

Hybrid Management in Construction Projects – Integrating Agile and Traditional Methodologies

Dragoş-Oliviu ŞERBAN*

National University of Science and Technology POLITEHNICA Bucharest, Bucharest, Romania
ORCID ID: <https://orcid.org/0009-0004-8769-9930>

*Corresponding author, e-mail address: serbandragos96@gmail.com

Cristian-Vasile GHIŢĂ

National University of Science and Technology POLITEHNICA Bucharest, Bucharest, Romania
ORCID ID: <https://orcid.org/0009-0009-3430-150X>
e-mail address: ghitacristianvasile@gmail.com

Alexandru MARIN

National University of Science and Technology POLITEHNICA Bucharest, Bucharest, Romania
ORCID ID: <https://orcid.org/0000-0002-8221-1084>
e-mail address: alexandru.marin@upb.ro

Laura-Florentina BOANŢĂ

National University of Science and Technology POLITEHNICA Bucharest, Bucharest, Romania
ORCID ID: <https://orcid.org/0000-0002-6627-3007>
e-mail address: laura.boanta@upb.ro

Abstract: In the context of profound transformations within the construction industry, an increasing number of organizations are exploring flexible project management models. This paper analyzes the applicability and impact of hybrid management, a combination of traditional and Agile methods, in civil, industrial and infrastructure construction projects. Based on two previous studies, both the benefits and limitations of the two approaches are highlighted, with an emphasis on how they can be effectively integrated into a unified framework. The hybrid approach allows the alignment of the rigor of traditional planning with the adaptability and collaboration provided by Agile methods. In industrial and infrastructure projects, where technical constraints and regulations are significant, the traditional component remains essential. Conversely, civil projects show a greater openness to Agile tools due to more flexible processes and active stakeholder involvement. The paper highlights specialists' perceptions regarding team readiness, managerial support and implementation barriers. It also discusses favorable premises for hybrid integration, such as digitalization, collaborative culture and a focus on incremental delivery. In conclusion, the study presents the usefulness of hybrid management in increasing project efficiency and outlines future research directions, including the development of integration models tailored to each project type.

Keywords: project, management, constructions, agile, hybrid, planning.

How to cite: SERBAN, D.-O., GHIŢĂ, C.-V., MARIN, A., & BOANŢĂ, L.-F. . Hybrid Management in Construction Projects – Integrating Agile and Traditional Methodologies. *International Conference of Management and Industrial Engineering*, 12. <https://doi.org/10.56177/12icmie2025.153>

Introduction

The construction industry is facing high project complexity, which highlights the need for more flexible project management approaches. Traditional waterfall methodologies offer rigor but may lack adaptability to change, which is why modern practices such as Agile have begun to attract interest in this field as well. At the same time, a hybrid management model that combines elements of the classical sequential approach with Agile practices (and sometimes Lean) is emerging as a solution to balance structure and flexibility in complex construction projects.

Based on the research conducted by Solinski and Petersen [1] regarding the adaptation of Agile practices, and the syntheses provided by Papatheocharous and Andreou [2] on team dynamics in complex projects, both the benefits and limitations of the two approaches are highlighted, with an emphasis on how they can be effectively integrated into a unified framework. In addition, the study by Qureshi et al. [3] supports the cultural and organizational analysis of Agile implementation in the construction sector.

Research shows that a hybrid model dedicated to construction projects can reduce both their duration and cost, while also improving client interaction and team collaboration. Furthermore, it reveals that hybrid approaches

significantly increase the chances of success in the construction sector by combining the flexibility of Agile with the structured planning of traditional methodologies [4].

In recent years, Romania has seen a growing need to adopt hybrid management in civil, industrial and infrastructure projects, in order to provide organizations with greater agility and responsiveness to change. These findings highlight the opportunity to develop hybrid management methods tailored to the specific characteristics of each project, with the aim of maximizing performance and final outcomes.

Agile methodology, known for its adaptability and iterative cycle, was originally developed in the software industry. Today, the question arises as to what extent Agile practices can be successfully extended to construction projects and how they can be combined with traditional methods within a hybrid framework. This paper aims to analyze hybrid management in the construction industry, emphasizing key findings from recent research and integrating relevant aspects related to Agile implementation in this sector, including stakeholder perceptions and the challenges encountered.

Literature review

Agile project management

Agile project management is an iterative and adaptive approach to managing projects that emphasizes flexibility and rapid customer feedback [5]. Unlike the traditional Waterfall model, which plans an entire project upfront, Agile methods break work into short cycles or sprints, allowing teams to adjust quickly to changing requirements and stakeholder needs throughout execution [5]. This philosophy was formally introduced in the early 2000s with the Agile manifesto, which promoted continuous value delivery, close client collaboration and openness to change at every stage of a project's life cycle. Agile teams are given autonomy in how they organize their work and focus on delivering functional increments of the product, ensuring that feedback is incorporated after each iteration to continuously improve the end result [5].

Over the past two decades, Agile has become a mainstream paradigm in project management across industries. Surveys indicate that nearly 70% of IT and software development teams now practice Agile methods, as do roughly half of engineering, product management and R&D teams [6]. This widespread adoption is credited to Agile's success in enabling projects to respond quickly to change and in improving customer satisfaction. By delivering work in frequent, small increments and continuously reprioritizing tasks based on feedback, Agile techniques help organizations react swiftly to market shifts and client needs.

However, purely Agile approaches can face limitations in certain contexts. Large-scale projects or those in highly regulated industries often require upfront planning, fixed timelines, or extensive documentation (aspects that Agile methods alone may not fully address) [7]. In such environments, as well as in organizations not yet ready for a fully Agile transformation, relying exclusively on either Agile or traditional approaches can be suboptimal. This realization has led to the rise of hybrid project management approaches, which blend Agile with classic management elements to achieve *the best of both worlds*.

Hybrid project management

Hybrid project management is an approach that combines traditional plan-driven techniques with Agile practices in order to capitalize on the strengths of each while mitigating their weaknesses [8]. In a hybrid methodology, elements of the classic predictive model (such as detailed upfront planning, sequential phases, or stage-gate reviews) coexist alongside Agile principles (for example, iterative development, flexibility, and frequent feedback). The intent is to balance the predictability and structure provided by traditional project management with the adaptability and speed of Agile methods [8]. For instance, a hybrid process might maintain a high-level roadmap and fixed milestones (from the conventional approach), but execute the work in iterative sprints and adjust requirements along the way (following Agile philosophy). By leveraging both approaches, hybrid management seeks to improve project success rates by providing flexibility without losing necessary control over the project's direction and constraints [9].

In recent years, hybrid project management has gained significant traction as a state-of-the-art solution for handling diverse project demands. Research shows a sharp increase in the use of hybrid methods: the Project Management Institute (PMI) reported a 57,5% surge in hybrid adoption over a three-year span, with organizations using hybrid approaches rising from 20% in 2020 to 31,5% in 2023 [10]. Furthermore, 89% of high-performing organizations now employ hybrid project management and these have seen project success rates up to 27% higher than those using a single methodology, according to PMI's 2021 *Pulse of the Profession* report [11]. The growing popularity of hybrid models is largely due to their adaptability: a hybrid approach can be tailored to fit an organization's specific context and each project's needs. In practice, hybrid methods allow teams to benefit from Agile's flexibility and customer-focused iterations while still maintaining the clear structure and resource oversight characteristic of traditional methods. Industry surveys find that 84% of companies adopting hybrid management cite greater flexibility as a key driver and 88% report improved resource management, factors that help teams deliver complex projects on time [11]. Essentially, the hybrid model strikes a balance between predictability and agility, which is especially valuable as projects grow in complexity and business environments become more unpredictable [12].

Because *hybrid* is a broad concept, multiple hybrid project management models and frameworks have emerged in the literature. There isn't a one-size-fits-all formula; each hybrid method mixes elements of Agile and traditional techniques in different ways to meet particular project demands [12]. One well-known example is the *Water-Scrum-Fall* model. In Water-Scrum-Fall, a project begins with a comprehensive Waterfall-style planning and requirements phase and ends with a traditional deployment and maintenance stage, but the development in between is carried out using Scrum-based Agile sprints [7]. This approach provides the upfront clarity and final stability of Waterfall, while inserting an Agile iterative core to accommodate change during development. Water-Scrum-Fall is often used as a stepping stone for organizations that cannot fully abandon structured stage-gate processes but want to introduce agility into project execution [7].

Another example is the *Agile-Stage-Gate* hybrid used in product development. This model integrates Agile principles into each stage of the conventional Stage-Gate process: instead of strictly linear phases, each stage contains iterative cycles and customer feedback loops before proceeding through the next gate [9]. Research by Cooper and Sommer showed that an Agile-Stage-Gate approach can accelerate innovation for new products by preserving governance (through formal gates) while adding agility within phases [9]. These examples illustrate that hybrid management is inherently customizable – organizations tailor the mixture of techniques (e.g., combining Kanban boards with Gantt charts, or Scrum sprints with milestone reviews) to best suit their goals, culture, and project complexity [12].

While hybrid project management offers many advantages, it also introduces inherent challenges. Blending two different methodologies can increase process complexity; teams must master both Agile and traditional practices to avoid inheriting the drawbacks of each approach [7]. If a hybrid approach is implemented poorly, an organization risks suffering both the excessive documentation burden of Waterfall and the scope creep tendency of Agile, which can negatively affect project outcomes [7]. Moreover, adopting a hybrid method often requires significant organizational change and skilled personnel, the company culture needs to embrace flexibility and team members must be capable of adapting processes on the fly [7]. From a scholarly perspective, the literature on hybrid project management is still evolving. Owing to the variety of hybrid methodologies and their context-specific applications, existing knowledge is somewhat fragmented regarding the differences or commonalities among hybrid approaches, as well as their general advantages and disadvantages [8].

In addition, understanding of the prerequisites and success factors for implementing hybrid management in organizations remains limited [8]. Recent studies note that there is incomplete insight into why organizations choose hybrid approaches, what challenges they face during implementation, and how hybrid methods are executed in practice [9]. In effect, no universal hybrid model or one-size-fits-all solution exists, and adopting a hybrid approach is often a gradual, ongoing adaptation process rather than a one-time change [9].

This underscores the need for new perspectives or models to guide the application of hybrid management tailored to specific contexts. The present paper aims to address this gap identified in the extant literature by proposing an innovative hybrid project management model. By building on the insights from prior studies and tackling the discrepancies noted, this research offers a fresh perspective that bridges the shortcomings of current practices, thereby contributing to the advancement of the state-of-the-art in project management.

Methodology

Before proceeding with the actual research, we conducted a literature review to understand the current stance on project management approaches in the construction sector. Traditional project management emphasizes anticipatory planning, strict control over cost, time, and quality, as well as a hierarchical decision-making chain. In contrast, Agile methodologies (originally developed in the software industry) promote short iterations, continuous adaptation to change, and close collaboration between the team and stakeholders.

The direct application of Agile principles in construction is challenging, given the physical nature of the product, strict regulations, and the sequential nature of certain activities (for example, concrete pouring or structural assembly cannot be easily "iterated"). Nevertheless, recent literature increasingly reports the emergence of hybrid approaches in construction projects, where Agile elements (such as daily coordination meetings, short sprint planning, or prototyping during the design phase) are combined with classical project management practices. Studies suggest that such an approach can improve flexibility and communication, but also emphasize the need to adapt Agile concepts to the specific realities of construction projects.

The literature review helped us identify a gap: the lack of empirical data on how construction professionals perceive and adopt these hybrid methods. This finding motivated our effort to collect and analyze primary data through the two questionnaires we designed and distributed to companies in this field. Thus, our research is grounded in a solid theoretical foundation, but also provides original contributions by offering a current, field-based perspective on the topic.

The questionnaire on Agile management in construction projects highlights the growing adoption of Agile practices outside the software industry, including in construction, especially for civil projects. Among the reasons for this trend are the need for adaptability, constant communication, and incremental value delivery.

The questionnaire on hybrid management in construction projects expands this perspective to hybrid management, where traditional methods of rigorous planning are combined with Agile practices to create a customized working model, tailored to the specific requirements and constraints of industrial and infrastructure projects.

The core of this research study consisted of the design and implementation of two questionnaires, distributed to companies operating in the construction sector. The main methodological steps followed for data collection and analysis are outlined below:

- **Questionnaire Design:** Two structured questionnaires were developed, each comprising sets of questions grouped into thematic sections. These sections addressed topics such as familiarity with Agile and hybrid methodologies, the implementation of Agile and hybrid practices in construction projects, perceived benefits and challenges of Agile and hybrid project management, as well as demographic information about the respondents (organizational role, industry experience, etc.). The questions were carefully formulated to ensure clarity and relevance to the study's objectives and were reviewed in advance with input from professionals in the field. It is important to note that the entire content of both questionnaires was designed and developed by the authors, representing a significant part of the personal contributions to this research.

- **Distribution and Data Collection:** Following completion, the questionnaires were distributed to construction companies across the country. Distribution was carried out through online platforms and professional networks (e.g., construction industry associations, specialist groups on social media, and direct contacts within construction firms). The survey was conducted over the course of one month. Although data collection required substantial effort, a representative sample was ultimately obtained, including respondents from a wide variety of organizations (general contractors, consultancy firms, etc.) and covering a broad range of professional roles (project managers, site managers, architects, design engineers and others).

- **Data Processing and Analysis:** After the data collection period ended, responses were prepared for analysis by removing incomplete or invalid entries, thereby ensuring the accuracy of the final dataset. The data were then analyzed using descriptive statistical methods (calculating frequencies, percentages and means to identify general trends). Results were presented graphically to provide a comparative view of respondents' opinions on the key questions. For any open-ended responses, a qualitative analysis was performed to identify recurring themes in participants' comments. The entire analysis process was carried out using appropriate software tools (such as Microsoft Excel and/or SPSS), with the aim of extracting relevant insights and validating the study's conclusions.

Results and further discussions

The analysis of the data collected through the two questionnaires provides a clear picture of the degree of hybrid project management adoption in the construction sector and of professionals' views on this approach.

The main findings emerging from the data analysis are as follows:

1. **Level of awareness and application of Agile methods in construction:** According to Figure 1, most of the professionals surveyed have had contact with Agile methodologies and understand their basic concepts. However, the practical implementation of a fully Agile framework (such as Scrum or Kanban) in construction projects remains limited. The majority adopt a partial hybrid model, selectively integrating certain Agile practices within traditional planning structures. For instance, many respondents mentioned using short stand-up meetings for daily coordination or organizing tasks in short time frames (sprints), even though the overall project continues to follow a classic master plan.

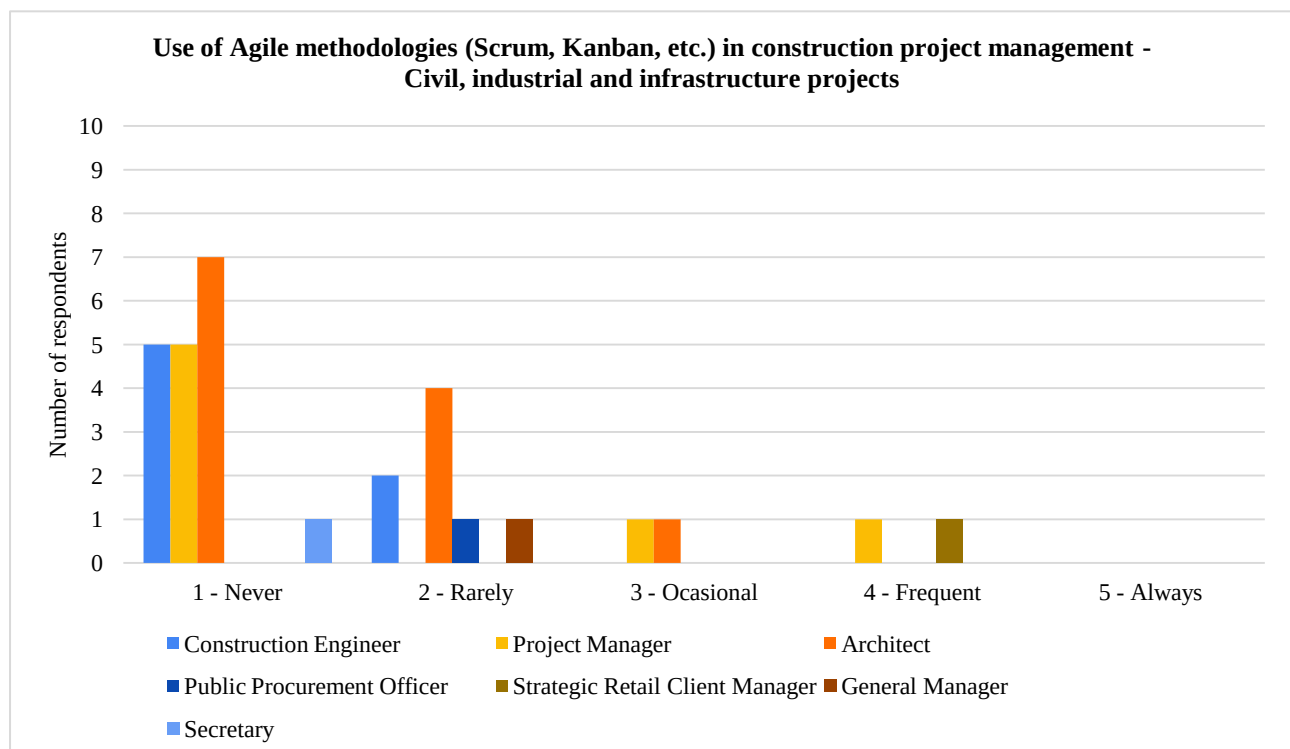


Figure 1: Use of Agile methodologies (Scrum, Kanban, etc.) in construction project management - Civil, industrial and infrastructure projects
Source: Authors' own research results

2. *Use of technologies and software platforms:* Based on the data presented in Figure 2, the analysis revealed several conclusions regarding the implementation of Agile methodologies:
- The predominance of using Microsoft Excel suggests a traditional approach - 17 out of 30 respondents (mostly architects and engineers) reported using Excel, indicating that project management practices still rely on static, less adaptive methods lacking Agile-specific functionalities, such as task boards or sprint planning;
 - Limited use of Agile tools - only 4 respondents reported using platforms that facilitate Agile-style collaboration and project management (e.g., Asana, Trello, Mural), highlighting a very low adoption rate compared to other industries;
 - Microsoft Project remains dominant - used by 7 professionals (5 project managers, 1 general director, and 1 public procurement officer), Microsoft Project is preferred for planning purposes. However, it is not an Agile tool per se, but rather a predictive one, aligned with traditional Waterfall-type methodologies;
 - BIM and PlanRadar tools are used in isolation - only 2 project managers reported using these advanced technologies, indicating that their integration remains limited and uneven across companies.

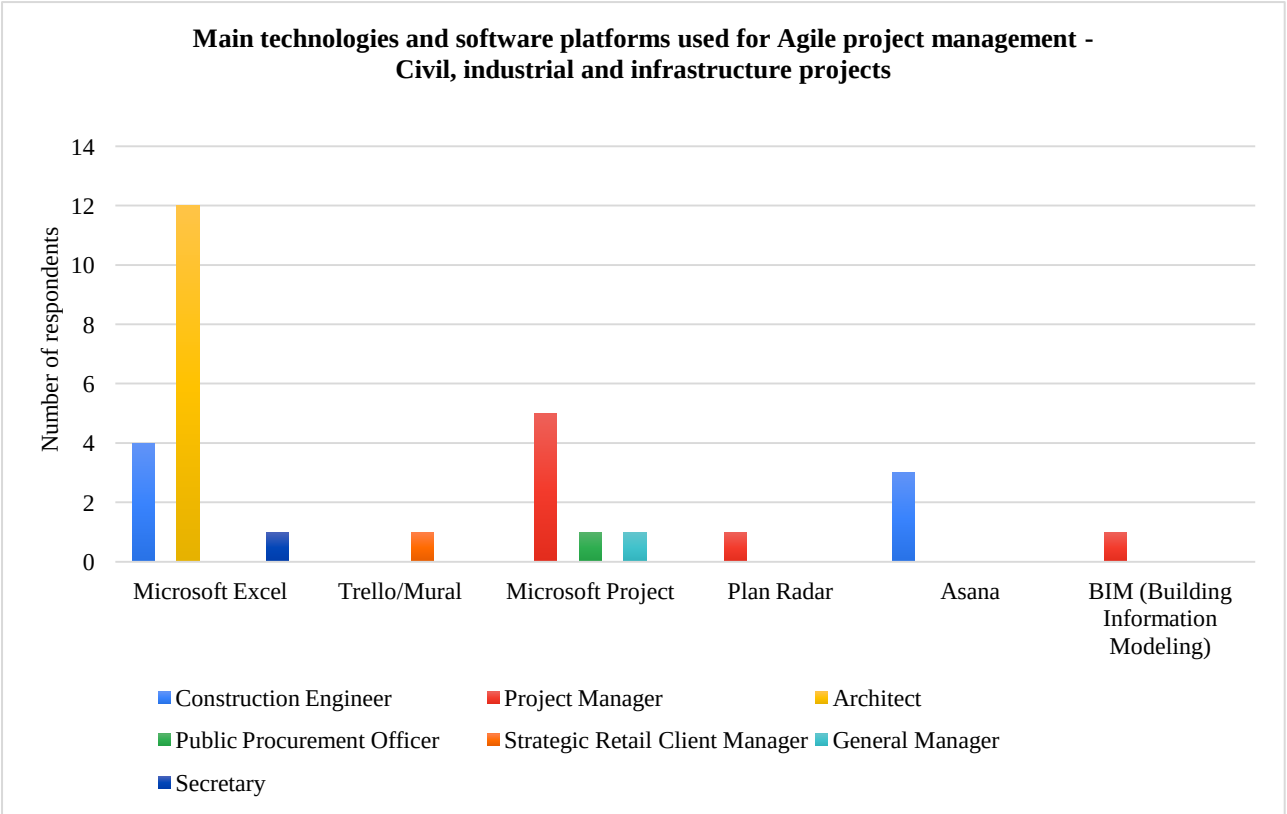


Figure 2: Main technologies and software platforms used for Agile project management - Civil, industrial and infrastructure projects
Source: Authors' own research results

3. *Challenges and barriers to implementation:* As illustrated in Figure 3, the analysis also identified several key obstacles hindering the widespread adoption of hybrid management. The most frequently cited issue was the lack of knowledge about Agile or hybrid methodologies among staff and top management. Many organizations remain attached to traditional work models and transitioning to new practices requires an organizational culture shift that cannot occur overnight. Another major barrier is the rigidity of contractual and legal frameworks in construction: projects are often constrained by fixed-term, fixed-cost contracts, which limit the application of flexible approaches. Communication issues between departments and teams were also reported as a significant impediment.

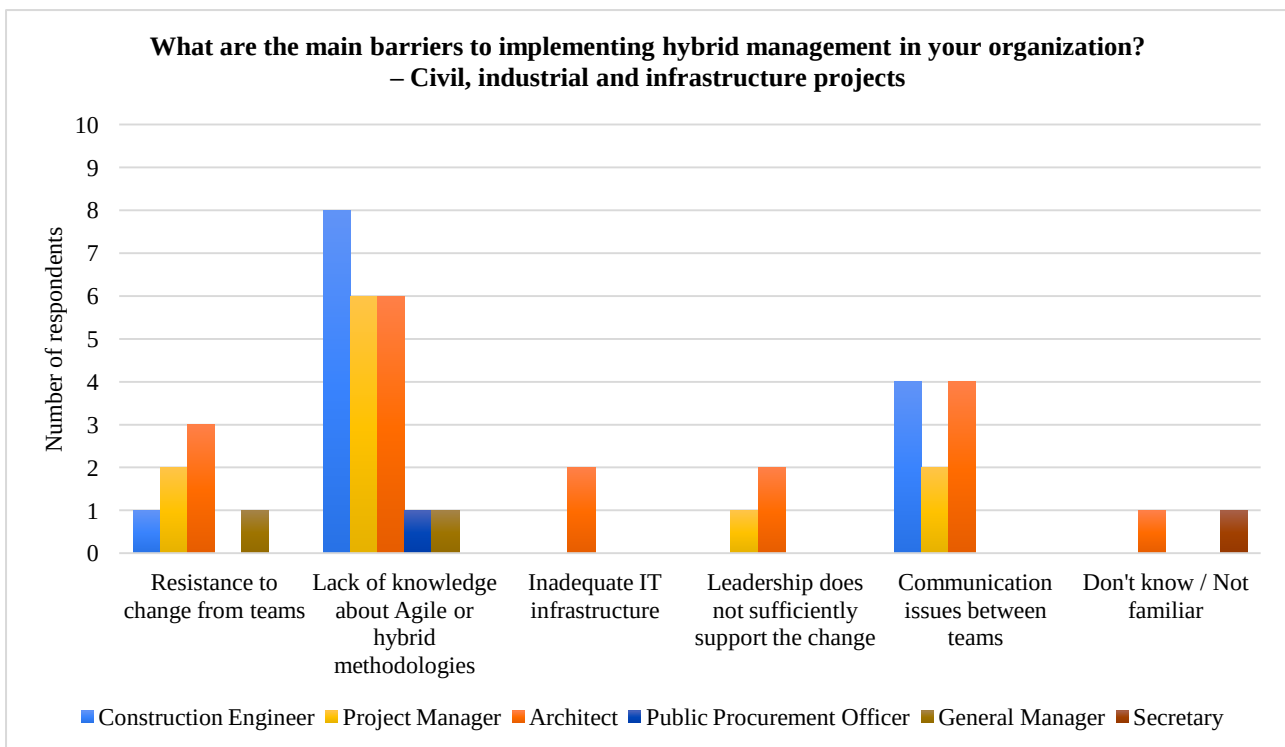


Figure 3: What are the main barriers to implementing hybrid management in your organization? – Civil, industrial and infrastructure projects
Source: Authors' own research results

4. *Perceived benefits of the hybrid approach:* Figure 4 demonstrates that construction professionals view hybrid management as a means to enhance flexibility and communication within projects. Many respondents reported that the introduction of Agile elements, especially iterative planning and continuous feedback from the construction site or the client, helped in identifying issues earlier and correcting project deviations in a timely manner. Moreover, teams that adopted certain Agile practices appeared to be more motivated and engaged, with greater clarity regarding progress and priorities. This indicates the significant potential of hybrid methodologies to improve construction project performance.

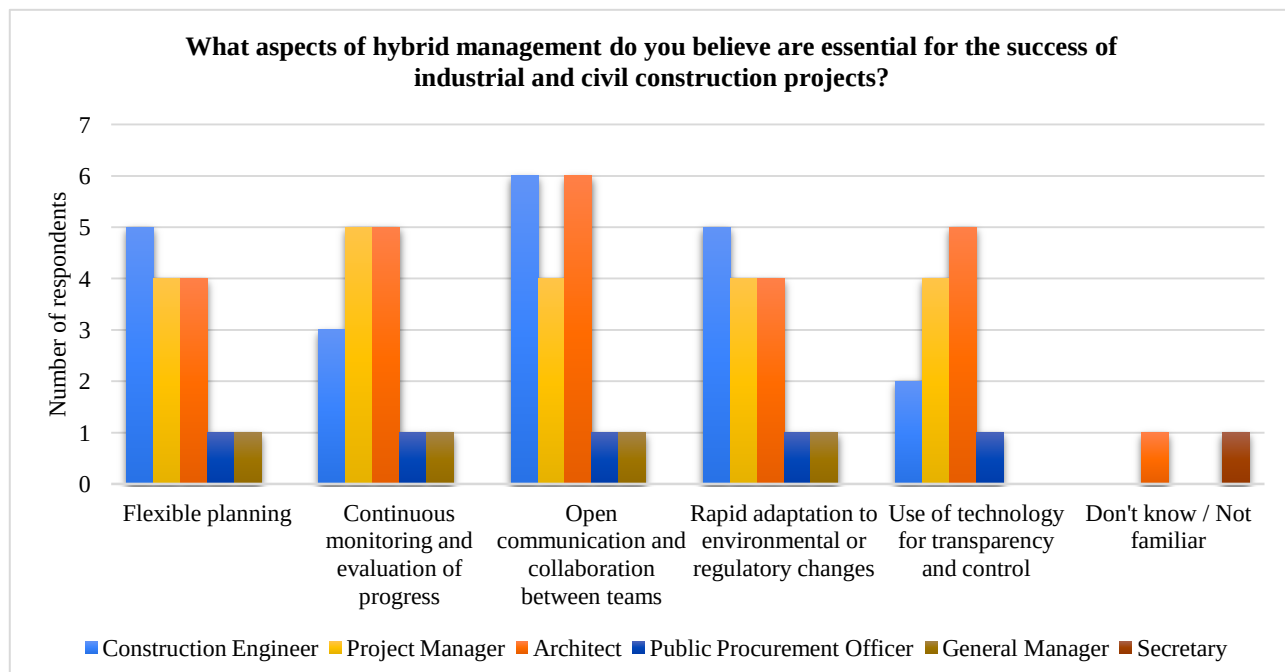


Figure 4: What aspects of hybrid management do you believe are essential for the success of industrial and civil construction projects?
Source: Authors' own research results

5. *Optimal context for Agile methods in construction*: The responses indicate that the applicability of Agile varies across different stages of a construction project lifecycle. The early phases, such as concept development and design (technical planning, initial scheduling), are perceived as most suitable for integrating Agile practices. During these stages, teams can iterate design solutions, receive timely feedback from clients and adjust plans without incurring major costs. Conversely, the execution phase is seen as less flexible: once construction begins, major changes become difficult to implement. As a result, the hybrid approach manifests more through micro-level improvements in site management (e.g., daily operational meetings, use of Kanban systems for tracking materials and teams) rather than through a fundamental shift in the sequence of execution. This perspective confirms that Agile project management must be adapted to the context: some principles can be successfully integrated, while others must be adjusted or selectively applied based on the specific nature of construction activities.

Overall, the results obtained through the two questionnaires highlight a genuine interest in more flexible project management practices within the construction sector, while also reflecting a justified level of caution.

The contribution of this study lies in bringing these perspectives to light directly from construction professionals, thereby offering a factual basis for the discussion on modernizing project management in the field. It demonstrates both the tangible benefits of the hybrid approach (in terms of efficiency and adaptability) and the limitations and conditions necessary for its optimal functioning.

Conclusion

As part of this study, we designed and administered two complementary questionnaires, then analyzed the results. One focused on how professionals perceive Agile methodologies and how prepared they feel to implement them. The other one examined the role of hybrid management models in civil, industrial and infrastructure construction projects. Together, these tools were meant to capture the real experiences and opinions of practitioners in the field.

The data that we obtained reflect a moderately positive openness among respondents toward the implementation of Agile principles in the construction sector, with emphasis on their potential to enhance team flexibility, stimulate collaboration and accelerate decision-making processes. However, this positive perception is accompanied by a low level of practical application, indicating a gap between intention and reality. The results suggest that, although the benefits of Agile methodologies are theoretically acknowledged, the absence of an adapted organizational culture and the lack of systematic training programs hinder their concrete implementation.

Regarding hybrid project management, the research revealed that this model is perceived as a realistic compromise solution that may facilitate the transition from traditional to Agile methods in construction. The comparative analysis of the three types of projects (civil, industrial and infrastructure) showed that civil projects demonstrate the highest openness to hybridization, while significant reservations persist in infrastructure projects. Industrial project management appears to occupy a middle ground, suggesting the need for context-specific adaptation of the models implemented.

The integrated analysis of the two questionnaires demonstrates a clear correlation between perceptions of Agile and hybrid management: where Agile is understood and applied, there is greater confidence in the value of hybrid management. Thus, the study supports the idea that professional training in Agile can serve as a key catalyst for the development and effective implementation of customized hybrid models in the construction sector.

The limitations of this study must also be acknowledged: the research was based on a selective sample of approximately 50 respondents, which does not allow for full generalization of the results at the national level. Although, respondents came from various geographic regions, the uneven distribution across project types (civil, industrial and infrastructure) may introduce bias in the interpretation of findings.

To strengthen these conclusions, future research should consider: the development of a construction-specific methodological framework that integrates Agile principles into sustainable hybrid models; the expansion of the study to a representative sample, segmented by region, organization size, and project type; the evaluation of the impact of Agile training on real-time project performance; qualitative studies involving project leaders to understand the cultural and institutional barriers that hinder the transition.

Through its contribution to the design and implementation of both questionnaires, this study offers an original perspective on the current state of transition toward more flexible and collaborative working models in construction, with the potential to inform future organizational transformation initiatives in this industry.

References

- [1] Solinski, A. & Petersen, K.: *Prioritizing agile benefits and limitations in relation to practice usage*, *Software Quality Journal*, 24(2), Available from https://www.researchgate.net/publication/284942300_Prioritizing_agile_benefits_and_limitations_in_relation_to_practice_usage;
- [2] Papatheocharous, E. & Andreou, A.: *Empirical evidence and state of practice of software agile teams*, *Journal of Software: Evolution and Process*, 26(9), Available from

- https://www.researchgate.net/publication/264710501_Empirical_evidence_and_state_of_practice_of_software_agile_teams;
- [3] Qureshi, M. R.; et al.: *Significance of teamwork in agile software engineering*, *Science International*, 26(1), Available from https://www.researchgate.net/publication/276273060_Significance_of_the_teamwork_in_agile_software_engineering;
- [4] Ozorhon, B.; et al.: *Investigating the Agile-Hybrid Approach in Construction*, *Journal of Management in Engineering*, 38(5), 04022060, Available from https://www.researchgate.net/publication/361671539_Investigating_the_agile_hybrid_approach_in_construction;
- [5] Gillis, A. S.; et al.: *What is Agile project management (APM)?*, Available from [https://www.techtarget.com/searchcio/definition/Agile-project-management#:~:text=Agile%20project%20management%20,cycles%20called%20sprints%2C%20or%20iterations](https://www.techtarget.com/searchcio/definition/Agile-project-management#:~:text=Agile%20project%20management%20,cycles%20called%20sprints%2C%20or%20iterations;);
- [6] *** Available from [https://www.praecipio.com/resources/articles/state-of-agile-report-special-edition#:~:text=If%20you%E2%80%99ve%20been%20on%20any,Big%20Dashboard%20Energy%20at%20Praecipio](https://www.praecipio.com/resources/articles/state-of-agile-report-special-edition#:~:text=If%20you%E2%80%99ve%20been%20on%20any,Big%20Dashboard%20Energy%20at%20Praecipio;);
- [7] Gora, M.: *The Water-Scrum-Fall Approach: Bridging the Gap Between Tradition and Agility*, Available from <https://www.linkedin.com/pulse/water-scrum-fall-approach-bridging-gap-between-tradition-marcin-gora#:~:text=This%20approach%20is%20particularly%20useful,Some%20typical%20scenarios>;
- [8] Reiff, J.; Schlegel, D.: *Hybrid project management – a systematic literature review*, *International Journal of Information Systems and Project Management*, Available from <https://aisel.aisnet.org/ijispm/vol10/iss2/4>;
- [9] Cooper, R.; Sommer A.: *Agile-Stage-Gate Hybrids*, Available from https://www.researchgate.net/publication/303144920_Agile-Stage-Gate_Hybrids#:~:text=Hybrid%20Project%20Management%20,foundation%20through%20a%20systematic%20literature;
- [10] Conforto, E.: *The Hybrid Era: Project Management Embraces the Fit-for-Purpose Approach*, Available from <https://www.pmi.org/blog/project-management-embraces-the-fit-for-purpose-approach#:~:text=Our%20newest%20research%20confirms%20the,in%202023>;
- [11] Bross-Puglisi, J.: *Hybrid Project Management: One Size Doesn't Fit All*, Available from <https://blog.iil.com/hybrid-project-management-one-size-doesnt-fit-all/#:~:text=By%20Jorgelina%20Bross>;
- [12] Krasteva, I.: *The Rise of Hybrid Project Management*, Available from <https://businessmap.io/blog/hybrid-project-management#:~:text=Hybrid%20project%20management%20is%20characterized,drive%20the%20method%27s%20successful%20application>.