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# Capítulo 16

## PROCESS MAPPING AND MODELING WITH BPMN: BEST PRACTICES AND IMPLEMENTATION CHALLENGES



# PROCESS MAPPING AND MODELING WITH BPMN: BEST PRACTICES AND IMPLEMENTATION CHALLENGES

Juliana Garcia Medeiro<sup>1</sup>

**Abstract:** The Business Process Model and Notation (BPMN) has established itself as the de facto standard for business process modeling globally. This article presents a Systematic Literature Review (SLR) aiming to identify and analyze the best practices and implementation challenges of BPMN, focusing on academic production from the last five years (2020-2025). The research covered high-impact scientific databases, resulting in the identification of emerging trends and persistent problems in the Business Process Management (BPM) discipline. The results reveal that while BPMN is fundamental for Business-IT alignment and process automation, its implementation faces significant obstacles, such as the lack of objectivity in modeling, the difficulty in dealing with process granularity, and the need to incorporate domain knowledge and common sense into analysis tools. Best practices are intrinsically linked to the Critical Success Factors (CSFs) of BPM, with Top Management Support, Business-IT Alignment, and the adoption of a robust Implementation Methodology standing out. This study contributes to the consolidation of knowledge in the field, providing an updated and robust overview for researchers and professionals seeking to optimize the application of BPMN in their organizational contexts.

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**Keywords:** BPMN; Systematic Literature Review; Business Process Management; Best Practices; Implementation Challenges.

## INTRODUCTION

Business Process Management (BPM) is a managerial discipline focused on improving organizational performance through the identification, modeling, analysis, execution, monitoring, and continuous optimization of business processes (Pufahl et al., 2022). At the core of this discipline, Business Process Model and Notation (BPMN), standardized by the Object Management Group (OMG), has emerged as the universal graphical language for process representation. Its widespread adoption is largely attributed to its ability to bridge communication between business stakeholders and Information Technology (IT) professionals, enabling conceptual process models to be transformed into executable workflows.

Despite the maturity and standardization of BPMN, its effective implementation in complex organizational environments remains challenging. Recent literature has increasingly emphasized that these challenges extend beyond syntactic correctness, encompassing sociotechnical, strategic, and technological dimensions (Beerepoot et al., 2023). Issues related to organizational culture, governance, knowledge integration, and digital transformation have become central themes in BPMN research from 2020 onwards.

In this context, the objective of this chapter is to conduct a Systematic Literature Review to map the state of the art of BPMN between 2020 and 2025, with a specific focus on best practices and implementation challenges that critically influence the success of BPM initiatives.



## SYSTEMATIC LITERATURE REVIEW METHODOLOGY

The Systematic Literature Review was conducted following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), adapted to the fields of Computer Science and Management.

### Search Strategy

The search was performed in high-impact academic databases, including ScienceDirect, ResearchGate, and Google Scholar. A combination of keywords in English and Portuguese was employed to ensure comprehensive coverage of relevant studies. The primary search terms included “BPMN”, “Business Process Management”, “Systematic Literature Review”, “Best Practices”, “Implementation Challenges”, and “Critical Success Factors”. The temporal scope was strictly limited to publications from 2020 to 2025.

### Selection Criteria

The inclusion criteria comprised peer-reviewed journal articles, conference papers, and book chapters addressing BPMN or BPM implementation, best practices, or challenges within the defined time frame. Exclusion criteria encompassed studies focused exclusively on technical extensions of BPMN without implementation analysis, as well as non-peer-reviewed literature. The application of these criteria resulted in a curated corpus emphasizing systematic reviews and empirical studies that consolidate contemporary knowledge in the field.



## RESULTS AND DISCUSSION

The analysis of the selected literature enabled the categorization of findings into two major thematic axes: persistent challenges in BPMN implementation and best practices associated with BPM Critical Success Factors.

### BPMN Implementation Challenges

The challenges identified in recent literature reflect the increasing complexity of applying BPMN in environments characterized by accelerated digital transformation.

One of the most prominent challenges is the lack of objectivity in process descriptions. Despite standardization, BPMN modeling is frequently perceived as a practice influenced by subjective interpretation, particularly regarding terminology, modeling perspectives, and process granularity. The selection of an appropriate level of detail directly affects model comprehensibility, analytical value, and automation potential (Pufahl et al., 2022; Beerepoot et al., 2023).

Another significant challenge relates to expansive BPM. Traditional BPM and BPMN approaches often focus on isolated process fragments, failing to adequately represent large-scale, cross-organizational processes that span multiple functional and technological boundaries. This limitation became particularly evident during the COVID-19 pandemic, when organizations struggled to adapt and coordinate rapidly evolving ad hoc processes (Beerepoot et al., 2023).

The emergence of Process Mining technologies has further highlighted challenges associated with stochastic and incomplete data. BPMN models derived from low-quality event logs frequently require the integration of human expertise and domain knowledge to ensure semantic accuracy, a task that current BPM tools are still unable to automate effectively (López-Pintado et al., 2024).

Additionally, worker-centric process management represents a critical sociotechnical challenge. BPM tools that rely on BPMN models to monitor execution often impose rigid structures



that fail to capture informal, dynamic, and discretionary work performed by employees, leading to cognitive overload and incomplete process representations (Beerepoot et al., 2023).

### **The Modeling Frontier: BPMN and Large Language Models**

An emerging research frontier involves the integration of BPMN with Large Language Models (LLMs). While LLMs demonstrate significant potential for automating BPMN model generation and analysis from textual descriptions, recent studies highlight substantial technical, ethical, and practical challenges. These include ensuring scalability, interpretability, fairness, and structural correctness, as well as compliance with organizational modeling standards and style guides (Kourani et al., 2024; Wenger, Spahic-Bogdanovic and Martin, 2024). Given BPMN's formal and structured nature, maintaining modeling precision remains a critical limitation of current LLM-based approaches.

### **Best Practices and Critical Success Factors**

Best practices in BPMN implementation are closely aligned with BPM Critical Success Factors. Comparative analyses emphasize that BPMN modeling quality is strongly influenced by organizational and managerial conditions rather than solely by technical proficiency (Aysollmaz et al., 2023).

Among the most influential CSFs identified in recent literature are top management support, which ensures strategic alignment and resource allocation; Business–IT alignment, which positions BPMN as a central artifact for translating business requirements into executable IT solutions; and the adoption of structured implementation methodologies that integrate modeling, execution, and monitoring phases (Aysollmaz et al., 2023).



## **Integration with Simulation for Performance Optimization**

An advanced best practice identified in the literature is the integration of BPMN with simulation techniques. Simulation enables the evaluation of what-if scenarios, optimization of resource allocation, and prediction of performance outcomes prior to implementation. This approach transforms BPMN models from static documentation artifacts into predictive and decision-support tools, particularly in complex domains such as healthcare, logistics, and cybersecurity (Cimino et al., 2025; López-Pintado et al., 2024).

## **RECOMMENDATIONS FOR PRACTICE AND FUTURE RESEARCH**

Based on the synthesized evidence, several recommendations are proposed. For practitioners, establishing internal modeling style guides, combining process mining with expert curation, investing in simulation-based analysis, and prioritizing semantic-oriented BPMN training are critical actions. For researchers, future studies should explore automated BPMN validation using LLMs, modeling approaches for expansive processes, and frameworks that better incorporate worker-centric perspectives into BPMN.

## **CONCLUSION**

BPMN remains a foundational pillar of Business Process Management as the dominant standard for process mapping and modeling. The literature from 2020 to 2025 demonstrates a clear shift from syntactic concerns toward challenges associated with organizational complexity, digital transformation, and emerging technologies. Addressing issues of modeling subjectivity, expansive processes, and human-centered work practices, while leveraging best practices such as strong governance, alignment, and simulation, is essential for ensuring that BPMN fulfills its role as a



strategic, predictive, and value-generating instrument in contemporary organizations.

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