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Bridging the Gap: A Systematic Review and the QualyPM Framework for Aligning Quality Tools with Project Management Practices.

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Bridging the Gap: A Systematic Review and the QualyPM Framework for Aligning Quality Tools with Project Management Practices.

1 INTRODUCTION

In a globalized and increasingly competitive environment, organizations face ongoing pressure to achieve operational excellence, economic sustainability, and regulatory compliance. To address these demands, the pursuit of integrated methodologies that drive consistent improvements in performance and quality has become a strategic priority (Escobar et al., 2018). Established tools from quality and production engineering—such as Measurement System Analysis (MSA), process capability indices including Process Capability (Cp), Process Capability Index (Cpk), Preliminary Process Capability (Pp), and Preliminary Process Capability Index (Ppk), Time Study, and the Overall Equipment Effectiveness (OEE) indicator—are employed to monitor, control, and optimize production processes, these tools provide metrics on process variability, measurement reliability, and operational performance (Pyzdek & Keller, 2014; Corrales et al., 2020).

However, the isolated use of these tools, while useful, may be insufficient to address the complexity of modern organizational challenges (Damasiotis; Fitsilis, 2019; Ogbonna, 2020). Their effectiveness increases significantly when integrated into structured improvement projects guided by Lean and Six Sigma philosophies. The Lean Six Sigma approach employs the DMAIC cycle (Define–Measure–Analyze–Improve–Control) to reduce waste and variability, often using statistical and operational tools in each phase (Womack; Jones, 1996; Pyzdek; Keller, 2014) across different sectors (Kjersem et al., 2015).

Project management has also become essential for implementing transformation initiatives. The PMBOK Guide, published by the Project Management Institute (PMI), offers a framework for managing the project life cycle. Its 7th edition presents a flexible structure based on performance domains and principles, emphasizing value delivery, adaptability, and stakeholder collaboration (PMI, 2021; Adamantiadou; Tsironis, 2025).

Publications on process capability indices have increased significantly over the past decade, focusing on the statistical assessment of the conformity between actual process performance and its specifications. The indices Cp, Cpk, Pp, and Ppk quantify process variability under different control and stability conditions, enabling standardized comparisons across production lines, shifts, or suppliers (Kotz; Johnson, 2002).

Recent reviews highlight efforts to map practices and identify gaps in the use of these indicators, including machine learning–based approaches for controlling dispersion and bias (You et al., 2025). Other studies discuss the evolution of Process Capability Indices applied to normal, non-normal, discrete, and multivariate distributions, and propose generalized indices and conditional ranking techniques for process analysis (Saha; Maiti, 2015). These works underscore the need for conceptual and technical systematization of such metrics, especially in industrial environments where data-driven decision-making and integration with digital systems are essential.

The application of OEE has expanded beyond manufacturing, encompassing services and administrative processes (Corrales et al., 2020). MSA has increasingly been integrated with digital technologies, such as IoT sensors and computer vision systems, enabling more agile and accurate assessments of measurement quality (Jaramillo-Alcázar et al., 2023). Time Study, a traditional technique for measuring process durations, has been incorporated into digital tools to provide data-driven insights for productivity management (Escobar et al., 2018).

Despite the individual relevance of quality, productivity, and project management tools, there is a noticeable gap in both the scholarly and practitioner literature regarding their systematic integration. Although numerous case studies report the use of MSA, Cp, Cpk, Pp,

Ppk, or OEE in improvement projects (Escobar et al., 2018), few studies examine how these tools are articulated within a standardized project management framework such as that proposed by the PMBOK Guide. This lack of systematization poses a challenge to the replicability of methods, hindering the comparison of results across initiatives and sectors, and thereby limiting theoretical advancement on the synergy between these approaches (Adamantiadou; Tsironis, 2025). Even where specialized project management evaluation tools have been proposed (Barghoth; Salah; Ismail, 2020), the literature still lacks a unified approach aligning classical quality tools with project management frameworks.

This article investigates the intersection between quality and productivity tools and structured project management through a systematic literature review. The central objective is to map and analyze how studies between 2013 and 2025 have addressed the integrated application of these tools in process rationalization and improvement projects, seeking to answer the following research questions:

RQ1: How has the literature addressed the integration of statistical and operational quality tools (such as MSA, Cp, Cpk, Pp, Ppk, OEE, and time study) in structured process improvement projects?

RQ2: What are the main gaps and opportunities in the coordinated use of statistical and operational quality tools from the perspective of the principles and performance domains of the PMBOK Guide?

Based on a critical analysis of the selected studies, this paper seeks to develop a theoretical framework that positions the principal quality and productivity tools within the typical phases of the project life cycle, aligning their application with the performance domains proposed by the PMBOK. This framework is expected to serve as a methodological guide for researchers and professionals aiming to implement process improvements in a more structured, effective, and management-aligned manner (PMI, 2021).

By addressing this methodological gap, the article contributes to advancing knowledge at the intersection of project management, quality engineering, and operational excellence, offering practical insights for organizations to optimize their processes more strategically (Sousa; Voss, 2008).

2 METHODOLOGY

This study adopts a systematic literature review (SLR) with a qualitative, exploratory approach, guided by the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Page et al., 2021). The SLR method was chosen for its ability to synthesize existing knowledge in a rigorous, transparent, and replicable way, focusing on the integration of quality and productivity tools into structured project environments.

The literature search was carried out in internationally recognized academic databases and relevant national repositories: Web of Science, ScienceDirect, IEEE Xplore, Scopus, SEMEAD (Seminários em Administração, from FEA-USP), and EnANPAD (Encontro da Associação Nacional de Pós-Graduação e Pesquisa em Administração).

The search strategy was structured around three core thematic axes – quality and productivity tools, Lean and continuous improvement, and project management – with key terms and their variations defined for each, as shown in Table 1.

Table 1 – Search terms by thematic area

Thematic Area	Search Terms (English and Portuguese)
Quality and Productivity Tools	"process capability" OR "Cp Cpk" OR "measurement system analysis" OR "MSA" OR "gage R&R" OR "gauge R&R" OR "overall equipment effectiveness" OR "OEE" OR "time study" OR "cronoanálise" OR "capabilidade de processo" OR "análise do sistema de medição"
Lean and Continuous Improvement	"Lean" OR "Six Sigma" OR "Lean Six Sigma" OR "continuous improvement" OR "melhoria contínua" OR "kaizen" OR "waste reduction" OR "redução de desperdício"
Project Management	"project management" OR "PMBOK" OR "PMI" OR "project life cycle" OR "gestão de projetos" OR "ciclo de vida de projeto" OR "gerenciamento de projetos"

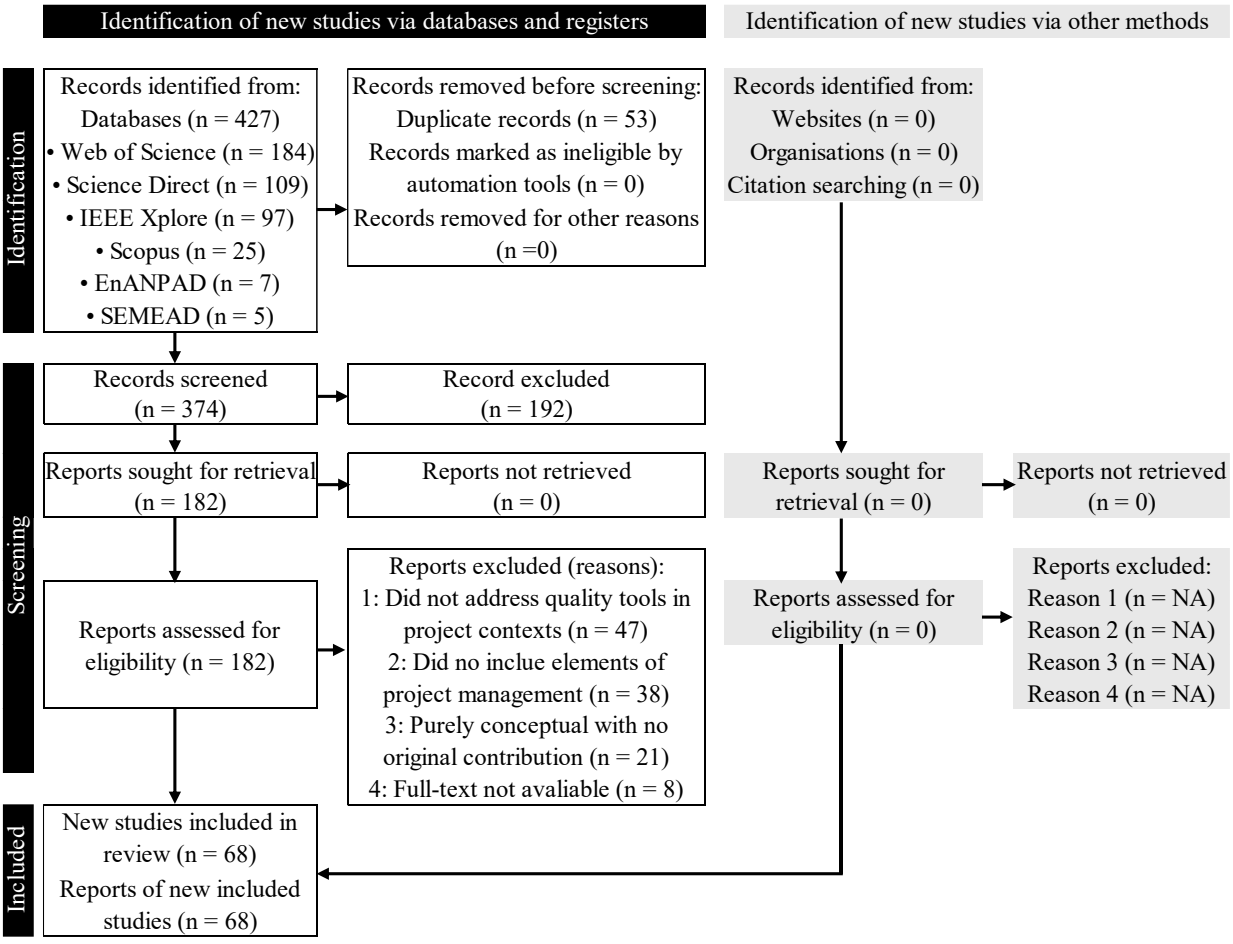


Figure 1 – PRISMA Flow Diagram of the Article Selection Process

Inclusion and exclusion criteria were applied to ensure the relevance and quality of the studies. Inclusion criteria: peer-reviewed articles published within the defined period; full texts in Portuguese or English; explicit application of at least one quality or productivity tool in structured project contexts; reference to project management elements; case studies, field research, or theoretical papers with original contributions. Exclusion criteria: publications lacking practical application or theoretical novelty; theses, dissertations, and non-peer-reviewed

reports; studies on quality or productivity tools with no link to project practices; papers on project management with no mention of quality tools; and publications from limited-scope or non-peer-reviewed conferences. The selection process followed the PRISMA protocol stages, as illustrated in figure 1 and described below.

Identification: The initial database search yielded 427 potentially relevant articles. After removing 53 duplicates, 374 unique records remained for screening.

Screening: Titles and abstracts of these 374 records were evaluated against the inclusion/exclusion criteria. This step led to the exclusion of 192 records that did not meet the criteria, leaving 182 articles for full-text assessment.

Eligibility: Full-text analysis of the 182 articles was conducted to determine alignment with the review objectives. An additional 114 studies were excluded at this stage for the following reasons: 47 did not address quality tools in a project context; 38 lacked project management elements; 21 were purely conceptual with no original contribution; and 8 had no full-text available.

Inclusion: A total of 68 articles were selected for in-depth analysis. Of these, 32 were published between 2013 and 2020, and 36 between 2021 and 2025, reflecting growing interest in the topic in recent years.

The 68 selected articles were analyzed and classified across multiple dimensions to identify patterns, trends, and gaps in the literature. A structured review protocol was employed, consistent with practices in production engineering and operations management. The analysis focused on five key aspects: the quality and productivity tools employed; the sectors in which they were applied; the methodological approaches adopted; the level of integration among tools; and the presence of project management elements.

In terms of tools, the studies included techniques such as MSA, process capability indices (Cp, Cpk, Pp, Ppk), OEE, time study, and related methods for quality control and productivity improvement (Corrales et al., 2020; Wu; Pearn; Kotz, 2009). The application contexts were predominantly industrial, with emphasis on sectors such as automotive, aerospace, pharmaceutical, electronics, food and beverage, and services (Sunmola; Burgess; Wertheim-Heck, 2024). The methodological approaches spanned single and multiple case studies, action research, surveys, modeling/simulation, and literature reviews.

Regarding the level of tool integration, studies were classified by degree of integration: from isolated use, to sequential use of multiple tools, up to fully integrated and synergistic application. Additionally, we identified whether and how project management elements were incorporated—such as references to formal frameworks like PMBOK, structuring by project phases, stakeholder engagement, risk management strategies, governance mechanisms, and performance measurement (Adamantiadou; Tsironis, 2025; Pandi-Perumal et al., 2015).

Content analysis of the articles followed Bardin's methodology (2015), adapted to our review's scope and objectives. This involved three stages: pre-analysis (initial reading and definition of analytical categories), material exploration (systematic coding of findings according to predefined dimensions), and treatment of results (synthesizing themes from the coded data). To ensure reliability in the qualitative coding, inter-coder agreement was measured using Cohen's Kappa, yielding a value of 0.87. According to Landis; Koch (1977), this represents an almost perfect level of agreement.

To complement the qualitative synthesis, we applied bibliometric techniques, including co-citation analysis and collaboration network mapping using VOSviewer (v1.6.20). These methods helped identify key research clusters, theoretical approaches, and collaboration patterns in the intersection of quality tools and project management. The findings were organized into four thematic axes for presentation of results: overall publication landscape; application and combination of quality tools; presence of project management elements; and gaps identified in the literature.

3 RESULTS

This section presents the main findings of the systematic review, structured into four dimensions: the publication landscape, the application and combination of quality tools, the presence of project management elements, and the research gaps identified in the literature.

Publication Landscape. The analysis of the 68 selected articles indicates a growing interest in integrating quality and productivity tools with project management practices. Figure 2 shows the temporal distribution of publications, with a notable increase from 2021 onward: 36 articles (52.9% of the total) were published between 2021 and 2025.

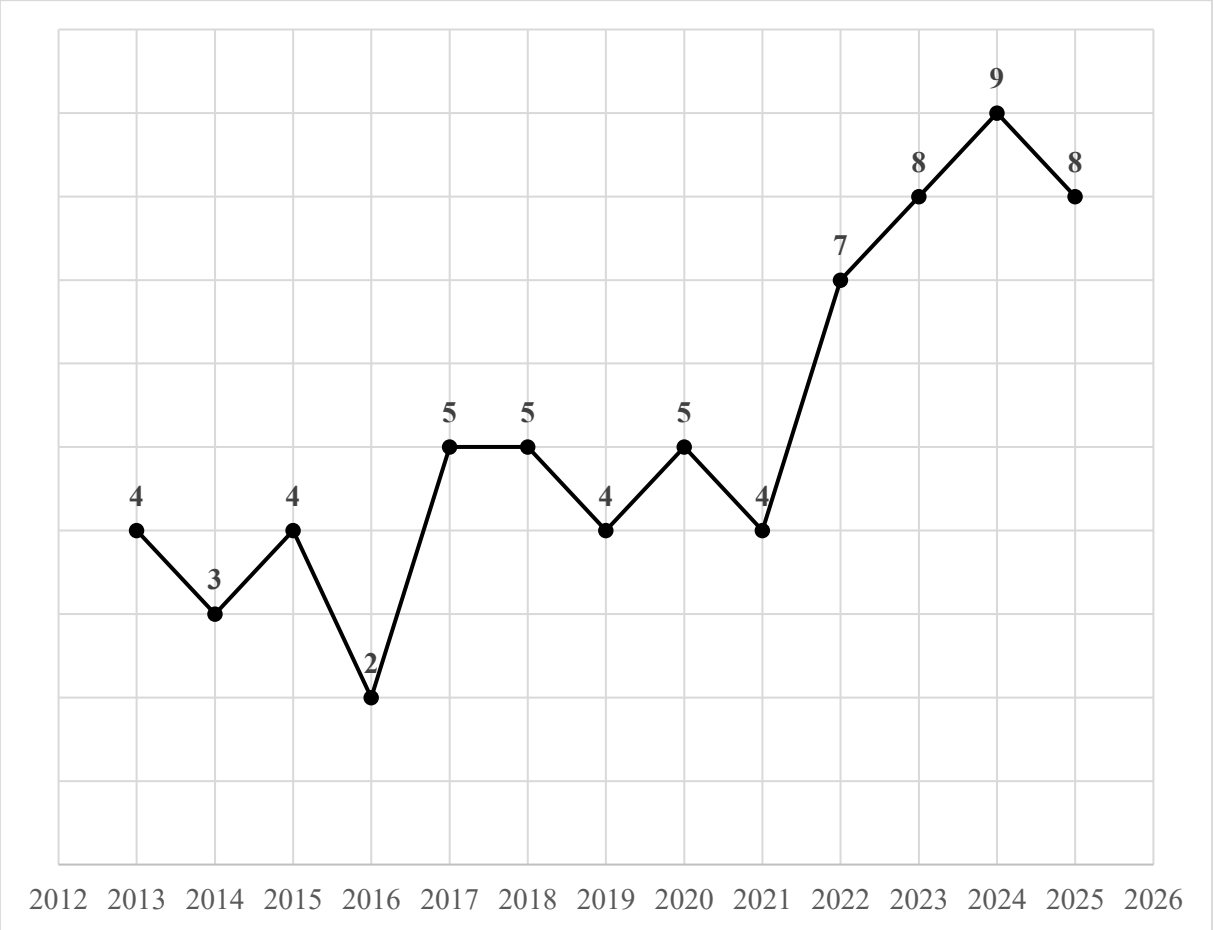


Figure 2 - Temporal distribution of publications (2013–2025)

Geographically, research is concentrated in countries with strong industrial traditions. The United States (15 articles), China (12), India (9), Germany (7), and the United Kingdom (UK) (6) lead in publications, reflecting these countries' interest in integrated methodologies for process improvement. In terms of publication venues, the articles appear mostly in journals specializing in quality management, production engineering, and project management. The International Journal of Production Research (7 articles), International Journal of Quality & Reliability Management (5 articles), International Journal of Project Management (4 articles), and Journal of Cleaner Production (4 articles) are the most prominent in this set.

Bibliometric analysis of co-authorship revealed five main clusters of researchers, indicating emerging scholarly communities dedicated to this topic. The largest cluster, led by

researchers from India, Germany, and the UK, focuses on applying quality tools in Lean Six Sigma projects. The second cluster, predominantly composed of American and Asian researchers, emphasizes integrating statistical tools with agile project management methodologies. From a methodological standpoint, case studies predominate (42 articles, 61.8%), followed by surveys (12 articles, 17.6%), modeling/simulation (8 articles, 11.8%), and literature reviews (6 articles, 8.8%). The prevalence of case studies suggests a field still in consolidation, valuing practical, context-specific applications of tools for knowledge building.

The frequency of specific quality and productivity tools is illustrated in Figure 3.

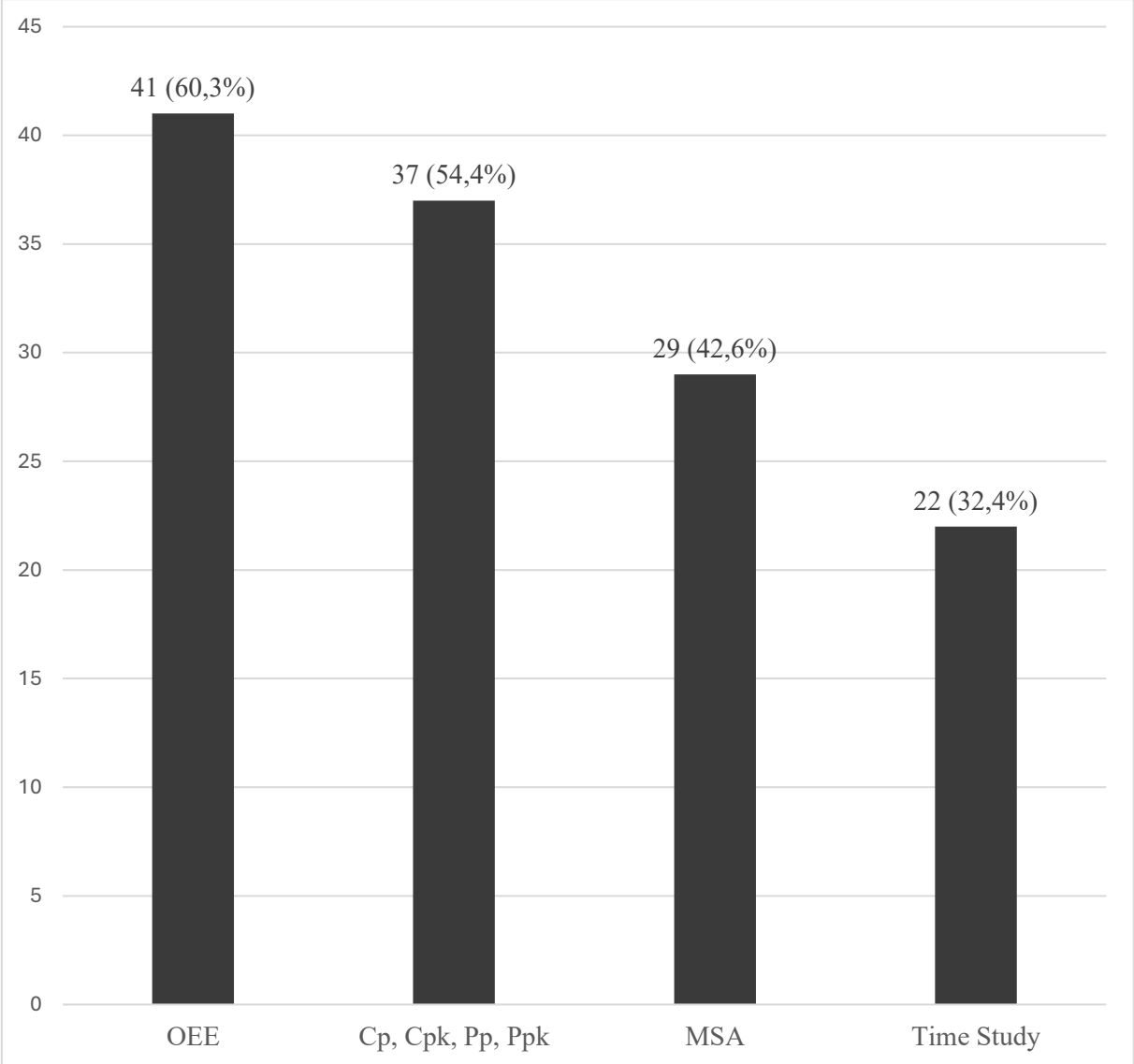


Figure 3 - Frequency of tool usage in the analyzed articles

OEE stands out as the most frequently addressed tool, appearing in 41 articles (60.3%). This prominence may be attributed to OEE's integrative nature, combining availability, performance, and quality dimensions.

The rank second indices, found in 37 articles (54.4%), with heavy use in sectors with strict quality requirements (e.g., automotive, aerospace, pharmaceuticals). MSA is discussed in 29 articles (42.6%), often as a prerequisite for capability studies or for implementing statistical process control.

Time study appears in 22 articles (32.4%), commonly associated with line balancing and layout optimization projects. A particularly relevant aspect is how these tools are used in combination. Table 2 presents a co-occurrence matrix indicating how often pairs of tools were jointly applied in the studies.

Table 2 - Co-occurrence matrix of quality and productivity tools

Tool	OEE	Cp, Cpk, Pp, Ppk	MSA	Time Study
OEE	41	19	12	15
Cp, Cpk, Pp, Ppk	19	37	24	8
MSA	12	24	29	5
Time Study	15	8	5	22

A strong association between MSA and capability indices was found in 24 articles, reflecting the logical sequence of validating the measurement system before assessing process capability. The combination of OEE with capability indices, seen in 19 articles, is also notable, suggesting approaches that integrate production efficiency metrics with product quality metrics.

In terms of overall integration level, 26 articles (38.2%) demonstrate a high degree of tool integration, characterized by synergistic and complementary use of multiple tools. In contrast, 31 articles (45.6%) show a medium level, with sequential but only partially connected use of tools, and 11 articles (16.2%) exhibit low integration, using tools in isolation.

The analysis of project management elements revealed a heterogeneous incorporation of project management elements across studies. Only 23 articles (33.8%) explicitly mention PMBOK or an equivalent project management methodology.

However, 47 articles (69.1%) indicate some form of phase-based project structuring, albeit with varying terminology and frameworks. Some align with traditional PMBOK phases (initiation, planning, execution, monitoring and control, closure), while others integrate project management with methodologies like the Six Sigma DMAIC cycle or use customized phase models. Table 3 summarizes the frequency of specific project management elements found.

Table 3 - Frequency of project management elements in the analyzed articles

Project Management Element	# Papers	%
Phased Structuring	47	69,1%
Stakeholder Consideration	39	57,4%
Performance and Value Measurement	36	52,9%
Risk and Uncertainty Management	21	30,9%
Project Governance	18	26,5%
Explicit Reference to PMBOK	23	33,8%

Stakeholder consideration and performance measurement appear with moderate frequency (in 57.4% and 52.9% of the studies, respectively), whereas more advanced elements such as risk management and project governance are less common (present in only 30.9% and 26.5% of studies, respectively). For example, one study proposed a set of tools to manage risk and improve quality outcomes in corporate event projects (Dounavi et al., 2022), illustrating an integrated approach that remains rare.

This moderate presence of certain elements is noteworthy given that robust monitoring and evaluation systems are known to enhance project success (Muriuki et al., 2021). A temporal analysis shows an increase in project management integration over time: among the 36 articles published in 2021–2025, 15 (41.7%) explicitly reference PMBOK, compared to only 8 (25.0%) of the 32 articles from 2013–2020. Sector-wise, formal project management elements are more often present in industries with complex project environments (e.g., aerospace with 83.3% of relevant articles referencing PMBOK, defense 75.0%) and markedly less in others (e.g., food and beverage 16.7%, textiles 0%).

A critical analysis of the selected studies identified six major gaps regarding the integration of quality and productivity tools into projects, highlighting opportunities for future research and development:

Gap 1 (Methodological): The absence of frameworks that explicitly position quality and productivity tools across the phases and performance domains of project management. Many studies use these tools in project contexts, but few adopt a systematic approach aligned with established project management best practices—especially those outlined in PMBOK 7, which emphasizes principles and performance domains.

Gap 2 (Contextual): A concentration of research in large companies within traditional sectors (notably automotive and aerospace). There is a lack of studies on integrating these tools in small and medium enterprises, startups, public organizations, and emerging sectors such as the circular economy and creative industries. This limits understanding of necessary adaptations in diverse organizational contexts.

Gap 3 (Technological): Limited incorporation of emerging technologies. Despite the Industry 4.0 revolution (4IR), few studies examine the potential of tools like IoT, artificial intelligence, blockchain, or digital twins to enhance the integration of quality methods with project management. While some literature addresses project planning challenges in the 4IR era (Kafile, 2021), the specific potential of such technologies for quality–project integration remains underexplored. This is a significant omission given these technologies' ability to automate data collection, enable predictive analytics, and support real-time decision-making.

Gap 4 (Sustainability): Minimal consideration of environmental and social sustainability in applying quality tools within projects. With growing emphasis on sustainability, there is an opportunity to integrate traditional performance metrics with environmental and social criteria in future frameworks.

Gap 5 (Empirical Validation): A lack of robust empirical validation for many proposed models. Few longitudinal studies track the implementation of integrated approaches over time or evaluate their long-term effects, critical success factors, and obstacles.

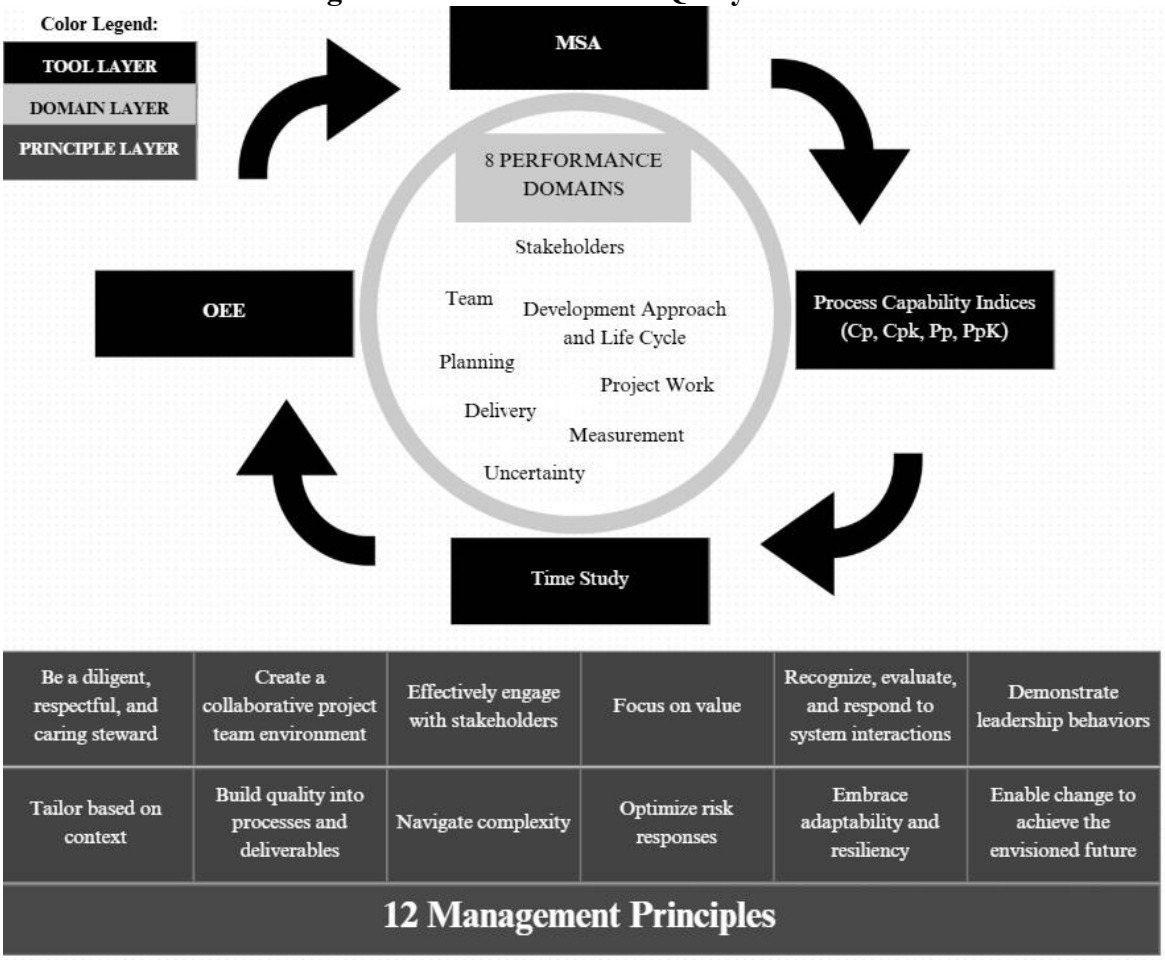
Gap 6 (Skills and Training): Limited attention to the competencies required to integrate quality tools and project management. Given the interdisciplinary nature of this challenge, there is room to advance research on professional training, the formation of multidisciplinary teams, and the overcoming of organizational barriers.

These gaps, identified through the literature review, underscore the need for an integrative framework, which is proposed in the next section. The proposal primarily addresses the first gap (methodological) by providing a structured approach to position quality and productivity tools throughout the project life cycle, aligned with the principles and performance domains of the PMBOK.

4 FRAMEWORK

Based on the results of the systematic review and the identified gaps, this section presents a framework for positioning quality and productivity tools throughout the life cycle of industrial projects, aligned with PMBOK principles and performance domains. The framework, entitled Quality and Productivity in Project Management (QualyPM), provides a structured and adaptable approach to integrating these tools into process improvement projects. QualyPM is organized into three layers, as illustrated in Figure 4.

Figure 4 - Structure of the QualyPM Framework



The framework for integrating quality and productivity tools with project management is built on three interconnected layers.

The Principles layer, grounded in the twelve project management principles of PMBOK, forms the value foundation of the model, guiding behaviors, decision-making, and the consistent application of tools throughout the project life cycle.

The Domains layer, structured according to the eight performance domains of the same guide, represents the functional core of the framework, outlining the key areas where tools should be applied and coordinated.

The Tools layer positions quality and productivity instruments within a dynamic, sequential cycle of use, anchored in the performance domains and guided by the principles.

This multilayered structure ensures coherence, adaptability, and practical applicability, enabling the integrated use of tools in line with project management best practices.

5 DISCUSSION

This section discusses the theoretical and managerial contributions of the study, as well as its limitations, by situating the proposed framework within the broader landscape of existing literature and organizational practice. The QualyPM framework, developed from the systematic review, offers several contributions to the interdisciplinary field connecting quality engineering, productivity, and project management.

From a theoretical perspective, the framework addresses a key methodological gap: the absence of models explicitly positioning quality and productivity tools within the modern structure of project management. By aligning these tools with the performance domains of PMBOK 7th edition, QualyPM conceptually bridges disciplines that have traditionally been treated separately in research. This integration is particularly relevant given the evolution of the PMBOK, which in its 7th edition shifted from a process group and knowledge area structure to a principles-and-domains orientation, opening opportunities for more organic integration of quality management methods.

The framework also proposes a contingency-based approach to using quality and productivity tools. Unlike prescriptive models that mandate a fixed sequence of implementation, QualyPM recognizes that each tool's relevance can vary depending on the project phase, organizational context, and development methodology. This perspective aligns with contemporary organizational theory emphasizing that management practices must fit their context (Sousa; Voss, 2008), and it echoes calls for context-sensitive project management (Atkinson; Crawford; Ward, 2006).

In addition, QualyPM broadens the conceptual scope of quality and productivity tools. Traditionally viewed as technical instruments for process control, these tools are repositioned in this framework as strategic instruments spanning multiple performance domains, including stakeholder engagement and team management.

This broader outlook aligns with emerging discussions of Quality 4.0, which advocate a strategic, holistic view of quality in the era of digital transformation. Moreover, the framework introduces maturity levels for the integration of quality tools with project management. This evolutionary perspective acknowledges that effective integration is not achieved instantaneously but is instead a progressive journey of building organizational capabilities. Maturity models of this nature offer valuable roadmaps for advancing interdisciplinary practices by delineating stages of growth in integration capability.

In terms of managerial implications, the QualyPM framework provides practical guidance for practitioners. It offers a structured map for selecting and applying tools at different project stages (see Table 4), helping project managers decide which tools to prioritize at each phase to optimize resources and maximize value. The framework also highlights the importance of effective stakeholder communication: improvement projects often struggle to translate technical concepts for diverse audiences (Goodman; Thompson, 2017), and by linking tools to stakeholder engagement, QualyPM helps align expectations and enhance stakeholder involvement (Ibraheem, 2018).

Another key implication is the emphasis on developing necessary competencies within project teams. By identifying the skills required to apply quality and productivity tools in project settings, the framework provides a roadmap for targeted training and for assembling multidisciplinary teams.

Addressing this competence gap is vital, as it often constrains the success of integrated methodologies. The framework further underscores adaptability to various organizational contexts through its maturity levels. These allow organizations to embark on the integration journey from their current state of readiness, avoiding overly ambitious initiatives that could lead to frustration and abandonment. This gradual implementation strategy is consistent with recommendations for context in project management (Atkinson; Crawford; Ward, 2006).

QualyPM also suggests strategies to overcome common barriers to integration, offering managers concrete guidance for dealing with organizational resistance or siloed cultures. By proactively recognizing such barriers and recommending ways to address them, the framework increases the likelihood of successful methodological transformation initiatives.

This study has several limitations. Although the SLR was conducted rigorously (Page et al., 2021), it focused on formal academic publications, potentially omitting insights from grey literature, technical reports, and practitioners' experience. Additionally, restricting the search to Portuguese and English sources may have led to the exclusion of relevant studies published in other languages.

Another limitation is the selection of tools examined: the review concentrated on four specific tools (MSA, capability indices, OEE, and time study) without examining others that might also be relevant (e.g., FMEA, QFD, DOE, or newer AI-based tools). This narrow focus, while reflecting the prevalence of these tools in the literature, simplifies the broader spectrum of quality and productivity techniques in practice.

A further limitation is the lack of empirical validation of the proposed framework. Although QualyPM is grounded in the literature and supported by evidence from the reviewed studies, it has not yet been tested in real-world projects. Without such practical validation, the framework's effectiveness remains to be confirmed. The generalizability of the findings may be limited by the context of the source literature.

The framework was derived primarily from studies in traditional industrial sectors (notably automotive and aerospace). Its applicability to other contexts—such as small enterprises, service industries, public sector projects, or different cultural environments—may require adaptations beyond the scope of this research. For example, project management in government-sponsored initiatives (Muriuki et al., 2021) or in software development settings (Barghoth; Salah; Ismail, 2020) might pose unique challenges not fully addressed by QualyPM.

This study only briefly touched on the implications of digital transformation (Industry 4.0) for integrating quality tools with project management. Although these trends were acknowledged, we did not explore in depth how emerging technologies (IoT, AI, blockchain, etc.) might fundamentally reshape the use of quality and productivity tools in future projects. These limitations point to directions for future research. Subsequent studies should consider expanding the scope to include additional tools and contexts, empirically test the QualyPM framework across different organizational settings, explore its relevance in emerging or non-industrial sectors, and examine how advanced digital technologies might influence the integration of quality and project management methodologies.

6 CONCLUSION

This study set out to investigate the integration of quality and productivity tools into structured process improvement projects, to identify key gaps in the literature, and to propose an integrative framework aligned with the principles and performance domains of PMBOK 7th edition. Through a systematic literature review of 68 articles published between 2013 and 2025, we found a heterogeneous landscape of practices, with significant opportunities for advancement in both theory and practice.

The results show that while tools such as MSA, capability indices, OEE, and time studies are frequently utilized in improvement initiatives, their formal integration with structured project management frameworks remains limited. Only about one-third of the reviewed articles explicitly reference standard project management methodologies like PMBOK, suggesting that the quality management and project management domains often operate in silos. Nonetheless, we observed a gradual shift: the inclusion of project management elements has increased in recent years (2021–2025), and sectors with inherently complex projects (e.g., aerospace, automotive) exhibit a higher maturity in integrating these disciplines. In contrast, industries such as food and beverage or textiles still lag in this integration.

The gaps identified—spanning methodological, contextual, technological, sustainability-related, empirical, and competency-related issues—informed the development of the QualyPM framework. Structured in three layers (principles, domains, and tools) and incorporating maturity levels, QualyPM provides a systematic way to position quality and productivity tools across the project life cycle, aligned with contemporary project management thinking as embodied in PMBOK 7.

Key theoretical contributions of this work include bridging previously disconnected disciplines by aligning quality tools with project management domains, promoting a contingency-based and context-aware deployment of tools, broadening the strategic perspective on quality tools (consistent with Quality 4.0 concepts), and conceptualizing integration as an evolutionary journey via maturity levels rather than a one-time change.

From a practical standpoint, the study offers project practitioners guidance on choosing and applying tools at various project stages, insights into effective communication with stakeholders about quality initiatives, suggestions for developing the necessary skills and multidisciplinary teams to support integration, and strategies to anticipate and overcome common organizational barriers to change. By outlining a path with defined maturity stages, the QualyPM framework allows organizations to tailor the integration process to their current capabilities, improving the likelihood of successful adoption and avoiding scenarios where poorly planned initiatives fail to take root.

The limitations of this research—such as its focus on certain tools and sectors, the lack of empirical validation, and the limited exploration of new technologies—open avenues for future work. Further research is encouraged to broaden the range of tools studied (including emerging methodologies), to test and refine the QualyPM framework in real-world settings (e.g., through pilot projects or case studies), and to investigate how factors like digital transformation, organizational culture, and change management practices affect the integration of quality tools and project management.

In conclusion, effectively integrating quality and productivity tools with structured project management represents a promising opportunity for organizations seeking systematic and sustainable process improvements. The QualyPM framework introduced in this study offers an adaptable model for achieving this integration, grounded in current literature and aligned with established management frameworks. Its successful implementation, however, should be viewed not as a standalone technical fix but as part of a broader organizational transformation—one that encompasses strategic alignment, capability building, and cultural change. Ultimately, true methodological integration transcends the mere use of tools and techniques; it emerges as a mindset that permeates all levels of the organization. This holistic perspective—acknowledging the interdependence of technical, human, and organizational factors—is essential to ensure that the convergence of quality and project management yields sustainable value and enhances organizational competitiveness and resilience in an ever-evolving, complex environment.

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