UPRAVLJANJE PROJEKTIMA U INDUSTRIJI 4.0 I 5.0: KOMPARATIVNA ANALIZA POSLEDNJIH IZDANJA PMBOK-A
PROJECT MANAGEMENT IN THE INDUSTRY 4.0 AND 5.0: A COMPARATIVE ANALYSIS OF RECENT PMBOK EDITIONS

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Apstrakt: *Ova studija upoređuje 6., 7. i predstojeće 8. izdanje PMBOK vodiča kroz kvalitativnu i kvantitativnu analizu njihovih sadržaja. Kroz rad se ističe razvoj od procesno orijentisanog okvira u PMBOK-u 6, preko pristupa zasnovanog na principima u PMBOK-u 7, do PMBOK-a 8 (planiranog za 2026), koji objedinjuje ova dva modela u hibridni pristup sa posebnim naglaskom na veštačku inteligenciju (AI) i održivo upravljanje projektima. Analiza pokazuje postepeni pomak ka isporuci vrednosti, unapređenom upravljanju, strateškom raspolaganju resursima i stvaranju vrednosti usmerenoj na zainteresovane strane, uz sve izraženiju ulogu ljudske dinamike i stručne procene u postizanju uspeha projekata. Ovaj razvoj usklađuje standarde upravljanja projektima sa složenim zahtevima industrija 4.0 i 5.0, koje povezuju čoveka i tehnologiju.*
Ključne reči: *Standardi za upravljanje projektima, Upravljanje projektima uz pomoć VI, PMI, PMBOK, Alati i tehnike upravljanja projektima*

Abstract: *This study comparatively analyzes the PMBOK Guide's 6th, 7th, and upcoming 8th editions through qualitative and quantitative content analysis. It traces the evolution from PMBOK 6's process-oriented framework to PMBOK 7's principles-based approach. PMBOK 8 (expected 2026) synthesizes these into a hybrid model, with explicit focus on Artificial Intelligence (AI) and sustainable project management. The analysis reveals a progressive shift towards value delivery, enhanced governance, strategic resource management, and stakeholder-centric value creation, increasingly integrating human dynamics and expert judgment. This evolution aligns project management standards with the complex, human-technology integrated demands of Industries 4.0 and 5.0.*
Key words: *Project management standards, AI Project Management, PMI, PMBOK, PM Tools and techniques (T&T)*

1. INTRODUCTION

The rapid digital transformation driven by Industry 4.0 and the emerging paradigm of Industry 5.0 has redefined how organizations conceive, design, and execute projects. Both value-driven industry 5.0, which stresses human-centric, sustainable, and resilient approaches, and technology-driven industry 4.0, which is defined by cyber-physical systems, automation, and data-driven decision-making, call for new methods of conducting business (Xu et al., 2021). Project management becomes a crucial skill in this situation to guarantee that organizational change and technology implementation go smoothly (Petrović et al., 2023).

One of the main groups establishing international project management standards and procedures is the Project Management Institute (PMI) (Starkweather & Stevenson, 2011). Its publication, the PMBOK Guide, is widely used by practitioners, educators, and organizations and is acknowledged as a major source of project management knowledge (Reich & Wee, 2006). The PMBOK Guide stands out for its systematic structure, broad applicability, and ongoing adaptation to industry changes, making it particularly relevant for analyzing project management standards in the context of Industry 4.0 and 5.0, even though other methodologies like PRINCE2 and ISO 21500 are also used (Drob & Zichil, 2013).

The limited comparative analysis of the most recent editions of the PMBOK Guide (6th, 7th, and 8th) represents the research gap that this paper attempts to fill. Few studies thoroughly assess how knowledge areas, principles, processes, tools, and techniques have been redefined across versions and how these changes align with the demands of modern industries, despite previous research by Rosenberger & Tick (2018), Chistyakova & Yudin (2022), and Zambrano et al. (2024) discussing individual editions or general trends.

Accordingly, the paper's goal is to examine and contrast the three most recent editions of the PMBOK, emphasizing any new features, changes in focus, or methodological advancements they bring. By doing this, the study aims to demonstrate how companies can change project management standards to meet the complexity and human-technology integration required by emerging industrial paradigms.

2. LITERATURE REVIEW

2.1. Project Management in Industries 4.0 and 5.0

Project management in practice rarely goes exactly as planned. Teams often face data overload, unpredicted hurdles, or monotonous administrative work that slows everything down. Such issues don’t just test patience, they can stretch timelines and drain budgets (Shoushtari et al., 2024). In recent years, digital transformation, especially through Industry 4.0 and 5.0, has started to change that picture. Automation

tools now take over much of the repetitive workload, while data analytics provides clearer insights for faster, evidence-based decisions (Rincon-Guio et al., 2023; Taboada et al., 2023).

What makes these new approaches particularly interesting is the way they combine advanced technology with human judgment. Rather than replacing people, Industries 4.0 and 5.0 seek to build systems where intuition and experience work alongside AI and automation. This balance creates workplaces that are more flexible, collaborative, and sustainable what is essentials for the future of responsible project management (Taboada et al., 2023).

According to Shoushtari et al. (2024), artificial intelligence (AI) is already reshaping project management across several key areas such as communication, scheduling, risk forecasting, resource planning, and budgeting. In practice, this means that many of the time-consuming or repetitive activities that once required human effort are now being automated. As a result, project teams can redirect their focus toward analytical and creative aspects of their work, leading to faster and more adaptive decision-making (Zadeh et al., 2024). Still, it's worth noting that AI doesn't replace the human factor. Tasks that depend on empathy, negotiation, or complex judgment continue to rely on people, while automated systems take on more routine coordination and monitoring. The Project Management Institute (2024) points out that this gradual shift is changing not just workflows, but also the roles and skills required in modern project teams.

2.2. PMI Recent Project Management Frameworks

During the last decade, the Project Management Institute (PMI) has introduced three major updates to its PMBOK Guide (6th, 7th, and 8th edition). The sixth edition, released in 2017, provided a detailed structure for managing projects in a standardized way. It unified terminology across industries and offered practical direction on using methods, tools, and procedures effectively (PMI, 2017). Together with the Agile Practice Guide, this version made one of the first serious attempts to connect agile principles with traditional project management, something many organizations had been struggling to do (Rosenberger & Tick, 2018).

The seventh edition, came out in 2021, marked a clear shift in philosophy. Instead of focusing mainly on processes, PMI emphasized principles and performance outcomes, encouraging teams to think more about the value they create than the steps they follow. According to PMI (2021), this edition was meant to inspire adaptability and innovation in complex environments. Chistyakova and Yudin (2022) note that this approach proved especially useful for IT and innovation-driven projects, which had previously found the sixth edition too rigid for rapidly changing requirements.

Anticipated in January 2026, the eighth edition builds upon earlier iterations by fusing principles-based and process-oriented methodologies. This edition broadens its focus

to include emerging technologies like artificial intelligence (AI) and places an emphasis on value delivery, attaining desired results, and incorporating Agile and hybrid approaches straight into the framework.

3. RESEARCH METHODOLOGY

This study is based on a comparative content analysis of the three most recent editions of the PMBOK Guide (6th, 7th, and 8th). Both qualitative and quantitative components are included in the research design. In addition to analyzing conceptual shifts in processes, knowledge domains, and principles, it also methodically counts and contrasts the quantity of tools, techniques, and processes that have been added, eliminated, or redesigned. Both structural changes in the standard and their alignment with the new features of Industry 4.0 and 5.0 projects can be found using this hybrid approach.

The primary data sources of the research are the official PMBOK Guides published in 2017, 2021, and 2024, while secondary sources include academic articles, PMI white papers, and industry reports on project management in digital transformation contexts. Data were extracted from each edition, organized into comparative matrices, and analyzed along three dimensions: (1) processes, (2) knowledge areas and performance domains and (3) tools and techniques.

The research procedure involved systematically reviewing each edition, coding relevant content, and performing cross-edition comparisons. The results were then interpreted with respect to the demands of Industries 4.0 and 5.0, focusing on adaptability, integration of digital tools, and value delivery. While this study provides a structured comparative overview, it is limited to PMI publications, especially since the comparisons for PMBOK 8 are based on its draft version, and does not include empirical validation through practitioner surveys or detailed comparisons with other methodologies such as PRINCE2 or Scrum. Furthermore, it is important to note that the conclusions drawn from quantitative analysis should be interpreted with caution, since the lists of tools and techniques (T&Ts) in the PMBOKs are not comprehensive but rather offered as suggested best practices.

4. RESEARCH RESULTS AND DISCUSSION

The comparative analysis highlights that the 7th Edition of the PMBOK Guide represents the most significant conceptual departure from its predecessor, while the 8th Edition integrates process-oriented and principle-driven perspectives. Specifically, PMBOK 6 is structured around 10 knowledge areas and 49 processes (PMI, 2017), whereas PMBOK 7 abandons this approach in favor of 12 principles and 8 performance domains (PMI, 2021). PMBOK 8 (PMI, 2024, draft) consolidates these frameworks into a hybrid structure, introducing 40 processes within 7 performance domains and reducing the principles to six.

This reflects an effort to restore practical guidance while maintaining adaptability. For example, stakeholder and communication processes are now in PMBOK 8 merged, Integration has been redefined as Governance, and the traditional processes Develop Project Charter and Develop Project Management Plan have been renamed Authorize Project Initiation and Integrate and Align Project Plans. At the same time, the schedule area has been significantly reduced (from six to three processes), while quality and procurement are no longer a distinct domain. Quality processes are embedded across all domaines, while procurement is relegated to an appendix. Table 1 presents a comparative overview of the key aspects of the three PMBOK Guide editions discussed.

Table 1: Qualitative comparative analysis between aspects of PMBOK Guides

Aspect	**PMBOK 6th Edition (Process-Based)**	**PMBOK 7th Edition (Principles-Based)**	**PMBOK 8th Edition (Hybrid Approach)**
Structure	49 processes grouped into 10 Knowledge Areas and 5 Process Groups	12 Project Management Principles and 8 Project Performance Domains	40 processes organized within 7 new Performance Domains and 5 Process Groups
Focus	Tactical project execution	Value delivery & measurement System	Sustainable project management and AI project management
Approach	Prescriptive, with a strong focus on formal Inputs, Tools and Techniques, and Outputs (ITTOs)	Adaptable and outcomes-focused, centered on delivering value and main project management principles	Blends the process-driven structure with the principles-based mindset. Processes are reintroduced, but focus remains on value delivery.
Technological orientation	Limited focus on technology integration.	Acknowledges modern practices but does not include specific guidance on AI or advanced data analytics.	Integrates discussions on AI, machine learning, and data analytics. A new AI appendix provides guidance on use cases and ethical considerations.
Success	Success measured primarily by process adherence and on-time/on-budget delivery.	Shifts focus toward value delivery and achieving desired outcomes for the customer in complex environment.	Strong emphasis on value creation, connecting project outcomes to organizational strategy and measurable benefits.

The quantitative analysis of tools and techniques (T&T) within Performance Domains/Knowledge areas further highlights these shifts (Figure 1). However, as it was previously said, the findings obtained in this way should be interpreted with caution, as the PMBOK T&T lists are not comprehensive but are offered only as suggestions of best practices. In PMBOK 6, the largest concentration of T&T was in Integration (13.83%), Risks (13.33%), and Resources (11,94%), while Procurement (4.72%) and Costs (7.22%) received the least attention. This reflects a framework focused on planning, control, and risk mitigation. By contrast, PMBOK 7 redistributed T&T toward Project Work (26.04%), Planning (20.08%), and Delivery (16.10%), while domains such as

Development Approach and Life Cycle (0%) and Uncertainty (5.57%) were minimally represented. PMBOK 8 again reshapes the distribution, concentrating T&T in Stakeholders (22.58%), Resources (20.23%), and Governance (17.89%). This demonstrates a progressive shift away from operational and cost-related areas toward governance, resource management, and stakeholder value, which are dimensions increasingly critical for projects in Industry 4.0 and 5.0 contexts, where emotional intelligence and human collaboration become key drivers of success (Ribeiro et al., 2021; Xu et al., 2021).

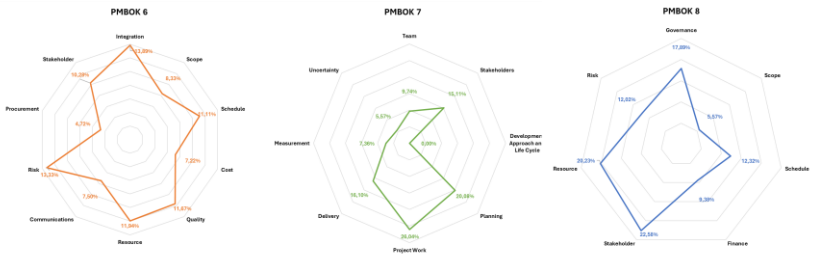

Figure 1: Prevalence of T&T within Performance Domains/Knowledge areas in the PMBOK Guides
Source: Authors' work

Further analysis reinforces these trends. The transition from PMBOK 6 to 7 introduced a dramatic 70.95% of new T&T, amounting to a 13.85% increase in total volume, driven by the entirely new structure that emphasized artifacts and models. Within this transition, the most new techniques were concentrated in Planning (25%), Project Work (21.6%), and Delivery (14.9%), while Development Approach and Life Cycle (2.6%) and Uncertainty (4.1%) contributed the least. The comparison between PMBOK 7 and 8 reveals a modest overall growth of only 2.7%, yet with a striking 73.68% of T&T reclassified as new due to structural changes. Here, Resources (16.1%) and Governance (13.1%) dominate the additions, while Finance and Scope (3% each) contribute minimally. Finally, the comparison of PMBOK 6 and 8 shows a growth of nearly 13% in the total number of T&T, with 30% being new. The largest expansions are in Governance (29.5%), Resources (45%), and Schedule (13.6%), whereas Finance, Risk, and Scope show almost no new contributions. These findings further support how governance, stakeholder management, and resource coordination are gaining prominence over purely operational concerns.

At the level of T&T groups, qualitative analysis shows clear shifts across PMBOK editions. From the 7th edition, significantly greater emphasis is placed on tailoring T&Ts, reflecting the growing recognition that project management practices must be adapted to the unique context of each project rather than applied uniformly. Another notable innovation in the 7th edition is the introduction of measurement as performance domain, a dimension absent in the 6th and 8th, which suggests a stronger orientation toward continuous improvement and evidence-based management. The

PMBOK 8th continues the focus on tailoring and provides the most detailed treatment of T&Ts as a separate chapter, with comprehensive examples and explanations. In contrast, in the 6th edition, T&Ts were only briefly addressed through the ITTO (Inputs, Tools, Techniques, and Outputs) framework, while in the 7th edition the focus shifted primarily to principles, leaving less room for operational guidance. These developments indicate an evolution from a prescriptive guide toward a flexible, principle-oriented, and ultimately practice-oriented standard.

Quantitive analysis further supported an evolution of focus across the three PMBOK editions (Figure 2). In PMBOK 6, data analysis (28.1%) and interpersonal/team skills (20.3%) dominate, reflecting a balance between technical and human factors. In PMBOK 7, the emphasis shifts strongly to data gathering and analysis (50%) and meetings/events (33.7%), while interpersonal skills are no longer explicitly recognized because they are presented as separate models. PMBOK 8 restores balance: data analysis decreases (20.2%), while communication (4.4%), decision-making (4.4%), and estimation (10.3%) gain greater importance. Interpersonal skills also return (17.6%), suggesting a stronger recognition of human dynamics. Furthermore, expert judgment is explicitly cited in every process of PMBOK 8, underscoring a shift from purely technical project management knowledge toward broader business acumen and contextual decision-making (PMI, 2024; Shoushtari et al., 2024).

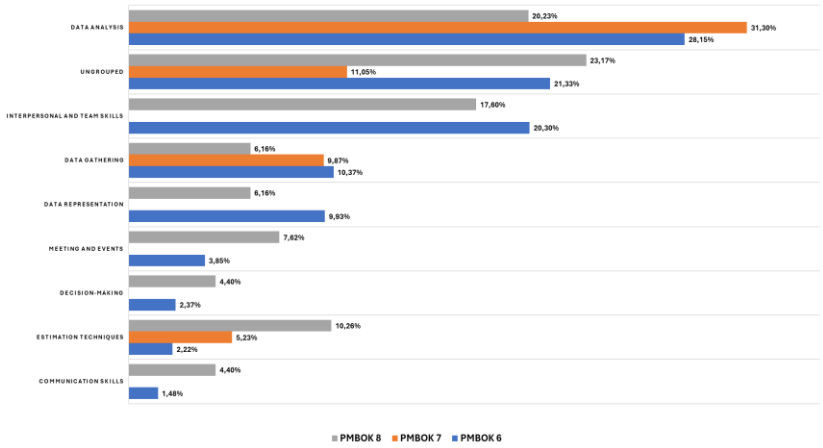

Figure 2: Prevalence of T&T groups in the PMBOK Guides
Source: Authors' work

Overall, the evolution of the PMBOK mirrors how project management has adapted to broader industrial changes, moving from efficiency-driven systems to more flexible and human-centered approaches (Xu et al., 2021; Wolniak, 2023). The sixth edition reflects the structured and process-oriented mindset of Industry 3.0, while the seventh introduces a needed shift toward adaptability and outcome-based thinking. The newest, eighth edition takes this further by combining practical process guidance with

attention to governance, value delivery, and the human side of teamwork. In this sense, PMBOK's latest direction aligns closely with the ideas behind Industry 5.0 such as sustainability, empathy in leadership, and creating value for all stakeholders (Petrović et al., 2023; Shoushtari et al., 2024).

5. CONCLUSIONS

This research examined the three most recent editions of the PMBOK Guide and how their evolution reflects wider industrial and technological shifts. The sixth edition remains rooted in structured, process-based management, while the seventh introduced a more flexible, principle-driven perspective focused on outcomes and adaptation. The upcoming eighth edition, expected in early 2026, aims to merge these two viewpoints. Its hybrid model brings stronger attention to sustainability and integrates emerging technologies such as artificial intelligence. Taken together, these editions trace a clear movement away from rigid procedural control toward governance, value creation, and stakeholder-oriented results. Just as importantly, they highlight how interpersonal skills, empathy, and professional judgment have become vital to effective decision-making. In essence, the PMBOK's evolution mirrors today's broader industrial transformation, balancing the efficiency mindset of Industry 4.0 with the human-centered values of Industry 5.0.

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