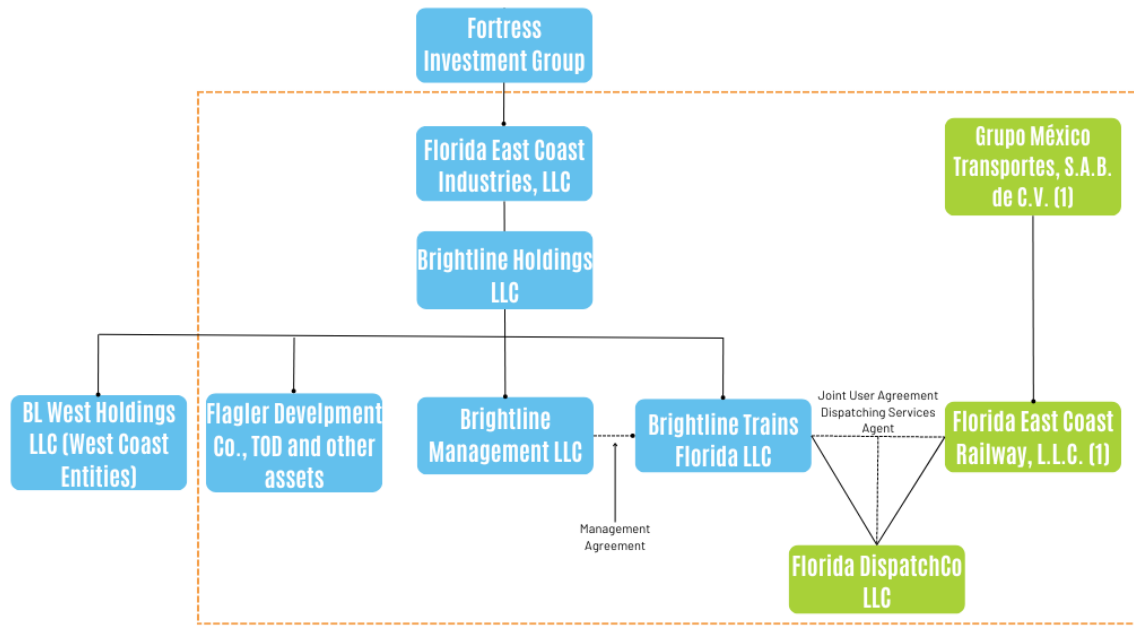
Source: Created using Canva. No permission required as per Canva's licensing policy.

Appendix VI – Brightline Trains Florida Route

Practitioner organizations for interviews

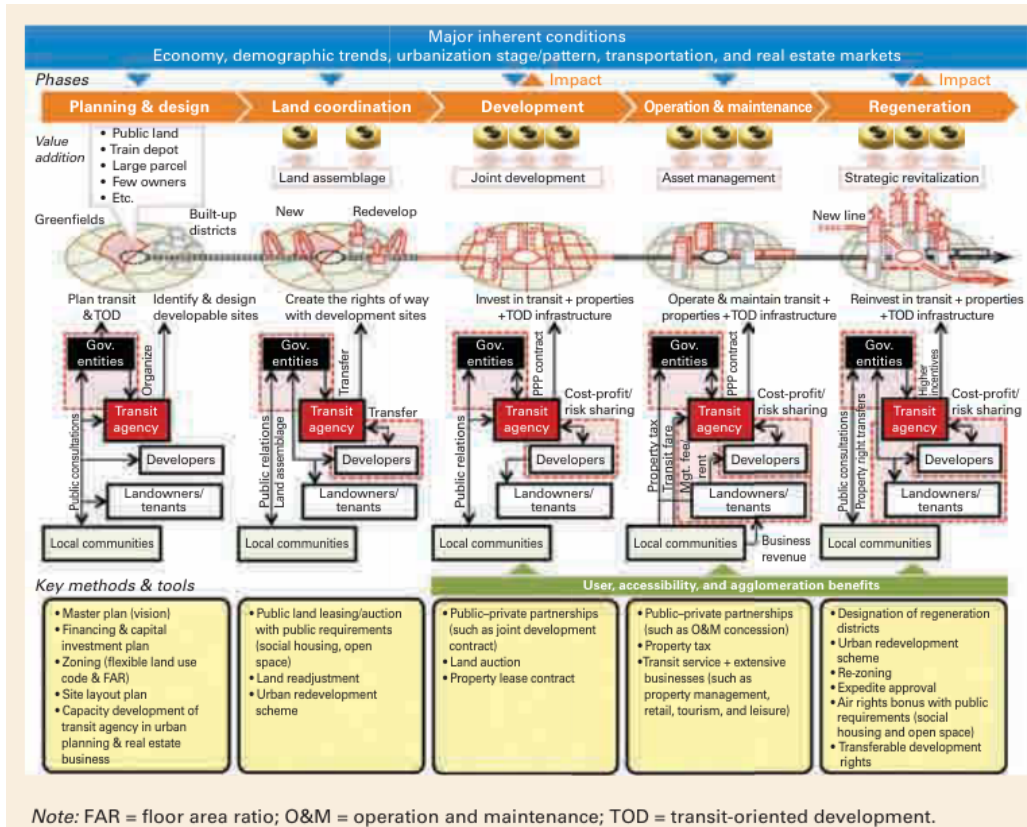


Appendix VII – FECI's organizational structure



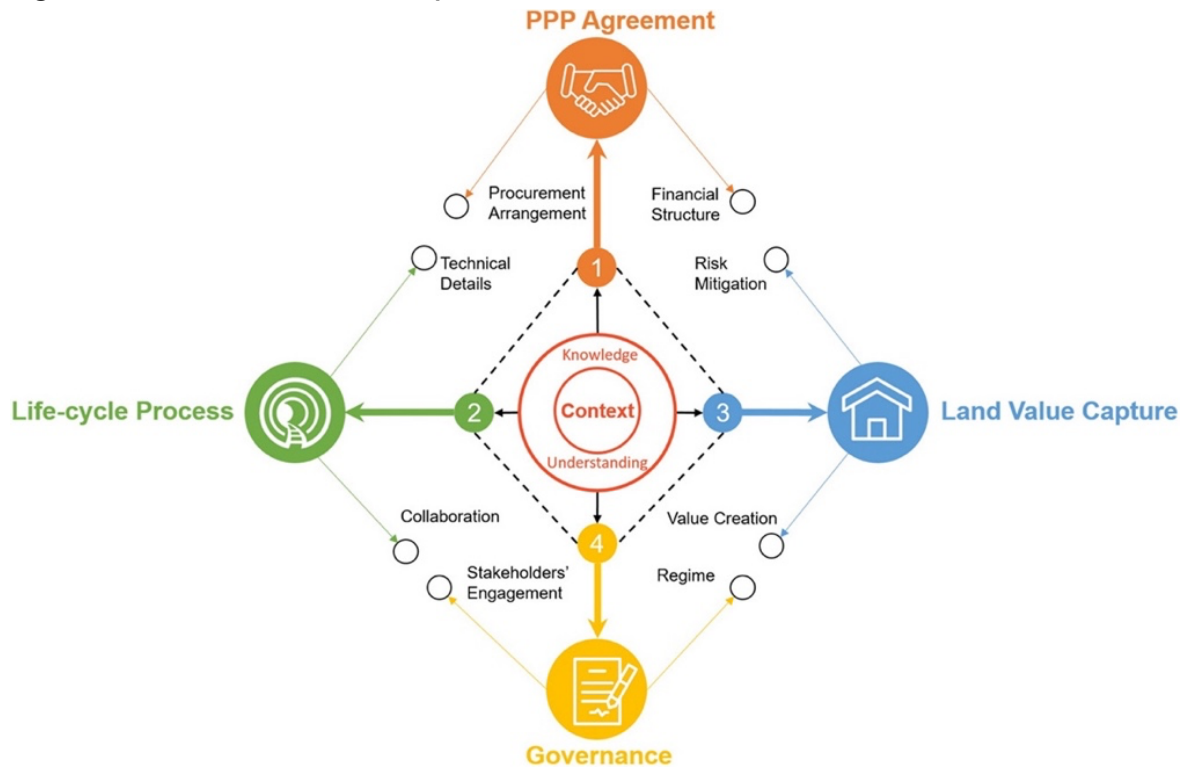
- (1) Grupo México Transportes, S.A.B. de C.V. (GM) and Florida East Coast Railway, L.L.C. (FECR) are not Company subsidiaries.
- (2) Florida DispatchCo LLC is the joint venture between the Brightline and FECR responsible for dispatching trains.

Appendix VIII – Roadmap for development-based land value capture implementation



Source: *Financing Transit-Oriented Development with Land Values: Adapting Land Value Capture in Developing Countries*. (Suzuki, Hiroaki, et al., 2015). World Bank. <https://doi.org/10.1596/978-1-4648-0149-5>. CC BY-NC-ND.

Appendix IX – Conceptual model of rail development PPP agreements with value capture



Source: *Procuring urban rail transit infrastructure by integrating land value capture and public-private partnerships.* (Li & Love, 2022). *Cities*, 119, Article 103412. Elsevier. <https://doi.org/10.1016/j.cities.2021.103412>. CC-BY-NC-ND.