

VALUE PROPOSITION EXPERIMENTATION PROCEDURES IN DIGITAL BUSINESS MODELS: A SYSTEMATIC LITERATURE REVIEW

PROCEDIMENTOS DE EXPERIMENTAÇÃO DE PROPOSTAS DE VALOR EM MODELOS DE NEGÓCIO DIGITAIS: UMA REVISÃO SISTEMÁTICA DA LITERATURA

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ABSTRACT: Business model experimentation reduces uncertainty by converting assumptions about customers, value propositions, and value capture mechanisms into testable hypotheses. This article consolidates value proposition experimentation procedures for digital business models reported in the literature. A systematic review guided by the PRISMA method was conducted using Scopus and Web of Science. The initial search returned 625 records. After refining the terms, 40 records were obtained. Screening removed 15 duplicates, one unavailable document, and four documents belonging to excluded typologies. Four additional studies were incorporated through a complementary search, resulting in 24 documents. The analysis identified 11 experimentation models, organized into the macro-stages of experimentation planning and design, operational cycle and learning test, and strategic validation and market transition. The most frequent evidence sources were documentary research, case studies, interviews, and literature reviews. The techniques included content analysis, descriptive statistics, structural equation modeling, cluster analysis, simulation, and supporting frameworks. The results show convergence around an iterative logic, but limited consolidation and insufficient detail in quantitative approaches.

KEYWORDS: Digital Business Models; Business Model Experimentation; Value Proposition; Systematic Literature Review; PRISMA.

RESUMO: A experimentação de modelos de negócio reduz incertezas ao converter suposições sobre clientes, propostas de valor e mecanismos de captura de valor em hipóteses testáveis. Este artigo consolida os procedimentos de experimentação de propostas de valor para modelos de negócio digitais relatados na literatura. Foi conduzida uma revisão sistemática orientada pelo método PRISMA, com buscas nas bases Scopus e Web of Science. A busca inicial retornou 625 registros. Após o refinamento dos termos, foram obtidos 40 registros. A triagem removeu 15 duplicatas, um documento indisponível e quatro documentos de tipologias excluídas. Quatro estudos adicionais foram incorporados por busca complementar, resultando em 24 documentos. A análise identificou 11 modelos de experimentação, organizados nas macroetapas de planejamento e design da experimentação, ciclo operacional e teste de aprendizado, e validação estratégica e transição para o mercado. As fontes de evidência mais frequentes foram pesquisa documental, estudo de caso, entrevistas e revisão bibliográfica. As técnicas abrangeram análise de conteúdo, estatística descritiva, modelagem de equações estruturais, análise de cluster, simulação e frameworks de apoio. Os resultados evidenciam convergência na lógica iterativa, mas baixa consolidação e detalhamento das abordagens quantitativas.

PALAVRAS CHAVE: Modelos de Negócio Digitais; Experimentação de Modelos de Negócio; Proposta de Valor; Revisão Sistemática da Literatura; PRISMA.

1. INTRODUCTION

The development of digital products and services tends to occur in environments characterized by rapid innovation and lower technological barriers (Balocco et al., 2019). This context fosters the emergence of startups and business models capable of reshaping traditional industries (Balocco et al., 2019). However, greater access to technology does not eliminate market uncertainty, as a significant share of venture failures results from developing solutions based on unvalidated assumptions and insufficient market demand (Bocken; Snihur, 2020; Silva et al., 2020). Business model experimentation (BME) seeks to address this problem by treating assumptions as testable hypotheses and replacing linear processes with iterative cycles of building, measuring, and learning (Xu; Koivumäki, 2019; Silva et al., 2020; Konietzko et al., 2020; Klenk; Giones; Brem, 2021).

The value proposition plays a central role in business model experimentation. It represents the benefits offered to a customer segment and connects an organization's offering to market needs (Osterwalder; Pigneur, 2011). Experimenting with the value proposition makes it possible to assess whether problems, benefits, features, channels, and monetization mechanisms are perceived as relevant (Osterwalder et al., 2014). In digital business models, this validation may involve multiple user groups and platform-mediated interactions. Therefore, experiments need to combine testable artifacts, evidence sources, and analytical techniques that support decisions on whether to persevere, pivot, reconfigure, or abandon a hypothesis (Osterwalder; Pigneur, 2011; Osterwalder et al., 2014; Brecht et al., 2021; Sadeghiani; Shokouhyar; Ahmadi, 2022).

The literature on value proposition experimentation in business models encompasses a wide range of terminologies, structures, and purposes. An initial analysis of the literature reveals models associated with lean and agile approaches (e.g., Bocken; Snihur, 2020; Silva et al., 2020; Sadeghiani; Shokouhyar; Ahmadi, 2022), platforms and ecosystems (e.g., Brecht et al., 2021; Laurischkat; Jandt, 2016), business model change and evolution (e.g., Balocco et al., 2019; Balta; Papadopoulos; Spanaki, 2023), design and engineering methodologies (e.g., Ide et al., 2015; Orth et al., 2025), and commercialization and scaling (e.g., Nieto Cubero; Gbadegeshin; Consolación, 2021; Gatto; Re, 2021). The literature also recommends the use of different qualitative and quantitative evidence sources for value proposition experimentation, as well as a broad range of analytical techniques, from content analysis (e.g., Holland; Gutiérrez-Leefmans, 2018; Nieto Cubero; Gbadegeshin; Consolación, 2021) to system dynamics simulation (e.g., Laurischkat; Jandt, 2016). Thus, research on the topic remains fragmented across different studies and fields of knowledge, with no unified structure integrating experimentation procedures, evidence sources, data analysis techniques, and decision-making. Furthermore, the value proposition experimentation models identified in the literature generally provide generic procedures, while quantitative approaches offer limited methodological detail and replicability (e.g., Balocco et al., 2019; Bocken; Snihur, 2020; Brecht et al., 2021; Nieto Cubero; Gbadegeshin; Consolación, 2021).

To address this gap, this article is guided by the following research question: What value proposition experimentation procedures for digital business models are reported in the literature? The study aims to consolidate the models and procedures used to experiment with value propositions in digital business models and to identify the recommended evidence sources, proposed data analysis techniques, and research gaps reported in the literature. The theoretical contribution lies in organizing the existing knowledge on the topic and proposing three comparable macro-stages across the identified models. The practical contribution consists of providing a reference for planning, conducting, and interpreting value proposition experiments in digital innovation contexts. The article is organized into five sections. First, it presents a brief literature review on value proposition experimentation in business models. Next, it describes the procedures adopted for the systematic literature review according to the PRISMA method. The following section presents and discusses the results. Finally, the conclusion summarizes the theoretical and practical contributions of the study.

2. LITERATURE REVIEW

A business model describes the logic through which an organization creates, delivers, and captures value. It extends beyond revenue generation and also guides activities, resources, partnerships, relationships, and strategic decisions. This logic can be represented through interdependent components, including customer segments, value propositions, channels, revenue streams, resources, activities, partnerships, and cost structures (Magretta, 2002; Osterwalder; Pigneur, 2011).

In the literature analyzed, digital business models are treated as organizational configurations in which value creation, delivery, or capture depends on digital technologies

(Xu; Koivumäki, 2019; Balocco et al., 2019). These configurations include technology-based startups, businesses undergoing digital transformation (Balocco et al., 2019; Balta et al., 2023), and platforms that connect producers and consumers (Brecht et al., 2021). Digitalization increases the speed of adaptation and enables data-driven models, mediated interactions, and network effects. However, it also requires validation procedures suited to the dynamic nature of these markets (Xu; Koivumäki, 2019; Balocco et al., 2019; Brecht et al., 2021).

Business model experimentation consists of systematically testing the hypotheses underlying the logic of value creation, delivery, and capture (Konietzko et al., 2020). The process aims to reduce uncertainty before substantial investments are made (Bocken; Snihur, 2020; Konietzko et al., 2020). Lean Startup and Customer Development approaches employ build-measure-learn cycles, as well as Minimum Viable Products (MVPs), prototypes, and predefined metrics (Silva et al., 2020). The expected outcome is validated learning, which is used to refine or reject the assumptions underlying the business model (Bocken; Snihur, 2020).

The value proposition defines the set of benefits that an organization intends to deliver to customers (Osterwalder; Pigneur, 2011). Its validation requires translating perceptions of customer jobs, pains, and gains into observable hypotheses (Osterwalder et al., 2014). Experimentation links these hypotheses to artifacts, behaviors, and metrics (Ide et al., 2015). Thus, value is no longer treated solely as a conceptual statement but is confronted with evidence of acceptance, use, conversion, or rejection (Brecht et al., 2021).

In this review, value proposition experimentation is treated as a focal subset of business model experimentation rather than as a separate or equivalent process. The value proposition is an interdependent component of the business model, while BME may also address value creation, delivery, and capture. Accordingly, broader business model experimentation models are relevant to this review when their stages, techniques, or tools support the formulation, testing, or interpretation of hypotheses concerning customer problems, expected benefits, offer characteristics, market acceptance, or product-market fit, even when later stages extend to business model reconfiguration, commercialization, or scaling (Osterwalder; Pigneur, 2011; Bocken; Snihur, 2020; Brecht et al., 2021; Nieto Cubero et al., 2021).

Applying this knowledge supports business model development and innovation (Orth et al., 2025). Experiments enable organizations to position a solution, assess its viability, develop MVPs, test product-market fit, and guide changes (Sadeghiani et al., 2022). At later stages, the results can also support market creation, organizational reconfiguration, and scaling (Nieto Cubero et al., 2021; Balta et al., 2023). Resulting decisions may involve persevering, pivoting, implementing changes, expanding commercially, or discontinuing the initiative (Sadeghiani et al., 2022; Nieto Cubero et al., 2021; Balta et al., 2023).

Evidence sources and analytical techniques are complementary elements of experimentation. Interviews, surveys, documentary research, case studies, experimental procedures, and observation provide data on customer needs, behaviors, and performance (Konietzko et al., 2020; Gatto; Re, 2021). Content analysis, descriptive and inferential statistics, structural equation modeling, cluster analysis, text mining, simulation, and

supporting frameworks transform these data into interpretations and decision criteria (Brecht et al., 2021; Etta et al., 2022; Gatto; Re, 2021). The validity of the resulting learning depends on the alignment among the hypothesis, evidence, analytical technique, and evaluation threshold (Konietzko et al., 2020; Brecht et al., 2021).

3. METHODOLOGY

The research employs a Systematic Literature Review (SLR) conducted and reported according to the PRISMA method. An SLR enables the identification, selection, analysis, and integration of evidence in a transparent and replicable manner (Tranfield; Denyer; Smart, 2003; Snyder, 2019). This article is guided by the following research question: “What value proposition experimentation procedures for digital business models are reported in the literature?” Evidence sources and analytical techniques were treated as complementary dimensions of this research question.

The identification of keywords was preceded by an initial review of 12 articles analyzed in full. The terms identified were grouped by similarity into three blocks. The first block comprised expressions related to business model experimentation, validation, optimization, prototyping, hypotheses, and pivoting. The second block included concepts associated with the Lean Startup approach, such as MVP, value proposition, market validation, and validated learning. The third block delimited the digital, technological, platform, and sportech contexts. Table 1 presents the terms and methodological references identified in the literature for the keywords used in the literature search.

Table 1 – Search terms and methodological references

Block	Search Terms	Key Methodological References
Core terms used to capture the main concepts of Business Model Experimentation (BME): the process of testing hypotheses to validate, optimize, or pivot a business model.	“business model experiment**”	(Klenk; Giones; Brem, 2021), (Sun et al., 2025), (Reusch; Schjetnan; Bocken, 2022), (Schjetnan; Bocken; Hjalmarsson, 2022), (Konietzko et al., 2020)
	“business model validat**”	(Malmström; Wincent, 2021)
	“business model optimizat**”	(Teece, 2010)
	“business model pivot**”	(Balocco et al., 2019), (Silva et al., 2020)
	“business model prototyp**”	(Laurischkat; Jandt, 2016)
	“business model hypoth**”	(Klenk; Giones; Brem, 2021), (Koch, 2021)
	“business model theory”	(Costa Climent; Haftor, 2021)
	“business hypothesis testing”	(Klenk; Giones; Brem, 2021), (Koch, 2021)
	“innovation hypothesis testing”	(Konietzko et al., 2020)
	“Business model innovation”	(Foss; Saebi, 2017)
Terms focused on tools and concepts associated with the Lean Startup approach, such as MVP, Value Proposition, and market validation.	“Business model elements”	(Wirtz et al., 2016)
	“MVP”	(Koch, 2021), (Silva et al., 2020), (Ide et al., 2015)
	“minimum viable product”	(Koch, 2021), (Silva et al., 2020)
	“lean startup”	(Silva et al., 2020), (Balocco et al., 2019), (Xu; Koivumäki, 2019), (Koch, 2021)
	“value proposition”	(Ide et al., 2015)
	“hypothesis testing”	(Klenk; Giones; Brem, 2021), (Konietzko et al., 2020)

Block	Search Terms	Key Methodological References
	"startup"	(Koch, 2021), (Malmström; Wincent, 2021), (Silva et al., 2020)
	"value proposition design"	(Baldassarre et al., 2017)
	"early validation"	(Malmström; Wincent, 2021)
	"market validation"	(Malmström; Wincent, 2021)
	"startup experiment**"	(Konietzko et al., 2020), (Koch, 2021)
	"Business Model Canvas"	(Toro-Jarrín; Ponce-Jaramillo; Güemes-Castorena, 2016)
	"Validated learning"	(Frederiksen; Brem, 2017)
	"Falsifiable Hypotheses"	(Camuffo et al., 2020)
	"Simultaneous Experimentation"	(Klingebiel; Rammer, 2014)
	"Assumptions"	(Leatherbee; Katila, 2020)
	"Effectual Logic"	(Chandler et al., 2011)
Contextual terms used to delimit the search to digital, platform-based, and technology-based businesses, including sportech.	"digita**"	(Sun et al., 2025), (Balocco et al., 2019), (Xu; Koivumäki, 2019)
	"digital transforma**"	(Sun et al., 2025)
	"technolog**"	(Ide et al., 2015), (Koch, 2021), (Malmström; Wincent, 2021)
	"technology-based"	(Koch, 2021), (Malmström; Wincent, 2021)
	"platform"	(Sun et al., 2025), (Reusch; Schjetnan; Bocken, 2022)
	"sportech"	(Ratten, 2020)
	"technological innovation"	(Ide et al., 2015)
	"digital transformation"	(Sun et al., 2025)

Source: Prepared by the author (2026).

The terms within each block were connected with OR, whereas the three thematic blocks were connected with AND. Parentheses were used to make the grouping explicit, and the searches were applied to the title, abstract, and keyword fields. Table 2 presents the Boolean logic used in the initial search.

Table 2 – Complete Boolean search string used in the initial systematic literature review search

("business model experiment**" OR "business model validat**" OR "business model optimizat**" OR "business model pivot**" OR "business model prototyp**" OR "business model hypoth**" OR "business model theory" OR "business hypothesis testing" OR "innovation hypothesis testing" OR "Business model innovation" OR "Business model elements") AND ("MVP" OR "minimum viable product" OR "lean startup" OR "value proposition" OR "hypothesis testing" OR "startup" OR "value proposition design" OR "early validation" OR "market validation" OR "startup experiment**" OR "Business Model Canvas" OR "Validated learning" OR "Falsifiable Hypotheses" OR "Simultaneous Experimentation" OR "Assumptions" OR "Effectual Logic") AND ("digita**" OR "digital transforma**" OR "technolog**" OR "technology-based" OR "platform" OR "sportech" OR "technological innovation" OR "digital transformation")

Source: Prepared by the author (2026).

The searches were conducted in the Scopus® and Web of Science® databases. Initially, no restrictions were applied regarding document type, publication year, or language in order to maximize study retrieval. The first search returned 377 records from Scopus® and 248 from Web of Science®, totaling 625 records. To evaluate search precision, a sample of 50 records from each database was examined. The inspection showed that the generic expressions “Business model innovation,” “Business model elements,” and “Business Model Canvas” substantially increased off-scope retrieval, while “Assumptions,” “Validated learning,” “Falsifiable Hypotheses,” “Simultaneous Experimentation,” and “Effectual Logic” did not retrieve relevant or additional records beyond those already captured. These terms were therefore removed while preserving the three-block structure of the search. The refined expression, shown in Table 4, reduced the result set from 625 to 40 records and produced a corpus with satisfactory thematic adherence.

Table 3 – Excluded search terms and justifications

Unused Search Term	Justification
Business model innovation	Generic terms that returned an excessive number of articles, making it difficult to delimit the scope of the study.
Business model elements	
Business Model Canvas (BMC)	
Assumptions	These terms did not retrieve relevant or additional articles beyond those already identified and therefore did not contribute to expanding the analyzed corpus.
Validated learning	
Falsifiable Hypotheses	
Simultaneous Experimentation	
Effectual Logic	

Source: Prepared by the author (2026).

Table 4 – Boolean search string used in the second systematic literature review search

("business model experiment*" OR "business model validat*" OR "business model optimizat*" OR "business model pivot*" OR "business model prototyp*" OR "business model hypoth*" OR "business model theory" OR "business hypothesis testing" OR "innovation hypothesis testing") AND ("MVP" OR "minimum viable product" OR "lean startup" OR "value proposition" OR "hypothesis testing" OR "startup" OR "value proposition design" OR "early validation" OR "market validation" OR "startup experiment*") AND ("digita*" OR "digital transforma*" OR "technolog*" OR "technology-based" OR "platform" OR "sportech" OR "technological innovation" OR "digital transformation")
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Source: Prepared by the author (2026).

The second search excluded the terms identified as problematic, as presented in Table 3. The search retrieved 24 records from Scopus® and 16 from Web of Science®, totaling 40 documents. The analysis of the results indicated that the thematic relevance of this set was satisfactory. Table 5 presents the results of both searches.

Table 5 – Number of articles retrieved from each database

	Scopus®	Web of Science®	Total
First search	377	248	625
Second search	24	16	40

Source: Prepared by the author (2026).

The screening process excluded duplicate, unavailable, or ineligible document types. Full books, dissertations, monographs, and complete conference proceedings were considered ineligible. Of the 40 records, 15 duplicates were removed, one document was unavailable, and four documents were excluded based on document type. As a result, 20 articles remained for full-text assessment. The screening process and the corresponding numbers are presented in Table 6.

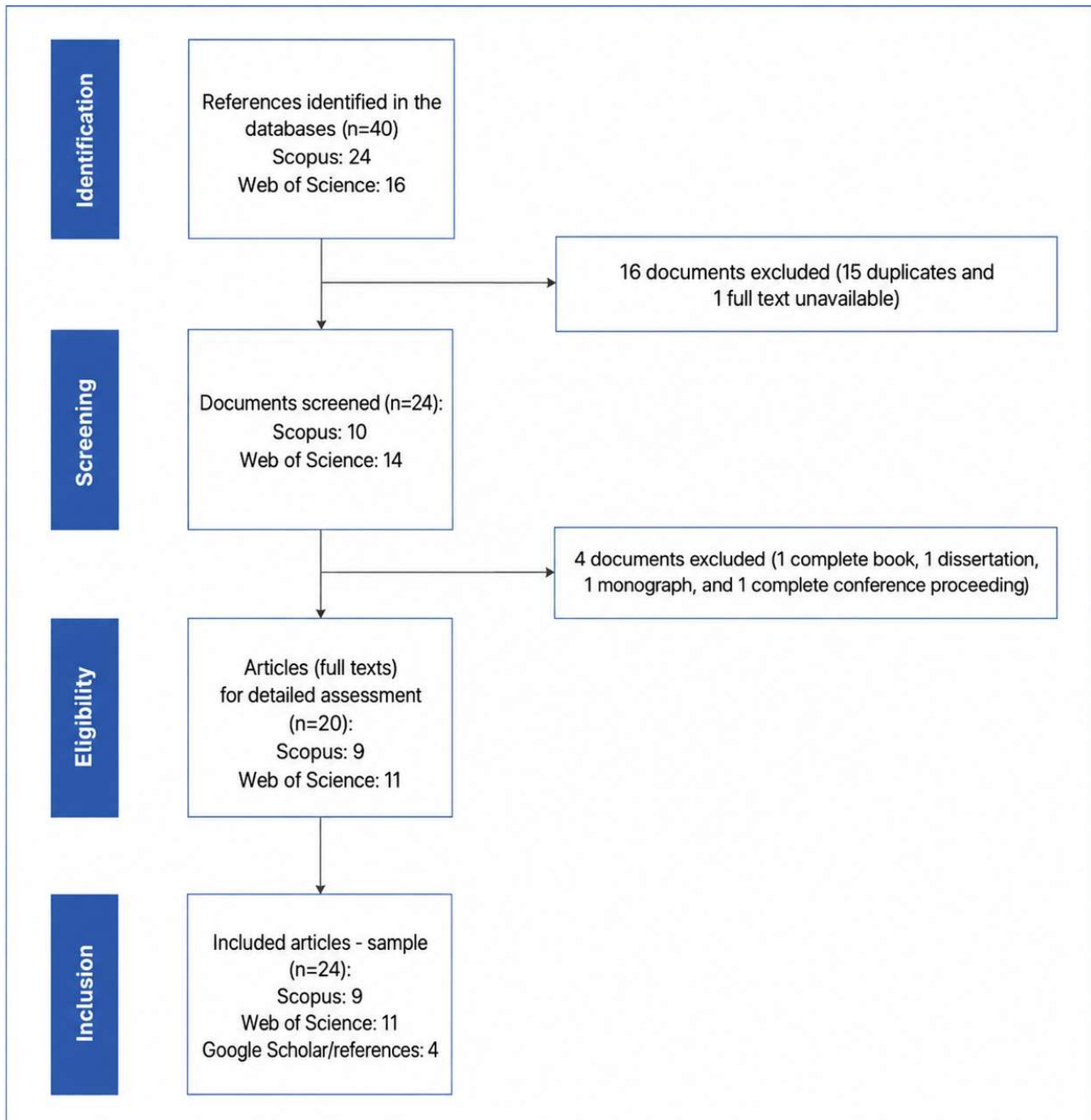
Table 6 – Screening stages

Screening Stage	Result
Total number of documents before screening	40
Duplicate documents removed	15
Unavailable documents	1
Documents excluded (books, dissertations, monographs, and complete conference proceedings)	4
Partial total	20
Inclusion: documents added to the SLR bibliographic portfolio	4
Final total	24

Source: Prepared by the author (2026).

At the eligibility stage, the 20 documents were assessed in full. No studies were excluded due to inadequacy or lack of relevance to the review questions. Subsequently, a complementary search was conducted using Google Scholar® and the reference lists of the selected documents. Four additional studies were included, resulting in a final portfolio of 24 documents. The review process, presented in Figure 1, follows the PRISMA stages of identification, screening, eligibility, and inclusion.

Figure 1 – PRISMA flow diagram



Source: Prepared by the author (2026).

Data were extracted through a full-text review of the portfolio and organized into matrices. The following information was recorded: **a)** evidence sources used or recommended; **b)** data analysis techniques; **c)** experimentation models and their stages; and **d)** the objectives associated with each stage. An item was marked in the evidence-source or analytical-technique matrices only when it was explicitly used, recommended, or described in the full text. Within the synthesis, an item was treated as an experimentation model when it presented an explicit sequence of stages, techniques, or tools intended to support the experimentation or validation of value propositions or business models. Broader business model experimentation frameworks were retained when their procedures included value-proposition-related hypotheses or validation activities. The 11 identified models were

classified into five categories according to their primary purpose and context, using the extracted stage objectives as the basis for comparison. To derive the macro-stages, the original stages were compared according to their predominant function rather than their original terminology. Three recurring functions were observed: (i) framing the problem, value proposition, hypotheses, artifact, metrics, and experiment design; (ii) executing tests, collecting and analyzing evidence, and generating learning; and (iii) incorporating validated learning into business model change, market creation, commercialization, or scaling. Models that did not extend to one of these functions were left without an allocation in the corresponding macro-stage. This comparative functional synthesis produced the three macro-stages: experimentation planning and *design*, operational cycle and learning test, and strategic validation and market transition. No formal assessment of the methodological quality of the included studies was conducted.

4. RESULTS

4.1 BUSINESS MODEL EXPERIMENTATION MODELS

The analysis of the 24 documents identified 11 models that present stages, techniques, or tools for experimenting with value propositions and business models. Despite differences in terminology, these models share a common logic of reducing uncertainty through iterative learning. They were organized into five categories, as summarized in Table 7: **i)** *lean* and agile approaches; **ii)** platforms and ecosystems; **iii)** business model change and evolution; **iv)** design and engineering methodologies; and **v)** commercialization and scaling. The categories reflect the dominant purpose and context of each model: Lean and Agile Approaches emphasize rapid iteration, MVPs, and build-measure-learn logic; Platforms and Ecosystems explicitly address multi-sided or networked interactions; Business Model Change and Evolution centers on triggers, pivoting, and reconfiguration; Design and Engineering Methodologies integrate technical and business architecture; and Commercialization and Scaling extends validation toward market creation, sales, investment, or growth. Models were assigned to the category that best represented their principal objective and sequence of activities; the categories do not imply a methodological quality ranking.

Table 7 – Synthesis of business model experimentation models

Category	Main Focus	Identified Models	References
Lean and Agile Approaches	Rapid build-measure-learn cycles and MVP validation.	Lean Startup	Lean Startup and the business model: Experimenting for novelty and impact (Bocken; Snihur, 2020)
		LS implementation roadmap	Lean Startup, Agile Methodologies and Customer Development for business model innovation: A systematic review and research agenda (Silva et al., 2020)
		Position-Build-Measure-Learn Loop	How digital startups use competitive intelligence to pivot (Sadeghiani; Shokouhyar; Ahmadi, 2022)
Platforms and Ecosystems	Validation of both sides of the platform and simulation of dynamic interactions.	Smart Platform Experiment Cycle (SPEC)	Smart platform experiment cycle (SPEC): a process to design, analyze, and validate digital platforms (Brecht et al., 2021)
		Business Model Prototyping Framework	Business model prototyping for electric mobility and solar power solutions (Laurischkat; Jandt, 2016)

Category	Main Focus	Identified Models	References
Business Model Change and Evolution	Triggers for business model change and strategic agility for digital pivoting.	Lean Business Model Change (LBMC)	Lean business models change process in digital entrepreneurship (Balocco et al., 2019)
		Dynamic capabilities for digital pivoting	Business model pivoting and digital technologies in turbulent environments (Balta; Papadopoulos; Spanaki, 2023)
Design and Engineering Methodologies	Detailed design of business architectures and technical-commercial integration.	Lean Design Methodology for Business Models	A Lean Design Methodology for Business Models and Its Application to IoT Business Model Development (Ide et al., 2015)
		Technology Innovation Framework	The role of constraints in sport technology development for improving perceptual-motor learning and coaching, design, and commercialization outcomes: An ecological dynamics approach to transdisciplinary innovation in start-ups (Orth et al., 2025)
Commercialization and Scaling	Transition from the initial idea to the mass market and access to investment.	Integrated Commercialization Model	Commercialization of disruptive innovations: Literature review and proposal for a process framework (Nieto Cubero; Gbadegeshin; Consolación, 2021)
		SME Instrument Innovation Cycle	Circular Bioeconomy Business Models to Overcome the Valley of Death. A Systematic Statistical Analysis of Studies and Projects in Emerging Bio-Based Technologies and Trends Linked to the SME Instrument Support (Gatto; Re, 2021)

Source: Prepared by the author (2026).

The functional comparison described in Section 3 yielded three macro-stages. Experimentation Planning and Design groups activities whose predominant function is to frame the problem, value proposition, hypotheses, artifact, metrics, and experiment design. Operational Cycle and Learning Test groups activities centered on execution, measurement, analysis, and learning. Strategic Validation and Market Transition groups activities that incorporate validated learning into business model reconfiguration, market creation, commercialization, or scaling. Table 8 makes this functional alignment explicit and also shows that not every model covers all three macro-stages.

Table 8 – Stages of the experimentation models across the three macro-stages

Experimentation Model	Experimentation Planning and Design	Operational Cycle and Learning Test	Strategic Validation and Market Transition
Lean Startup	i) Ideation ii) Experiment Design and Testing iii) Hypothesis Generation	iv) Hypothesis Testing	-
Integrated Commercialization Model	i) Concept/Value Proposition Validation	-	ii) Business Model Validation & Market Creation iii) Creating Sales in the Majority Market
Business Model Prototyping Framework	i) Canvas for Mobility and Energy Solutions	ii) System Dynamics Simulation iii) Reconfiguration / Iteration	-
Position-Build-Measure-Learn Loop	i) Position	ii) Build iii) Measure iv) Learn	-
Lean Business Model Change (LBMC) Framework	i) Trigger	ii) Experimentation Loop	iii) Execution
Smart Platform Experiment Cycle (SPEC)	i) Design the digital platform business model ii) Design experiments for consumers and producers	iii) Build experiments including a MVP and implement a Measuring Metric iv) Run the experiments and measure the outcome v) Analyze and learn from the results	-
Lean Design Methodology for Business Models	i) Initial Business Model Design ii) Evaluation	iii) Detail Business Model Design iv) Learning and Improvement	-
Dynamic capabilities for digital pivoting	i) Digital Sensing	-	ii) Digital Seizing iii) Digital Transforming
Staircase roadmap for LS implementation	-	i) Build ii) Measure iii) Learn (Build-Measure-Learn Loop)	-
Technology Innovation Framework	i) Start-up Phase	ii) Validation Phase / Fit Finding	iii) Scaling Up

Experimentation Model	Experimentation Planning and Design	Operational Cycle and Learning Test	Strategic Validation and Market Transition
SME Instrument Innovation Cycle	i) Phase 1	ii) Phase 2	iii) Phase 3

Source: Prepared by the author (2026).

4.1.1 EXPERIMENTATION PLANNING AND DESIGN

The first macro-stage defines the direction of the experiment. In the Lean Startup Process, ideation establishes the initial vision, experiment design translates ideas into experiments, and hypothesis generation makes explicit the assumptions that need to be tested (Bocken; Snihur, 2020). The Integrated Commercialization Model begins with concept and value proposition validation (Nieto Cubero et al., 2021). The Business Model Prototyping Framework uses a canvas to represent actors, flows, and technological building blocks (Laurischkat; Jandt, 2016). These procedures aim to reduce uncertainty before implementation (Bocken; Snihur, 2020; Nieto Cubero et al., 2021; Laurischkat; Jandt, 2016).

Other models incorporate diagnostic activities. The Position-Build-Measure-Learn Loop uses competitive intelligence to position the solution and identify actual market gaps (Sadeghiani et al., 2022). The LBMC begins with an internal or external trigger indicating the need to change the logic of value creation or capture (Balocco et al., 2019). The dynamic capabilities approach begins with digital sensing, which monitors opportunities, threats, and competitors' actions (Balta et al., 2023). These activities connect experimentation to the strategic environment (Sadeghiani et al., 2022; Balocco et al., 2019; Balta et al., 2023).

In platform and engineering models, planning also encompasses business and system architecture. SPEC defines the value unit, participants, filters, platform functions, and separate hypotheses for producers and consumers (Brecht et al., 2021). The Lean Design Methodology converts information technology capabilities into value hypotheses, evaluates value, feasibility, and sustainability, and structures initial architectures (Ide et al., 2015). The objective is to align technical requirements, business goals, customer segments, and metrics before testing (Brecht et al., 2021; Ide et al., 2015).

This macro-stage also requires the artifact, duration, metric, and success threshold to be defined in advance (Brecht et al., 2021). These elements help preserve the objectivity of the subsequent evaluation (Brecht et al., 2021). Therefore, planning transforms a broad value proposition into falsifiable hypotheses, observable indicators, and an execution roadmap (Konietzko et al., 2020). This structure is necessary for the collected data to support the validation, rejection, or reformulation of the business model (Konietzko et al., 2020; Brecht et al., 2021).

4.1.2 OPERATIONAL CYCLE AND LEARNING TEST

The second macro-stage focuses on empirical validation. The most recurrent pattern is the build-measure-learn cycle (Silva et al., 2020). The build stage materializes the hypothesis through an MVP, prototype, landing page, mockup, or detailed architecture (Brecht et al., 2021). The measure stage collects data on behavior, perception, conversion, or performance (Silva et al., 2020; Brecht et al., 2021). The learn stage compares the results with predefined criteria and guides the decision to persevere, pivot, or abandon the hypothesis (Sadeghiani et al., 2022; Brecht et al., 2021).

SPEC separates experiment design for producers and consumers, develops MVPs, and establishes metrics before implementation. The experiments are then conducted in real or controlled environments. Quantitative and qualitative results are compared with predefined thresholds. This sequence aims to generate evidence for both sides of a platform and prevent decisions from relying solely on the team's perceptions (Brecht et al., 2021).

The Business Model Prototyping Framework employs system dynamics simulation to assess the behavior and profitability of prototypes under virtual scenarios. Simulation feedback guides reconfiguration before real-world implementation (Laurischkat; Jandt, 2016). The Lean Design Methodology develops and verifies the model through phased cycles (Ide et al., 2015). The Technology Innovation Framework uses co-design and qualitative and quantitative techniques to identify the fit among the product, users, and market (Orth et al., 2025).

Although the operational procedures generally converge, their level of specification varies (Silva et al., 2020). Some studies present only the sequence of the experimentation cycle, whereas others define artifacts, metrics, environments, and decision criteria (Ide et al., 2015; Brecht et al., 2021). The literature reports quantitative techniques, but their operationalization is not always described in sufficient detail to enable replication (Souza; Batista, 2017; Sadeghiani et al., 2022). This variation limits comparisons across experiments and the systematic accumulation of evidence.

4.1.3 STRATEGIC VALIDATION AND MARKET TRANSITION

The third macro-stage applies the learning generated during experimentation to business configuration and growth. The Integrated Commercialization Model progresses from value proposition validation to validation of the complete business model, market creation, and sales generation in the mainstream market (Nieto Cubero et al., 2021). The LBMC concludes the cycle with the implementation of the validated change (Balocco et al., 2019). The dynamic capabilities approach uses digital seizing to allocate resources and digital transforming to redesign organizational structures and relationships with stakeholders (Balta et al., 2023).

The Technology Innovation Framework refers to this transition as scaling up (Orth et al., 2025). The SME Instrument Innovation Cycle structures business development into phases of feasibility, demonstration and replication, and market introduction with access to investment (Gatto; Re, 2021). The objective is to determine whether the validated innovation can operate at a larger scale, coordinate multiple actors, and sustain commercial exploitation (Orth et al., 2025; Gatto; Re, 2021).

Not all models include an explicit market transition stage. The Lean Startup Process, SPEC, the Business Model Prototyping Framework, and the Lean Design Methodology focus primarily on experiment design and learning. This distinction reveals two different scopes. One group treats experimentation as a mechanism for hypothesis validation, whereas the other integrates validation with organizational transformation, commercialization, and expansion. The lack of integration between these two scopes represents a relevant divergence within the analyzed corpus.

4.2 EVIDENCE SOURCES FOR BUSINESS MODEL EXPERIMENTATION

The portfolio includes nine different types of evidence sources. Documentary research was the most frequently identified source, with 11 occurrences. Case studies were the second most frequently suggested source, with nine occurrences. Individual interviews and literature reviews were each identified in six studies. Questionnaires and surveys, as well as experimental procedures, were identified in four studies. Collective interactive methods appeared in three studies, while direct observation and theoretical essays or analyses were each identified once. Table 9 presents the identification matrix.

Table 9 – Evidence sources identified in the analyzed articles

Authors	Individual Interviews	Questionnaires and Surveys	Collective Interactive Methods	Documentary Research	Experimental Procedures	Direct Observation	Literature Review	Case Study	Theoretical Essay / Analysis
(Bocken; Snihur, 2020)									X
(Nieto Cubero; Gbadegesin; Consolación, 2021)							X		
(Laurischkat; Jandt, 2016)					X				
(Sadeghiani; Shokouhyar; Ahmadi, 2022)	X				X			X	
(Xu; Koivumäki, 2019)			X	X				X	
(Konietzko et al., 2020)	X	X	X	X		X			
(Wang; Zhang; Gupta, 2022)				X	X				
(Holland; Gutiérrez-Leefmans, 2018)				X					
(Balocco et al., 2019)	X	X		X				X	
(Brecht et al., 2021)								X	
(Etta et al., 2022)				X	X				
(Ütük Bayılmış; Orhan, 2025)				X	X				
(Aashish et al., 2025)		X							
(Waldner; Zsifkovits; Heidenberger, 2010)				X					
(Noor et al., 2009)	X			X				X	
(Silva et al., 2021)	X							X	
(Balta; Papadopoulos; Spanaki, 2023)	X								
(Ide et al., 2015)			X					X	
(Silva et al., 2020)							X		
(Orth et al., 2025)							X		
(Hopkins; Lazonick, 2024)				X			X	X	
(Souza; Batista, 2017)		X					X		
(Gatto; Re, 2021)				X			X	X	
Total	6	4	3	11	5	1	6	9	1

Source: Prepared by the author (2026).

Documentary research provides secondary information on markets, competitors, technologies, and organizational configurations. It is particularly useful during planning, positioning, and the initial formulation of hypotheses. Literature reviews and theoretical analyses also help structure concepts and alternatives before experimentation. Individual interviews, collective interactive methods, and case studies add insights into problems, expectations, processes, and contexts of use.

During the operational cycle, questionnaires, surveys, experimental procedures, and direct observation generate data on acceptance, behavior, interaction, and performance. Interviews can complement these data by explaining underlying reasons and perceptions. In platform-based business models, evidence sources must represent the different groups of participants. SPEC illustrates this requirement by defining separate hypotheses and evidence for producers and consumers (Brecht et al., 2021).

During strategic validation, case studies and documentary research support the assessment of feasibility, market creation, and organizational change. The association between evidence sources and the macro-stages represents an integrated interpretation developed in this review. The article reports the frequency of evidence sources across the studies but does not provide an explicit matrix linking them to each macro-stage. This synthesis suggests that exploratory sources support hypothesis formulation, behavioral sources support hypothesis testing, and organizational sources support market transition.

Evidence contributes to hypothesis validation or rejection when it is linked to predefined metrics and thresholds. Documentary evidence may refute assumptions about markets or competitors. Interviews and collective interactive methods may confirm perceived pains and benefits. Questionnaires and experiments may estimate intention, preference, conversion, or usage. Case studies may assess the consistency of a business model within a specific context. Triangulation reduces dependence on a single evidence source and strengthens the learning process.

4.3 DATA ANALYSIS TECHNIQUES IN BUSINESS MODEL EXPERIMENTATION

The portfolio identified 14 groups of data analysis techniques, as presented in Table 10. Frameworks were the most frequently suggested form of analysis in the literature, with ten occurrences. Case studies appeared in nine studies. Content analysis was identified in seven studies, while descriptive statistics appeared in six. Text mining, systematic literature reviews, and decision support techniques were each identified three times. Structural equation modeling, inferential statistics, and cluster analysis appeared twice. Factor analysis, regression or panel analysis, PRISMA review, and system dynamics simulation each appeared once.

Table 10 – Data analysis techniques identified in the analyzed articles

Authors	Content Analysis	Case Study	Structural Equation Modeling	Factor Analysis	Regression / Panel Analysis	Inferential Statistics	Descriptive Statistics	Text Mining	Systematic Literature Review	PRISMA Systematic Review	Cluster Analysis	System Dynamics Simulation	Frameworks	Decision Support
(Bocken; Snihur, 2020)													X	
(Nieto Cubero; Gbadegeshin; Consolación, 2021)	X								X					
(Laurischkat; Jandt, 2016)												X		
(Sadeghiani; Shokouhyar; Ahmadi, 2022)		X												
(Xu; Koivumäki, 2019)		X												
(Konietzko et al., 2020)													X	X
(Wang; Zhang; Gupta, 2022)								X						
(Holland; Gutiérrez-Leefmans, 2018)	X										X		X	
(Balocco et al., 2019)		X												
(Brecht et al., 2021)		X											X	X
(Etta et al., 2022)					X	X	X	X			X			
(Ütük Bayılmış; Orhan, 2025)	X							X						
(Aashish et al., 2025)			X			X	X							
(Waldner; Zsifkovits; Heidenberger, 2010)							X						X	
(Noor et al., 2009)		X												
(Silva et al., 2021)	X	X												
(Balta; Papadopoulos; Spanaki, 2023)	X	X												
(Ide et al., 2015)		X											X	X
(Silva et al., 2020)	X								X					
(Orth et al., 2025)													X	
(Hopkins; Lazonick, 2024)		X					X						X	
(Souza; Batista, 2017)			X	X			X						X	
(Gatto; Re, 2021)	X						X		X	X			X	
Total	7	9	2	1	1	2	6	3	3	1	2	1	10	3

Source: Prepared by the author (2026).

Qualitative techniques analyze textual and contextual data. Content analysis organizes interviews, documents, and observations into categories. Case studies integrate multiple sources of evidence while preserving the organizational context. Systematic reviews consolidate concepts and findings from previous studies. Text mining expands the analysis of large volumes of digital content. These techniques are suitable for identifying problems, formulating hypotheses, and interpreting underlying mechanisms (Nieto Cubero; Gbadegeshin; Consolación, 2021; Holland; Gutiérrez-Leefmans, 2018; Ütük Bayılmış; Orhan, 2025).

Quantitative techniques analyze structured responses, performance indicators, and relationships among variables. Descriptive statistics summarize distributions and patterns. Inferential statistics test relationships and differences. Structural equation modeling evaluates relationships among constructs. Factor analysis reduces dimensionality. Regression and panel analysis estimate associations. Cluster analysis identifies segments. System dynamics simulation tests model behavior under virtual scenarios (Aashish et al., 2025; Souza; Batista, 2017; Etta et al., 2022; Laurischkat; Jandt, 2016).

During the planning stage, content analysis, reviews, and frameworks support the definition of hypotheses and indicators. During the operational cycle, statistical techniques, structural equation modeling, text mining, cluster analysis, and simulation are used to analyze the data generated by the experiments. During strategic transition, case studies, frameworks, and decision-support tools relate the results to organizational changes, investments, and scaling. This association represents an analytical synthesis developed in this review, since the literature does not provide a formal cross-classification between analytical techniques and macro-stages.

The contribution of analytical techniques to decision-making depends on the experimental design. The analysis must be consistent with the type of data, the hypothesis, and the success criterion. Descriptive techniques characterize observed behavior but do not establish causal relationships. Inferential and structural techniques examine relationships but require appropriate model specification and data. Simulations enable scenario testing but depend on the assumptions embedded in the model. Frameworks integrate information but may remain generic. The literature does not present a dominant and replicable quantitative protocol.

4.4 SYNTHESIS OF THE LITERATURE

The integrated synthesis indicates that value proposition experimentation can be understood through two complementary layers: a process architecture and a decision logic. The process architecture is represented by the three macro-stages identified in the review. The decision logic links five elements that appear dispersed across the corpus: hypothesis, evidence source, analytical technique, threshold, and decision.

These elements are sequentially dependent. The hypothesis specifies the uncertainty to be tested; the evidence source determines what will be observed; the analytical technique defines how the observations will be transformed into an interpretable result; the metric and threshold establish the success criterion; and the decision rule converts the comparison between the observed result and the threshold into an action such as persevering, pivoting,

reconfiguring, scaling, or discontinuing. The importance of defining metrics and success criteria before interpreting results is explicit in more structured experimentation procedures, including SPEC and Lean Startup-derived approaches (Konietzko et al., 2020; Brecht et al., 2021).

Across the studies, the strongest convergence concerns iterative uncertainty reduction through hypotheses, MVPs or prototypes, measurement, evidence, and learning. The main differences concern scope and operationalization: some models begin with ideation, others with change triggers, competitive positioning, or digital sensing; some rely on market testing, while others use simulation or architectural assessment; and only part of the models extends validated learning to organizational transformation, market creation, sales, or scaling (Bocken; Snihur, 2020; Silva et al., 2020; Brecht et al., 2021; Nieto Cubero; Gbadegeshin; Consolación, 2021).

The main gap is not the absence of individual evidence sources or analytical techniques, but the absence of a standardized and replicable linkage among all five decision elements. The corpus rarely specifies, in a single procedure, which evidence should be collected for a given hypothesis, how it should be analyzed, which threshold should be applied, and which decision follows from the result. Therefore, this review does not propose universal thresholds; rather, it identifies explicit alignment among hypothesis, evidence, analysis, threshold, and decision as a minimum logic for planning and documenting value proposition experiments. The lack of a formal methodological quality assessment remains a limitation when interpreting the robustness of the underlying evidence.

5. CONCLUSIONS

This article consolidated value proposition experimentation procedures for digital business models reported in a PRISMA-guided portfolio of 24 documents. Eleven experimentation models were identified and functionally organized into three macro-stages: experimentation planning and design, operational cycle and learning test, and strategic validation and market transition. The synthesis shows that, despite heterogeneous terminology and scope, the literature converges on iterative uncertainty reduction and evidence-based learning.

The main theoretical contribution is the integration of the process architecture represented by the three macro-stages with the decision logic connecting hypothesis, evidence source, analytical technique, threshold, and decision. This distinction clarifies both what the models have in common and where the literature remains fragmented. From a practical perspective, the synthesis provides a reference for structuring experiments without prescribing a single technique or universal success threshold: the evidence source, analytical technique, metric, and threshold should be selected according to the hypothesis and the type of data required, and the resulting evidence should support an explicit decision about whether to persevere, pivot, reconfigure, scale, or discontinue.

The study is limited by its documentary scope, the use of Scopus and Web of Science as the primary databases, and the absence of a formal methodological quality assessment of the included studies. Future research may update and broaden the portfolio, compare the

identified procedures across digital sectors, and develop replicable quantitative protocols that explicitly connect hypotheses, evidence sources, analytical techniques, thresholds, and decisions.

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