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ECONOMIC FEASIBILITY ANALYSIS IN THE MANUFACTURING INDUSTRY: A LITERATURE REVIEW

ANÁLISE DE VIABILIDADE ECONÔMICA NA INDÚSTRIA DE TRANSFORMAÇÃO: UMA REVISÃO BIBLIOGRÁFICA

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ABSTRACT

Purpose: The development of companies in the manufacturing industry and determining their viability is challenging. This article reviews the most applied methodologies to facilitate investment decision-making in resource allocation within the supply chain. **Methodology/Approach**: The PRISMA 2020 methodology was applied, using Web of Science and Scopus as sources, analyzing articles up to April 2024, and rigorously following inclusion and exclusion criteria. **Findings**: The study included 16 articles, exhaustively extracting bibliographic metadata and detailing, particularly the methodologies applied in each study. It identified approaches such as the most used methods, variables, main objectives, optimization goals, and methods for validating results. **Research, practical & social implications**: This article identified dominant approaches and research gaps within its scope, providing a guide for researchers interested in studying the relationship between supply chain risks and investments. The results support decision-making and indicate the most used methods for investment evaluation. **Originality/ Value**: The article contributes to the consolidation of knowledge on risk analysis methods and economic feasibility, also highlighting the application of these tools in the manufacturing industry. This systematic review offers a critical analysis of existing studies, points out directions for future research, and supports the development of the field.

Keywords: Investments. Supply Chain. Risks. Technical-Economic Feasibility. Decision Methods.

RESUMO

Objetivo: O desenvolvimento de empresas na indústria de transformação e determinar a sua viabilidade é desafiador. Este artigo revisa as metodologias mais aplicadas com o propósito de facilitar a tomada de decisão de investimentos na alocação de recursos na cadeia de suprimentos. **Metodologia/Abordagem**: A metodologia PRISMA 2020 foi aplicada, usando como fonte as bases Web of Science e Scopus, analisando artigos de 2010 a 2024 e seguindo critérios de inclusão e exclusão de artigos rigorosamente descritos e executados. **Resultados**: O estudo contemplou 16 artigos, extraindo exaustivamente metadados bibliográficos e detalhando principalmente de forma minuciosa as metodologias aplicadas em cada estudo. Determinando abordagens como métodos mais usados, variáveis, objetivos principais, objetivos de otimização e métodos para validação dos resultados. Contribuições, implicações práticas e sociais: Este artigo identificou abordagens dominantes e lacunas de pesquisas na sua área de escopo, fornecendo um guia para pesquisadores interessados em estudos na relação entre riscos na cadeia de suprimentos e investimentos. Os resultados auxiliam na tomada de decisão e indicam os métodos mais utilizados para a avaliação de investimentos. **Originalidade/Valor**: O artigo contribui com a consolidação de conhecimentos de métodos de análise de risco e viabilidade econômica, destacando também a aplicação dessas ferramentas na indústria de transformação. Esta revisão sistemática aponta direções para futuras pesquisas e o desenvolvimento da área.

Palavras-chave: Investimentos. Cadeia de suprimentos. Riscos. Viabilidade técnico-econômica. Métodos de decisão.

Introduction

Developing new companies is a complex challenge, particularly due to uncertainties that can hinder decision-making (Gopika & Resmi, 2024). Raw material prices, demand issues, logistics costs, selling prices, the emergence of technologies, and new competitors are only a few examples of uncertainties that directly affect the supply chain (SC) (Zhang, Shang, & Li, 2011). External factors can also significantly disrupt the SC. Environmental disasters, economic crises, legislative updates, and geopolitical issues can equally affect investments and, to some extent, are unpredictable (Roscoe et al., 2022; Yılmaz, 2024). Another crucial factor is the payback period of allocated resources (Kondaveeti, Vatsavayi, Yasaswini, & Mangapathi, 2023), which can exceed a decade in cases of investments for creating or expanding companies, and changes related to the aforementioned points can make resource allocation unsustainable (Bocken, 2015).

Such concerns are not new, and several researchers have dedicated efforts to developing methods aimed at assessing these uncertain scenarios. Therefore, this study involves in-depth research intended to analyze and compile existing knowledge to facilitate the use of these tools in future studies in the field. Integrating such knowledge into a single study also contributes to identifying research gaps, highlighting the most used methods and those that require further investigation.

This systematic review aims to contribute to scientific knowledge by classifying and analyzing studies dedicated to applying methods used in the manufacturing industry supply chain's investment risk assessment. It also seeks to determine how these investments are addressed by researchers and to facilitate the work of future researchers interested in this topic. Thus, this article aims to answer the following questions:

a) What is the current state of the literature on economic feasibility analysis methods in the manufacturing industry?

b) What have been the main methods and metrics employed in existing studies?

This article is structured as follows: Chapter 1 introduces the topic and outlines the research questions that will be answered throughout this work. Then, it details the methodology for including and excluding articles composing the database, followed by the execution of this process. Chapter 3 describes the data extraction process required to answer the research questions. Chapter 4 presents the results and compiles the data collected in the previous phases. Chapter 5 provides the conclusions, limitations, suggestions for future research, and acknowledgments.

Methodology

The bibliometric analysis complied with the PRISMA 2020 guidelines (Page et al., 2021). Studies were retrieved from the Web of Science and Scopus databases on April 18, 2024, covering the entire available time span. We restricted the search to terms present in titles, abstracts, and keywords. These databases were chosen due to their breadth and strict journal inclusion criteria (Singh, Singh, Karmakar, Leta, & Mayr, 2021).

Articles written in languages other than English and Portuguese were retained in the database if they could be translated adequately through automated tools such as Google Translate. These articles were also retained if official translations were available (Steigerwald et al., 2022).

Reference management and data deduplication were performed using the Parsival tool (2024), with default analysis settings. Articles identified as duplicates were manually reviewed before removal.

The analysis and selection procedure for all articles followed the criteria defined in this methodology. All excluded articles were documented along with the respective exclusion rationale. This information is available in detail at https://osf.io/fnyzh.

Inclusion Criteria

The database was formed by articles that contribute to answering the research theme, "analysis of the relationship between supply chain risks and the effectiveness of investments in the manufacturing industry of consumer goods." To this end, the following string was developed according to the guidelines suggested by Vaz and Uriona Maldonado (2017) for conducting a comprehensive and robust search.

("connect*" OR "contact" OR "network" OR "relation*" OR "acquaintance" OR "associate*") AND ("risk" OR "danger" OR "exposure" OR "hazard" OR "threat") AND ("supply chain" OR "SC") AND ("effectiv*" OR "convenci*" OR "persuasiv*" OR "strength" OR "validity") AND ("investment" OR "asset" OR "purchase" OR "transaction" OR "venture" OR "funding" OR "capital allocation") AND ("manufacturing" OR "production" OR "fabrication" OR "industry") AND ("goods" OR "product" OR "amount" OR "brand" OR "commodity" OR "production").

Exclusion Criteria

The first analysis performed involved excluding duplicate articles, references that were not journal articles, and articles in languages not covered by the research, as defined earlier. In accordance with PRISMA 2020, we screened titles, abstracts, and keywords to identify whether they fit the scope of this systematic review. To assist in this task, enable replicability, and document the criteria adopted, we created an Excel spreadsheet and searched for the following topics in titles, abstracts, and keywords:

a) Relationship Analysis

b) Risks

c) Supply Chain

d) Effectiveness

e) Investments

f) Manufacturing Industry

g) Consumer Goods

Each criterion was assigned a weight of 1 (meets the criterion), 0.5 (partially meets the criterion), and 0 (does not meet the criterion). After tallying up the average points of each item, we carefully reviewed articles whose averages exceeded 0.6 by reading them in full. Our detailed analysis is available at https://osf.io/ma76d.

Continuing with PRISMA 2020, we performed a full reading of the remaining articles, which were classified according to their quality and fit to the researched topic. In this quality assessment, the authors answered the ten questions in Table 1 based on a thorough reading of the articles.

Table 1

Quality assessment criteria

ID	Questions for analysis
Q1	Are the objectives clearly described, specific, and measurable? (Dybå & Dingsøyr, 2008, as cited in Dermeval, Paiva, Bittencourt, Vassileva, & Borges, 2018)
Q2	Are the methods used adequately, clearly, and precisely described? (Achimugu, Selamat, Ibrahim, & Mahrin, 2014, as cited in Dermeval et al., 2018)
Q3	Are the metrics used in the study clearly defined and aligned with the proposed objectives? (Petticrew & Roberts, 2008; Slawson, 1997, as cited in Kitchenham et al., 2010)
Q4	Were the databases collected appropriately? (Petticrew & Roberts, 2008; Slawson, 1997, as cited in Kitchenham et al., 2010)
Q5	Is there an adequate description of the context (industry, laboratory setting, products used, and so on) in which the research was carried out? (Dybå & Dingsøyr, 2008; Mahdavi-Hezavehi, Galster, & Avgeriou, 2013, as cited in Dermeval et al., 2018)
Q6	Are the variables used in the study adequately measured?
Q7	Is the data analysis consistent and transparent, enabling replication of the results? (Petticrew & Roberts, 2008, as cited in Kitchenham et al., 2010)
Q8	Were all proposed questions answered? (Kitchenham et al., 2010)
Q9	Are the limitations of the study discussed, and were solutions proposed for these limitations? (Ding, Liang, Tang, & Van Vliet, 2014, as cited in Dermeval et al., 2018)
Q10	Does the study present a critical and unbiased analysis of the included studies, considering possible selection, publication, and methodological biases? (Petticrew & Roberts, 2008, as cited in Kitchenham et al., 2010)

Note. Elaborated by the authors.

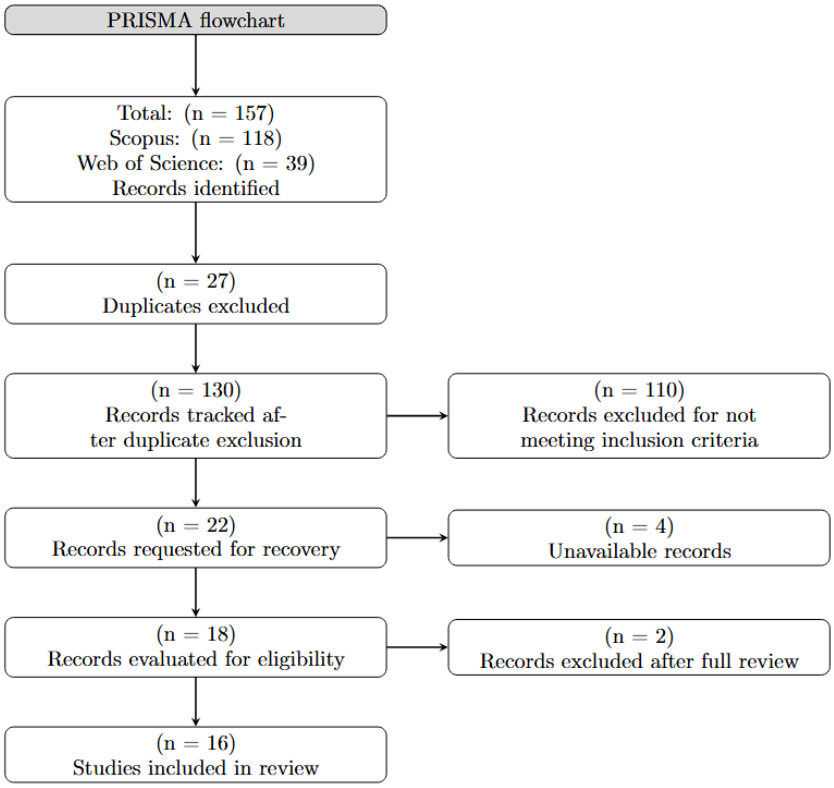
Each question was assigned a weight of 1 (yes), 0.5 (partial), and 0 (no), according to its fit to the topic. After tallying up the scores of all questions, articles whose scores exceeded seven points were deemed suitable for data extraction. The detailed assessment is available at https://osf.io/gn98u. If the analysis scored zero on all requirements, the article did not fit the research scope.

Execution of the article selection process

In the study selection process, 118 articles were found on Scopus and 39 on Web of Science, of which 27 were duplicates. After screening titles, abstracts, keywords, and document types, 110 articles were excluded. Of these, 75 did not fit the scope, 28 were gray literature (conference papers, symposia, conferences, or retracted works), and five were systematic reviews. At this stage, 22 articles remained for full reading and evaluation, of which four were excluded due to lack of full access. Among the remaining articles, two were discarded after full reading due to lack of fit with the research scope. Data and metadata were extracted from the 16 articles that passed the exclusion criteria. This process is illustrated in Figure 1, with the full analysis available at https://osf.io/msrfj.

Figure 1

Flow of record inclusion and exclusion



Note. Elaborated by the authors.

Table 2 introduces the authors of the articles that were selected and will be assessed throughout this study. The table also contains the article identification code (ID), which will assist in subsequent results, and the quality score of each article according to the questions introduced in the previous section of this paper.

Table 2

Selected articles

ID	Autor	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Pt.
S01	DAL-MAS et al., 2011	1	1	1	1	1	1	1	1	0	1	9.0
S02	FANG; KANG; LU, 2023	1	1	1	1	1	1	1	1	0	1	9.0
S03	GEBRESLASSIE; YAO; YOU, 2012	1	1	1	1	1	1	1	1	0	1	9.0
S04	HU et al., 2019	1	1	1	1	1	1	1	1	1	1	10
S05	JAIN; HAZRA, 2017	1	1	1	1	1	1	1	1	0	1	9.0
S06	KWON; NGAN DO; KIM, 2022	1	1	1	1	1	1	1	1	1	1	10
S07	LI; LIU; YANG, 2023	1	1	1	1	1	1	1	1	0.5	1	9.5
S08	MAKRIDIS; MAVREPIS; KYRIAZIS, 2023	1	1	1	1	1	1	1	1	1	1	10
S09	NGAN et al., 2020	1	1	1	1	1	1	1	1	0.5	1	9.5
S10	QUIGLEY et al., 2018	1	1	1	1	1	1	1	1	1	1	10
S11	SIMIC, 2019	1	1	1	1	1	1	1	1	1	1	10
S12	SURYAWANSHI et al., 2021	1	1	1	1	1	1	1	1	0.5	1	9.5
S13	TALLURI; NARASIMHAN; CHUNG, 2010	1	1	1	1	1	1	1	1	0	1	9.0
S14	VICCARO et al., 2019	1	0.5	1	0.5	0.5	1	0.5	1	0	1	7.0
S15	YODER et al., 2015	1	1	1	1	1	1	1	1	0	1	9.0
S16	ZHU; CAO, 2021	1	1	1	1	1	1	1	1	0.5	1	9.5

Note. Elaborated by the authors.

DATA EXTRACTION

For data extraction, the selected articles were analyzed and classified according to criteria adapted from Resende, Lima-Junior, and Carpinetti (2023), which helped answer the research questions proposed throughout the project development. The following paragraphs describe the criteria used in this task:

Purpose: Assesses the main purpose of the study. First, it divides the articles into two groups: articles aimed at designing investment projects and articles aimed at assessing investment results. In the first category, we assessed four points based on the purpose of the article: the definition of metrics, how to operate, when to implement, and how much to invest. In the second category, we assessed two subcategories: metrics definition and results analysis.

Application scenario: Indicates whether the study considered real scenarios or hypotheses.

Application sector: Identifies which industrial sector was evaluated, such as the food, petrochemical, or pharmaceutical industry.

Optimization objective: Classifies the objectives of the models proposed in the articles based on the parameters the study aims to optimize. Articles can be classified according to optimization objectives, for example, profit maximization, cost reduction, resilience maximization, and maximization of return on investments.

Parameter selection: Evaluates the criteria used by researchers to establish which parameters to use, for example, opinions from specialists and business models recommended by the author or selected from other studies.

Parameters used: Identifies which parameters researchers used throughout the study. Parameters are the variables, metrics, and criteria used in analyses.

Data source: Analyzes the source of data used to feed the models, for example, historical data, simulated data, specialist opinions, and whether they were selected from other studies.

Type of method used: Classifies the study according to the proposed decision-making method, for example, Multi-Criteria Decision Making (MCDM), stochastic, mathematical programming, statistics, and artificial intelligence.

Decision-making method(s): Identifies which specific method(s) were used to assist in decision-making.

Number of methods: Determines the number of methods used in the articles, given that studies may apply only one method or combine multiple methods.

Validation approach: Establishes which methods were used to validate results.

Studying article metadata is important not only for indicators of quality and relevance but also for additional information that can improve understanding of the results. To this end, we analyzed the number of citations (Cit.), publication year, country of the main authors, journal, CiteScore (Scopus), and Impact Factor (IF) of journals, all of which are provided in Table 3.

Metadata

Table 3

Analyzed articles metadata

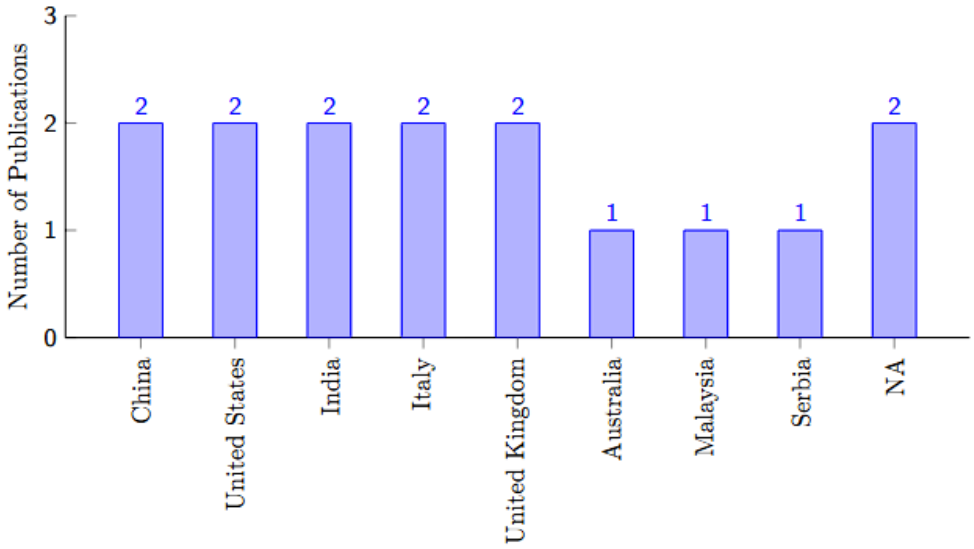
ID	Cit.	Year	Countries	Journal	Cite Score	IF
S01	166	2011	Italy	Biomass and Bioenergy	11.5	6.00
S02	0	2023	United States	Journal of Financial Stability	7.7	5.4
S03	199	2012	Australia	AIChE Journal	7.1	N/A
S04	33	2019	United Kingdom	Supply Chain Management: An International Journal	16.7	8.80
S05	26	2017	India	International Journal of Production Economics	21.4	12.0
S06	5	2022	South Korea	Journal of Industrial and Engineering Chemistry	10.4	6.1
S07	4	2023	China	International Transactions in Operational Research	7.8	3.1
S08	1	2023	N/A	Machine Learning	N/A	4.3
S09	37	2020	Malaysia	Renewable and Sustainable Energy Reviews	31.2	15.9
S10	37	2018	United Kingdom	European Journal of Operational Research	11.9	6.4
S11	13	2019	Serbia	Environmental Modelling\& Assessment	N/A	2.7
S12	23	2021	India	Sustainable Production and Consumption	17.4	12.1
S13	103	2010	United States	European Journal of Operational Research	11.9	6.4
S14	34	2019	Italia	Journal of Cleaner Production	20.4	11.1
S15	12	2015	N/A	BioEnergy Research	N/A	3.1
S16	16	2021	China	Transportation Research Part E: Logistics and Transportation Review	16.2	10.6

Note. Elaborated by the authors.

Figure 2 facilitates the visualization of publication numbers by providing the history of publications by author nationality. This chart indicates that nationality is homogeneous across authors, pointing to a global concern regarding risks and economic feasibility in investment projects within this industry.

Figure 2

Number of published articles by author nationality

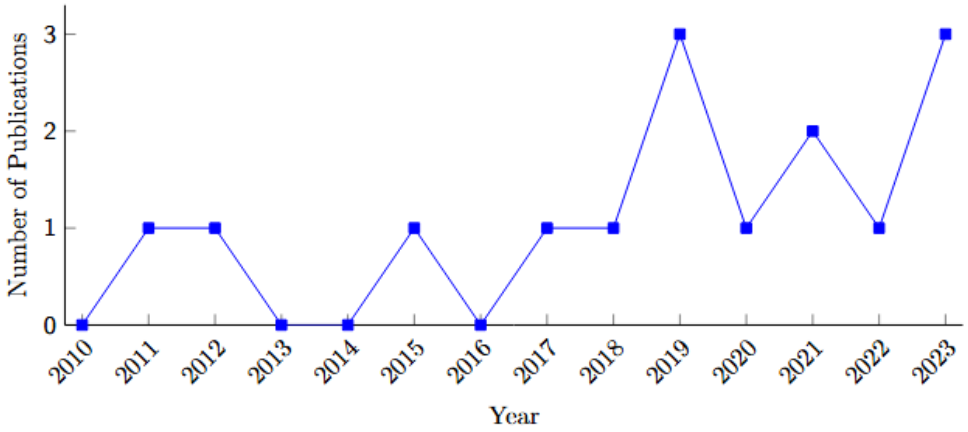


Note. Elaborated by the authors.

In the same regard, Figure 3 presents the number of publications by year. Among the articles analyzed, the oldest was published in 2011. Since then, the number of published articles has risen until 2023; however, the number of articles analyzed is still small, which hinders the development of a trendline with an acceptable degree of reliability.

Figure 3

Number of publications by year



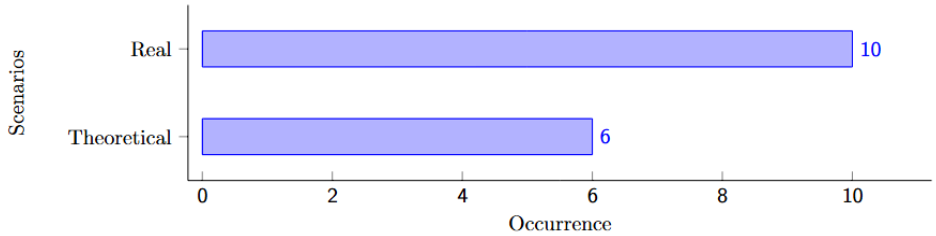
Note. Elaborated by the authors.

Data

Most articles applied methods to real scenarios (about 62%, 10 articles), as shown in Figure 4. This preference may be justified by natural economic volatility, such as price and demand variations, natural disasters, technological changes, among others (Choi, Wallace, & Wang, 2016). The difficulty of simulating these variables complicates purely theoretical models (about 37%, 6 articles), though these studies remain relevant. Other parameters did not vary significantly by scenario, except for data sources, which showed a strong relationship with the application scenario.

Figure 4

Application scenario



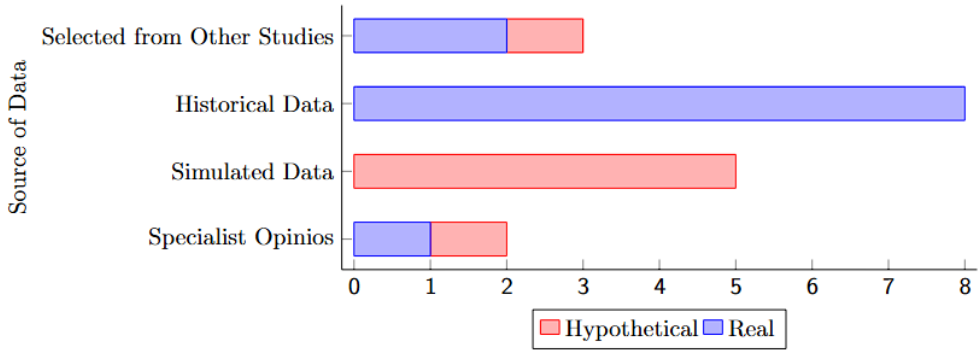
Note. Elaborated by the authors.

As shown in Figure 5, all studies using historical data evaluated real scenarios, while all studies using simulated data focused on theoretical scenarios. Two-thirds of the studies using data selected from other studies analyzed real cases, while one-third used hypothetical

scenarios. For studies using specialists' opinions as a data source, 50% analyzed real cases and 50% theoretical cases.

Figure 5

Occurrences by source of Data

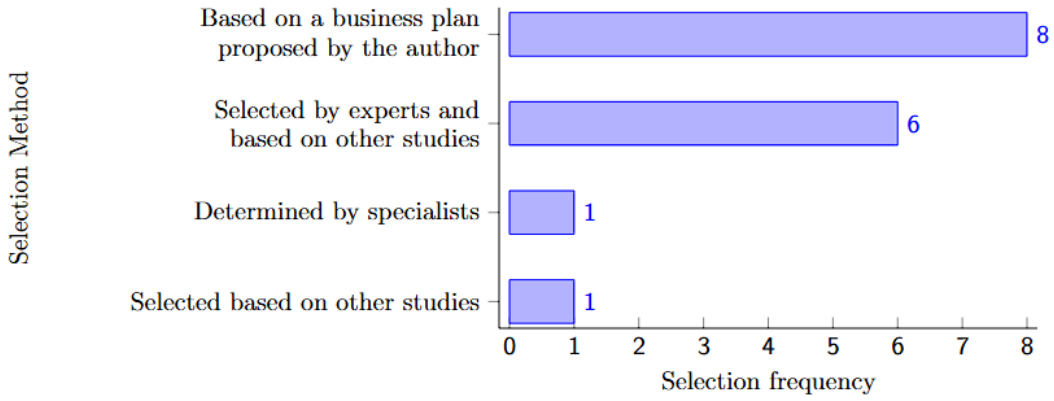


Note. Elaborated by the authors.

A noteworthy detail is that some studies used more than one source of data. Across all articles, 50% used historical data, 31% simulated data, 19% data selected from other studies, and 12% specialist opinions. Two studies used more than one source: one combined historical data with data selected from other studies, and the other used specialist opinions with data obtained from other studies.

Figure 6

Method of variable definition



Note. Elaborated by the authors.

Regarding variable definition, Figure 6 presents the methods used. In 50% of cases, variable selection was based on the business plan proposed by the authors; 38% used a mix of

specialist opinions and prior studies; and the remaining 12% split between variables selected solely by specialists or solely based on other studies.

Table 4
Parameters used in the models

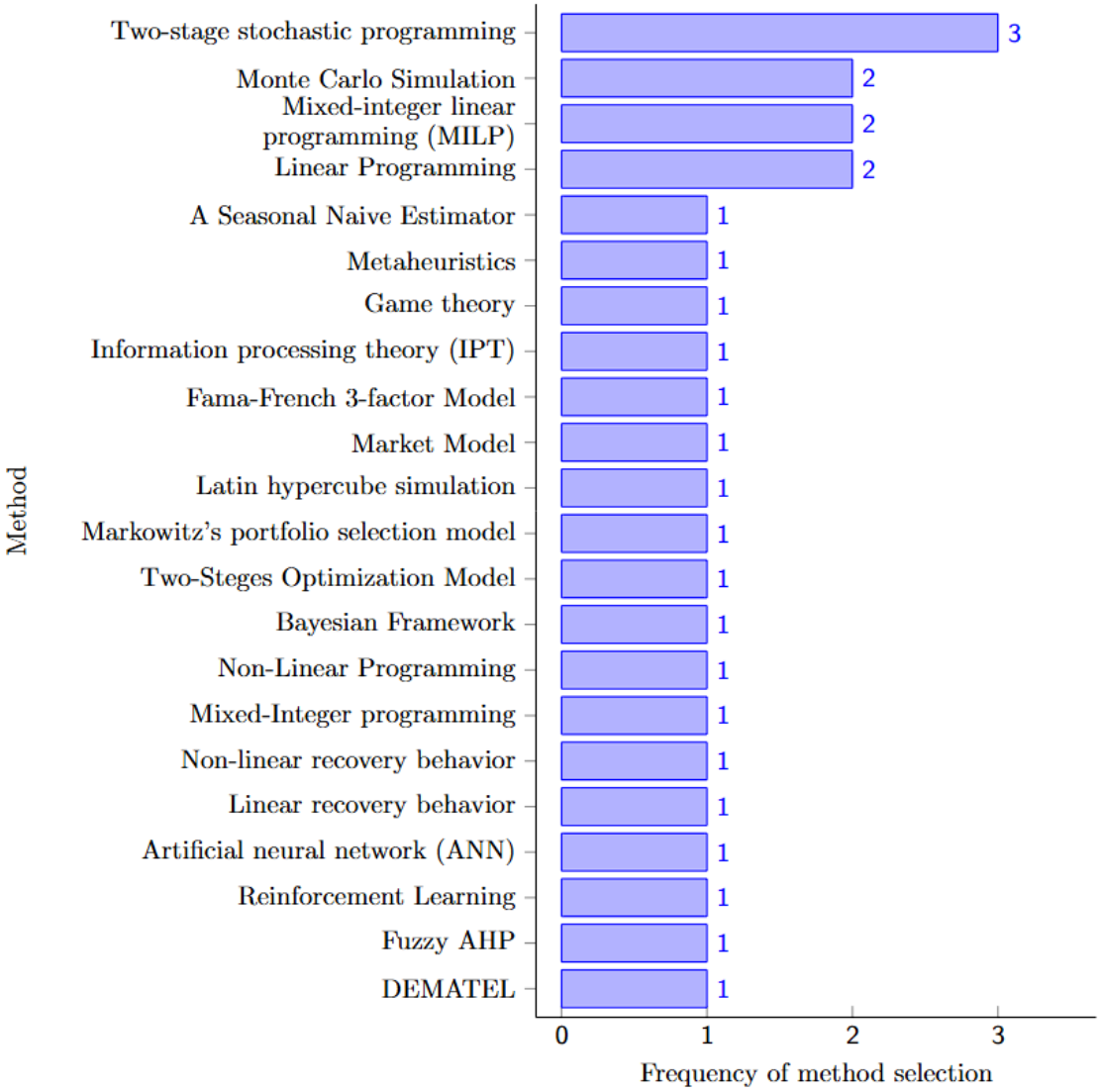
Parameters / Articles	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13	S14	S15	S17	Freq.
Infrastructure and Operating Costs	X	X	X			X					X	X	X	X	X	X	10
Production Volume	X	X	X		X	X			X		X				X		8
Price	X	X			X	X			X					X	X		7
Logistics Costs			X				X				X	X	X		X	X	7
Raw Material Costs	X					X			X		X	X	X	X			7
Demand	X		X		X		X		X		X	X					7
Invested Capital		X	X		X	X	X						X				6
Investment Period		X		X				X	X					X	X		6
Financial Cost		X			X	X								X		X	5
Geographical Position of Facilities	X	X		X			X					X					5
Efficiency				X	X	X			X						X		5
Geographic Position of Suppliers	X	X				X	X					X					5
Geographic Position of Distribution Centers	X	X					X					X					4
Inventory Levels			X			X				X	X						4
Firm Size		X			X	X											3
Investment Rate		X			X											X	3
Government Incentive			X							X				X			3
Estimated Financial Risks											X	X			X		3
Quality								X		X		X					3
Product							X	X									2
Operational Loss Costs												X				X	2
Supplier Determination							X						X				2
Efficiency				X	X												2
Value of Information										X							1
Financial Distress Cost		X															1
Payment Policies		X															1
Deadlines												X					1
Geographic Position of Customers												X					1
Raw Material Exploration			X														1
Effectiveness										X							1
Recoverability Difficulty																X	1
Severity																X	1
Disruption Start Time																X	1
Profitability		X															1
Climatic History															X		1

Note. Elaborated by the authors.

This study also identified the most relevant parameters used in each article—120 parameters were applied across the studies, as shown in Table 4. Of these, 62% used infrastructure and operating costs, the most frequent parameter. The second most frequent was production volume (50%). Product price, logistics costs, raw material costs, and demand appeared in 44% of the studies. Other parameters, such as invested capital, investment period, financial cost, geographic position of facilities, geographic position of suppliers, geographic position of distribution centers, and inventory levels, appeared with frequencies ranging from 37% to 25%.

Figure 7

Type of Model



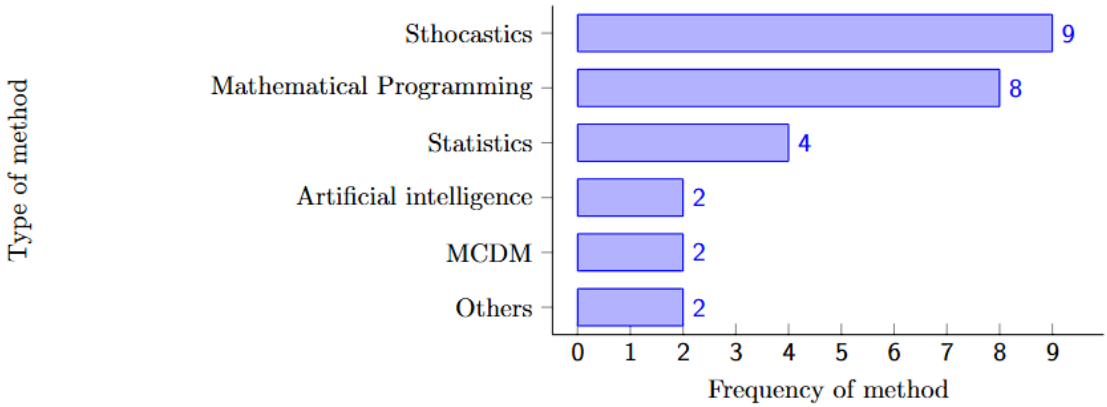
Note. Elaborated by the authors.

Less frequent parameters included firm size, investment rate, government incentives, estimated financial risk, quality, product, operational loss costs, supplier determination, and effectiveness (19%–12%). Several other parameters occurred at a 6% frequency in the studies assessed.

The cataloging of the most used methods identified a total of 27 distinct methods. Two-Stage Stochastic Programming was the most used—present in 19% of the articles and accounting for 11% of all methods applied. Tools such as Monte Carlo Simulation, Mixed-Integer Linear Programming (MILP), and Linear Programming were also prominent, each appearing in 12% of the studies and representing 7% of the methods. Many other methods were identified (individually in 6% of articles; jointly 67% of all methods). This may be due to the wide range of methods and their variations. See Figure 8 for details.

Figure 8

Types of modeling method

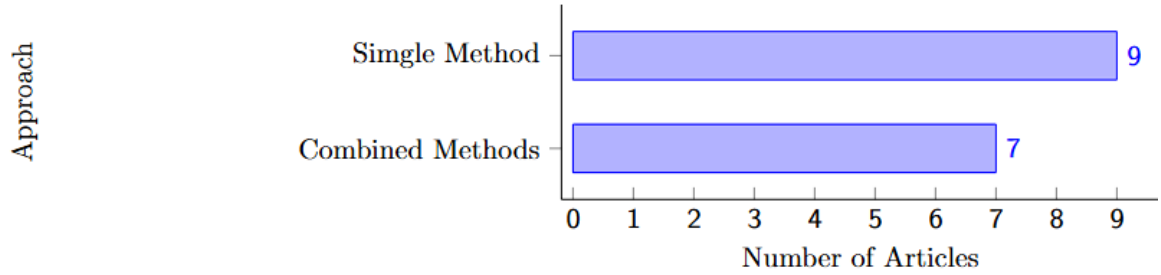


Note. Elaborated by the authors.

Grouping the methods by type provides a clearer view of the approaches conducted by the authors in their studies. Figure 8 shows that the stochastic method was the most used—present in 56% of the articles and representing 33% of the methods used. Mathematical programming methods corresponded to 30% of the methods and appeared in half of the articles.

Figure 9

Variety of methods per study



Note. Elaborated by the authors.

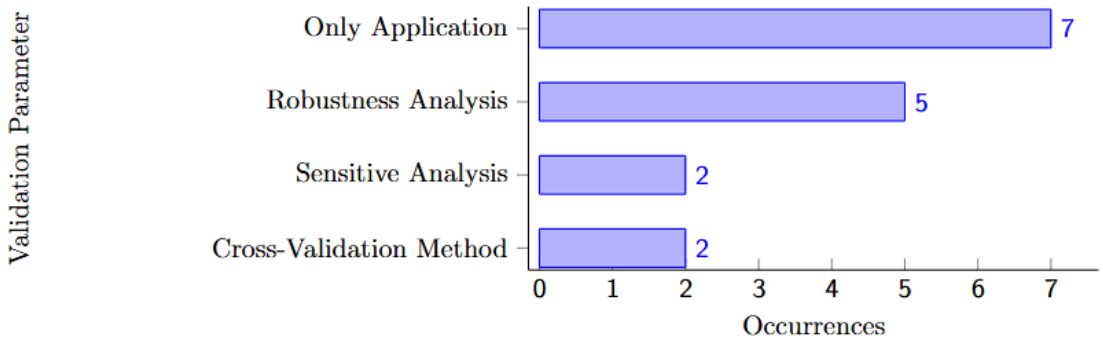
Calculation-based and statistical studies used these tools in 25% of cases, and this method amounted to 15% of the methods used. Artificial Intelligence tools, Multi-Criteria Decision Making (MCDM), and "others" were used in 12% of the studies, each amounting to 7% of the methods used.

The study also demonstrated a clear difference in approaches by authors regarding the number of methods used in each study, as seen in Figure 9. Regarding the number of analysis methods per study, 56% of the papers used a single method, while 44% combined two or more models.

Upon analyzing authors' result validation approaches, 44% of the studies did not apply a validation method. Robustness analysis was the most common validation technique (31%). Finally, 12% applied cross-validation or sensitivity analysis, as seen in Figure 10.

Figure 10

Result Validation Approach

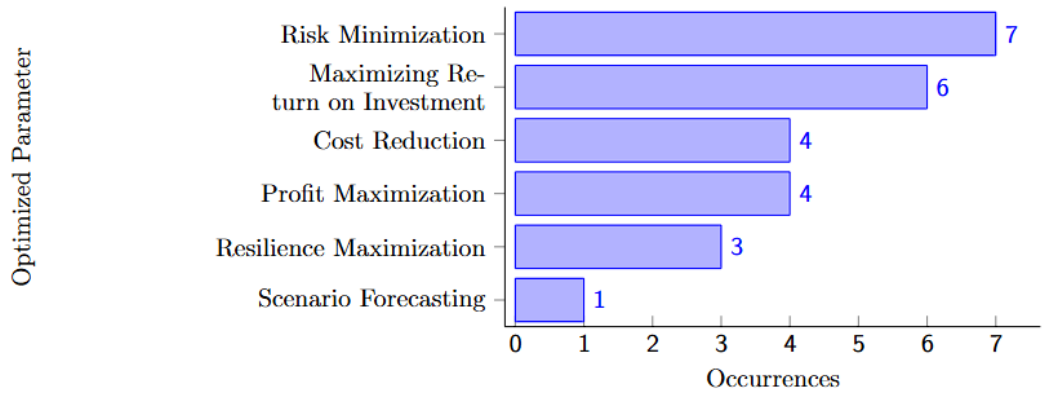


Note. Elaborated by the authors.

Regarding optimization objectives, we identified 25 objectives across the articles. Seven papers had at least two objectives, of which four authors combined risk minimization with another objective.

Figure 11

Optimization objectives

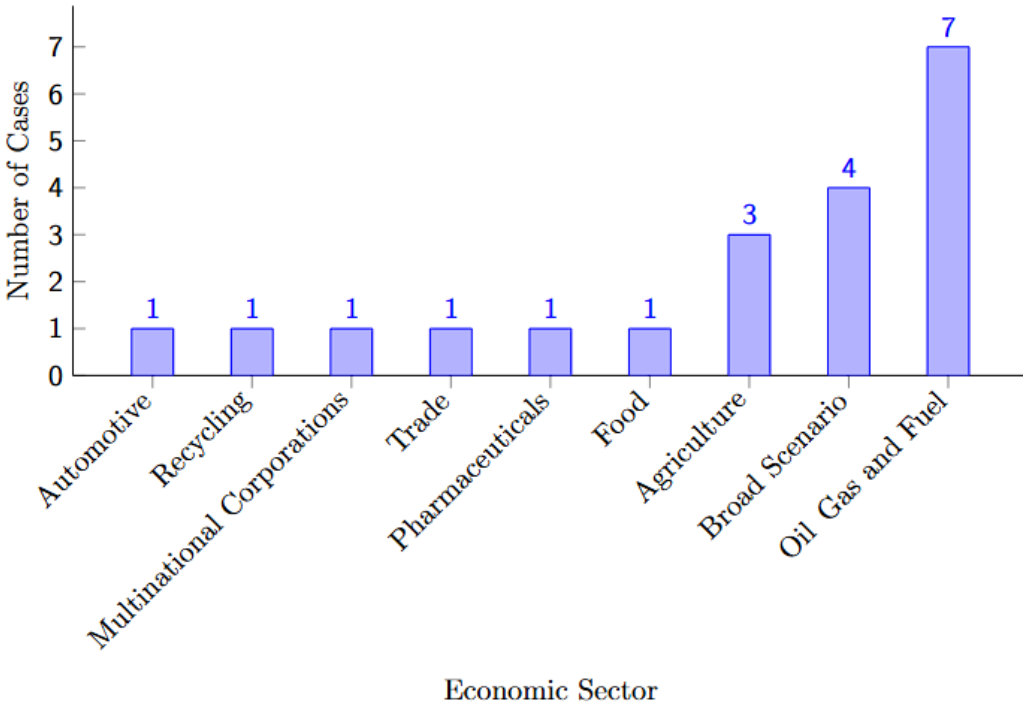


Note. Elaborated by the authors.

Risk minimization was the most frequent objective (28% of objectives; present in 44% of articles). Return on Investment maximization appeared in 37% of papers, which amounts to 24% of optimization objectives. Cost reduction and profit maximization appeared in 25% of studies, amounting individually to 16% of objectives. Resilience maximization was sought in 18% of studies (12% of optimization objectives). Finally, only one study focused on scenario forecasting without optimizing a variable. These results can be seen in Figure 12.

Figure 12

Sectors where studies were applied



Note. Elaborated by the authors.

These objectives were applied to 20 types of industrial scenarios, with some articles addressing more than one type or linking sectors. For example, Ngan et al. (2020), Viccaro, Cozzi, Rocchi, and Romano (2019), and Yoder et al. (2015) addressed similar sectors related to oilseed agriculture for bioenergy supply chains. In our sample, 35% of the industries analyzed were fuel production, included in 44% of the articles. Broad scenarios or undefined industrial sectors represented 20% of companies and were present in 25% of studies, all theoretical. Agribusiness represented 15% of sectors, always linked to biofuels, representing 19% of the articles. Sectors such as automotive, recycling, multinational corporations, trade, pharmaceuticals, and food were analyzed in only one study each and together represented 30% of sectors. These data can be seen in Figure 12.

We also analyzed articles from the perspective of the motivating purpose. First, we filtered studies that aimed to formulate scenarios linked to future strategies or scenarios linked to past strategies. From this perspective, only two articles evaluated scenarios, and both analyzed results; in addition, one of them also sought the best metrics to evaluate results. Such studies account for 12% of the sample.

Among the articles, 14 sought to formulate actions, amounting to 87% of the sample. Of these, 71% sought to improve the method of executing actions and defining strategies; 57% sought to determine how much to invest; 25% sought to define the best metrics to use in analyses; and, finally, 12% sought to define the best investment period. These data can be seen in Table 5.

Table 5

Motivating purpose of the study

	Formulation				Evaluation	
ID	Definition of metrics and inter-relationships	How to act	When to implement	How much to invest	Definition of metrics and inter-relationships	Analysis of results
S01		X	X	X		
S02						X
S03		X		X		
S04					X	X
S05	X	X		X		
S06		X	X	X		
S07		X		X		
S08		X				
S09	X					
S10				X		
S11	X	X				
S12		X				
S13				X		
S14		X				
S15	X	X				
S16				X		

Note. Elaborated by the authors.

RESULTS

The literature review presented satisfactory results, with a bibliographic base composed of articles published in high-impact journals. Standouts include *Renewable and Sustainable Energy Reviews*, *International Journal of Production Economics*, and *Journal of Cleaner Production*, among others. Citation counts vary widely—from zero (newer papers) to 199 (older papers). Articles span from 2010 to 2023, showing a gradual increase in publications. While articles written 13 years ago are not deemed current, the fact that the oldest article in the database dates to 2010 indicates the topic's continued relevance. Combined with the quality of journals willing to publish such work and the growing number of publications on this subject, this suggests a demand for more studies to support investment decision-making. Additionally, there is considerable diversity in authors' nationalities, indicating global concern with the topic.

Most studies focused on real investment projects. The main objectives were to determine the best positioning relative to the supply chain, to determine how much should be invested, and, to a lesser extent, to define the metrics used in analyses and the investment implementation period, addressing core decision-making issues. Researchers translated these questions primarily into objectives of risk mitigation coupled with Return on Investment maximization, cost reduction, and profit maximization. For these analyses, parameters were defined based on business plans developed by the authors and, to a lesser extent, selected from other studies or via specialist consultation.

Although a wide variety of specific parameters were used, and this article compiled them, parameters can be grouped into costs, revenues, and demand. This indicates a greater emphasis on quantitative rather than qualitative variables. Many authors highlighted the volatility of these parameters; consequently, there was a preference for stochastic models, mathematical programming, and statistics, sometimes combined. Articles applied to real cases showed greater concern with the validation of results: 70% used some validation method.

Theoretical scenario studies relied on simulated data; 67% focused on determining investment amounts and, to a lesser extent, on identifying the best variables to use. These studies often analyzed broad investment sectors without specifying an industry. Variables and selection methods did not differ significantly from real-case studies. However, only four of the six theoretical articles used a validation method, and the other two applied robustness analysis.

CONCLUSION

This review contributes to scientific knowledge by classifying and analyzing studies on methods for determining risk and technical-economic feasibility of investments in the manufacturing industry, facilitating future work by researchers interested in this and related topics. It addressed matters related to metadata (publication year, citations, publishing journals, authors' nationalities, and article quality) and specific methodological aspects (nature of methods employed, supply chain sectors studied, variables used in models, validation methods, application scenarios, data sources, and methods for determining which data to use).

The research followed the PRISMA 2020 (Page et al., 2021) guidelines for systematic reviews and rigorously applied detailed inclusion and exclusion criteria, ensuring that only relevant articles were included in the analyzed database. Data analysis revealed that most studies were applied to real scenarios, used stochastic methods, relied on historical data, determined variables from author-developed business models, sought to minimize risk and maximize return on investment, validated primarily through robustness analyses, and focused on oil, gas, and fuels supply chains. The substantial number of variables used in each model highlights the complexity of investment planning models.

Limitations and future research

Although the criteria and exclusions were rigorously described and applied, with particular care to avoid evaluation biases, systematic reviews remain subject to errors that can hinder reproducibility and weaken results. Generalization of results is also limited by researchers' focus on specific contexts.

One noteworthy finding was the number of articles focusing on the energy and fuel sectors. Future research may identify the drivers behind the interest in assessing economic feasibility and investment-related risks in these areas.

Additionally, future studies may continue updating the database underpinning this review, either targeting more specific sectors or broader scopes. It is also possible to apply the most-used methods indicated here to validate the results obtained by the researchers, as well as to test methods not yet explored in previous studies, thereby expanding the knowledge base.

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