UNIVERSIDADE FEDERAL DE SÃO CARLOS
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA DE PRODUÇÃO
DO CAMPUS SOROCABA

ALEXANDRE BERTO CALVINHO

IMPACTS OF ORGANIZATIONAL FINANCIALIZATION ON SUPPLY CHAIN MANAGEMENT: AN ANALYSIS OF THE INDUSTRIAL POLE OF MANAUS

Sorocaba

2025

UNIVERSIDADE FEDERAL DE SÃO CARLOS
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA DE PRODUÇÃO
DO CAMPUS SOROCABA

ALEXANDRE BERTO CALVINHO

IMPACTS OF ORGANIZATIONAL FINANCIALIZATION ON SUPPLY CHAIN MANAGEMENT: AN ANALYSIS OF THE INDUSTRIAL POLE OF MANAUS

Dissertação apresentada ao Programa de Pós-Graduação em Programa de Pós-Graduação em Engenharia de Produção do Campus Sorocaba para obtenção do título de Mestre em Engenharia de Produção Universidade Federal de São Carlos. Área de concentração: Gestão de Sistemas de Produção

Orientação: Profª. Drª. Patrícia Saltorato

Sorocaba

2025

Calvinho, Alexandre Berto

Impacts of organizational financialization on supply chain management: an analysis of the Industrial Pole of Manaus / Alexandre Berto Calvinho -- 2025.
89f.

Dissertação (Mestrado) - Universidade Federal de São Carlos, campus Sorocaba, Sorocaba
Orientador (a): Patrícia Saltorato
Banca Examinadora: João Eduardo Azevedo Ramos da Silva, Martin Mundo Neto
Bibliografia

1. Financeirização. 2. Gestão da cadeia de suprimentos. 3. Incentivos Fiscais. I. Calvinho, Alexandre Berto. II. Título.

Ficha catalográfica desenvolvida pela Secretaria Geral de Informática (SIn)

DADOS FORNECIDOS PELO AUTOR

Bibliotecário responsável: Maria Aparecida de Lourdes Mariano - CRB/8 6979

UNIVERSIDADE FEDERAL DE SÃO CARLOS

Centro de Ciências em Gestão e Tecnologia
Programa de Pós-Graduação em Engenharia de Produção

Folha de Aprovação

Defesa de Dissertação de Mestrado do candidato Alexandre Berto Calvinho, realizada em 25/08/2025.

Comissão Julgadora:

Profa. Dra. Patrícia Saltorato (UFSCar)

Prof. Dr. Martin Mundo Neto (FATEC)

Prof. Dr. João Eduardo Azevedo Ramos da Silva (UFSCar)

O Relatório de Defesa assinado pelos membros da Comissão Julgadora encontra-se arquivado junto ao Programa de Pós-Graduação em Engenharia de Produção.

Dedico esta dissertação à minha esposa, Nathália, e à nossa filha, Alice, por todo amor, paciência e apoio incondicional ao longo desta jornada.

AGRADECIMENTO

A realização desta dissertação foi possível graças ao apoio de muitas pessoas que contribuíram, direta ou indiretamente, ao longo desta jornada.

À minha esposa, Nathália, e à nossa filha, Alice, agradeço pela paciência, compreensão e presença nos momentos mais exigentes deste percurso. Vocês foram meu alicerce e principal motivação.

Agradeço aos meus pais, Ramiro e Lúcia, pelo exemplo de dedicação, pelos valores que me ensinaram e pelo incentivo constante ao longo da minha formação.

Ao Programa de Pós-Graduação em Engenharia de Produção do Campus Sorocaba (PPGEPS), pela estrutura acadêmica e pela formação sólida que proporcionou ao longo do mestrado.

À minha orientadora, Dra. Patrícia Saltorato, agradeço pela orientação atenta, pelas contribuições valiosas ao longo do processo e pelo empenho em aprimorar cada etapa deste trabalho.

Aos professores e colegas do PPGEPS, pelas trocas de conhecimento, colaborações e apoio ao longo desta etapa.

A todos que, de alguma forma, contribuíram para a realização desta dissertação, deixo aqui meu sincero agradecimento.

ABSTRACT

CALVINHO, A. B. **Impacts of Organizational Financialization on Supply Chain Management:** an analysis of the Industrial Pole of Manaus. 2025. Thesis (Master's in Production Engineering) – Federal University of São Carlos, Sorocaba campus, Sorocaba, 2025.

This research investigates how financialization impacts supply chain management, focusing on the case study of LED lamp production in the Industrial Pole of Manaus (PIM), analyzing the effects of tax incentives from the Manaus Free Trade Zone (ZFM) on production structure and logistical efficiency. The methodology combines a systematic literature review and an empirical case study, with the aim of understanding the fiscal advantages and the logistical challenges resulting from production fragmentation. The study reveals that although production in Manaus involves logistical complexities and additional costs related to transportation and inventory management, the fiscal benefits make it a financially advantageous location. The research highlights that the feasibility of production fragmentation or full relocation should be analyzed on a case-by-case basis, considering the specific cost structures of each industry, as dependence on imported materials and the nature of production can directly influence strategic decisions. The dissertation discusses the trade-offs between fiscal benefits and operational efficiency, emphasizing that financial logic guides strategic decisions, often at the expense of logistical efficiency, as the pursuit of cost minimization and maximization of fiscal benefits prevails over the efficient integration of the supply chain. The research offers practical perspectives for managers, highlighting the need for individualized evaluations and suggests areas for future research, such as the comparison between fragmented and centralized production models and the analysis of different industrial sectors under similar fiscal regimes.

Keywords: Financialization; Supply Chain Management; Industrial Pole of Manaus; Tax Incentives; Production Fragmentation.

RESUMO

CALVINHO, A. B. **Impacts of Organizational Financialization on Supply Chain Management:** an analysis of the Industrial Pole of Manaus. 2025. Dissertação (Mestrado em Engenharia de Produção) – Universidade Federal de São Carlos, campus Sorocaba, Sorocaba, 2025.

A presente pesquisa investiga como a financeirização impacta a gestão da cadeia de suprimentos, com foco no estudo de caso da produção de lâmpadas LED no Polo Industrial de Manaus (PIM), analisando os efeitos dos benefícios fiscais da Zona Franca de Manaus (ZFM) sobre a estrutura de produção e a eficiência logística. A metodologia adotada combina uma revisão sistemática da literatura e um estudo de caso empírico, com o objetivo de compreender as vantagens fiscais e os desafios logísticos decorrentes da fragmentação da produção. O estudo revela que, embora a produção em Manaus envolva complexidades logísticas e custos adicionais relacionados ao transporte e à gestão de estoques, os benefícios fiscais tornam a localização financeiramente vantajosa. A pesquisa destaca que a viabilidade da fragmentação produtiva ou da realocação completa deve ser analisada caso a caso, considerando as estruturas de custo específicas de cada indústria, já que a dependência de materiais importados e a natureza da produção podem influenciar diretamente as decisões estratégicas. A dissertação discute os trade-offs entre benefícios fiscais e a eficiência operacional, evidenciando que a lógica financeira guia as decisões estratégicas, muitas vezes em detrimento da eficiência logística, uma vez que a busca pela minimização de custos e maximização de benefícios fiscais prevalece sobre a integração eficiente da cadeia de suprimentos. A pesquisa oferece perspectivas práticas para gestores, destacando a necessidade de avaliações individualizadas e sugere áreas para pesquisas futuras, como a comparação entre modelos de produção fragmentada e centralizada e a análise de diferentes setores industriais sob regimes fiscais semelhantes.

Palavras-chave: Financeirização; Gestão de Cadeia de Suprimentos; Polo Industrial de Manaus; Incentivos Fiscais; Fragmentação da Produção.

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

ANT National Transport Agency

ANTT National Land Transport Agency

CAGR Compound Annual Growth Rate

DHC Descending Hierarchical Classification

ESG Environmental, Social and Governance

ICMS Tax on the Circulation of Goods and Services

II Import Tax

IPEA Institute for Applied Economic Research

IPI Industrialized Products Tax

IRPJ Corporate Income Tax

IRaMuTeQ R Interface for Multidimensional Text Analysis

LED Light Emitting Diode

LP Linear Programming

M&A Mergers & Acquisitions

PIM Industrial Pole of Manaus

PIS/COFINS Social Integration Program / Contribution for the Financing of Social Security

PPB Basic Productive Process

PRISMA Preferred Reporting Items for Systematic Reviews and Meta-Analyses

R&D Research and Development

ROIC Return on Invested Capital

SCM Supply Chain Management

SLR Systematic Literature Review

SUFRAMA Superintendence of the Manaus Free Trade Zone

TCIF Fiscal Incentive Control Fee

VOS Viewer Software for Bibliometric Mapping

WoS Web of Science

ZFM Manaus Free Trade Zone

CONTENTS

1 INTRODUCTION

The increasing dominance of financial metrics in corporate decision-making has reshaped production strategies and supply chain structures across industries. This process, commonly referred to as financialization, prioritizes short-term financial returns, shareholder value maximization and cost minimization, often at the expense of long-term operational efficiency and supply chain integration (VAN DER ZWAN, 2014; DIAS & ZILBOVICIUS, 2006).

In this context, financial incentives such as tax benefits and government subsidies frequently guide production decisions, sometimes overriding traditional supply chain principles that prioritize efficiency, integration and logistics optimization. These institutional mechanisms, although offered by the state, can be strategically appropriated by firms as part of financialized behavior, particularly when such incentives reshape cost structures and influence production geographies.

A relevant example is the Manaus Free Trade Zone (ZFM) and its associated Industrial Pole of Manaus (PIM), which currently hosts over 600 companies operating under a fiscal regime designed to promote industrial development in the Amazon region (SUFRAMA, 2023). Firms located in the PIM benefit from exemptions such as IPI and IRPJ reductions, granted through the Basic Productive Process (PPB). The PPB is a regulatory framework that defines the minimum set of production steps required in the Manaus region to access tax incentives, thus influencing how and where production is allocated (IPEA, 2019).

While these fiscal advantages offer relevant financial gains, they also introduce operational trade-offs. The geographic isolation of Manaus and its infrastructure limitations demand adaptations in supply chain design, including increased transportation time, higher inventory levels and complex multimodal coordination (GOMES, 2009; SANT'ANNA, 1998). In many cases, firms choose to operate under these conditions not due to supply chain efficiency, but because of the financial benefits associated with PPB compliance.

This dissertation explores how fiscal mechanisms embedded in financial logic influence production fragmentation and supply chain decisions. The research is structured around two complementary studies. The first presents a systematic literature review that discusses the influence of financialization on supply chain strategies, identifying how financial metrics reshape operational and strategic decisions. The second applies these insights to a case study of LED lamp production in the PIM, comparing two production scenarios: one centralized in

Sorocaba, and another fragmented between Sorocaba and Manaus, following the requirements of the PPB.

By combining conceptual and empirical analysis, this study contributes to the understanding of how financialization manifests in industrial policy instruments and impacts supply chain configuration, especially in regions shaped by fiscal incentives.

1.1 RESEARCH PROBLEM AND OBJECTIVES

Based on this context, the present research seeks to answer the following question: **how does financialization influence supply chain management in the context of the Industrial Pole of Manaus (PIM), considering production fragmentation decisions required to meet the fiscal conditions of the Manaus Free Trade Zone (ZFM)?** This problem involves understanding how the predominance of financial metrics affects the organization of production and the operational and logistical costs faced by firms operating in the region.

The general objective of this dissertation is to analyze the impacts of financialization on supply chain management in the context of the PIM, with emphasis on production fragmentation and its effects on operational costs, logistics and production efficiency. To achieve this goal, the research aims to:

1. Examine the academic literature on the impacts of financialization on supply chain management, investigating how companies reorient their production strategies in response to financial and fiscal incentives.
2. Compare the effects of a fragmented production model benefiting from ZFM incentives with a model that does not access these fiscal advantages, analyzing differences in operational costs, logistics performance and tax impacts.
3. Contribute to the academic and managerial debate on the challenges imposed by financialization, offering insights into the economic viability of production fragmentation and its consequences for firms' competitiveness within fiscal incentive regimes.

1.2 METHODOLOGY

The research was conducted in two main stages. The first consisted of a systematic literature review, applied in the first article, following the methodological principles established by Petticrew and Roberts (2005) for systematic reviews in social sciences and management.

Indexed databases such as Web of Science and Scopus were used, with strict inclusion and exclusion criteria to select the most relevant articles on financialization and supply chain management. Bibliometric and content analysis techniques were also applied, enabling the identification of thematic patterns and keyword co-occurrences across the reviewed studies.

The second stage consisted of a case study developed in the Industrial Pole of Manaus (PIM), based on methodological references commonly used in empirical research within production engineering, such as Köche (2013) and Rohde and Wagner (2002). A mixed-methods approach was adopted, combining quantitative modeling and qualitative interpretation to analyze the implications of production fragmentation under the fiscal logic of the Manaus Free Trade Zone (ZFM).

Three main procedures were employed: (1) documentary analysis, including official tax regulations, PPB requirements and company-level information in the LED sector; (2) development of a cost comparison model to evaluate total operational costs and net profitability in two production scenarios (one centralized and one fragmented), considering tax incentives and logistics variables; and (3) qualitative analysis to contextualize the findings, with attention to the strategic and institutional implications of fiscal compliance in production configuration.

The methodological structure supported a consistent analysis of how financial logics, expressed through fiscal instruments, influence corporate decisions related to supply chain design. A summary of the methods, procedures and data sources applied in each stage of the research is presented in Table 1.

Table 1 – Research Methodology Structure

Objective	**Research Method**	**Procedures**	**Data Sources**	**Article Section**
Review the literature on financialization and supply chains.	Systematic literature review.	Search in indexed databases, application of inclusion/exclusion criteria, bibliometric and content analysis.	Web of Science, Scopus.	First article.
Analyze the impacts of production fragmentation in the PIM.	Case study.	Collection of quantitative and qualitative data, documentary analysis.	PPB regulations, LED sector firms, fiscal documents.	Second article.
Compare models with and without ZFM benefits.	Comparative analysis.	Cost analysis of operational and fiscal differences between scenarios.	Logistics cost reports, tax regulations.	Second article.

Source: Developed by the author based on the research methods applied.

1.3 WORK STRUCTURE

This dissertation is structured in the form of scientific articles, addressing the relationship between financialization and supply chain management from complementary perspectives. The first article presents a systematic literature review, gathering and analyzing studies that discuss the impacts of financialization on production chains and corporate strategic decisions. Its objective is to build a solid conceptual foundation on how financial metrics influence production allocation, supplier selection and the global organization of manufacturing. Based on this review, trends, challenges and gaps in the literature are identified, particularly regarding the role of fiscal incentives and production fragmentation in specific industrial contexts.

Building upon this theoretical foundation, the second article develops an empirical case study of the Industrial Pole of Manaus, examining how financial logics influence production allocation decisions in the region. The focus is on LED lamp manufacturing, comparing two production scenarios: one fragmented between Manaus and Sorocaba to comply with the Basic Productive Process (PPB), and another fully centralized in Sorocaba, without accessing ZFM incentives. The study evaluates the implications of this fragmentation on logistics performance, operational costs and competitiveness, offering a practical lens to the dynamics outlined in the first article.

The relationship between the two articles is articulated through the integration of theory and application. While the first article explores financialization in supply chains from a macro and conceptual perspective, the second examines this dynamic in a specific territorial context, highlighting how financial and institutional incentives shape corporate decisions in practice. The general introduction and final conclusion aim to connect both studies, emphasizing the coherence of the research design and its contributions to the interdisciplinary debate on financialization, supply chain strategy and fiscal policy.

1.4 JUSTIFICATION

The relevance of this research lies in its contribution to both the academic understanding and the practical application of financialization in supply chain management (SCM). While most studies on financialization focus on the financial sector or corporate governance (VAN DER ZWAN, 2014), this dissertation addresses a gap in the literature by analyzing how financial logics directly influence the structuring of production chains and the allocation of

industrial processes. More specifically, it explores how financial metrics and fiscal incentives shape decisions on production fragmentation in regions that offer tax advantages, such as the Industrial Pole of Manaus (PIM).

By analyzing the case of the Manaus Free Trade Zone (ZFM), the study provides empirical evidence of how state-designed tax policies, when interpreted through financialized corporate strategies, become instruments that affect supply chain configuration. Incentives such as IPI exemption and IRPJ reductions, mediated by the Basic Productive Process (PPB), operate as institutional mechanisms capable of reshaping industrial decisions at both operational and territorial levels (IPEA, 2019; SENADO FEDERAL, 2020).

From a practical perspective, the research provides valuable insights for decision-makers in companies operating under the ZFM fiscal regime. The analysis of trade-offs between substantial fiscal benefits and the operational burdens introduced by production fragmentation highlights critical issues for supply chain design. Companies in the PIM face logistical and managerial challenges due to the geographic isolation of Manaus and the regulatory demands of the PPB, which require precise coordination of production stages across regions (GOMES, 2009; SANT'ANNA, 1998).

By quantifying these trade-offs and interpreting their strategic implications, this dissertation enables managers to evaluate whether the financial advantages provided by fiscal incentives justify the resulting operational complexities. Furthermore, the study contributes to the broader debate on how financialization influences competitiveness, territorial industrial policy and long-term production planning in emerging economies.

REFERENCES

DIAS, A. V.; ZILBOVICIUS M. **A produção face à financeirização: quais consequências para a organização da produção e do trabalho?** Uma proposta de agenda de pesquisa para a engenharia de produção brasileira. In: ENCONTRO NACIONAL DE ENGENHARIA DE PRODUÇÃO, 26., Fortaleza, 2006. Anais do XXVI Encontro Nacional de Engenharia de Produção.

GOMES, H. M. O. **Identificação e análise dos critérios de decisão na escolha de transportes de carga pelas indústrias do PIM.** Master's Dissertation. UFAM, 2009.

IPEA - INSTITUTO DE PESQUISA ECONÔMICA APLICADA. **O Polo Industrial de Manaus: Desafios e Perspectivas.** Technical report, Brasília: IPEA, 2019. Available at: ipea.gov.br. Accessed on: January 20, 2025.

KÖCHE, J. C. **Fundamentos de Metodologia Científica: Teoria da ciência e iniciação à pesquisa.** 33. ed. Petrópolis: Vozes, 2013.

PETTICREW, M.; ROBERTS, H. **Systematic reviews in the social sciences: A practical guide.** 1st Edition, Blackwell Publishing Professional, December 2005.

ROHDE, J.; WAGNER, M. **Master Planning.** In: STADLER, H.; KILGER, C. (Eds.), Supply Chain Management and Advanced Planning – Concepts, Models, Software and Case Studies, p. 159-177. Berlin, 2002.

SANT'ANNA, J. **Sistema Hidroviário da Amazônia.** Manaus: SUFRAMA, 1998.

SENADO FEDERAL. **Zona Franca de Manaus: Desafios e Vulnerabilidades.** Textos para Discussão – Senado Federal, n. 126, Brasília: Senado Federal, 2020. Available at: senado.gov.br. Accessed on: January 20, 2025.

SUFRAMA - SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Relatório Anual 2022.** Manaus: SUFRAMA, 2023. Available at: gov.br/suframa. Accessed on: January 20, 2025.

VAN DER ZWAN, N. **Making sense of financialization.** Socio-Economic Review, v. 12, n. 1, pp. 99-129, 2014.

2 IMPACTS OF ECONOMIC FINANCIALIZATION ON SUPPLY CHAIN MANAGEMENT: A SYSTEMATIC LITERATURE REVIEW

Abstract: This article presents a systematic literature review that investigates the effects of financialization on supply chain management (SCM). The growing dominance of financial metrics in organizational performance has led to profound impacts on economic, business, and social contexts. Using the Web of Science and Scopus databases, 15 articles were selected through a rigorous filtering process to form the research portfolio. The findings reveal that financialization significantly influences SCM strategies, driving changes in decision-making processes and prioritizing financial imperatives over operational adaptability. These dynamics often increase the number of suppliers, expand geographic dispersion, and foster transnational supply chains, while weakening responsiveness and resilience through excessive outsourcing, cost-driven supplier selection, and relocation to low-cost regions. While these shifts aim to maximize shareholder value, they expose supply chains to vulnerabilities and external shocks. This study contributes to advancing the understanding of financialization's implications for SCM, highlighting critical challenges and opportunities for balancing financial objectives with sustainability and operational efficiency.

Keywords: Financialization. Supply Chain Management. Global Value Chains. Corporate Governance

2.1 INTRODUCTION

The rise of globalized economies and open capital markets has fundamentally transformed corporate structures and market dynamics. Over recent decades, the shift from industrial capitalism, centered on the production of goods and services, to financial capitalism has marked a profound reconfiguration of organizational priorities. This phenomenon, known as financialization, has significantly altered corporate governance by privileging shareholder value and financial performance metrics over traditional operational goals (VAN DER ZWAN, 2014). Consequently, organizations have increasingly adopted management practices aligned with financial market expectations, which has brought about substantial changes in their strategic decision-making processes and operational structures.

In the context of supply chain management (SCM), financialization exerts an especially profound influence. Traditional supply chain models emphasize efficiency, cost reduction, and resilience, seeking to optimize the flow of goods and services while maintaining robust partnerships with suppliers and distributors. However, financialization reorients these priorities by introducing financial performance indicators as dominant metrics for decision-making. This shift often results in trade-offs that prioritize short-term shareholder returns at the expense of supply chain stability and adaptability (DIAS & ZILBOVICIUS, 2006).

Empirical evidence demonstrates that the emphasis on financial metrics impacts critical supply chain activities, such as supplier selection, geographic location decisions, and risk management. For example, companies often favor financial criteria such as credit ratings and cost metrics over considerations of quality, social responsibility, or environmental impact (JUM'A et al., 2021). Furthermore, the pressures to maximize shareholder value can encourage strategies that fragment supply chains, increase geographic distances between suppliers, and shift production to regions with lower costs, thereby creating vulnerabilities to external shocks (HE & ZUO, 2023). While much of the literature emphasizes these firm-driven logics, it is also important to acknowledge that financial rationalities can be embedded in institutional arrangements originally motivated by social or developmental objectives, such as fiscal regimes or industrial policies, which over time become aligned with financialized outcomes (LEVY-ORLIK, 2013).

Financialization also complicates sustainability efforts within supply chains. Evidence suggests that the pursuit of financial objectives often leads to environmentally and socially suboptimal outcomes. For instance, sustainability goals are frequently deprioritized in favor of cost reduction strategies aimed at meeting short-term financial targets (LEVY-ORLIK, 2013). These dynamics underline the tension between financial imperatives and broader operational and sustainability objectives.

The relationship between financialization and SCM has emerged as a critical area of study, yet much of the literature remains fragmented and underdeveloped, particularly in contexts beyond the domains of economics and business management. Addressing this gap is essential to advancing both academic understanding and managerial practices in SCM.

This study seeks to contribute to this field by systematically examining the intersection of financialization and SCM. Employing a systematic literature review methodology, the research aims to construct a comprehensive portfolio of studies that analyze the implications of financialization on supply chain strategies and operations. By synthesizing diverse perspectives and findings, the study endeavors to highlight key patterns, identify existing gaps, and propose

directions for future research. Ultimately, this effort aims to inform both scholars and practitioners, providing insights into how financialization reshapes supply chain dynamics and the broader organizational ecosystem.

In addition to the emphasis on financial logics, this review also considers how corporate decisions regarding supply chain configuration may be influenced by fiscal instruments such as tax incentives and regulatory regimes. While these factors are often underexplored in the literature, they may function as financialized mechanisms capable of reshaping production and distribution structures. By integrating this perspective, the study provides a theoretical foundation for further empirical investigations into how firms strategically respond to both market-based financial pressures and institutional fiscal stimuli.

Building on this debate, this article adopts financialization as the growing predominance of financial logics in non-financial corporations and their supply chain configurations, which increasingly shape strategic and operational decisions. Prior research has shown how financial imperatives reconfigure sourcing, investment, and production strategies, often privileging cost optimization and shareholder-oriented outcomes over long-term productive capacity (BURCH & LAWRENCE, 2013; ISAKSON, 2014; FROUD et al., 2014; MORGAN, 2014; PARKER & COX, 2018). In this perspective, financialization is treated as a multidimensional process that operates through governance mechanisms, financial behavior, and the strategic use of fiscal or contractual arrangements within supply chains. This operational understanding provides the conceptual foundation for the systematic literature review presented in the next sections.

2.2 METHODOLOGY

According to Petticrew and Roberts (2005), the systematic literature review (SLR) is an exploratory and descriptive research method that enables a comprehensive evaluation of existing literature on a specific topic. This approach allows researchers to examine underexplored themes and critically reassess established theories through a transparent and rigorous process. It serves as a valuable tool for synthesizing knowledge and identifying research gaps, providing a strong foundation for advancing academic and practical understanding.

This study follows the methodological framework proposed by Tranfield et al. (2003), which organizes the SLR process into three sequential stages: planning, execution, and dissemination. The planning stage involved defining research questions, selecting appropriate databases, and establishing search strategies. These steps ensured that the study captured

relevant and high-quality articles within the scope of financialization and supply chain management (SCM).

The SLR process adhered to the PRISMA framework (PAGE et al., 2021), a widely accepted guideline for systematic reviews. The inclusion and exclusion criteria, as well as the search strategies, were guided by best practices outlined by Pahlevan-Sharif et al. (2019). To support the identification and screening of articles, the Rayyan web application was utilized, as recommended by Ouzzani et al. (2016).

For the dissemination stage, bibliometric analysis was performed using VOSViewer (VAN ECK & WALTMAN, 2010), which allowed the identification of keyword co-occurrences and citation patterns. Additionally, content analysis was conducted using the methodological guidelines of Bardin (2011), with support from the IRaMuTeQ software (RATINAUD & DÉJEAN, 2009), enabling the identification of thematic clusters and conceptual linkages within the selected articles. Following Bardin's framework, the procedure involved pre-analysis of the textual corpus, categorization through lexical associations, and interpretation of the emerging clusters, ensuring that the automated outputs were systematically aligned with established principles of content analysis.

By employing this structured and methodologically sound approach, the study contributes to a clearer understanding of the ways financialization influences supply chain strategies and practices. This methodology ensures that the review provides a robust and comprehensive analysis of the topic, guiding future research and practice in this area.

Although the keyword set was constructed to broadly capture financialization phenomena in supply chain contexts, the scarcity of studies explicitly addressing tax incentives as drivers of structural supply chain decisions reveals a gap in academic literature.

2.3 RESULTS

This section presents and details the three stages of the methodological process adopted: planning, execution, and dissemination of results, as proposed by Tranfield et al. (2003).

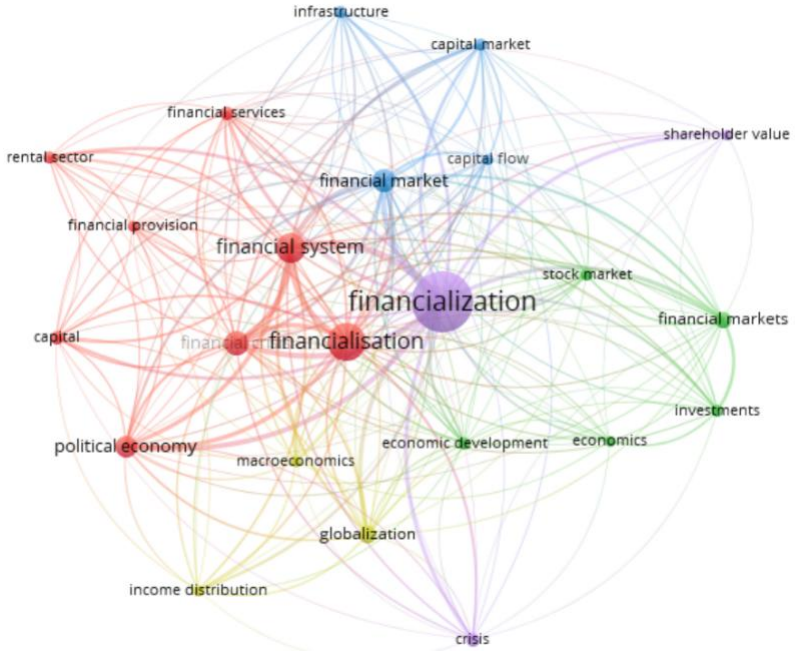
2.3.1 Planning Phase

Considering its broad application in scientific research, the Web of Science (WoS) and Scopus databases were chosen to search for articles that composed the research portfolio, as they are recognized for their extensive coverage in various fields (PRANCKUTĖ, 2021).

Keywords that guided the primary research were defined as: “Financialization” (Financialization/Financialisation) and “Supply Chain Management”. The preliminary results returned only eight articles correlating the two search terms, which highlighted the need to explore related terms within each construct.

To achieve this, the term “Financialization” was researched individually, restricted to articles and reviews, and the VOSviewer software was used to identify keyword variants of the initially proposed terms. In addition to the occurrence and relationship analysis among keywords, the theoretical foundation behind the concept of the main research term contributed to the network diagram presented in Figure 1.

Figure 1 – Analysis of Correlated Terms for Financialization (VOSViewer software)



Source: Elaborated by the author, software VOSViewer.

In Figure 1, the clusters generated by VOSviewer can be distinguished by color, each representing groups of terms frequently co-occurring in the initial dataset, prior to PRISMA screening. The red cluster relates to political economy and macroeconomic debates, the green cluster emphasizes shareholder value and financial markets, the blue cluster captures capital flows and infrastructure, while the yellow cluster connects financialization to globalization and income distribution. A smaller purple cluster associates financialization with crises. Together, these clusters provide an overview of the broader field, indicating the multiple research streams in which financialization has been mobilized.

In addition to the terms “Financialization” and “Financialisation”, the term “financial system” was included in the construct. By analyzing the keywords and the diagram above, the chosen synonym allows coverage of topics related to financial analysis, capital markets, and shareholder value, which are directly related to corporate financial management.

For the term “Supply Chain Management”, two searches were conducted: one restricting the construct to “Supply Chain Management” and another expanding the construct to “Supply Chain”, removing the restriction to management topics. This decision was based on the scarcity of articles exclusively focused on supply chain management, allowing for a broader vision of the research field while exploring management aspects within articles covering other supply chain points.

The conclusion of the planning phase is presented in Table 2, showing the search expressions and results in each database.

Table 2 – Terms and Search Results in WoS and SCOPUS

Bibliographic Platform	**Search Expression**	**Result**
WoC	(financialization OR financialisation OR "financial system") AND "Supply Chain" (All Fields) AND (Article OR Review Article) (Document Types)	56 articles
Scopus	TITLE-ABS-KEY (financialization OR financialisation OR "financial system") AND "Supply Chain") AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")	148 articles

Source: Elaborated by the author.

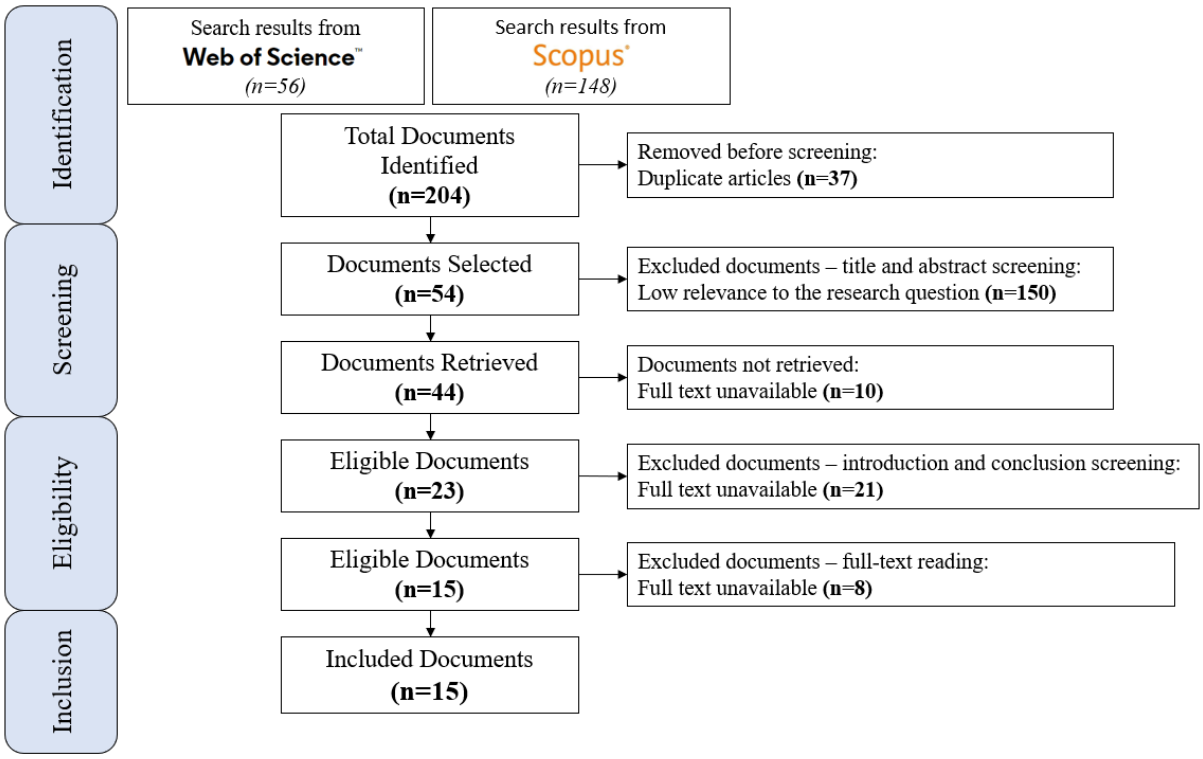
2.3.2 Execution Phase

The Planning Phase allowed the identification of 204 works that met the established search criteria. During the analysis process in the Rayyan web application, 37 duplicate articles were identified and excluded.

For screening, titles and abstracts of all articles were read, applying a filter where 123 articles were excluded for not focusing on aspects related to the impact of financialization on supply chains or their management, or because full articles were not freely available.

The remaining 44 publications were directed to the eligibility phase, divided into two stages. In the first, introductions and conclusions were read, leading to the exclusion of 21 works. In the second stage, full readings of the articles were conducted, resulting in the 15 works included in the portfolio of this systematic literature review. The PRISMA flowchart model is presented below.

Figure 2 – PRISMA Flowchart



Source: Adapted from Page et al. (2021).

2.3.3 Dissemination Phase

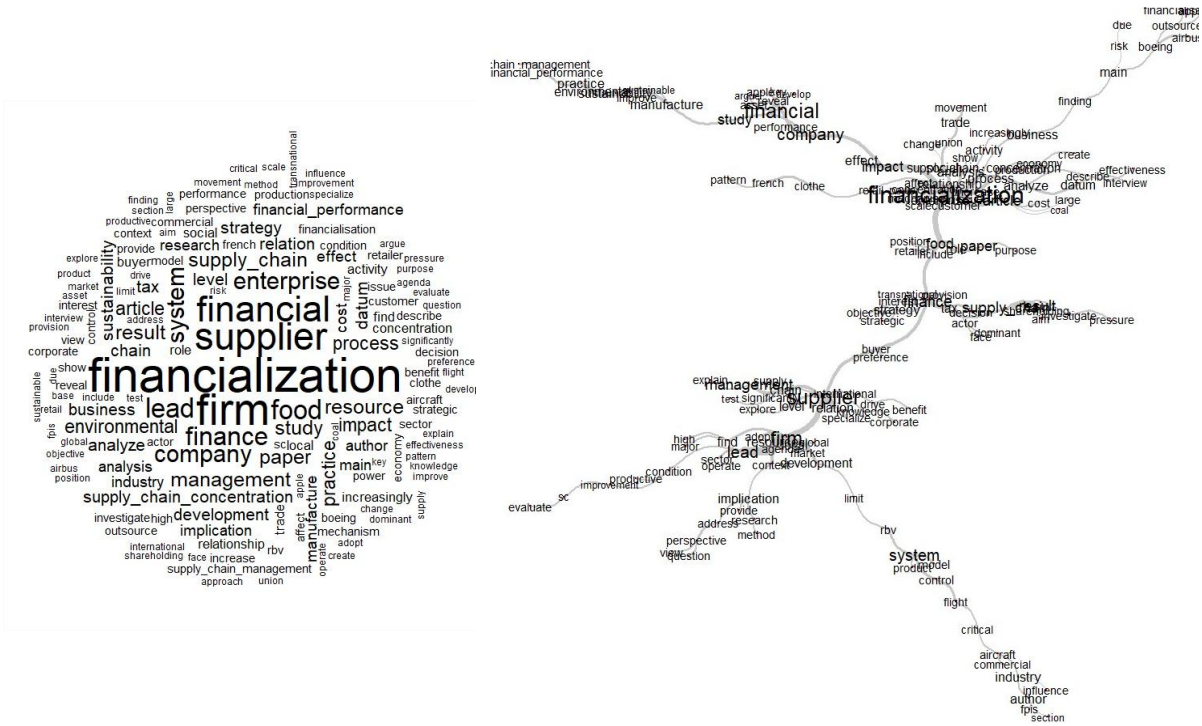
The results show a growing research field encompassing various areas. Financialization has been extensively explored in Economics, Management, and Administration studies, particularly addressing globalized markets.

Crossing this topic with supply chain evaluation shows an increase in publication volume in the second decade of the 21st century, with a portfolio composed of 12 articles written in the last 10 years. Given that no temporal restrictions were applied to the Identification, Screening, or Eligibility Phases, this result demonstrates the evolving nature of this topic. A closer look at the database search results before screening shows that 113 of the 167 articles (excluding duplicates) were written in the last five years.

To analyze the content, the summaries of the 15 research works were exported from the Rayyan software in CSV format and saved in UTF-8, removing special characters as per the IRaMuTeQ manual's guidelines (SALVIATI, 2017). The graphs generated by IRaMuTeQ provided clearer visualization of relationships among terms and concepts frequently addressed in the reviewed articles. Additionally, this tool enabled a more objective and systematic analysis of the studies, aiding in the identification of patterns and guiding the grouping of results for further analysis.

The first results extracted from the application divided the article summaries into units (words) and grouped them based on frequency, as shown in the Word Cloud in Figure 3(a), and by similarity, in the Similitude Analysis in Figure 3(b).

Figure 3 – Analysis of Words (IRaMuTeQ)



(a) Word Cloud (b) Similitude Analysis

Source: Elaborated by the author, software IRaMuTeQ.

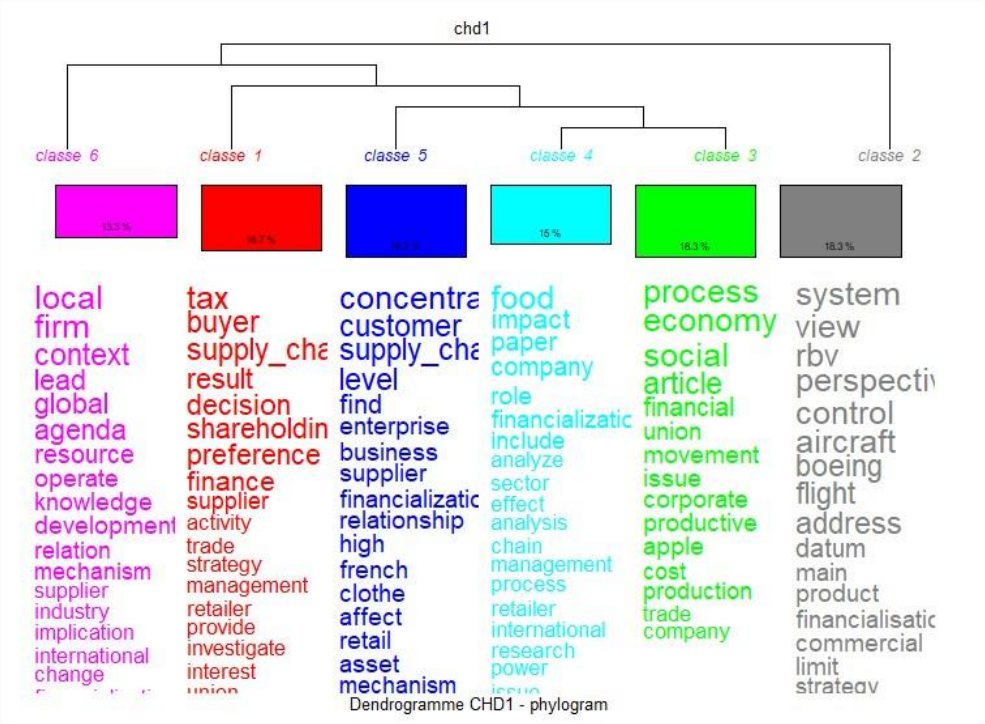
The Word Cloud in Figure 3(a) demonstrates various perspectives addressed in supply chain studies, including terms such as "supply chain concentration," indicating analyses of the geographic distribution of supply chains; "supplier," reflecting discussions on supplier selection; and "tax," which, though not a prominent term in the diagram, is significant for analyzing transnational scenarios. Terms like "sustainability" and "environmental" highlight

that the portfolio contains articles addressing supply chain sustainability aspects potentially impacted by financialization.

The Similitude Analysis in Figure 3(b) reveals the term “Financialization” as a central node, reinforcing its prominence in the Word Cloud. Smaller links, connected to more specific terms, indicate case study-focused articles, while broader links suggest clusters that additional analyses in IRaMuTeQ may reveal. Overall, the similitude analysis highlights three main thematic branches: one linking financialization to shareholder value and corporate governance, another connecting it to outsourcing and restructuring in global value chains, and a third associated with sustainability and environmental issues. This structure demonstrates that the literature simultaneously addresses macroeconomic logics, operational decisions, and socio-environmental concerns, reinforcing the multidimensional character of the field.

The descending hierarchical classification (DHC) method by Reinert, based on lexical proximity and the idea that words used in similar contexts are associated with the same lexical world (SALVIATI, 2017), was used to create word clusters indicating potential article groupings. The result for this systematic literature review portfolio was the division into six clusters, as shown in Figure 4.

Figure 4 – Dendrogram DHC (IRaMuTeQ)



Source: Elaborated by the author, software IRaMuTeQ.

Classes 3 and 4 highlight specific terms like “food” and “social,” indicating a narrow focus within the constructs; moving to Class 5 and subsequently to Class 1, the focus shifts to general supply chain terms like “concentration,” “buyer,” and “tax.” Class 6 shows highly generalist terms, suggesting articles that approach a more globalized context without evaluating specific cases. Class 2, as an isolated cluster, suggests a distinctive article within the portfolio.

The findings of this systematic literature review highlight the multifaceted ways financialization reshapes supply chain management, affecting sustainability, geographic concentration, and operational resilience. These results not only confirm the growing influence of financial imperatives but also reveal gaps in understanding how these dynamics evolve across industries and regions. Interpreting these patterns helps to advance the theoretical understanding of financialization's role in supply chain design and points to important questions for future empirical research. Moreover, the thematic contents highlighted by the DHC are consistent with the portfolio analyzed in Table 3, which allows for a deeper exploration of how these dimensions materialize in specific sectors and cases.

While bibliometric and textual analysis tools such as VOSviewer and IRaMuTeQ enhance transparency and replicability, they also present limitations. Co-word analysis may overemphasize frequent terms while underrepresenting emerging concepts, and IRaMuTeQ relies on lexical categories that may not fully capture contextual nuances. To mitigate these constraints, automated outputs were complemented by interpretive reading of the selected article.

2.4 DISCUSSIONS

The growing academic attention to financialization and supply chain management reflects an effort to understand the profound organizational and institutional transformations that redefine production and distribution logics in global markets. The studies analyzed demonstrate that the effects of financialization are not limited to the prioritization of shareholder value but extend to structural decisions in supply chain configuration, such as sourcing policies, geographic distribution, and network governance models.

Although these studies vary in their disciplinary perspectives, several patterns emerge. First, financialization is consistently associated with a reorientation of corporate strategies that prioritize short-term financial gains over long-term operational robustness. This includes decisions that increase supply chain vulnerability, such as excessive outsourcing, cost-driven supplier selection, and relocation to low-cost regions, often at the expense of environmental

and social sustainability (HE & ZUO, 2023; JUM'A et al., 2021). At the same time, it is important to acknowledge that financial logics may also operate within long-standing institutional frameworks, such as fiscal incentive regimes or industrial policies. This indicates that financialization does not emerge exclusively from firm-level strategies but can be embedded in broader regulatory arrangements that persist over time (LEVY-ORLIK, 2013).

To better illustrate the patterns and thematic gaps across the reviewed literature, Table 3 presents a synthesis of the 15 selected articles, including their sectoral focus, financialization practices, supply chain impacts, and any mention of fiscal or institutional incentives.

Table 3 – Summary of Selected Articles on Financialization and Supply Chain Management

Author (Year)	**Sector / Region**	**Financialization Practice**	**SCM Impact**	**Article Focus Summary**
He et al. (2023)	Global / Various	Cross-border financial behavior	Tax regime-based structural decisions	Discusses transnational financial strategies shaped by differentiated tax regimes.
Parker, Cox & Thompson (2018)	Australia / Mining	Value-based control, shareholder focus	Control over supplier cost structure	Explores financial control over suppliers in the Australian mining supply chain using value-based metrics.
Froud et al. (2014)	Global / Electronics	Corporate value capture	Global outsourcing, social impacts	Examines Apple's transpacific chain, emphasizing social impacts of corporate value capture.
Burch & Lawrence (2013)	Global / Agri-food	Private equity, vertical integration	Supplier dependency, food logistics	Studies agri-food chain financialization and restructuring driven by logistics giants.
Beaugency, Sakinc & Talbot (2015)	Europe / Aerospace	Outsourcing of strategic assets	Operational fragmentation	Analyzes outsourcing of strategic resources in aerospace under financial rationalization.
Jum'a et al. (2021)	Jordan / Industry	Financial performance indicators	Supplier evaluation, cost vs sustainability	Relates financial performance indicators and sustainability in Jordanian industry.
Hong & Najmi (2020)	Asia / General	Shareholder value focus	Strategic supplier decisions	Analyzes shareholder value logic in supply chain decisions in Asia.
He & Zuo (2023)	China / Manufacturing	Asset reallocation	Supplier relocation	Explores asset and supplier relocation in China under financial pressure.

Yuesti et al. (2020)	Indonesia / Institutions	Public-sector financial logic	Managerial adaptation	Examines public sector financial logic impacting institutional supply chains in Indonesia.
Isakson (2014)	Global South / Agri-food	Commodity trading	Market speculation, price volatility	Explores effects of financialization on agricultural commodity trading and price volatility.
Morgan (2014)	Global / Corporations	Multinational corporate finance	Governance across borders	Addresses financial strategies of multinationals and implications for chain governance.
Zou & Zhang (2023)	China / Corporate	Supply chain concentration, capital pressure	Location decisions, supplier consolidation	Analyzes how supplier concentration and capital pressure influence supply chains in China.
Parker & Cox (2018)	Australia / Mining	Global cost discipline	Disempowerment of suppliers	Discusses how global cost discipline reshapes supplier relations in mining.
Levy-Orlik (2013)	Mexico / Private firms	Debt structure, asset shift	Disinvestment, restructuring	Analyzes effects of financialization in Mexican firms, focusing on production and debt structure.
Palpacuer (2006)	France / Fashion	Retail cost rationalization	Offshoring, labor displacement	Studies how French retailers rationalize sourcing and externalize social impacts.

Source: Elaborated by the author.

The analysis of the portfolio reveals differentiated sectoral patterns in how financialization practices shape supply chain management. In the mining sector, Parker and Cox (2018) and Parker, Cox and Thompson (2018) demonstrate how shareholder-oriented cost discipline and value-based control metrics restructure supplier relations. In both studies, suppliers are disempowered, as their operations become subordinated to global financial imperatives and continuous benchmarking, showing how financial logics penetrate deeply into resource-based industries and shift the balance of power within supply networks.

In manufacturing and global value chains, Froud et al. (2014), Beaugency, Sakinc and Talbot (2015), and Palpacuer (2006) highlight the consequences of outsourcing and fragmentation under financial rationalization. Froud et al. (2014) illustrate Apple's global cost

ratios and their social impacts, Palpacuer (2006) documents how French retailers rationalize sourcing through offshoring, and Beaugency et al. (2015) show the implications of outsourcing strategic assets in aerospace. Taken together, these studies indicate that financial logics drive supply chains toward greater fragmentation, labor displacement, and long-term erosion of productive capacity.

In the agri-food sector, Burch and Lawrence (2013) and Isakson (2014) reveal how private equity and speculative commodity trading reshape food supply chains. Their findings highlight how supplier dependency and price volatility intensify when agribusiness and retail are subordinated to financial imperatives. Both studies reinforce the idea that financialization operates not only through manufacturing and services but also through food systems, raising broader questions about sustainability and social reproduction.

Emerging economies offer further perspectives. Levy-Orlik (2013) shows how financial logics in Mexico led to disinvestment and restructuring of productive assets, while Jum'a et al. (2021) and Hong and Najmi (2020) examine how shareholder value orientation and financial performance indicators shape supplier evaluation in Asia and Jordan. These cases illustrate how firms in developing contexts face tensions between cost discipline, sustainability, and long-term investment. They also reveal the uneven geography of financialization, with Global South economies exposed to its pressures while lacking institutional buffers.

At the corporate governance level, Morgan (2014), He et al. (2023) and He and Zuo (2023) examine how multinational firms adapt their supply chain and tax structures to global financial regimes. Morgan (2014) emphasizes governance across borders, He et al. (2023) show how cross-border financial strategies respond to differentiated tax regimes, and He and Zuo (2023) illustrate asset reallocation and supplier relocation in China. These studies point to a growing convergence between supply chain restructuring and corporate financial engineering, reinforcing the dominance of financial logics in global production networks.

Yuesti et al. (2020) broaden the scope by analyzing how public institutions in Indonesia adopt financial rationalities, reshaping managerial practices and institutional supply chains. Their study shows that financial logics are not limited to private corporations but also permeate public and semi-public organizations, extending the scope of financialization across sectors.

Across these diverse cases, common patterns emerge: financialization promotes short-term performance metrics, shareholder value discipline, outsourcing, and supplier dependency, often at the expense of long-term productive investment and resilience. At the same time, significant gaps remain, particularly regarding the role of fiscal regimes, industrial policy, and state-mediated arrangements. These observations underline both the pervasiveness of financial

logics in supply chain management and the limits of current research, establishing the basis for further empirical investigation.

Beyond academic contributions, the findings also carry practical implications. For supply chain managers, the review indicates that financial pressures increasingly drive sourcing and restructuring decisions, which may undermine long-term resilience and sustainability. For policymakers, the absence of fiscal and industrial policy considerations in the literature suggests the need for regulatory frameworks that explicitly address the financial logics shaping global production networks.

2.5 CONCLUSION

This Systematic Literature Review synthesized research at the intersection of financialization and supply chain management, identifying how financial logics have increasingly shaped corporate decision-making and supply chain structures. The reviewed literature reveals that financialization not only alters capital allocation and governance priorities but also restructures sourcing strategies, network configurations, and the very role of supply chains in corporate value creation.

Three critical patterns emerge from the analysis. First, financialization reorients supply chain management toward short-term financial metrics, frequently at the expense of long-term operational resilience. Second, environmental and social dimensions of supply chain management appear in the literature as secondary effects, often mentioned but rarely examined in depth or with robust analytical frameworks. Third, and most notably, literature offers limited engagement with institutional and fiscal instruments, such as tax incentives, public subsidies, and location-based financial regimes, as explicit drivers of supply chain restructuring.

This last point underscores a key conceptual gap. While much attention has been devoted to shareholder value, asset reallocation, and cost minimization, few studies investigate how financialized decision-making processes interact with differentiated fiscal environments. The role of such instruments in shaping global production and distribution strategies remains under-theorized and empirically marginal.

By mapping the existing knowledge and highlighting its limitations, this review contributes a structured foundation for future inquiries into how financial and fiscal logics converge in the governance of supply chains. The findings reinforce the need for integrative research that transcends disciplinary silos, connecting financial theory, operations management, and public policy analysis. Such an approach is critical for understanding how production

systems are increasingly configured not by operational rationality alone but by a broader landscape of financial pressures and institutional opportunities.

REFERENCES

BARDIN, L. **Análise de Conteúdo.** 3ª reimpressão da 1ª edição de 2011. São Paulo: Edições 70, 2011. ISBN 9724408981.

BEAUGENCY, A.; SAKINC, M.; TALBOT, D. **Outsourcing of strategic resources and capabilities: opposing choices in the commercial aircraft manufacturing.** Journal of Knowledge Management, v. 19, Issue 5, pp. 912-931, 2015. DOI: 10.1108/JKM-01-2015-0040.

BURCH, D.; LAWRENCE, G. **Financialization in agri-food supply chains: private equity and the transformation of the retail sector.** Agriculture And Human Values, Brisbane, Australia, v. 30, Issue 2, pp. 247-258, 2013. DOI: 10.1007/s10460-012-9413-7.

DIAS, A. V.; ZILBOVICIUS M. **A produção face à financeirização: quais consequências para a organização da produção e do trabalho?** Uma proposta de agenda de pesquisa para a engenharia de produção brasileira. In: ENCONTRO NACIONAL DE ENGENHARIA DE PRODUÇÃO, 26., Fortaleza, 2006. Anais do XXVI Encontro Nacional de Engenharia de Produção.

FROUD, J. et al. **Financialization across the Pacific: Manufacturing cost ratios, supply chains and power.** Critical Perspectives on Accounting, United Kingdom, v. 25, Issue 1, pp. 46-57, February 2014. DOI: 10.1016/j.cpa.2012.07.007.
HE, H.; ZUO, Z. **Supply chain concentration and enterprise financialization: Evidence from listed companies in China's manufacturing industry.** PLOS One, China, v. 18, Issue 5, 2023. DOI: 10.1371/journal.pone.0285308.

HE, M. et al. **Financing strategy of transnational supply chain with vertical shareholding under tax system difference: Creditor or guarantor?** Transportation Research Part E: Logistics and Transportation Review, Tianjin, China, v. 169, January 2023. DOI: 10.1016/j.tre.2022.102973.

HONG, S.; NAJMI, H. **The relationships between supply chain capability and shareholder value using financial performance indicators.** Sustainability, Switzerland, v. 12, Issue 8, pp. 3130, January 2020. DOI: 10.3390/SU12083130.

ISAKSON, S.R. **Food and finance: the financial transformation of agro-food supply chains.** Journal of Peasant Studies, Toronto, Canada, v. 41, Issue 5, pp. 749-775, January 2014. DOI: 10.1080/03066150.2013.874340.

JUM'A, L.; ZIMON, D.; IKRAM, M. **A relationship between supply chain practices, environmental sustainability and financial performance: evidence from manufacturing companies in Jordan.** Sustainability, Switzerland, v. 13, Issue 4, pp. 1-22, January 2021. DOI: 10.3390/su13042152.

LEVY-ORLIK, N. **Effects of financialization on the structure of production and nonfinancial private enterprises: The case of Mexico.** Journal of Post Keynesian Economics, Mexico City, Mexico, v. 35, Issue 2, pp. 235-254, 2013. DOI: 10.2753/PKE0160-3477350204.

MORGAN, G. **Financialization and the multinational corporation.** European Review of Labour and Research, United Kingdom, v. 20, Issue 2, pp. 183-197, May 2014. DOI: 10.1177/1024258914525561.

OUZZANI, M et al. **Rayyan - a web and mobile app for systematic reviews.** Systematic Reviews, v. 5, n. 1, p. 1–10, 2016. ISSN 20464053. DOI: 10.1186/s13643-016-0384-4.

PAGE, M. J. et al. **The PRISMA 2020 statement: an updated guideline for reporting systematic reviews.** International Journal of Surgery, v. 88, 2021. DOI: 10.1016/j.ijsu.2021.105906.

PAHLEVAN-SHARIF, S.; MURA, P.; WIJESINGHE, S. N. **A systematic review of systematic reviews in tourism.** Journal of Hospitality and Tourism Management, v. 39, pp. 158-165, 2019.

PALPACUER, F. **The global sourcing patterns of French clothing retailers.** Environment and Planning A, Montpellier, France, v. 38, Issue 12, pp. 2271-2283, 2006. DOI: 10.1068/a3883.

PARKER, R.; COX, S.; THOMPSON, P. **Financialization and Value-based Control: Lessons from the Australian Mining Supply Chain.** Economic Geography, United States, v. 94, Issue 1, pp. 49-67, January 2018. DOI: 10.1080/00130095.2017.1330118.

PARKER, R.; COX, S. **How the globalisation and financialisation of mining Majors affects linkage development with local engineering and technology suppliers in the Queensland resources industry.** Resources Policy, Queensland, Australia, v. 58, pp. 125-130, January 2018. DOI: 10.1016/j.resourpol.2018.04.002.

PETTICREW, M.; ROBERTS, H. **Systematic reviews in the social sciences: A practical guide.** 1st Edition, Blackwell Publishing Professional, December 2005.

PRANCKUTĖ, R. **Web of Science (WoS) and Scopus: The titans of bibliographic information in today's academic world.** Publications, v. 9, n. 1, 2021.

RATINAUD, P.; DÉJEAN, S. **IRaMuTeQ: implémentation de la méthode ALCESTE d'analyse de texte dans un logiciel libre.** Modélisation appliquée aux sciences humaines et sociales MASHS, n. 8-9, 2009.

TRANFIELD, D. et al. **Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review.** British Journal of Management, v. 14, n. 3, pp. 207–222, 2003. DOI: 10.1111/1467-8551.00375.

VAN DER ZWAN, N. **Making sense of financialization.** Socio-Economic Review, v. 12, n. 1, pp. 99-129, 2014.

VAN ECK, N.; WALTMAN, L. **Software survey: VOSviewer, a computer program for bibliometric mapping.** Scientometrics, v. 84, n. 2, pp. 523–538, 2009.

YUESTI, A.; RATNADI, N.M.D.; TAHU, G.P. **Analysis of supply chain management effectiveness for financial system of institutes.** International Journal of Supply Chain Management, India, v. 9, Issue 4, pp. 1092-1102, August 2020.

ZOU, M.; ZHANG, X. **Supply chain concentration and corporate financialization.** Frontiers in Psychology, Taiyuan, China, v. 13, January 2023. DOI: 10.3389/fpsyg.2022.934753.

3 FINANCIALIZATION AND SUPPLY CHAIN MANAGEMENT: A CASE STUDY OF LED LAMP PRODUCTION IN THE INDUSTRIAL POLE OF MANAUS

Abstract: This study analyzes the financial and operational impacts of two distinct production scenarios for LED tubular lamps, considering the context of the Industrial Pole of Manaus (PIM) and the fiscal benefits provided by the Manaus Free Trade Zone (ZFM). The first scenario centralizes production in Sorocaba, while the second fragments production stages between Manaus and Sorocaba, following the requirements of the Basic Productive Process (PPB). The methodology combined quantitative and qualitative analyses to compare the total operational costs and logistical challenges of each scenario. The results indicate that the Manaus scenario is financially more advantageous due to the exemption of IPI, reductions in IRPJ, and other fiscal incentives. However, from a supply chain efficiency perspective, the Manaus scenario introduces significant logistical complexities, including increased transportation times, dependence on multimodal infrastructure, and higher inventory requirements. Currently, the PIM hosts more than 600 companies operating under the PPB framework, demonstrating how the ZFM's fiscal benefits influence operational decisions, prompting companies to navigate complex logistics in pursuit of financial advantages. This study contributes to understanding the impact of financialization on supply chain management strategies, particularly in regions offering specific fiscal incentives.

Keywords: Financialization. Manaus Free Trade Zone. Supply Chain Management. Supply Chain Fragmentation. Financial Incentives

3.1 INTRODUCTION

In past decades, financialization has emerged as a dominant force in corporate decision-making, reshaping priorities in Supply Chain Management (SCM). This phenomenon emphasizes short-term financial metrics, such as profitability and shareholder value, often at the expense of operational efficiency and logistical simplicity (VAN DER ZWAN, 2014; DIAS & ZILBOVICIUS, 2006). Financialization is characterized by the growing influence of financial motives, metrics, and actors in shaping corporate strategies. In the context of SCM, this influence manifests through decisions that prioritize cost reduction, production fragmentation, and the pursuit of fiscal incentives to maximize financial returns (HE & ZUO,

2023). These dynamics have a direct impact on supply chain complexity and operational trade-offs, particularly in regions where fiscal incentives play a central role in industrial strategies.

The *Zona Franca de Manaus* (ZFM), or Manaus Free Trade Zone, is a prominent example of how fiscal policies intersect with financialized strategies to influence supply chain decisions. Created in 1967, the ZFM was designed to promote industrial development in the Amazon region, offering extensive tax incentives (IPEA, 2019; SENADO FEDERAL, 2020). These fiscal benefits are linked to the *Processo Produtivo Básico* (PPB), or Basic Productive Process, a regulatory framework that requires manufacturers to perform specific production stages locally to qualify for these incentives. The PPB is essentially a document that certifies a company's eligibility for fiscal benefits based on its commitment to manufacturing a certain percentage of the product within the PIM.

While the PPB significantly reduces production costs for companies operating within the ZFM, it also introduces logistical challenges due to the geographic isolation of Manaus and the need for production fragmentation between regions like Manaus and the Southeast of Brazil (COSTA & OLIVEIRA, 2022; SUFRAMA, 2023a).

The present article examines the production of LED lamps within the PPB framework to explore how fiscal benefits impact supply chain decisions. LED lamps are a representative case of the ZFM's industrial model, as their production process highlights the trade-offs between tax incentives and operational complexities. Two production scenarios are analyzed: centralized production in Sorocaba and mixed production between Sorocaba and Manaus. The centralized scenario eliminates the need for inter-regional logistics but forfeits the fiscal benefits provided by the ZFM. In contrast, the mixed scenario leverages the ZFM's tax incentives but introduces logistical and operational challenges due to production fragmentation and the reliance on multimodal transport systems.

By comparing these scenarios, this study investigates how financialization influences supply chain decisions, particularly in environments shaped by fiscal incentives and operational constraints. The findings aim to provide practical insights into supply chain strategies in regions like the *Polo Industrial de Manaus* (PIM), or Industrial Pole of Manaus, where financial and logistical trade-offs are central to corporate decision-making. This research contributes to the broader understanding of how fiscal policies interact with financialized strategies to shape production models and supply chain configurations.

3.2 LITERATURE REVIEW

The growing dominance of financial markets and the increasing prevalence of financialization over the past decades have transformed organizational dynamics and deeply influenced business strategies, including supply chain management. Financialization of the economy can be understood as the process by which companies and economies become increasingly oriented by financial metrics, prioritizing quick returns on investment and maximizing shareholder value, often at the expense of operational and social considerations (LEVY-ORLIK, 2013). This phenomenon has led to a reconfiguration of business practices, particularly in how companies structure their operations and their relationships with suppliers and customers.

In this context, supply chain management (SCM) has been impacted in various ways. Traditionally, SCM focused on optimizing logistical efficiency, reducing costs, and ensuring operational resilience. However, with the growing emphasis on financial metrics, many companies have adopted strategies that fragment their supply chains, increase geographic distances between suppliers, and prioritize decisions based on financial indicators, such as credit ratings and short-term costs, at the expense of factors such as quality and sustainability (HE & ZUO, 2023; JUM'A et al., 2021).

The Industrial Pole of Manaus (PIM) is an emblematic example of how fiscal policies and financial incentives can shape business decisions and logistical practices, creating both challenges and opportunities for local companies. By integrating the fiscal benefits offered by the Manaus Free Trade Zone (ZFM) with supply chain management in PIM, financialization is reflected in business decisions that prioritize financial efficiency over other operational and environmental considerations (SUFRAMA, 2023a; IPEA, 2019).

This literature review aims to present the key concepts related to financialization and supply chain management, and to explore how these two phenomena interact in the context of PIM. The review will discuss the impacts of financialization on companies' logistical and operational strategies, highlighting changes in management practices and the challenges faced by organizations in an increasingly globalized and financialized environment. At the end of this section, gaps in the existing literature will be identified, and the contribution of this study to understanding the effects of financialization on supply chain management, particularly in specific regional contexts like PIM, will be highlighted.

3.2.1 Financialization of the Economy

The concept of financialization refers to the increasing dominance of financial motives, financial institutions, and financial actors in the economy. In past decades, financialization has significantly reshaped both corporate behavior and economic structures, particularly within non-financial firms. Historically, firms were primarily focused on producing goods and services; however, with the rise of globalized capital markets and the deregulation of financial systems, companies began to adopt financial performance metrics as the main drivers of their operations. This shift marked a profound transformation from industrial capitalism—focused on production and long-term investment—to financial capitalism, which is driven by short-term profits and shareholder value maximization (VAN DER ZWAN, 2014). While the literature often highlights firm-driven initiatives, it is important to note that in some contexts, such as fiscal incentive regimes, state action can indirectly induce financialized behaviors, an aspect further discussed in Section 3.2.3.1.

At the core of financialization lies the increasing emphasis on maximizing shareholder value. Financial metrics, such as stock price, liquidity, volatility, and return on equity, became the dominant factors influencing corporate decision-making. As a result, companies increasingly adopted strategies that prioritized immediate financial returns, often at the expense of long-term investment in production, innovation, and labor (MATSUDA, 2015). The growing importance of financial considerations in corporate strategies led to profound changes in the way companies operate, including a greater reliance on financial markets, increased borrowing, and the creation of more complex financial instruments to generate profit.

In the context of supply chains, financialization led to significant shifts in how companies managed their operations. Historically, supply chain management (SCM) was focused on efficiency, cost reduction, and building long-term relationships with suppliers. However, financialized companies increasingly emphasized financial criteria, such as cost minimization and shareholder value, often neglecting factors like sustainability, supplier quality, and long-term partnerships. This shift has led to a rise in supply chain fragmentation, with companies increasingly sourcing materials and services from lower-cost regions, regardless of the logistical challenges or social implications (HE & ZUO, 2023). This financial imperative often drives companies to prioritize financial performance over operational resilience, resulting in a more fragile and less sustainable supply chain.

The financialization of non-financial corporations also altered their investment strategies. Companies began to focus less on reinvesting profits into their production capacity

and more on short-term financial activities, such as stock buybacks, dividend payments, and leveraging financial assets. This emphasis on financialization has contributed to a rise in mergers and acquisitions, as firms sought to enhance shareholder value through consolidation, often disregarding the long-term health of their operations or their workforce (JUM'A et al., 2021). In many cases, financialization has led to increased pressure on workers, as companies sought to reduce labor costs, increase labor flexibility, and adopt practices such as outsourcing and temporary employment to enhance profitability.

Empirical studies have shown that financialization affects not only the structure of individual companies but also the broader economy. It has contributed to the rise of shareholder capitalism, where the interests of investors are prioritized over those of employees, customers, and other stakeholders. This shift has had significant social and economic consequences, including rising inequality, job insecurity, and a growing divide between financial markets and the real economy (LEVY-ORLIK, 2013). As companies focus on short-term profits, their commitment to long-term goals, such as sustainable growth and innovation, diminishes, leading to a more volatile and risk-prone economic environment.

Authors such as Lapavitsas (2013) and Orhangazi (2008) also highlight how financialization affects non-financial corporations by altering the balance between productive and financial logics. In their view, financial income becomes increasingly central in corporate strategies, while productive reinvestment and operational expansion are deprioritized. These dynamics align with the empirical behavior observed in supply chains that prioritize fiscal and financial returns, often at the expense of productive integration and resilience.

In addition to its impact on corporate governance, financialization has also influenced the organization of work. As companies adopt financial metrics as the primary measure of success, workers are increasingly seen as units of cost rather than as assets that contribute to long-term value creation. This shift has led to the flexibilization of labor, with an increase in part-time, temporary, and outsourced jobs. Workers are often required to adapt to new forms of employment that prioritize flexibility and cost-cutting over job security and benefits (LUCA; AMARAL, 2016). This has contributed to the erosion of traditional labor relations and has led to increased precariousness in the workforce, further exacerbating income inequality and job insecurity (COSTA; SOUSA-SANTOS, 2012).

The impacts of financialization are not limited to the corporate sector. They extend to the broader economic and social fabric, influencing public policy, labor laws, and social welfare systems. As companies become more financially driven, they often push for deregulation and the reduction of social protections, which can undermine public welfare systems and contribute

to the financialization of the public sector (HE & ZUO, 2023). This has led to a rise in financialized economies, where the focus is on creating financial profits rather than addressing societal needs or promoting economic stability.

Thus, the financialization of the economy represents a fundamental shift in how both businesses and governments approach economic development. This transition to a financialized economy has reshaped the global economic landscape, leading to both opportunities and challenges in the way companies manage their supply chains, labor forces, and relationships with various stakeholders. In the next sections, we will explore how these changes have specifically affected supply chain management, with a particular focus on the impacts within the Industrial Pole of Manaus (PIM), a region marked by its reliance on financial incentives and the global supply chain dynamics.

3.2.2 Customs Zones: Conceptual Foundations and Global Perspectives

Customs zones—also known as Free Trade Zones (FTZs), Special Economic Zones (SEZs), Free Economic Zones (FEZs), or Export Processing Zones (EPZs)—are geographically delimited areas within a national territory that are subject to a differentiated legal, fiscal, and regulatory framework. Their primary function is to promote industrial development, increase exports, attract foreign direct investment (FDI), and support regional integration by offering incentives such as tax exemptions, reduced tariffs, and simplified customs procedures (FIORITO & LAURO, 2014; FAROLE & AKINCI, 2011; UNCTAD, 2019).

Historically, the concept of customs zones has evolved in response to the globalization of trade and production. The first modern zones emerged in the early 20th century, but their proliferation occurred primarily after the 1960s, as countries in Latin America, Asia, and Africa sought tools to stimulate industrial growth and competitiveness. According to the World Bank, by 2020, there were over 5,400 customs zones operating in more than 140 countries, reflecting their widespread adoption and strategic relevance in contemporary industrial policy (WORLD BANK, 2020). In this context, industrial policy refers not only to traditional protection of domestic industries but also to broader strategies of attracting investment, fostering competitiveness and experimenting with new regulatory frameworks.

Customs zones vary widely in scope and design. While some are narrowly focused on export manufacturing, others encompass broader economic activities, including logistics, warehousing, and even services. Despite their diversity, all customs zones share a common feature: they rely on spatial and regulatory differentiation to create an environment that is more

attractive to investors than the domestic territory at large. In doing so, they operate as “policy laboratories” where governments can test regulatory flexibility and new models of industrial development (FAROLE, 2011).

In Latin America, the use of customs zones has been closely linked to national development agendas. In Brazil, for instance, the Manaus Free Trade Zone (Zona Franca de Manaus, ZFM) was established in 1967 as a territorial development initiative to promote economic integration of the Amazon region (IPEA, 2019; SENADO FEDERAL, 2020). Unlike many FTZs focused exclusively on export activities, the ZFM incorporates production requirements defined by the Basic Productive Process (Processo Produtivo Básico, PPB), aligning fiscal incentives with domestic industrialization goals (SUFRAMA, 2023a).

While customs zones are often framed as instruments for economic transformation, their success has varied across regions. Their performance depends not only on the fiscal incentives provided but also on institutional quality, infrastructure availability, and integration into national and global supply chains. Zones that lack strong linkages with the domestic economy often struggle to generate sustained benefits (UNCTAD, 2019). Nevertheless, in many contexts, they continue to play a central role in shaping the geography of production, especially in regions with limited economic alternatives.

Given their global prevalence and strategic relevance, customs zones have become a key area of interest in both academic research and policy formulation. Understanding their legal structures, economic rationale, and practical outcomes is essential for evaluating their role in national industrial strategies and their impact on production organization and regional development.

3.2.3 The Industrial Pole of Manaus (PIM)

The *Polo Industrial de Manaus* (PIM), or Industrial Pole of Manaus, is the central element of the *Zona Franca de Manaus* (ZFM), or Manaus Free Trade Zone, which was created by Decrete-Law No. 288 in 1967. The ZFM is a special economic zone designed to promote industrial development in the Amazon region by offering tax incentives to companies that establish operations there. These incentives are central to the attractiveness of the region and have played a significant role in transforming the PIM into one of the largest industrial hubs in Brazil and Latin America. The ZFM’s creation aimed to reduce the economic disparities between the Amazon region and the more developed areas of the country, fostering job creation and sustainable economic growth. Over 600 companies, including multinational corporations,

now operate in the PIM, benefiting from a variety of tax exemptions that significantly lower their operational costs (SILVA et al., 2019).

The benefits available to companies operating in the PIM include:

- Reduction of up to 88% of the Import Duty (II) on raw materials and parts, making imports more affordable (SUFRAMA, 2023a).
- Exemption from the Industrialized Products Tax (IPI) for selected products according to the criteria set by the Superintendence of the Manaus Free Trade Zone (SUFRAMA), such as household appliances, motorcycles, electronics, injection-molded products, and adhesive tapes (SUFRAMA, 2023a).
- Exemption from PIS/PASEP and COFINS for internal operations within the ZFM (SILVA et al., 2019).
- Benefits and compensations related to the Informatics Law of the Manaus Free Trade Zone (BIGLIA, 2009).
- Reduction of 75% in Corporate Income Tax (IRPJ) (SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS – SUFRAMA, 2023a).
- Reduction of 55% to 100% in the Tax on Circulation of Goods and Services (ICMS) (INSTITUTO DE PESQUISA ECONÔMICA APLICADA – IPEA, 2019).

These fiscal incentives have been fundamental in attracting a diverse range of industries to the region, particularly in sectors such as electronics, motorcycles, and thermoplastics. The PIM has become a significant contributor to the local and regional economy, generating over 80,000 direct jobs. This is especially important in a region where the purchasing power of the population is heavily dependent on the employment generated by the industrial park (BIGLIA, 2009).

However, the PIM also faces several logistical challenges due to its geographical isolation. Despite having access to the Amazon River system, the region suffers from insufficient road infrastructure, relying heavily on ferry routes that are both costly and time-consuming. This creates significant challenges for companies operating in the PIM, particularly in the management of supply chains, as transportation delays of at least 20 days between the PIM and other regions of Brazil are common. These logistical barriers increase operational costs, particularly for industries that rely on just-in-time production and distribution (IPEA, 2019).

In addition to these logistical challenges, financialization has significantly influenced the business strategies of companies in the PIM. Financialization refers to the increasing

dominance of financial motives and performance metrics in corporate decision-making. As multinational corporations seek to maximize shareholder value, many have adopted business strategies focused on cost reduction and short-term financial returns, often at the expense of long-term investment in production capacity, operational efficiency, and workforce development. The growing importance of financial performance indicators has reshaped the operational landscape of the PIM, with companies increasingly prioritizing financial metrics over the traditional goals of operational efficiency and sustainability (MATSUDA, 2015).

A key component of the PIM's fiscal policy is the *Processo Produtivo Básico* (PPB), or Basic Production Process, which requires companies to submit a proposal to the Ministry of Industry in order to qualify for the tax exemptions provided by the ZFM. The PPB is essentially a document that certifies a company's eligibility for fiscal benefits based on its commitment to manufacturing a certain percentage of the product within the PIM. Companies that divide their production between the PIM and other regions of Brazil must ensure that they meet the PPB criteria to access these incentives. This system has led to the fragmentation of production processes, where some stages of production occur in the PIM, while others are outsourced to regions like the South or Southeast, where production costs are typically lower. These fragmented production processes are financially motivated by the fiscal incentives, as companies evaluate whether the added logistical costs of operating in multiple regions are outweighed by the financial advantages provided by the PPB system (BIGLIA, 2009).

This approach, driven by the PPB and financial incentives, often leads to fragmented supply chains, which can be more difficult to manage. While splitting production across regions allows companies to take advantage of the tax benefits offered by the ZFM, it also introduces significant challenges in terms of logistics, coordination, and cost management. Companies face higher logistical costs and longer delivery times, as the supply chain becomes more complex and geographically dispersed. The financialization of these decisions encourages companies to prioritize financial savings over operational efficiency, leading to a focus on short-term financial performance rather than long-term operational sustainability (HE & ZUO, 2023).

The influence of financialization, combined with the PPB system, has created a corporate environment in the PIM where decisions are increasingly driven by financial metrics rather than the traditional operational and production-related goals. This trend has led to increased outsourcing, labor flexibilization, and an overall reduction in the integration of local production processes. Companies in the PIM, driven by financial incentives, often seek to

optimize their production processes and reduce costs by fragmenting their supply chains, despite the logistical challenges and operational inefficiencies that arise from this approach.

3.2.3.1 The Manaus Free Trade Zone and the Financialization of Industrial Policy

At first glance, the use of the Manaus Free Trade Zone (ZFM) and its associated fiscal benefits may seem disconnected from the theoretical framework of financialization, since the ZFM is a public policy instrument created by the Brazilian government to promote regional development in the Amazon. However, as argued by Van der Zwan (2014), financialization is not limited to the domain of capital markets or purely financial institutions; it also affects how non-financial firms restructure their production strategies, prioritize capital allocation, and respond to incentive structures, often subordinating operational logic to financial metrics. In this sense, the contemporary corporate appropriation of the ZFM demonstrates a clear case of financialized behavior, even within a state-driven industrial policy.

Originally conceived in the 1960s as a tool for territorial development and economic integration (IPEA, 2019), the ZFM offers a series of fiscal incentives, including exemption from IPI, PIS/COFINS, and import duties, as well as significant reductions in IRPJ and ICMS (SENADO FEDERAL, 2020; SUFRAMA, 2023a). However, companies that operate in the region increasingly interpret these incentives not as a stimulus for long-term regional investment, but rather as opportunities for fiscal arbitrage. The decision to relocate production to Manaus is frequently not driven by supply chain efficiency or access to specialized labor or inputs, but by the maximization of tax savings, even at the expense of added logistical complexity, higher inventory levels, and fragmented operations (GOMES, 2009; MANGABEIRA, 2010; COSTA & OLIVEIRA, 2022).

This behavior illustrates what scholars such as Froud et al. (2006) and Krippner (2005) have identified as the essence of financialization: the reorientation of corporate decision-making away from productive efficiency toward financial outcomes. In the case of the ZFM, the distortion of public policy to serve shareholder-oriented or profit-maximizing goals is not merely incidental. It reflects a broader pattern in which firms restructure operations to align with financial incentives, even when this introduces inefficiencies across the supply chain.

Comparable dynamics have been documented in other contexts. Pike and Pollard (2010), for example, showed how financial logic influenced the use of regional development policies in Europe, leading companies to exploit tax differentials and incentive schemes in ways that mimic capital market behavior. Similarly, Baud and Durand (2012) demonstrated that

global production networks are increasingly guided by financial calculations, where investment decisions prioritize return on capital employed (ROCE) over long-term industrial strategy.

The decision analyzed in the present study to fragment production between Sorocaba and Manaus is a tangible example of how financialization shapes industrial behavior. The requirement for final assembly to occur in Manaus, despite the logistical implications, further illustrates this pattern.

This logic is not unique to the case studied, nor to a single firm or product. The same trade-offs between logistical burden and financial gain are reproduced across a wide range of industries operating within the ZFM regime. Rather than fulfilling its original developmental mission, the ZFM is increasingly instrumentalized as a tool of financial strategy, demonstrating how financialization can permeate even state-designed industrial policy frameworks.

The use of the ZFM in this context, therefore, does not contradict the notion of financialization. On the contrary, it reinforces the phenomenon's theoretical scope, showing how financial imperatives increasingly guide strategic decisions, even when these decisions conflict with conventional supply chain management principles. This reinforces the analytical framework adopted in this article and validates the case study's relevance as an expression of how financial reasoning can override operational rationale in the pursuit of fiscal advantage.

3.2.4 Supply Chain Management (SCM) in Financialized Economies

Supply Chain Management (SCM) emerged in the early 1980s as a field dedicated to optimizing the flow of goods and services from suppliers to end consumers, aiming to reduce costs and meet customer demands through strategic coordination (OLIVER & WEBBER, 1982). Over time, SCM has become central to industrial competitiveness. However, with the increasing dominance of financial logic, corporate supply chains have evolved to prioritize short-term profitability over operational efficiency and long-term resilience (HE & ZUO, 2023; VAN DER ZWAN, 2014).

In financialized environments, companies often make supply chain decisions guided by metrics such as return on investment and tax impact rather than by logistics integration or production stability. This shift can lead to the fragmentation of operations, where firms choose geographically dispersed production strategies primarily to maximize fiscal advantages, even at the cost of more complex supply chains (DIAS & ZILBOVICIUS, 2006; LEVY-ORLIK, 2013).

The Industrial Pole of Manaus (PIM) exemplifies this logic. Established to attract industry through tax incentives, the PIM allows companies to benefit from exemptions such as IPI and reductions in IRPJ by complying with the Basic Productive Process (PPB). This regulatory framework allows firms to carry out part of their production in Manaus and the remainder elsewhere in Brazil. The result is a production strategy shaped more by fiscal benefit than by operational rationale, as companies adapt their production networks to meet legal requirements rather than logistical coherence (BIGLIA, 2009; IPEA, 2019).

Although the PPB promotes localized manufacturing, it has incentivized a widespread fragmentation of operations. Many companies execute final assembly in Manaus to secure the tax advantages, while upstream processes like component production and driver sourcing remain in the Southeast. This division introduces elevated transport costs, greater inventory needs, and coordination complexity between distant production nodes. Such configurations are driven less by supply chain strategy and more by financial calculus (BIGLIA, 2009; SUFRAMA, 2020).

To understand these dynamics, this study applies a deterministic multivariable comparative analysis. The analysis evaluates total operational costs across different production setups, incorporating variables such as freight, inventory, material inputs, and taxes. By quantifying how cost structures respond to different configurations, companies can assess whether the financial advantages of fragmented production outweigh the logistical challenges (ROHDE & WAGNER, 2002).

While cost modeling enables firms to justify fragmentation in financial terms, it often neglects non-financial impacts. Supplier development, labor quality, sustainability, and responsiveness to market changes may deteriorate in complex and dispersed supply chains. These dimensions are critical to long-term competitiveness but tend to be sidelined in financialized corporate environments where capital allocation and cost minimization dominate (LEVY-ORLIK, 2013).

Therefore, while the PPB system and ZFM incentives succeed in attracting firms to the Amazon region, they also induce structural inefficiencies in how companies organize production. The financial benefits are substantial, but they encourage decisions that may erode supply chain resilience and operational coherence. For companies operating in the PIM, the key challenge lies in balancing fiscal gains with supply chain sustainability and long-term strategic viability.

3.3 METHODOLOGY

This study combines both qualitative and quantitative methods to assess the impact of financialization on supply chain management (SCM) in the Industrial Pole of Manaus (PIM), focusing on the production of LED lamps. The analysis will explore how tax incentives under the Basic Production Process (PPB, influence logistics costs and supply chain management practices. A cost modeling technique will be used to assess the financial trade-offs between logistical costs (such as freight, inventory management, etc.) and the financial benefits derived from the PPB system. The methodology is structured to cover both qualitative insights into the complexities of supply chain management and quantitative analysis through cost modeling.

3.3.1 Research Design

This research is based on an exploratory-descriptive case study of the PIM, specifically focusing on companies engaged in the production of LED lamps. The PIM, with its specific tax incentives and the PPB system that encourages the fragmentation of production processes, serves as a practical example to explore the implications of financialization on supply chain decisions. The choice of LED lamps as the focus is motivated by the sector's relevance in the PIM and its applicability to understand how tax incentives influence production processes and supply chain complexity. According to Köche (2013), the case study is a valuable approach in applied research, particularly when studying complex phenomena like financialization and production fragmentation within an industrial setting such as the PIM. In addition, Yin (2015) defines the case study as an appropriate strategy to investigate phenomena in their real-life context, especially when the boundaries between phenomenon and context are not clearly evident. He highlights that multiple sources of evidence may be employed, including documents and archival records, which supports the adequacy of this research design even though it relies exclusively on publicly available data.

3.3.2 Data Collection

The data collection combined qualitative and quantitative sources within a single case study design, ensuring that both theoretical and documentary materials as well as numerical evidence were incorporated into the analysis.

The qualitative sources included:

- Theoretical frameworks and models of supply chain management, focusing on complexity, logistics management, inventory control, supply chain disruptions, and operational challenges within the PIM. This theoretical data will be derived from academic literature on SCM and financialization, which influences logistical decisions (VAN DER ZWAN, 2014; DIAS & ZILBOVICIUS, 2006)
- Publicly available documents and government reports on the PIM, such as publications from SUFRAMA, to understand how the ZFM and PPB system impact supply chain management strategies. These documents will help clarify the logistics difficulties faced by companies in managing operations under the tax incentives framework, aligning with insights by Chen (2014), who emphasizes the importance of using secondary data and public documents to understand the broader implications of policy on operational performance.

The qualitative material was examined through thematic analysis to identify key challenges in managing supply chains under the influence of financialization. This approach provided insights into the non-financial impacts of fragmented production and fiscal imperatives on logistics.

The quantitative sources included:

- Financial reports and official documents related to tax exemptions, incentives provided by the ZFM and PPB system, including detailed data on tax reductions, costs saved from the PPB system, and costs associated with production and transportation.
- Reports from the *Agência Nacional de Transportes* (ANT), or National Transport Agency, and other government sources that provide quantitative data on freight costs, inventory management, and transportation expenses. These sources will provide the numerical data needed to assess the cost-benefit trade-offs between logistical costs and financial incentives.

The quantitative material supported the development of a cost comparison model based on deterministic financial modeling. This model evaluated logistics-related costs (transportation, inventory, etc.) against the financial savings obtained through tax incentives (ROHDE & WAGNER, 2002), enabling the identification of the most cost-effective strategies for companies in the PIM based on real-world data from logistical cost reports and ZFM fiscal benefits.

3.3.3 Cost Modeling Approach

A cost modeling approach analyzed the financial implications of production fragmentation under the PPB system. The objective of the cost model is to evaluate the trade-offs between logistical costs (such as freight, inventory management, and transportation costs) and the financial savings gained from the tax benefits. It is important to highlight that this study focuses exclusively on logistical costs, and does not compare production costs (such as labor or manufacturing costs) between the PIM and other regions of Brazil. The model will be formulated with the following considerations:

1. Identification of Key Variables: Key cost variables, such as transportation costs, inventory management costs, and production setup costs, will be identified and quantified using publicly available data. These variables were chosen based on their relevance to the fragmented production process in the PIM and their potential impact on the overall cost structure. The choice of logistical costs as the focus follows the recommendations of Köche (2013), who argues that focusing on logistics is critical when analyzing complex supply chain decisions.
2. Model Formulation: The model developed in this study follows a deterministic comparative structure, aimed at evaluating two predefined production scenarios based on their financial outcomes. Rather than employing an optimization technique, the model relies on the construction of total cost and net profit equations for each scenario, enabling a direct comparison of their economic viability. The methodology is grounded in the logic of scenario-based modeling and financial engineering commonly applied in production systems analysis (KÖCHE, 2013; ROHDE & WAGNER, 2002).
3. Sensitivity Analysis: A sensitivity analysis conducted to evaluate how variations in key parameters affect the financial outcomes of different production and distribution configurations. This technique, as highlighted by Rohde and Wagner (2002), is commonly used in operations research to examine the stability and reliability of comparative models when input variables fluctuate. In this study, two types of sensitivity assessments are applied. The first examines how total logistics and fiscal costs respond to changes in production volume, analyzing three demand levels: 100,000; 250,000; and 500,000 units per month. It should be noted that production costs were assumed equal across locations, therefore the sensitivity analysis focused exclusively on logistics and fiscal components. The second explores how

profitability is influenced by relative differences in unit production costs across alternatives, simulating variations of 10%, 15%, and 20% while maintaining fixed production volumes of 100,000 and 250,000 units per month. These analyses allow for the identification of threshold conditions and help determine the robustness of strategic choices under the constraints of the Basic Productive Process (PPB).

The structure of the model reflects a financialized rationale, in which supply chain decisions are increasingly assessed based on fiscal return rather than operational coherence. This reinforces the argument that financial considerations are not external to supply chain design but are embedded in the very criteria used to evaluate strategic alternatives.

The study design ensures transparency and replicability by relying exclusively on publicly available secondary data. The quantitative modeling draws on parameters from official sources such as SUFRAMA and IPEA, while the qualitative discussion of financial dimensions (Section 3.5.2) draws on institutional reports, regulatory filings, and sectoral studies. No proprietary or confidential firm-level data were used, which allows the analysis to be reproduced under the same selection criteria and data sources.

3.3.4 Limitations and Delimitations

While this study offers valuable insights into the impact of financialization on supply chain management within the PIM, the following limitations should be acknowledged:

- The study focuses on one specific PPB, related with LED Lamp production, limiting the results to a group of companies within the PIM, which may not fully represent the diversity of industries in the region.
- Data Availability: As all data is sourced from publicly available information, the study may be limited by the quality and availability of the data. However, all data used in this research is from publicly accessible sources, ensuring transparency and compliance with academic standards.
- Exclusion of Production Costs: This study does not compare manufacturing and storage costs (such as labor or expenses costs) between the PIM and other regions of Brazil. It focuses specifically on analyzing the logistical costs and the financial impacts of tax incentives provided by the PPB system.

The scope of the study is thus restricted to fiscal, regulatory, and observable financial-structural dimensions of firms operating under the PPB. Nevertheless, the transparency of the

data collection and the explicit criteria adopted ensure that the analysis remains replicable by other researchers.

3.4 RESULTS

This section presents both quantitative and qualitative findings based on the data collected from Manaus and Sorocaba operations under the PPB system. The analysis focuses on logistical costs, including freight, inventory management, and production fragmentation costs, compared to the financial benefits derived from the PPB system. The results also include a qualitative assessment of supply chain management (SCM) practices in both locations, exploring the impact of financialization on logistics operations and supply chain complexity (VAN DER ZWAN, 2014; DIAS & ZILBOVICIUS, 2006).

The selection of Sorocaba as the reference production hub in this study is justified by its robust industrial base and strategic logistical positioning. The municipality is home to more than 22,000 registered companies, including over 2,000 in the industrial sectors, some of which specialize in lighting equipment manufacturing, providing an established ecosystem to produce LED lamps (FIESP, 2023). In addition, Sorocaba benefits from a highly integrated logistics infrastructure, with direct access to major highways, a dry port terminal, and proximity to São Paulo's airport and port facilities. These characteristics enable efficient inbound logistics for components (e.g., drivers) and streamlined outbound distribution to large consumer markets, reinforcing Sorocaba's role as a logical anchor point in both scenarios analyzed.

3.4.1 Introduction to the Case Study: LED Lamp Production

This case study analyzes the production of LED lamps with a specific focus on PPB and the tax incentives offered in Manaus. The product being analyzed is a LED tubular lamp with 96 LEDs (each LED lamp consists of 96 individual LEDs) and dimensions of 120cm length x 10 cm width x 10cm height, as presented by Taschibra (2025).

The above characteristics are representative of a typical LED lamp manufactured and sold within the Brazilian market, used for applications in residential, commercial, and industrial environments.

3.4.1.1 Basic Productive Process (PPB) for Solid-State Light Source Luminaire

The Basic Productive Process (PPB) for LED luminaires, Interministerial Ordinance SEPEC/ME/SEXEC/MCTIC nº 4, dated January 30, 2020 (BRASIL, 2020), consists of eight key stages, ranging from component manufacturing to final integration. Figure 5 summarizes the main steps and local manufacturing requirements.

Figure 5 – LED Lamp production process steps

I. Manufacturing of LEDs (light-emitting diodes), OLEDs (organic light-emitting diodes), or LED COBs (Chips on Board) • This requirement is temporarily waived until domestic manufacturing capabilities for these components are established
II. Injection, 3D printing, or molding of plastic parts • At least 80% of the plastic parts used in the luminaire must be injected, 3D printed, or molded locally
III. Injection, extrusion, stamping, and machining of metal parts • At least 80% of the metal parts must be produced locally
IV. Tampografy or painting of external parts • At least 80% of the external parts must undergo tampografy or painting locally
V. Manufacturing of the power supply (drivers) • The power supply (drivers) must be produced locally, involving assembly and soldering of components onto the printed circuit board (PCB), and at least 80% of this process must be conducted locally. • **Exception:** This stage may be performed outside the Manaus Free Trade Zone, in other regions of Brazil.
VI. Manufacture of electrical cables • At least 80% of the electrical cables used in the luminaire must be manufactured locally
VII. Assembly and soldering of all components onto the printed circuit boards (PCBs) • All components must be assembled and soldered onto the PCBs locally
VIII. Integration of the PCBs with electrical and mechanical parts to form the final product • The PCBs, along with electrical and mechanical components, must be integrated locally to create the finished luminaire

Source: Developed by the author based on the LED Lamps PPB.

According to the ordinance, all stages of the production process may be outsourced to third parties, if they comply with the specific requirements of the PPB. However, the final integration stage, where printed circuit boards (PCBs) and electrical and mechanical parts are assembled into the finished product (Stage VIII), cannot be outsourced, ensuring local production of the final product (BRASIL, 2020).

3.4.1.2 Tax Benefits for LED Lamp Production in the Manaus Free Trade Zone

The production of LED lamps in the Manaus Free Trade Zone (ZFM) provides companies with significant tax benefits, which are essential incentives for attracting industries to the region. These benefits are granted under the Basic Productive Process (PPB) regulations and aim to stimulate local production while ensuring competitive costs for companies operating in the region. Table 4 summarizes the tax benefits for LED Lamp Production.

Table 4 – Tax Benefits for LED Lamp Production in the Manaus Free Trade Zone

Tax Benefit	**Description**	**Source**
Import Duty (II) Exemption	Exemption on imported raw materials and components; savings estimated at 10-12%.	IPEA, 2019
Industrialized Products Tax (IPI) Exemption	Exemption for raw materials, components, and finished products sold domestically; typical IPI rate is 7.5%.	RECEITA FEDERAL, 2022; SENADO FEDERAL, 2020
Corporate Income Tax (IRPJ) Reduction	75% reduction for prioritized sectors; effective IRPJ rate reduced to 3.75%.	IPEA, 2019
Social Contributions (PIS/COFINS) Exemption	Full exemption for products sold within Brazil; typical combined rate is 9.25%.	SENADO FEDERAL, 2020
State Tax (ICMS) Reduction	Full exemption on incoming goods; reduced interstate rates on outbound shipments (7% or 12%).	SUFRAMA, 2020

Fiscal Incentive Control Fee (TCIF)	Fee applied on entries to ZFM: R$ 200 per invoice (max 1.5%) + R$ 30 per item (max 1.5%).	SUFRAMA, 2017

Source: Developed by the author.

The combination of import duty exemptions, IPI exemptions, IRPJ reductions, PIS/COFINS exemptions, and ICMS reductions creates a highly favorable tax environment for the production of LED lamps in the ZFM. These benefits can collectively reduce the total cost of production by an estimated 30% to 40%, depending on the company's compliance with PPB requirements and operational structure.

3.4.1.3 Comparison Scenarios: Sorocaba vs. Manaus + Sorocaba

To analyze the financial and logistical impacts associated with LED lamp production, this study compares two distinct scenarios of production and distribution. These scenarios highlight the trade-offs between centralizing production in Sorocaba and fragmenting production across Manaus and Sorocaba, leveraging the tax benefits provided by the ZFM.

- **Scenario 1 - Centralized Production in Sorocaba:** In this scenario, all production stages, except for the importation of LEDs (Stage I), occur in Sorocaba. This includes the production of components such as plastic and metal parts, drivers, and electrical cables, as well as the final assembly of the LED lamps. Production Process in Sorocaba, following the PPB's definitions (BRASIL, 2020):
    - **Stage I (Manufacturing of LEDs)**: LEDs, which are not manufactured in Brazil, are directly imported from international suppliers to Sorocaba.
    - **Stages II to VIII**: The production of plastic and metal parts, painting and tampography, the manufacturing of drivers and electrical cables, and the final assembly of the LED lamps are entirely conducted in Sorocaba.
    - Finished LED lamps are stored in Sorocaba and commercialized through a local distributor, who sells them to the domestic market. For this scenario, the customer is responsible for the collection of the products in Sorocaba.
- **Scenario 2 - Mixed Production, Manaus + Sorocaba:** In this scenario, the production process is divided between Manaus and Sorocaba, as required by the

PPB. In this configuration, the production of plastic and metal parts, electrical cables, and the final assembly occurs in Manaus, while drivers are manufactured in Sorocaba. Production Process, following the PPB's definitions (BRASIL, 2020):

- **Stage I (Manufacturing of LEDs)**: LEDs, which are not manufactured in Brazil, are directly imported from international suppliers to Manaus.
- **Stages II to IV and VI**: The production of plastic and metal parts, painting and tampography, the manufacturing of electrical cables, and the final assembly of the LED lamps are conducted in Manaus.
- **Stage V:** Drivers are manufactured in Sorocaba and transported to Manaus for integration into the final product.
- Finished LED lamps are sold to a distributor that has a storage facility in São Paulo. For this scenario, the company in Manaus is responsible for the delivery of the product to the customer.

The comparison of the two scenarios highlights significant differences in their operational and logistical structures. While Scenario 1 offers a simplified production and supply chain model with centralized operations in Sorocaba, it does so at the expense of fiscal incentives provided by the ZFM. Conversely, Scenario 2, which divides the production process between Manaus and Sorocaba, aligns with the PPB requirements and leverages substantial tax benefits. However, from a SCM perspective, Scenario 2 introduces a higher level of complexity, requiring the coordination of multiple transportation routes, increased inventory management across regions, and reliance on the logistical infrastructure of the Manaus region. These added layers of operational intricacy highlight the trade-offs between cost efficiency achieved through fiscal incentives and the challenges of managing a fragmented supply chain.

3.4.1.4 Challenges of Logistics in the Manaus Industrial Park

The logistics operations required for the production and distribution of LED lamps in the PIM face significant challenges due to the region's geographical isolation, infrastructural limitations, and dependency on multimodal transport systems. These factors introduce inefficiencies and increase costs, particularly in the mixed production scenario, which involves inter-regional transportation between Sorocaba and Manaus. The following points summarize the key logistical challenges and cost implications:

- **Geographical isolation:** The Amazon region's vast territory relies heavily on rivers for transportation, yet the absence of regular dredging and insufficient port

facilities hinder operational efficiency (SANT'ANNA, 1998; SUFRAMA, 2012). The road network in Amazonas contributes to less than 2% of Brazil's total paved roads, many of which are in poor condition, particularly during the rainy season (RODRIGUES, 2009).

- **Long distances:** The mixed production model involves a 4,000 km route between Sorocaba and Manaus, requiring a combination of road and river transport. Drivers manufactured in Sorocaba (Stage V) are shipped to Manaus for integration into the final product and finished LED lamps are transported back to Sorocaba for storage and distribution. The dependency on river transport, especially for the Manaus-Belém segment, increases the risk of delays caused by seasonal water level variations (GOMES, 2009).
- **High transportation costs:** Based on *Agência Nacional de Transportes Terrestre* (ANTT), or National Land Transport Agency, Resolution nº 6.059, the cost of transporting goods over the Sorocaba-Manaus route is approximately R$ 19,044.69 per trip for a standard truck with a capacity of 26 pallets. This cost includes a distance-based rate of R$ 5.2850 per kilometer and R$ 547.19 in loading and unloading fees. When divided by the truck's capacity, the average cost per pallet is R$ 732.49. These figures highlight the significant financial burden of inter-regional logistics (ANTT, 2024).
- **Inventory implications:** Logistical inefficiencies in the PIM require companies to maintain higher inventory levels than those in the Southeast. For example, while companies in the Southeast typically keep seven days of inventory, those in the PIM require an average of 22 days (MANGABEIRA, 2003).
- **Operational complexity:** The fragmented production process in the mixed model introduces additional layers of logistical coordination. Managing multiple transportation routes and ensuring timely deliveries of both components and finished products require robust planning and can strain supply chain performance (BALLOU, 2008).

When comparing the two production scenarios, the logistical simplicity of centralized production in Sorocaba contrasts sharply with the complexity of the mixed model. Scenario 1 benefits from the absence of inter-regional transportation, which reduces costs and minimizes the risk of delays. In contrast, Scenario 2 leverages the tax benefits of the ZFM but incurs significantly higher logistics costs and operational challenges due to the dependency on

multimodal transport and the region's infrastructural limitations. While the fiscal advantages of the ZFM may offset some of these costs, the added complexity of Scenario 2 remains a critical consideration for supply chain decision-making.

Beyond these cost elements, qualitative evidence drawn from official reports and policy documents helps to contextualize how logistical conditions shape day-to-day supply chain performance in the PIM. Seasonal fluctuations in river levels, limitations in port infrastructure and the reliance on long lead-time routes increase schedule variability and the likelihood of delays, intensifying coordination efforts across tiers. In practice, firms respond by building inventory buffers, expanding safety stocks and revising transport plans to accommodate the volatility of fluvial segments, particularly along the Manaus–Belém corridor. These choices are consistent with the vulnerabilities already identified for the region and translate directly into higher inventory and handling costs at the system level (GOMES, 2009; SANT'ANNA, 1998; SUFRAMA, 2023a).

Interregional flows required by fragmented production compound these risks. Drivers manufactured in Sorocaba are shipped to Manaus for final integration, while finished lamps return to the Southeast for storage and distribution. This two-way circuit lengthens total lead times, multiplies handovers and adds insurance and damage risks to the logistics equation. Because river segments are time-sensitive and road segments face seasonal degradation, synchronizing upstream component availability with downstream assembly and outbound distribution demands tighter planning and higher working capital tied in goods in transit (SUFRAMA, 2023a).

From an operational standpoint, fragmentation also raises managerial complexity: production calendars must be synchronized across distant facilities; compliance with PPB milestones must be aligned with transportation windows; and contingency stocks are needed to cushion unpredictable transit times. These measures are necessary for service continuity, but they dilute efficiency gains and compress the margin created by fiscal incentives when freight, storage and idle-time costs accumulate (BALLOU, 2008; SUFRAMA, 2023a).

Taken together, the qualitative evidence explains why firms tolerate persistent logistical inefficiencies: fiscal incentives compensate for them. In other words, location and configuration decisions prioritize the financial upside of PPB compliance over supply chain coherence, an alignment consistent with a financialized rationale for network design. This reading also clarifies the modeling choices employed next. Variables such as the Sorocaba to Manaus freight term ($F_{Sorocaba \rightarrow Manaus}$), insurance on interregional shipments and higher safety stock

assumptions in Scenario 2 explicitly operationalize these qualitative constraints in the comparative analysis developed in Section 3.4.2.

3.4.2 Comparative Study

The detailed analysis presented in 3.4.1 provided the foundational data necessary for the modelling process, incorporating material costs, fiscal benefits, and logistical challenges across the two production scenarios. These elements enable a systematic evaluation of the financial and operational trade-offs involved in centralized production in Sorocaba versus a mixed production model between Sorocaba and Manaus. In this context, the next step applies a quantitative approach to deepen the understanding of how fiscal incentives and logistical complexities shape supply chain decisions.

To maintain analytical focus on the financial and logistical impacts of the two production scenarios, this study assumes equal production and inventory holding costs in Manaus and Sorocaba, with the inventory holding cost measured in R$/unit/day. What varies between the scenarios is the total days of inventory, according to their specific characteristics.

By isolating production and storage costs in this way, the analysis emphasizes the influence of tax incentives and logistical complexities, ensuring that the conclusions drawn highlight the trade-offs inherent in each scenario without conflating them with variations in manufacturing expenses.

For the unit price, the study assumes equal prices for both production scenarios, considering that the LED lamp producer will use the benefits to increase the net profitability of sales. This assumption excludes the scenario where the company uses the benefits from financial incentives to reduce the price, increase competitiveness, and boost sales.

The analysis was conducted in two steps: (1) an **Operational Cost Comparison**, which evaluated all costs involved in each scenario, including production, logistics, and taxes; and (2) a **Net Profit Comparison**, which assessed the financial results of the entire operation, from the importation of raw materials to the delivery to the distributor (final customer).

1. **Operational Cost Comparison:**
    - i. **Variables/Parameters:**
        - **a.** D_{Market} - Total monthly demand supplied to the final market.
        - **b.** $M_{LED\ Chip}$ - Unit cost of the imported LED Chip.
        - **c.** M_{Drives} - Unit cost of the material used to produce the power supply.
        - **d.** M_{Others} - Unit cost of all the other materials.

e. II - Import Duties.

f. P_{Drives} - Production cost of the power supply.

g. P_{Others} - Summatory of production cost of all the others production steps.

h. C_{Drives} - Total cost to produce the power supply.

i. PIS/COFINS - Social Contributions.

j. TCIF - Fiscal Incentive Control Fee.

k. $F_{Sorocaba \rightarrow Manaus}$ - Freight cost per pallet from Sorocaba to Manaus.

l. I_t - Transportation insurance.

m. H - Unit inventory holding cost, in R$/unit/day.

ii. Operational Cost Functions:

a. Total Cost Scenario 1 ($C_{Total-S1}$):

$$C_{Total-S1} = (M_{LED\ Chip} \times II \times 96 + M_{Drives} + M_{Others} + P_{Drives} + P_{Others}) \times D_{Market} + \frac{D_{Market}}{4} \times H \quad (1)$$

Where:

- $(D_{Market}/4) \times H$ is the inventory cost, defined based in the definition of a safety stock equal to 1 week of production.

b. Total Cost Scenario 2 ($C_{Total-S2}$):

$$C_{Total-S2} = (M_{LED\ Chip} \times 96 + M_{Others} + P_{Others}) \times D_{Market} + (M_{Drives} + P_{Drives}) \times (1 + PIS/COFINS) \times D_{Market} + (F_{Sorocaba \rightarrow Manaus} + I_t) + \frac{3 \times D_{Market}}{4} \times H + TCIF \quad (2)$$

Where:

- As presented on 3.4.1.2, the transactions related to raw material being shipped from Sorocaba and Manaus are exempt from IPI and ICMS, but not from PIS/COFINS (the transaction between Sorocaba and Manaus is processed as a sale from one plant to another).
- $F_{Sorocaba \rightarrow Manaus} = (^{732.49}/_{90000}) \times D_{Market}$. Based on the cost per pallet presented on 3.4.1.3, where it is defined the value of R$ 732.49 per pallet. For the power supply, it is possible to consider approximately 90,000 units per pallet, based on standard pallet dimensions (1,200 mm x 1,000 mm x 1,500 mm) and the typical size of a power supply unit (60 mm x 20 mm x 15 mm). This calculation

assumes optimal packing and stacking conditions to maximize pallet utilization (MERCADO LIVRE, 2025).

- $I_t = 0.2\% \times (M_{Drives} + P_{Drives}) \times D_{Market}$. According to Liberty Seguros (2018), 0.2% is the insurance tax applied to the route between São Paulo State and Amazonas.
- $(3/4) \times D_{Market} \times H$ is the inventory cost, defined based on the definition of a safety stock equal to 3 weeks of production (considering higher risks of logistical disruption).

iii. **Operational Cost Variation (ΔC):** substituting the tax values (as outlined in Section 3.4.1.2 and assuming a 12% II rate for LED chips) and applying the necessary simplifications, it is possible to derive the equation for ΔC.

$$\Delta C = C_{Total-S2} - C_{Total-S1} \quad (3)$$

$$\Delta C = D_{Market} \times \left(-11.52 \times M_{LED\ Chip} + 0.0925 \times (M_{Drives} + P_{Drives}) + 0.00814 + 0.002 \times (M_{Drives} + P_{Drives}) + {}^{H}/_{2}\right) + TCIF \quad (4)$$

Where:

- $(M_{Drives} + P_{Drives})$ can be replaced by C_{Drives}.
- Considering the transportation of a single item in a monthly delivery, the total TCIF cost will amount to R$230.
- For this analysis, H is assumed to be R$0.30 per unit/day. This estimation is based on industry insights, which indicate that storage costs typically include expenses such as rent, labor, utilities, and insurance. According to TOTVS (2025), storage costs can vary significantly depending on the region and operational complexity, justifying the conservative estimate used in this study.

From the assumed values, it is possible to simply the ΔC as presented in (5).

$$\Delta C = D_{Market} \times \left(-11.52 \times M_{LED\ Chip} + 0.0927 \times C_{Drives} + 0.15814\right) + 230 \quad (5)$$

iv. **Sensitivity Analysis:**

a. From the equation (5), it is possible to conclude that if $\Delta C < 0$, the total operational cost of Scenario 2 is lower than the cost of Scenario 1.

b. The cost of a single LED chip is estimated to range between R$ 0.08 and R$ 0.20 before the application of import taxes. This estimation reflects typical market prices for SMD 2835 LED chips, widely used in tubular

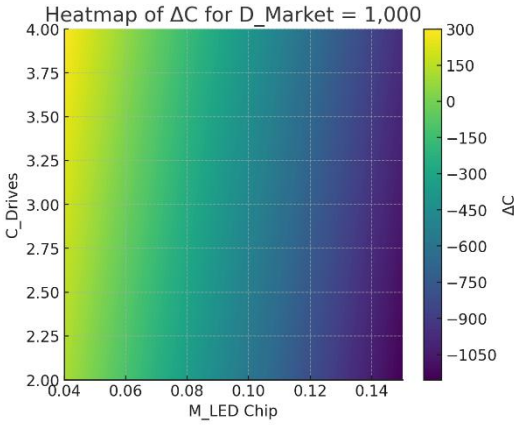
LED lamps due to their efficiency and cost-effectiveness. The range reflects variations in supplier pricing and the impact of order size on unit costs in large-scale production (BENWEI, 2025).

c. The total cost of the power unit (C_{Drives}), ranges between R$3.00 and R$5.00 (ELETRÔNICA SANTANA, 2025).

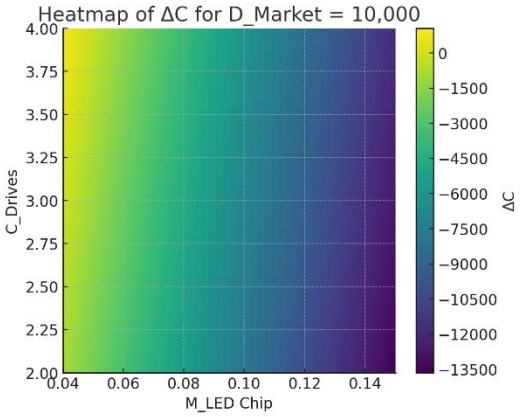
d. With LED chip costs ranging from R$ 0.04 to R$ 0.15 per unit and power unit costs between R$ 2.00 and R$ 4.00, a sensitivity analysis for ΔC was conducted. As shown in Figure 6, the only situations where ΔC is higher than zero occur in the combination of extremely low demand with the lowest values for $M_{LED\ Chip}$ and the highest value of C_{Drives}.

e. For a big LED Lamps supplier, the market demand (D_{Market}) is expected to surpass 100,000 LED lamps per month, condition presented in Figure 6(c), where no positive values were observed for ΔC.

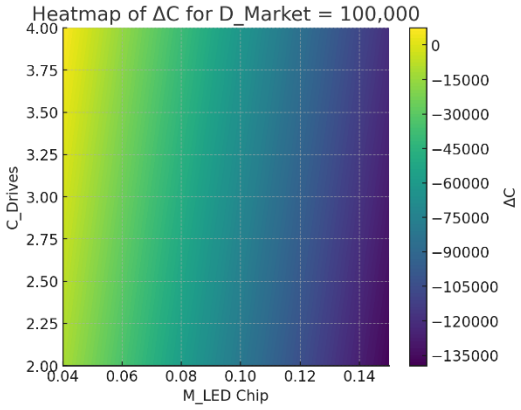
Figure 6 – Heatmaps of ΔC



(a) Heatmap of ΔC for D_{Market}=1,000



(b) Heatmap of ΔC for D_{Market}=10,000



(c) Heatmap of ΔC for D_{Market}=100,000

Source: Elaborated by the author.

2. **Net Profit Comparison:**

   i. **Variables/Parameters:**

      a. Q - Total quantity sold monthly.

      b. $C_{Total\text{-}S1}$ - Total monthly cost Scenario 1.

      c. $C_{Total\text{-}S2}$ - Total monthly cost Scenario 2.

      d. $UP_{LED\ Lamp}$ - Unit price of the LED Lamp.

      e. UC_{S1} - Unit cost of the LED Lamp, produced in Scenario 1.

      f. UC_{S2} - Unit cost of the LED Lamp, produced in Scenario 2.

      g. $IRPJ_{Sorocaba}$ – Corporate Income Tax for Sorocaba.

      h. $IRPJ_{Manaus}$ – Corporate Income Tax for Manaus.

      i. PIS/COFINS - Social Contributions.

      j. ICMS - Tax on the Circulation of Goods and Services.

      k. IPI - Industrialized Products Tax.

      l. $F_{Manaus \rightarrow São\ Paulo}$ - Freight cost per pallet from Manaus to São Paulo.

      m. I_t - Transportation insurance.

   ii. **Net Profit Functions:**

      a. Net Profit Scenario 1 (NP_{S1}):

$$NP_{S1} = (UP_{LED\ Lamp} \times Q) - C_{Total-S1} - ((UP_{LED\ Lamp} \times Q) \times (IPI + PIS/COFINS)) - ((UP_{LED\ Lamp} \times Q) - C_{Total-S1}) \times IRPJ_{Sorocaba} \quad (6)$$

      Where:

      - As presented on 3.4.1.2, the following taxes are applicable for this Scenario: IPI = 7.5%; PIS/COFINS = 9.25%; $IRPJ_{Sorocaba}$ = 15%.

      b. Net Profit Scenario 2 (NP_{S2}):

$$NP_{S2} = (UP_{LED\ Lamp} \times Q) - C_{Total-S2} - ((UP_{LED\ Lamp} \times Q) - C_{Total-S2}) \times IRPJ_{Manaus} - (F_{Sorocaba \rightarrow Manaus} + I_t) \times (1 + ICMS) \quad (7)$$

      Where:

      - As presented on 3.4.1.2, the following taxes are applicable for this Scenario: ICMS (São Paulo as destination) = 7%; $IRPJ_{Manaus}$ = 3.75%.
      - $F_{Manaus \rightarrow Sorocaba} = \left({}^{732.49}/_{150}\right) \times Q$. Based on the cost per pallet presented on 3.4.1.3, where it is defined the value of R$ 732.49 per pallet. For the LED Lamps, it is possible to consider

approximately 150 units per pallet, based on standard pallet dimensions (1,200 mm x 1,000 mm x 1,500 mm) and the typical size of the tubular LED Lamp (presented on 3.4.1). This calculation assumes optimal packing and stacking conditions to maximize pallet utilization (TASCHIBRA, 2025).

- $I_t = 0.2\% \times UP_{LED\ Lamp} \times Q$. According to Liberty Seguros (2018), 0.2% is the insurance tax applied to the route between Amazonas and São Paulo.

iii. Net Profit Variation (ΔNP): substituting the tax values (as outlined in Section 3.4.1.2 and assuming a 12% II rate for LED chips) and applying the necessary simplifications, it is possible to derive the equation for ΔC.

$$\Delta NP = NP_{S2} - NP_{S1} \tag{8}$$

$$\Delta NP = Q \times (0.27786 \times UP_{LED\ Lamp} - 5.2251) - 0.9625 \times C_{Total-S2} + 0.85 \times C_{Total-S1} \tag{9}$$

Where:

- If ΔNP > 0, the Scenario 2 results in higher net profit.
- If ΔNP < 0, the Scenario 1 results in higher net profit.
- If ΔNP = 0, both scenarios result in the same net profit.

Considering that $C_{Total\text{-}S1} = Q \times UC_{S1}$ and $C_{Total\text{-}S2} = Q \times UC_{S2}$ (assuming that for a full month of operation, $Q = D_{Market}$), it is possible to develop the equation, resulting in (10).

$$\Delta NP = Q \times (0.27786 \times UP_{LED\ Lamp} - 5.2251 - 0.9625 \times UC_{S2} + 0.85 \times UC_{S1}) \tag{10}$$

iv. Sensitivity Analysis:

a. The Operational Cost Comparation for scenarios with high volume of production/sales concluded that $C_{Total\text{-}S1} > C_{Total\text{-}S2}$, what means that $UC_{S1} > UC_{S2}$. For the Sensitivity Analysis, three percentual differences were tested: (1) $UC_{S1} = 1{,}10 \times UC_{S2}$, (2) $UC_{S1} = 1{,}15 \times UC_{S2}$, and (3) $UC_{S1} = 1{,}20 \times UC_{S2}$.

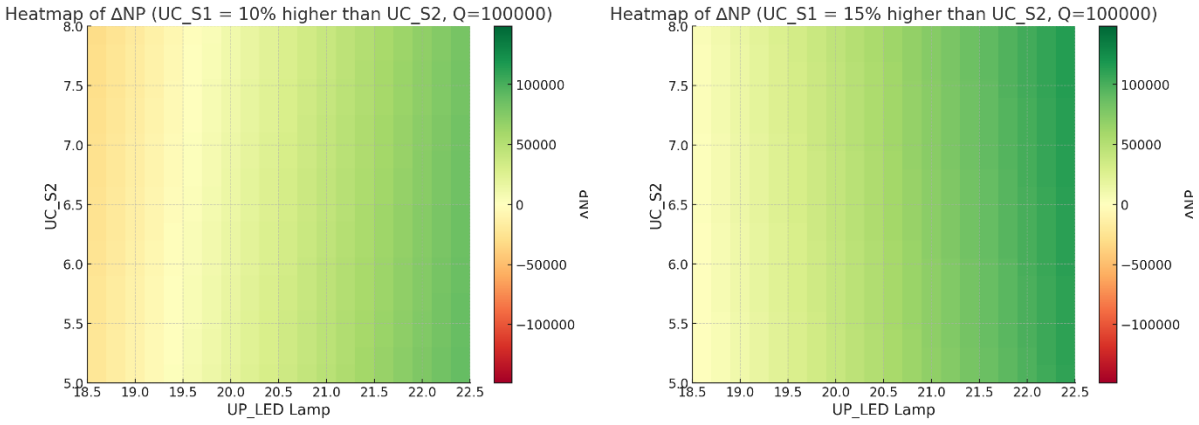
b. The UC_{S2} was defined as ranging between R$5.00 and R$8.00, values that cover different combinations of production and material costs, allowing for a deeper understanding of scenarios comparison.

c. For the $UP_{LED\ Lamp}$, the range of R$18.50 to R$22.50 was defined based on the prices of different suppliers commercializing the 1.2m tubular LED Lamp T8.

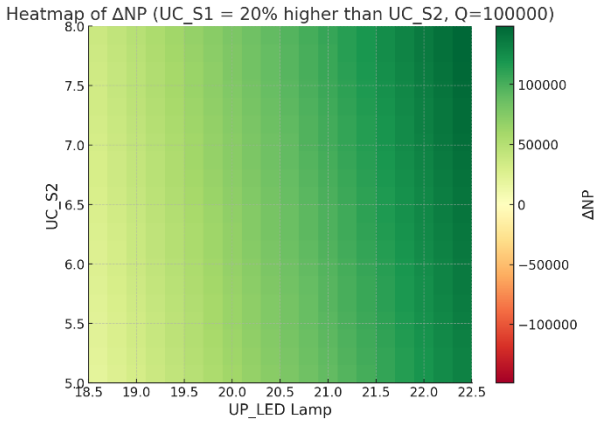
d. Figure 7 presents the results of the sensitivity analysis for Q = 100,000; using the ranges presented for UC_{S2} and $UP_{LED\ Lamp}$.

e. Figure 8 presents the results of the sensitivity analysis for Q = 250,000; using the ranges presented for UC_{S2} and $UP_{LED\ Lamp}$. This value of Q is an extreme condition of high demand and market penetration. While market demand exists, especially due to fluorescent replacements, industrial use, and government contracts, the distributor must ensure well-diversified sales.

Figure 7 – Heatmaps of ΔNP and Q = 100,000



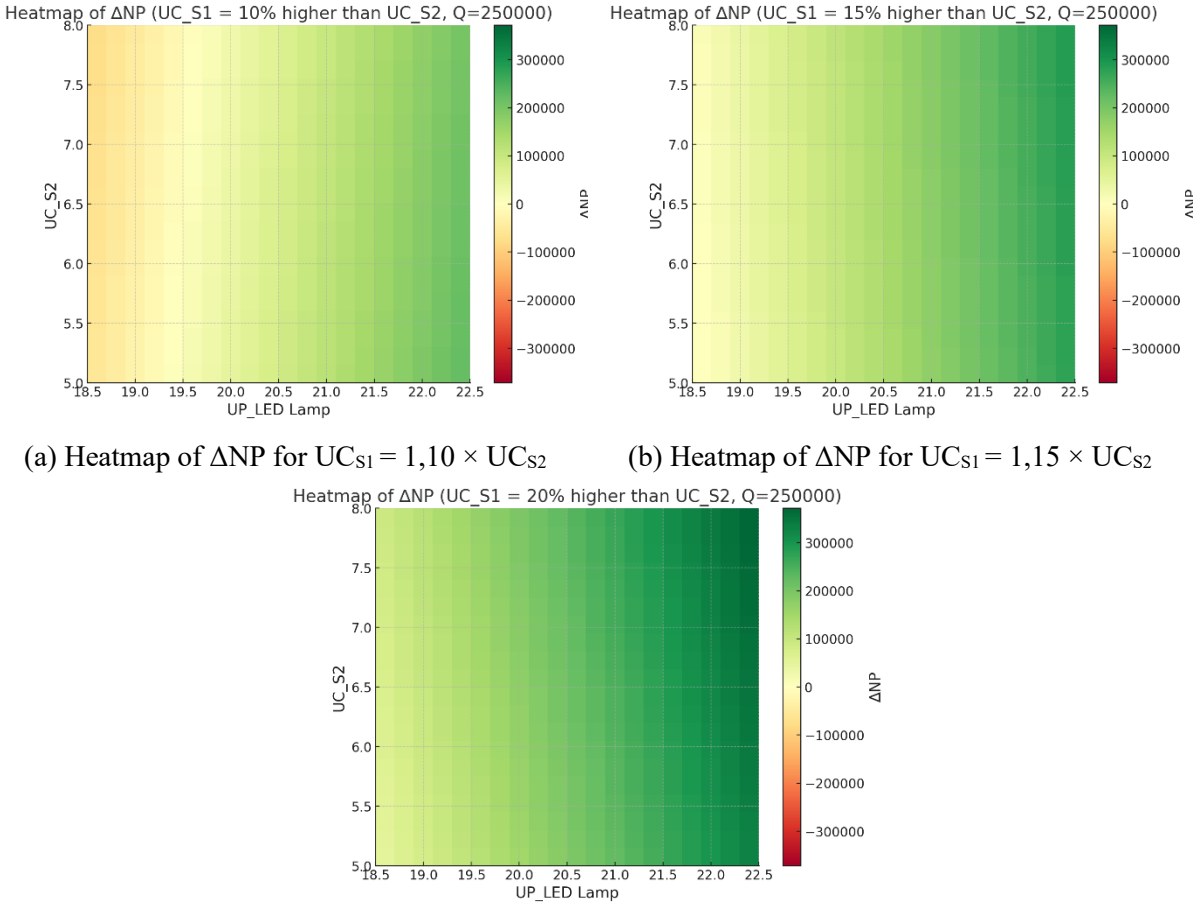
(a) Heatmap of ΔNP for $UC_{S1} = 1{,}10 \times UC_{S2}$ (b) Heatmap of ΔNP for $UC_{S1} = 1{,}15 \times UC_{S2}$



(c) Heatmap of ΔNP for $UC_{S1} = 1{,}20 \times UC_{S2}$

Source: Elaborated by the author.

Figure 8 – Heatmaps of ΔNP and Q = 250,000



(a) Heatmap of ΔNP for $UC_{S1} = 1{,}10 \times UC_{S2}$ (b) Heatmap of ΔNP for $UC_{S1} = 1{,}15 \times UC_{S2}$

(c) Heatmap of ΔNP for $UC_{S1} = 1{,}20 \times UC_{S2}$

Source: Elaborated by the author.

The results presented in the ΔC heatmaps confirm that for volumes below 10,000 units/month, the benefits of producing in Manaus are less pronounced, as logistical costs tend to offset the advantage of tax incentives. However, as the production scale increases, the effects of tax incentives on total costs become more significant, progressively reducing ΔC and establishing Manaus as the most advantageous option. For D_{Market} = 100,000, decentralized production in the ZFM becomes even more attractive, with a growing cost differential compared to Sorocaba.

The ΔNP analysis reinforces this trend by demonstrating that the impact of tax incentives not only reduces costs but also leads to a significant increase in profitability for companies operating at high volumes. Since these incentives directly affect taxes that represent a substantial portion of the cost structure (such as II, ICMS, PIS/COFINS, and IRPJ), large-scale companies can extract substantial financial gains by choosing production in Manaus. The final ΔNP equation indicates that the greater the difference between UC_{S1} and UC_{S2}, the more

significant the increase in profit margins, reinforcing the feasibility of the ZFM for large-scale industrial operations.

However, despite the financial advantage evidenced by the models, the decision to decentralize production cannot be based solely on tax incentives and operational cost reductions. The logistical challenges associated with production fragmentation play a critical role in the viability of this model. The final ΔC equation highlights that factors, such as freight costs between Sorocaba and Manaus ($F_{Sorocaba \rightarrow Manaus}$) and storage costs (H), can reduce the benefits of decentralization if not managed efficiently. Companies operating in the ZFM must consider strategies such as inventory optimization, selection of efficient transportation modes, and robust logistical planning to ensure that tax benefits are not nullified by additional operational costs.

Thus, the quantitative findings not only confirm the economic advantage of the ZFM for high production volumes but also highlight the critical role of logistical planning in ensuring the feasibility of a decentralized production model. While tax incentives significantly reduce costs, their benefits can be eroded if companies fail to manage operational challenges effectively. This reinforces that production location decisions should not be based solely on tax advantages, but also on the company's ability to optimize its supply chain, control freight and storage costs, and maintain stable inventory levels.

Considering these factors, it becomes evident that the feasibility of production in Manaus must be evaluated holistically, taking into account both production volume and the impact of tax incentives on unit costs and net profit. For companies with lower-scale operations, logistical constraints may limit the effectiveness of decentralization, making centralized production a more predictable option. However, for large industries, the ZFM proves to be a highly advantageous strategy, not only reshaping the cost structure of operations but also providing substantial long-term financial gains when paired with efficient logistical and operational planning.

3.5 DISCUSSIONS

This section discusses the empirical results from both a strategic and financialization-oriented perspective. First, it analyzes the trade-offs between operational efficiency and financial benefits observed in the case study. Then, it expands the discussion to consider the broader structural forces shaping corporate decision-making, particularly the role of financial

actors and global capital flows in the configuration of the Manaus production ecosystem for LED Lamp.

3.5.1 Strategic Trade-offs Between Financial and Operational Logic

The analysis demonstrates that producing LED lamps in Manaus under the ZFM framework is financially advantageous compared to Sorocaba, primarily due to the significant fiscal incentives available. The decision to fragment production, allocating specific stages to Manaus to comply with PPB requirements and access these benefits, reflects the influence of financial metrics on corporate strategies. This aligns with the broader concept of financialization, where decisions prioritize fiscal outcomes and cost optimization over operational efficiency and supply chain simplification (STOCKHAMMER, 2004; LEVY-ORLIK, 2013). Although this choice leads to financial gains, it simultaneously introduces logistical and managerial complexities, highlighting the trade-offs inherent in fragmented production models.

From an operational perspective, the logic of supply chain management challenges the validity of Scenario 2 as the most efficient option. Fragmenting production to comply with PPB requirements results in additional layers of complexity, including inter-regional transportation, increased inventory needs, and reliance on Manaus's logistical infrastructure, which is characterized by significant limitations, such as dependence on river transport and seasonal variability (SANT'ANNA, 1998; GOMES, 2009). These complexities contrast with the principles of streamlined operations, which traditionally aim to reduce costs through production centralization and supply chain simplification. In this scenario, financial metrics dominate decision-making, potentially at the expense of operational efficiency, reflecting how financialization shapes corporate strategies in non-financial industries (DIAS & ZILBOVICIUS, 2006).

The assumptions made in this study, such as considering equal production and storage costs in both scenarios, further reinforce the financial advantage of producing in Manaus. In practice, production costs in Manaus tend to be lower due to reduced labor expenses and operational efficiencies associated with the region (COSTA & OLIVEIRA, 2022; SUFRAMA, 2023a). Similarly, storage costs in Manaus are often more competitive due to the lower cost of facilities and services (SUFRAMA, 2023a). While these cost advantages were not included in the quantitative analysis, their presence would likely further enhance the financial appeal of Scenario 2. This reinforces the importance of evaluating each case individually, as other sectors

with different cost structures might experience distinct outcomes. For example, products with lower dependency on imported raw materials or sectors where labor and storage costs carry more weight could see these factors become critical in determining feasibility. Furthermore, accessing the fiscal benefits offered under the ZFM depends on having an approved PPB, a process that is not universally applicable to all products and sectors and requires alignment with government priorities (IPEA, 2019; SENADO FEDERAL, 2020).

Ultimately, this study highlights the complex interplay between financialization and operational decision-making in supply chain management. While the financial benefits of producing in Manaus under the ZFM are substantial, they come at the expense of supply chain efficiency, requiring companies to carefully weigh fiscal gains against logistical and operational risks. These findings emphasize the role of financialization in shaping strategic decisions, particularly in contexts where fiscal policies incentivize production in regions with significant operational constraints. This case serves as a valuable example of how fiscal incentives can shift priorities in supply chain strategies, demonstrating the broader implications of financialization on corporate decision-making in non-financial industries.

The results of this analysis indicate that the decision to decentralize production in order to access tax incentives goes beyond traditional supply chain strategy. It reflects a financialized approach in which fiscal outcomes are prioritized over operational logic. This behavior is consistent with the literature on corporate financialization, particularly in non-financial firms that restructure operations around short-term financial targets, as discussed by Krippner (2005), Lazonick (2010), and Lapavitsas (2013).

3.5.1.1 Brazilian LED Market Landscape

The Brazilian LED lighting market has grown rapidly in the past decade, supported by regulatory changes, technological advances, and energy-efficiency programs. In 2024, the sector generated approximately USD 1.43 billion and is projected to reach USD 2.09 billion by 2030, at a compound annual growth rate (CAGR) of 7 percent (GRAND VIEW RESEARCH, 2024). Alternative estimates place the market at USD 2.8 billion in 2024, with forecasts of USD 7.3 billion by 2033, corresponding to a CAGR of 10.65 percent (IMARC, 2024). Other reports point to annual growth rates above 12 percent for the period 2025–2030 (MARKNTEL ADVISORS, 2024) and up to 13.6 percent between 2023 and 2028 (TECHNAVIO, 2023).

This expansion is driven by four main factors. First, the national ban on incandescent bulbs and the progressive phase-out of fluorescents created regulatory pressure favoring LED

adoption (EPE, 2018; PROCEL, 2020). Second, public policies such as the Procel Energy Efficiency Program and municipal street-lighting retrofits stimulated demand in residential, commercial, and governmental segments (MINISTÉRIO DE MINAS E ENERGIA, 2021). Third, integration into global supply chains and technological maturation reduced costs, broadening consumer access (IMARC, 2024; TECHNAVIO, 2023). Finally, environmental awareness and ESG agendas consolidated LED as the dominant standard in the domestic lighting industry (GRAND VIEW RESEARCH, 2024; MARKNTEL ADVISORS, 2024).

Within this growing market, several firms stand out for their relevance and strategic positioning. Signify (formerly Philips) is the global and national leader, with strong market share and structured presence in Brazil (SIGNIFY, 2023). Among domestic manufacturers, Elgin operates large-scale facilities in Manaus, directly tied to the fiscal regime of the Manaus Free Trade Zone (SUFRAMA, 2022). Lumicenter expanded its operations in the PIM in 2021, specializing in LED luminaires (SUFRAMA, 2024). Artek maintains a long-standing presence in the Industrial Pole of Manaus, producing lighting equipment under the ZFM regime (ARTEK INDUSTRIAL, 2023). Finally, the Unicoba Group, through its Ledstar unit in Manaus, illustrates how national firms leverage subsidiary structures to comply with the Basic Productive Process and capture fiscal benefits (CIEAM, 2023). Other firms such as FT LED/City Lumi are also registered in the ZFM, further confirming the sector's reliance on fiscal incentives (SUFRAMA, 2023b).

Given this context, the case selection for the present study combines two criteria: market leadership and effective participation in the PIM under the ZFM regime. The five core firms analyzed—Signify, Elgin, Lumicenter, Artek, and Unicoba—represent the intersection of these criteria. Together they capture the dynamics of global capital, national champions, and regionally embedded producers, providing a robust basis to investigate how financialization shapes strategic behavior in the LED sector. The following section (3.5.2) develops this analysis by examining ownership structures, executive profiles, financial practices, and the appropriation of public policy across these firms.

3.5.2 Financialization and Strategic Behavior in the LED Sector of the PIM

In the context of the structural transformations affecting global corporate governance, the production arrangements located in the Manaus Free Trade Zone (ZFM) reveal dynamics that extend beyond traditional technical-operational rationality. Decisions regarding the location, fragmentation, and coordination of supply chains in the lighting sector cannot be

interpreted solely through logistical, technological, or regulatory factors. Increasingly, these choices reflect a strategic orientation anchored in the logic of financial valorization, prioritizing the capture of fiscal incentives, the maximization of accounting indicators, and the return on invested capital (KRIPPNER, 2005; VAN DER ZWAN, 2014).

The contemporary literature on the financialization of non-financial firms, particularly the work of Krippner (2005), Van der Zwan (2014), Froud et al. (2006), and Pike and Pollard (2010), provides the analytical tools necessary to understand how the logic of financial capital permeates operational decisions and reconfigures corporate objectives. This dynamic is not restricted to the use of sophisticated financial instruments; rather, it manifests structurally through ownership architectures, executive orientations, capital allocation practices, and, most notably, through the appropriation of public policy as a mechanism of tax engineering (FROUD ET AL., 2006; LEVY-ORLIK, 2013).

In the LED lighting sector of the Industrial Pole of Manaus (PIM), the strategic behavior of firms such as Signify, Elgin, Lumicenter, Artek, and Unicoba clearly illustrates this process. Despite differences in size, ownership structure, and governance models, these companies converge in treating financial objectives as central to their productive strategies. What emerges is not a logic of operational efficiency or supply chain deepening, but rather the incorporation of the PIM into broader strategies of financial valorization, guided by indicators such as return on capital employed (ROCE), free cash flow, and risk-adjusted fiscal profitability (BAUD & DURAND, 2012).

To capture the complexity of this phenomenon, the section is structured around six interpretive axes. Each corresponds to a specific dimension of financialization: ownership structure and corporate control; executive profiles and managerial orientation; financial engineering practices; performance indicators and capital allocation; dynamics of mergers and corporate restructuring; and, finally, the strategic appropriation of public policy. Considered together, these six dimensions reveal how financialization becomes a structuring force behind productive decision-making in the LED sector of the PIM. The analytical effort undertaken here is not limited to identifying operational distortions or isolated incentives; it empirically demonstrates how financial logics reconfigure corporate strategies within a peripheral fiscal-industrial regime.

To support this multidimensional analysis, Table 5 summarizes the strategic characteristics of the principal LED manufacturers operating under the ZFM regime. The table provides a comparative overview of ownership structures, presence of institutional investors, executive backgrounds, governance models, financial strategies, interaction with public policy,

and capital allocation approaches. This synthesis facilitates cross-case interpretation and highlights the contrasts between transnational and national firms embedded in the same fiscal framework. Importantly, Table 5 also functions as a synthesis and analytical map of the six dimensions discussed in the subsections that follow, guiding the reader and enabling cross-case interpretation in advance.

Table 5 – Overview of strategic financial behavior among LED manufacturers in the PIM

Analytical Dimension	**Signify**	**Elgin**	**Unicoba (Ledstar)**	**Lumicenter**	**Artek**
Ownership Structure	Publicly traded with dispersed global ownership	Privately held Brazilian group with industrial operations in Manaus	Brazilian group with subsidiary in Manaus created to operate under ZFM	Privately held, local production	Private with long ZFM presence
Presence of Institutional Investors	BlackRock, Vanguard, and Norges Bank Investment Management	No publicly disclosed institutional investors due to private ownership	No publicly disclosed institutional investors due to private ownership	Institutional ownership not applicable. Operates outside capital markets	Not subject to institutional investor influence due to private ownership
Executive Profiles	CEO with technical and financial background	No executive data publicly available. Inferred logic oriented to fiscal and regulatory compliance	No executive data publicly available. Inferred logic oriented to PPB compliance and cost management	No executive data publicly available. Inferred operational logic based on regulatory compliance	Current CEO information is not publicly available. Long-term stability reflects continuity
Corporate Governance	Board with strong financial background, oriented to shareholder value	Governance behavior suggests adaptation to SUFRAMA and PPB requirements	Governance behavior reflects incentive-driven strategy and group-level fiscal alignment	Undisclosed structure; strategy reflects incentive-based adaptation	Stable profile, aligned with long-term fiscal continuity
Financial Strategy (Practices)	Share buybacks, high dividends, ROCE focus	Focused on PPB compliance and fiscal-credit optimization	Selective PPB compliance combined with fiscal arbitrage consolidated at group level	Lean operations for PPB eligibility	Focused on maintaining fiscal status

Interaction with Public Policy	Uses ZFM incentives strategically	Integrated into ZFM regime	ZFM used as fiscal enclave integrated into group accumulation strategy	Presence aligned with policy continuity	Integrated into ZFM regime
Capital Allocation: Reinvestment vs. Shareholder Return	Clear prioritization of shareholder returns over reinvestment, with limited CAPEX and operational consolidation strategies	Investment decisions oriented toward fiscal return preservation rather than industrial expansion	Group-level profitability uplift prioritized over local reinvestment	Reinvestment strategies unclear. Operational sustainability seems contingent on policy stability rather than long-term planning	Capital allocation decisions are opaque. Business continuity rather than financial optimization seems to dominate

Source: Elaborated by the author, based on public data from Financial Times (2024), SUFRAMA (2022; 2024), CIEAM (2023), Artek Industrial (2023), Elgin (2023), Unicoba (2023), and official corporate reports from Signify.

Table 5 presents the main elements of firm-level characterization. Although consolidated firm-level market share data for the PIM are not available, the qualitative comparison reveals relevant structural differences among the companies. In the case of the multinational Signify, there is greater capacity to internalize fiscal incentives into corporate strategies aligned with a financialized logic, either through the optimization of working capital or through the emphasis on shareholder returns. Among the nationally owned firms, important contrasts also emerge: Elgin, as a large and diversified company, operates with greater financial flexibility, whereas Unicoba, a medium-sized and more specialized firm, shows stronger dependence on productive and logistical contracts, with less room for sophisticated financial governance practices. This heterogeneity demonstrates that the appropriation of fiscal incentives in the PIM is not uniform, but rather conditioned by the structural position of firms within the supply chain, their ownership structure, and the configuration of corporate governance. Such contrasts reinforce the central argument of this dissertation, namely that financialization does not unfold as a homogeneous process, but rather as a selective dynamic that reshapes, in uneven ways, the operational and strategic decisions of firms.

3.5.2.1 Ownership Structure and Corporate Control

A Among the main LED manufacturers with industrial operations in the PIM, ownership structures reveal how financial logics permeate corporate governance. Signify, as a publicly

listed multinational, is strongly exposed to the discipline of capital markets. Its largest shareholders include BlackRock, The Vanguard Group, and Norges Bank Investment Management, three of the world's largest institutional investors (FINANCIAL TIMES, 2024). This configuration subjects management to governance focused on maximizing market value and capital return indicators (PIKE; POLLARD, 2010). The composition of its board of directors reinforces this orientation, since it is predominantly formed by former executives from banks, asset managers, and strategic consultancies, reflecting a decision-making culture centered on financial efficiency (FINANCIAL TIMES, 2024).

By contrast, Elgin, Lumicenter, and Artek are privately held Brazilian firms, and therefore not directly exposed to international capital markets. However, their governance models are equally permeated by financial imperatives. Their strategic behavior, particularly in the formalization of subsidiaries in Manaus, the adaptation of corporate structures to Basic Productive Process (PPB) requirements, and the alignment of internal governance with SUFRAMA regulations, indicates that corporate architecture is subordinated to fiscal engineering and to the maximization of access to ZFM incentives (SUFRAMA, 2022; SUFRAMA, 2024; ARTEK INDUSTRIAL, 2023; LEVY-ORLIK, 2013).

The Unicoba Group represents a hybrid case. Although it is a national conglomerate rather than a listed multinational, its decision to establish the Ledstar unit in Manaus was not aimed at industrial deepening, but at optimizing fiscal positioning. The group created a separate legal entity in the ZFM to comply selectively with PPB requirements, thereby ensuring permanent access to the "fiscal bundle" of incentives (CIEAM, 2023; UNICOBA, 2023). In this case, corporate ownership itself operates as a financial instrument, structuring the relationship between subsidiaries and the state around tax optimization rather than technological development.

Taken together, these ownership and governance patterns show that, whether through shareholder-driven boards in multinationals like Signify or through family-controlled structures disciplined by fiscal regulation in domestic firms, governance in the PIM converges toward financial imperatives. The LED sector demonstrates how productive units are managed not primarily as spaces of innovation or supply chain coordination, but as vehicles for financial valorization anchored in state-provided incentives (KRIPPNER, 2005; VAN DER ZWAN, 2014; BAUD; DURAND, 2012; FROUD et al., 2006).

3.5.2.2 Executive Profile and Managerial Logic

The composition of executive boards and managerial teams further demonstrates how financialization shapes corporate decision-making in the LED sector of the PIM. In the case of Signify, the profile of top executives reflects a strong financial orientation. Its board of directors includes professionals with previous experience in global banks, asset management firms, and strategic consultancies, such as BlackRock, The Vanguard Group, and McKinsey, reinforcing a culture of governance oriented toward financial efficiency and shareholder value (FINANCIAL TIMES, 2024; SIGNIFY, 2024). This managerial orientation is consistent with the broader patterns of financialized capitalism, in which non-financial corporations adopt financial expertise at the highest levels to ensure alignment with investor expectations (FROUD et al., 2006; PIKE; POLLARD, 2010).

Among domestic firms such as Elgin, Lumicenter, and Artek, there is less transparency regarding the composition of executive boards, since they are privately held and not subject to international reporting standards. However, available information and company disclosures suggest that their leadership teams are primarily structured around compliance with fiscal regulation and management of ZFM incentives (SUFRAMA, 2022; SUFRAMA, 2024; ARTEK INDUSTRIAL, 2023). The centrality of executives specialized in legal, fiscal, and regulatory affairs reflects how managerial logic is oriented toward sustaining access to the PPB framework rather than investing in local technological or operational capacity.

The Unicoba Group, through its Manaus-based Ledstar unit, further illustrates this orientation. While the group presents itself as a technology-driven company, executive roles directly linked to the Manaus operation emphasize regulatory compliance and cost management, consistent with the goal of maximizing fiscal benefits (CIEAM, 2023; UNICOBA, 2023). This suggests that managerial specialization in peripheral contexts is less about industrial innovation and more about navigating complex fiscal regimes.

Taken together, these executive profiles indicate that, regardless of ownership structure, the managerial elite of LED firms in the PIM operates within a financialized rationality. For multinational corporations, this results in boards dominated by financial professionals aligned with global capital markets. For national firms, it leads to the prioritization of fiscal engineers and compliance specialists. In both cases, executive logic reflects the subordination of productive decisions to financial imperatives, reinforcing the broader dynamic of financialization in the ZFM (KRIPPNER, 2005; VAN DER ZWAN, 2014; LEVY-ORLIK, 2013).

3.5.2.3 Financial Engineering Practices

Financialization is also evident in corporate capital management practices. Signify has conducted recurring share buyback programs totaling over €1 billion between 2019 and 2024, aimed at increasing total shareholder return and optimizing earnings per share indicators (FINANCIAL TIMES, 2024). The company also maintains a payout ratio exceeding 60%, underscoring the prioritization of capital return over productive reinvestment. These mechanisms are typical of financialized firms, where shareholder value maximization often overrides long-term productive investment (LAZONICK, 2014).

For domestic firms such as Elgin, Lumicenter, and Artek, financial engineering manifests in more localized forms. Rather than deploying global capital-market instruments, these firms design their corporate and productive structures to maximize the "fiscal bundle" of the ZFM, including exemptions and reductions in IPI, ICMS, PIS/COFINS, and IRPJ (SUFRAMA, 2022; SUFRAMA, 2024). The recurrent practice of producing only the minimum required under the Basic Productive Process (PPB) while outsourcing or importing complementary components demonstrates how financial rationality prevails over industrial deepening. Investment flows, rather than being directed to technological upgrading or supply chain integration, are optimized to sustain tax compliance at the lowest operational cost (LEVY-ORLIK, 2013; BAUD; DURAND, 2012).

The Unicoba Group, through the Ledstar unit, illustrates the hybrid nature of financial engineering in the Brazilian periphery. While the group projects an image of technological advancement and ESG alignment, its Manaus operation is primarily structured as a fiscal enclave. Legal entities are fragmented to meet PPB requirements selectively, ensuring uninterrupted access to tax benefits and permitting financial consolidation at the group level (CIEAM, 2023; UNICOBA, 2023). This organizational design underscores how engineering is less about technology and more about the engineering of fiscal flows.

Among the national companies present in the PIM, systematic adoption of tax planning strategies designed to optimize fiscal outcomes is evident. Production configurations, corporate segmentation, and geographic allocation of production stages are structured based on tax profitability criteria, exemplifying operational forms of financial engineering. These practices, while less complex than those of transnational firms, illustrate how the fiscal structure of the ZFM encourages even medium-sized manufacturers to prioritize financial metrics in productive decisions (LEVY-ORLIK, 2013; FROUD et al., 2006).

3.5.2.4 Performance Indicators and Capital Allocation

The dominance of financial logics in the PIM is further evidenced by the centrality of performance indicators in shaping corporate strategies. Signify reports global performance primarily through financial metrics such as return on capital employed (ROCE), free cash flow, earnings per share (EPS), and operating margin (SIGNIFY, 2024). These indicators are not neutral tools of efficiency measurement; they reflect a financialized orientation in which the success of industrial operations, including those in Manaus, is assessed by their capacity to contribute to capital valorization rather than by productivity gains or supply chain deepening (FROUD et al., 2006; BAUD; DURAND, 2012).

Domestic firms such as Elgin, Lumicenter, and Artek show less disclosure, but evidence from SUFRAMA reports and company documentation indicates a similar reliance on fiscal performance as the ultimate measure of success (SUFRAMA, 2022; SUFRAMA, 2024; ARTEK INDUSTRIAL, 2023). In these cases, capital allocation decisions are strongly linked to the capacity to maintain PPB compliance at the lowest possible cost. Investments in innovation, R&D, or productive efficiency are secondary to the goal of preserving fiscal benefits and reporting profitability through tax optimization (LEVY-ORLIK, 2013).

The Unicoba Group, operating through the Ledstar unit, reinforces this pattern. While the group markets itself as a technology and sustainability-oriented company, its Manaus operation is essentially evaluated by the fiscal returns it generates. Internal allocation of resources reflects a prioritization of PPB-related compliance expenditures and tax-optimized imports, rather than productive upgrading (CIEAM, 2023; UNICOBA, 2023).

Among national firms, the fiscal gains derived from the ZFM translate into high net profit margins and low tax exposure, without proportional reinvestment in productive capacity or innovation. The absence of consistent capital budgeting policies, alongside minimal Research and Development (R&D) intensity, reinforces the interpretation that the location decision in Manaus serves primarily a fiscal rather than an industrial rationale (FROUD et al., 2006; LEVY-ORLIK, 2013).

3.5.2.5 Mergers, Acquisitions, and Corporate Restructuring

Mergers & Acquisitions (M&A) operations reflect a logic of inorganic growth and consolidation driven by financial return. Signify acquired Cooper Lighting Solutions in 2020 for US$1.4 billion, justifying the move with expectations of synergy and immediate financial

gains. Beyond operational integration, the acquisition was framed as a strategic manoeuvre to enhance earnings per share and generate short-term shareholder value, following a pattern observed in financialized industrial conglomerates (LAZONICK, 2014).

For domestic firms such as Elgin, Lumicenter, and Artek, the dynamics of restructuring do not involve high-profile acquisitions but rather recurrent adjustments in corporate and productive organization. These include the opening and closure of subsidiaries, changes in legal structures, and reallocations of production designed to preserve profitability. Instead of signalling technological innovation or supply chain expansion, these reorganizations reflect a financial calculus aimed at optimizing margins, safeguarding fiscal positions, and reducing exposure to operational risk. Restructuring thus functions as a mechanism of financial discipline consistent with broader patterns of financialization (PIKE; POLLARD, 2010; LEVY-ORLIK, 2013).

The Unicoba Group, through its Ledstar subsidiary, offers a clear example of restructuring as financial engineering. The group created the Manaus unit not as a project of industrial deepening but as a legal instrument to secure eligibility for ZFM incentives and consolidate their fiscal returns at the group level. The maintenance of this unit and the possibility of internal reorganizations underscore the use of corporate flexibility as a tool for fiscal arbitrage. The outcome is the consolidation of enhanced profitability at the group scale with limited productive investment (CIEAM, 2023; UNICOBA, 2023).

In all cases, whether through global M&A or domestic restructuring, corporate change operates primarily as a financial instrument. Portfolio rebalancing, subsidiary creation, and legal reorganization are subordinated to financial imperatives, enhancing shareholder value, preserving fiscal advantages, and consolidating profits, rather than serving as pathways to technological upgrading or supply chain strengthening. This reflects the broader literature on financialization, which highlights how mergers and restructurings are increasingly instruments for capital valorization in both core and peripheral contexts (KRIPPNER, 2005; VAN DER ZWAN, 2014; FROUD et al., 2006; BAUD; DURAND, 2012).

3.5.2.6 Financialized Appropriation of Public Policy

The presence of companies in the PIM cannot be explained as a response to industrial policies aimed at territorial development but rather as a tool for tax arbitration. The PPB, originally conceived as a mechanism for productive integration, is interpreted as a minimum regulatory hurdle to be overcome in pursuit of financial profitability. Production is fragmented,

value-added is relocated, and industrial presence is adjusted to the minimum necessary for fiscal compliance (IPEA, 2019; SUFRAMA, 2020).

As Fraud et al. (2006) assert, financialization does not oppose the state; it instrumentalizes it. In the case of the ZFM, public policy is absorbed by corporate strategy, transformed into a mechanism for value capture. The decisions analyzed are fully aligned with international patterns of financialization, in which the geography of production is determined by tax efficiency rather than productive or territorial logic.

Beyond the specific configuration adopted in the LED sector, the findings also point to broader implications for supply chain design and public policy. When operational choices are primarily shaped by financial incentives, strategic conformation may lead to structurally misaligned decisions that favor short-term fiscal returns over long-term productive consistency. This highlights the need for regular assessment of how industrial policy instruments are used in practice, ensuring they continue to support sustainable development objectives rather than reinforcing financial arbitrage behaviors.

3.6 CONCLUSION

This study analyzed the financial and operational impacts of two distinct production scenarios for LED tubular lamps, comparing a centralized production model in Sorocaba with a fragmented model between Manaus and Sorocaba under the ZFM framework. The results demonstrated that, despite the logistical complexities introduced by fragmented production, the financial benefits provided by the ZFM, such as IPI exemption, IRPJ reduction, and other fiscal incentives, make the Manaus scenario more advantageous in terms of total operational cost and net profit (IPEA, 2019; SENADO FEDERAL, 2020). These findings highlight the strong influence of fiscal policies on corporate decision-making, particularly in contexts where financial metrics dominate strategic priorities (VAN DER ZWAN, 2014).

From an operational standpoint, the fragmented production model increases supply chain complexity due to inter-regional transportation, reliance on multimodal infrastructure, and higher inventory requirements. These challenges underline the trade-offs between financial and operational considerations, reinforcing how financialization drives companies to prioritize cost optimization through fiscal incentives, even when this comes at the expense of supply chain efficiency (HE & ZUO, 2023). This behavior exemplifies the broader implications of financialization in non-financial industries, where decisions are increasingly shaped by financial metrics rather than operational efficiency.

Beyond these logistical and operational effects, however, the findings also suggest that fiscal incentives are not merely compensatory mechanisms for regional inefficiencies but are increasingly incorporated into firms' financial strategies. In companies more exposed to financialized governance structures, such benefits can be redirected toward working capital optimization, the extension of supplier payment terms, and even the reinforcement of payout policies, rather than exclusively into productive reinvestment. This dynamic illustrates how the ZFM incentives, originally conceived as instruments of regional development, are partially reconfigured into tools of corporate financial governance, aligning local industrial policy with shareholder-oriented imperatives (LAZONICK & O'SULLIVAN, 2000; STOCKHAMMER, 2004; VAN DER ZWAN, 2014; DURAND, 2017).

While the analysis presented here focused on the specific case of LED lamp production, the results have broader applicability. The relative importance of factors such as imported materials, labor costs, and storage costs may vary significantly across industries, potentially altering the conclusions for other sectors. Furthermore, the fiscal advantages of the ZFM depend on compliance with the PPB, a requirement that is not universally accessible and requires careful alignment with government regulations (SUFRAMA, 2023a). These findings emphasize the need for case-by-case evaluations to determine the feasibility of relocating production to Manaus or other regions with fiscal incentives.

In summary, this study contributes to the understanding of the interplay between financialization and supply chain management strategies in regions with fiscal benefits. It highlights how fiscal policies, while offering substantial financial advantages, can lead to decisions that challenge traditional principles of operational efficiency. By providing a detailed analysis of this trade-off, the study sheds light on the broader implications of financialization for corporate strategies in non-financial industries.

Furthermore, this study emphasizes not only the financial benefits that motivate the fragmentation of production to Manaus but also the broader structural dynamics that sustain this pattern. The presence of global manufacturers backed by institutional investors reveals how fiscal incentives such as those provided by the ZFM are increasingly used as tools of financial strategy, rather than regional development. These findings strengthen the link between financialization and corporate behavior, showing that the strategic use of tax benefits is not an isolated case, but a widespread logic shaped by shareholder-oriented imperatives, even when based primarily on public data from institutional records and observable market behavior.

REFERENCES

ANTT - AGÊNCIA NACIONAL DE TRANSPORTES TERRESTRES. **Tabela de Preços de Frete Rodoviário de Cargas Lotação.** Resolução nº 6.059, Brasília, 2024.

ARTEK INDUSTRIAL. **Company profile**. Artek Industrial, Manaus, 2023. Available at: https://www.artekindustrial.com.br. Accessed on: September 4, 2025.

BALLON, R. H. **Logística Empresarial: Transportes, Administração de Materiais e Distribuição Física.** São Paulo: Atlas, 2008.

BAUD, C.; DURAND, C. **Financialization, globalization and the making of profits by leading retailers**. Socio-Economic Review, v. 10, n. 2, p. 241–266, 2012. DOI: 10.1093/ser/mwr016.

BENWEI. **200LM/W SMD 2835 LED 0,2W.** Available at: pt.benweilight.com/led-chip/led-smd-2835/200lm-w-smd-2835-led-0-2w.html. Accessed on: January 27, 2025.

BIGLIA, B. B. **Zona Franca de Manaus: Um bom Investimento?** 2009. Monograph – Undergraduate Program in Economics, PUC-RIO – Pontifical Catholic University of Rio de Janeiro, July 2009.

BRASIL, MINISTÉRIO DA ECONÔMIA. **Portaria Interministerial SEPEC/ME/SEXEC/MCTIC nº 4, de 30.01.2020.** Processo Produtivo Básico – PPB para o produto de Luminária com Fonte de Luz em Estado Sólido. Available at: antigo.mctic.gov.br/mctic/opencms/legislacao/portarias_interministeriais/Portaria_Interministerial_SEPEC_ME_SEXEC_MCTIC_n_4_de_30012020.html.

CHEN, L. **A novel framework for customer-driven service strategies: A case study of a restaurant chain.** Journal Tourism Management, v. 41, p. 119–128, April 2014.

CIEAM – CENTRO DA INDÚSTRIA DO ESTADO DO AMAZONAS. **Ledstar reforça produção de luminárias LED em Manaus**. Manaus: CIEAM, 2023. Available at: https://www.cieam.com.br. Accessed on: September 4, 2025.

COSTA, P. A.; OLIVEIRA, J. S. **A sustentabilidade ambiental no contexto da Zona Franca de Manaus.** Revista Amazônia Sustentável, v. 18, n. 2, p. 85-103, 2022.

DIAS, A. V.; ZILBOVICIUS, M. **A produção face à financeirização: quais consequências para a organização da produção e do trabalho?** Uma proposta de agenda de pesquisa para a engenharia de produção brasileira. In: ENCONTRO NACIONAL DE ENGENHARIA DE PRODUÇÃO, 26., Fortaleza, 2006. Anais do XXVI Encontro Nacional de Engenharia de Produção.

ELETRÔNICA SANTANA. **Driver de Emergência para Lâmpada Tubular LED T8 8-18W 48DELED18W00 Elgin.** Available at: eletronicasantana.com.br/driver-de-emergencia-para-lampada-tubular-led-t8-8-18w-48deled18w00-elgin/p. Accessed on: January 27, 2025.

ELGIN. **Institucional e unidades de produção**. Elgin do Brasil, São Paulo, 2023. Available at: https://www.elgin.com.br. Accessed on: September 4, 2025.

FAROLE, T. **Special Economic Zones in Africa: Comparing Performance and Learning from Global Experiences**. Washington, DC: The World Bank, 2011.

FAROLE, T.; AKINCI, G. **Special Economic Zones: Progress, Emerging Challenges, and Future Directions**. Washington, DC: The World Bank, 2011.

FIESP – FEDERAÇÃO DAS INDÚSTRIAS DO ESTADO DE SÃO PAULO. **Perfil da indústria nos municípios paulistas: Sorocaba**. São Paulo: FIESP, 2023. Available at: https://www.fiesp.com.br/arquivo-download/?id=64819. Accessed on: June 3, 2025.

FINANCIAL TIMES. **Signify shareholder composition and financial performance**. Financial Times, London, 2024.

FINANCIAL TIMES. **Top shareholders of Signify and Osram. Financial Times Markets Data**. Financial Times, London, 2023.

FIORITO, V. E.; LAURO, C. A. **As zonas francas e o comércio internacional: fundamentos e análise crítica**. Revista de Direito Internacional Econômico e Tributário, v. 10, n. 1, p. 115–136, 2014.

FROUD, J.; JOHANSSON, U.; LEAVER, A.; WILLIAMS, K. **Financialization and strategy: narrative and numbers**. London: Routledge, 2006.

GOMES, H. M. O. **Identificação e análise dos critérios de decisão na escolha de transportes de carga pelas indústrias do PIM.** Master's Dissertation. UFAM, 2009.

GRAND VIEW RESEARCH. **Brazil LED lighting market size, share & trends analysis report**. 2024. Available at: https://www.grandviewresearch.com. Accessed on: September 4, 2025.

HE, H.; ZUO, Z. **Supply chain concentration and enterprise financialization: Evidence from listed companies in China's manufacturing industry.** PLOS One, v. 18, Issue 5, 2023. DOI: 10.1371/journal.pone.0285308.

IMARC GROUP. B**razil LED market: industry trends, share, size, growth, opportunity and forecast 2024–2033**. 2024. Available at: https://www.imarcgroup.com. Accessed on: September 4, 2025.

IPEA - INSTITUTO DE PESQUISA ECONÔMICA APLICADA. **O Polo Industrial de Manaus: Desafios e Perspectivas.** Technical report, Brasília: IPEA, 2019. Available at: ipea.gov.br. Accessed on: January 20, 2025.

IPEA - INSTITUTO DE PESQUISA ECONÔMICA APLICADA. **Zonas Francas e Desenvolvimento: desafios contemporâneos**. Brasília: IPEA, 2019. Available at: ipea.gov.br. Accessed on: June 19, 2025.

JUM'A, L.; ZIMON, D.; IKRAM, M. **A relationship between supply chain practices, environmental sustainability and financial performance: evidence from manufacturing companies in Jordan.** Sustainability, v. 13, Issue 4, p. 1-22, 2021. DOI: 10.3390/su13042152.

KÖCHE, J. C. **Fundamentos de Metodologia Científica: Teoria da ciência e iniciação à pesquisa.** 33. ed. Petrópolis: Vozes, 2013.

KRIPPNER, G. R. **The financialization of the American economy**. Socio-Economic Review, v. 3, n. 2, p. 173–208, 2005. DOI: 10.1093/SER/mwi008.

LAPAVITSAS, C. **Profiting without producing: how finance exploits us all**. London: Verso, 2013.

LAZONICK, W.; O'SULLIVAN, M. **Maximizing shareholder value: a new ideology for corporate governance**. Economy and Society, v. 29, n. 1, p. 13–35, 2000. DOI: 10.1080/030851400360578.

LEBARON, G. **Captive labour and the reconfiguration of development in the global economy**. Third World Quarterly, v. 31, n. 8, p. 1413–1429, 2010. DOI: 10.1080/01436597.2010.541080.

LEVY-ORLIK, N. **Effects of financialization on the structure of production and nonfinancial private enterprises: The case of Mexico.** Journal of Post Keynesian Economics, v. 35, Issue 2, p. 235-254, 2013. DOI: 10.2753/PKE0160-3477350204.

LIBERTY SEGUROS. **Tabela de Taxas RCTR-C: Seguro Obrigatório de Responsabilidade Civil do Transportador Rodoviário de Cargas.** Liberty Seguros, 2018. Available at: libertyseguros.com.br/Shared%20Documents/3%20-%20CL%20n%C2%BA%20107%20-%20TABELA%20TAXA%20RCTR-C_OUT18%20%28004%29.pdf. Accessed on: January 27, 2025.

MANGABEIRA, L. **Os desafios logísticos da Amazônia.** Available at: komintl.com. Accessed on: March 24, 2010.

MARKNTEL ADVISORS. **Brazil LED lighting market research report (2025–2030)**. 2024. Available at: https://www.marknteladvisors.com. Accessed on: September 4, 2025.

MATSUDA, P. M. **The impact of the financialization process on the social structure in companies: a case study in the São Paulo electric sector.** 2015. PhD Thesis – Graduate Program in Production Engineering, UFSCar – Federal University of São Carlos, São Carlos, 2015.

MERCADO LIVRE. **Driver Reator para Lâmpada LED Tubular T8, 10W a 20W, 1,2m.** Available at: produto.mercadolivre.com.br/MLB-1309112186-driver-reator-da-lmpada-led-tubular-t8-10w-20w-12m-60cm-300ma-fonte-tubular-_JM. Accessed on: January 27, 2025.

MILBERG, W.; WINKLER, D. **Outsourcing Economics: Global Value Chains in Capitalist Development**. Cambridge: Cambridge University Press, 2013.

OLIVER, R. K.; WEBBER, M. D. **Supply Chain Management: Logistics catches up with strategy.** International Journal of Physical Distribution & Logistics Management, v. 13, n. 8, p. 36-38, 1982.

ORHANGAZI, Ö. **Financialisation and capital accumulation in the non-financial corporate sector: a theoretical and empirical investigation on the US economy: 1973–2003**. Cambridge Journal of Economics, Oxford, v. 32, n. 6, p. 863–886, 2008.

PIKE, A.; POLLARD, J. **Economic geographies of financialization**. Economic Geography, v. 86, n. 1, p. 29–51, 2010. DOI: 10.1111/j.1944-8287.2009.01057.x.

RECEITA FEDERAL, BRASIL. **Tabela de Incidência do Imposto sobre Produtos Industrializados – TIPI**. Decreto nº 11.158, de 29 de julho de 2022. Available at: https://www.gov.br/receitafederal. Accessed on: January 27, 2025.

RODRIGUES, G. **Desafios da logística no Brasil: estudo de caso da região amazônica.** Revista Brasileira de Logística, v. 5, n. 2, 2009.

ROHDE, J.; WAGNER, M. **Master Planning.** In: STADLER, H.; KILGER, C. (Eds.), Supply Chain Management and Advanced Planning – Concepts, Models, Software and Case Studies, p. 159-177. Berlin, 2002.

SANT'ANNA, J. **Sistema Hidroviário da Amazônia.** Manaus: SUFRAMA, 1998.

SENADO FEDERAL. **Zona Franca de Manaus: Desafios e Vulnerabilidades.** Textos para Discussão – Senado Federal, n. 126, Brasília: Senado Federal, 2020. Available at: senado.gov.br. Accessed on: January 20, 2025.

SIGNIFY. **Annual report 2023 and executive profile**. Signify Corporate Publications, Amsterdam, 2024.

STOCKHAMMER, E. **Financialisation and the slowdown of accumulation**. Cambridge Journal of Economics, v. 28, n. 5, p. 719–741, 2004. DOI: 10.1093/cje/beh032.

SUFRAMA - SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Relatório de Indicadores de Desempenho do Pólo Industrial de Manaus.** Manaus: SUFRAMA, 2012.

SUFRAMA - SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Taxas TCIF e TS**. Manaus: SUFRAMA, 2017. Available at: gov.br/suframa/pt-br/assuntos/tcif-e-ts. Accessed on: January 27, 2025.

SUFRAMA - SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Marco Regulatório dos Incentivos Fiscais da Zona Franca de Manaus, Amazônia Ocidental e Áreas de Livre Comércio.** 5. ed. Manaus: SUFRAMA, 2020. Available at: gov.br/suframa/pt-br/publicacoes/marco_regulatorio_4a_edicao_2020-1.pdf. Accessed on: January 27, 2025.

SUFRAMA – SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Visita institucional à Elgin Componentes da Amazônia Ltda**. Manaus: SUFRAMA, 2022. Available at: https://www.suframa.gov.br. Accessed on: September 4, 2025.

SUFRAMA - SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Relatório Anual 2022.** Manaus: SUFRAMA, 2023a. Available at: gov.br/suframa. Accessed on: January 20, 2025.

SUFRAMA - SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Registros industriais e habilitações ao PPB: relatórios setoriais 2022–2023**. Manaus: SUFRAMA, 2023b. Available at: gov.br/suframa. Accessed on: June 20, 2025.

SUFRAMA – SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Visita institucional à Lumicenter da Amazônia Ltda**. Manaus: SUFRAMA, 2024. Available at: https://www.suframa.gov.br. Accessed on: September 4, 2025.

TASCHIBRA. **Lâmpada Tubular LED T8 120cm 20.5W 6500K.** Available at: taschibra.com.br/pt_BR/produto/lampadas/led-tubular/lampada-tubo-led-t8-120cm-205w-6500k/15938. Accessed on: January 23, 2025.

TECHNAVI0. **LED lighting market in Brazil 2023–2028: industry analysis**. 2023. Available at: https://www.technavio.com. Accessed on: September 4, 2025.

TOTVS. **Custo de armazenagem: o que é e como calcular.** Available at: totvs.com/blog/gestao-industrial/custo-de-armazenagem/. Accessed on: January 27, 2025.

UNCTAD – UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT. **World Investment Report 2019: Special Economic Zones**. Geneva: UNCTAD, 2019.

UNICOBA. **Institucional e unidades de negócio**. Unicoba Corporate, São Paulo, 2023. Available at: https://www.unicoba.com.br. Accessed on: September 4, 2025.

VAN DER ZWAN, N. **Making sense of financialization.** Socio-Economic Review, v. 12, n. 1, p. 99-129, 2014.

WORLD BANK. **World Development Report: Trading for Development in the Age of Global Value Chains**. Washington, DC: World Bank, 2020.

YIN, R K. **Case study research: design and methods**. 5. ed. Thousand Oaks: SAGE, 2015.

4 GENERAL CONCLUSIONS

This dissertation analyzed the intersection between financialization and supply chain management through a case study of LED lamp production in the Industrial Pole of Manaus (PIM). The objective of this research was to analyze how financialization impacts supply chain management, through a systematic literature review and an empirical case study of the PIM, ensuring consistency with the aims presented in the introduction and in the articles. The study adopted a mixed-methods approach, combining a systematic literature review and an empirical case study, to evaluate the financial and operational trade-offs involved in production fragmentation under the fiscal regime of the Manaus Free Trade Zone (ZFM). While the articles were developed independently, together they reinforce how financialization reconfigures supply chain strategies, both in international literature and in the specific case of the PIM.

The first article provided the theoretical foundation by reviewing literature on financialization and its impacts on supply chain strategies. It showed how financial logics, often guided by short-term returns and shareholder value, influence corporate decision-making at the expense of operational robustness and long-term planning (VAN DER ZWAN, 2014; DIAS & ZILBOVICIUS, 2006). The review also identified gaps related to the role of fiscal incentives in shaping supply chain configurations.

Based on this framework, the second article investigated the production of LED tubular lamps under PPB regulations in the PIM. The analysis compared two production scenarios: one centralized in Sorocaba and another fragmented between Sorocaba and Manaus to meet PPB requirements. Results showed that the scenario operating under ZFM incentives generated higher financial returns, but introduced logistical challenges such as longer transport times, increased inventory needs and reliance on multimodal infrastructure (GOMES, 2009; SANT'ANNA, 1998). These results also indicate that beyond cost considerations, firms must account for risk exposure associated with infrastructural constraints and logistical uncertainties, which are central to evaluating the sustainability of such decisions.

Beyond the cost modeling, the second article introduced a multidimensional analysis of corporate behavior under the ZFM, considering ownership structures, executive profiles, governance models and financial strategies. This layer helped to reveal how transnational and national firms adopt distinct forms of fiscal appropriation, often subordinating operational logic to capital return metrics. It also reinforced the idea that the PPB is no longer just a policy tool for industrial development, but a mechanism strategically reinterpreted through a financialized lens. Thus, while the first article identified theoretical gaps in the literature concerning the role

of fiscal regimes and industrial policies in shaping supply chain management, the second article demonstrated empirically how these dynamics materialize in the case of the Manaus Industrial Pole. Together, they consolidate the central argument of this dissertation, that financialization reshapes supply chain logics across both global debates and specific institutional contexts.

These findings confirm that financial considerations, including tax optimization, often override supply chain efficiency. Such trade-offs between fiscal gains and operational constraints are not unique to the PIM, but inherent to fiscal incentive regimes worldwide, where financial logics frequently dominate industrial policy outcomes. They also indicate that similar trade-offs may occur in other sectors, depending on cost structures, dependence on imported materials and logistical conditions. Although the analysis focused on a single product, the approach used can be applied to other cases in regions governed by fiscal incentive regimes. In such cases, access to tax benefits often depends on compliance with specific regulatory instruments, such as the Basic Productive Process (PPB), which requires alignment with government criteria to qualify for incentives (SUFRAMA, 2023).

The contributions of this dissertation can be summarized in three dimensions. Theoretically, it advances the debate on financialization by connecting it to supply chain management, an underexplored field in the international literature, and by identifying the role of fiscal regimes as a missing element in current discussions. Methodologically, it demonstrates the value of combining systematic review techniques (VOSviewer, IRaMuTeQ) with a case study based on public documentary and quantitative data, reinforcing that case study research remains valid even when relying exclusively on secondary sources (YIN, 2015). Practically, it offers insights for managers, who must balance financial imperatives with supply chain resilience, and for policymakers, who need to design regulatory frameworks that explicitly address how fiscal and industrial regimes interact with financial logics.

A key theoretical contribution of this study is the recognition that fiscal policies like the ZFM, originally intended to promote regional development, are often interpreted through financialized strategies. In this context, the PPB becomes a structuring element that affects not only where production happens, but how companies justify fragmentation as a financial decision.

Beyond the specific case of the PIM, this dissertation also contributes to broader debates on industrial policy and financialization in peripheral economies. The findings suggest that fiscal incentives, while conceived as instruments of regional development, are structurally vulnerable to financialized appropriation. In contexts marked by capital scarcity and institutional asymmetries, such policies may reinforce dependence on short-term financial

logics rather than fostering productive upgrading. This underscores the importance of rethinking industrial policy design in order to reduce susceptibility to capture by financial imperatives, particularly in economies where fiscal regimes remain central tools of industrial strategy.

Future research could explore other sectors or products under similar fiscal conditions, compare full relocation to partial fragmentation and analyze the long-term impact of these strategies on supply chain resilience and environmental performance.

In summary, this dissertation contributes to the understanding of how financial logics, reinforced by state-designed fiscal mechanisms, influence supply chain configuration and production decisions. By integrating conceptual analysis and empirical modeling, it offers insights for researchers, managers and policymakers working at the interface between finance, supply chain strategy and industrial policy.

REFERENCES

DIAS, A. V.; ZILBOVICIUS, M. **A produção face à financeirização: quais consequências para a organização da produção e do trabalho?** Uma proposta de agenda de pesquisa para a engenharia de produção brasileira. In: ENCONTRO NACIONAL DE ENGENHARIA DE PRODUÇÃO, 26., Fortaleza, 2006. Anais do XXVI Encontro Nacional de Engenharia de Produção.

GOMES, H. M. O. **Identificação e análise dos critérios de decisão na escolha de transportes de carga pelas indústrias do PIM.** Master's Dissertation. UFAM, 2009.

SANT'ANNA, J. **Sistema Hidroviário da Amazônia.** Manaus: SUFRAMA, 1998.

SUFRAMA - SUPERINTENDÊNCIA DA ZONA FRANCA DE MANAUS. **Relatório Anual 2022.** Manaus: SUFRAMA, 2023. Available at: gov.br/suframa. Accessed on: January 20, 2025.

VAN DER ZWAN, N. **Making sense of financialization.** Socio-Economic Review, v. 12, n. 1, p. 99-129, 2014.