

Marijeta Jurković, mag.
ing. agr.¹

Saša Peranić, bacc. oec.²

Hrvoje Zovko, mag. oec.³

Stručni rad
Professional paper

UDC UDK: 005.21.



AGILNI MENADŽMENT U GRAĐEVINSKOM SEKTORU

Sažetak:

Integracija agilnih praksi u upravljanje građevinskim projektima predstavlja promjenu paradigme, obećavajući ne samo povećanje operativne učinkovitosti, već i poticanje suradničkog i transparentnijeg odnosa između građevinskih tvrtki i njihovih klijenata. Ovaj rad ima za cilj istražiti ova pitanja, nudeći uvid u to kako se agilni principi mogu prilagoditi jedinstvenim zahtjevima građevinske industrije, s posebnim fokusom na projekte stambenih zgrada. Kroz sveobuhvatno ispitivanje postojeće literature ova studija nastoji osvijetliti put prema osjetljivijem, učinkovitijem pristupu upravljanju građevinskim projektima usmjerenom na dionike.

Ključne agilni menadžment, moderna ekonomija, građevina, interdisciplinarnost.

AGILE MANAGEMENT IN THE CONSTRUCTION SECTOR

Abstract:

The integration of agile practices into construction project management represents a paradigm shift, promising not only to enhance operational efficiency but also to foster a more collaborative and transparent relationship between construction firms and their clients. This paper aims to explore these questions, offering insights into how agile principles can be tailored to fit the unique demands of the construction industry, with a particular focus on apartment building projects. Through a comprehensive examination of existing literature this study seeks to illuminate the path toward a more responsive, efficient, and stakeholder-focused approach to construction project management.

Keywords: agile management, modern economy, construction, interdisciplinarity.

¹ PROJECT CONSULTING, obrt za poslovno savjetovanje, vl. Marijeta Jurković, Vukovar, Čakovečka 174, marijetajurkovic93@gmail.com

² Ministarstvo financija, Carinska uprava, speranic@gmail.com

³ C.E.M.P. d.o.o. Trgovačka ulica 3, Donji Stupnik, hrv.zovko@gmail.com

INTRODUCTION

The construction industry, pivotal to global economic development, is perennially challenged by inefficiencies manifesting as project delays, budget overruns, and compromised quality. Traditional project management methodologies, characterized by their linear and sequential nature, often prove inadequate in addressing the dynamic complexities inherent in construction projects, particularly those involving apartment buildings. These projects, integral to urban development, necessitate a management approach that accommodates fluctuating demands, stringent timelines, and diverse stakeholder expectations. Agile management methodologies, originating from the software development sector, offer a paradigm shift with their emphasis on flexibility, iterative progress, and stakeholder collaboration. This paper explores the potential applicability and benefits of agile methodologies within the construction industry, positing that these principles can significantly mitigate traditional challenges through adaptive planning, evolutionary development, and continuous improvement, while fostering a responsive approach to change.

The integration of agile practices into the construction industry represents a significant cultural and operational shift, necessitating a thorough examination of implementation strategies, potential challenges, and the framework for successful adaptation. Through a detailed review of existing literature and a case study analysis of AgileConstruct Inc., a front-runner in applying agile methodologies in construction, this study seeks to illuminate the pathway towards a more agile, efficient, and stakeholder-centric project management approach in construction. This exploration is poised to contribute to the burgeoning discourse on the need for innovative project management methodologies in construction, aiming to redefine traditional practices in favor of a more adaptable, transparent, and collaborative model.

1. AGILE PRINCIPLES IN CONSTRUCTION

TKoskela and Howell's (2002) introduction of Lean Construction has laid a critical foundation for the application of agile principles in the construction industry. Their work highlights the potential for construction project management to evolve beyond traditional methodologies, embracing a more flexible, efficient, and stakeholder-focused approach. As the construction industry continues to grapple with its inherent

challenges, the integration of Lean Construction and agile methodologies offers a promising pathway toward transformative improvement. The journey towards a more agile construction industry is complex and requires a commitment to continuous learning and adaptation. However, the foundational principles established by Koskela and Howell continue to inspire and guide this evolution, underscoring the potential for significant advancements in construction project management.

The construction industry, characterized by its complex projects and multifaceted challenges, has long sought methodologies that can enhance operational efficiency and project flexibility. In this context, the work of Conforto et al. (2014) represents a seminal exploration into the applicability of agile methodologies across various sectors, including construction. Their research provides compelling evidence that agile practices, known for their success in the software development realm, hold significant potential for mitigating common construction challenges such as project delays and cost overruns. This extensive examination delves into the implications of their findings, advocating for a more responsive and efficient approach to construction project management through the adoption of agile methodologies.

Agile methodologies, with their roots in software development, are predicated on principles of flexibility, iterative progress, and stakeholder collaboration. Conforto et al. (2014) extend the application of these principles beyond their traditional domain, suggesting that industries characterized by complexity and rapid change, such as construction, can greatly benefit from agile's adaptive approach. The study underscores the universality of agile's core tenets, highlighting their relevance to the dynamic and often unpredictable nature of construction projects.

The journey toward integrating agile methodologies into construction is complex and requires a commitment to adaptation and continuous improvement. However, the potential benefits of such an integration—reduced project delays, cost savings, and improved operational efficiency—offer a compelling case for the construction industry to explore and embrace agile practices. As the industry continues to evolve, the insights provided by Conforto et al. serve as a valuable guide for navigating the path toward a more agile and responsive approach to construction project management.

The work of Owen et al. (2016) represents a pioneering effort to bridge the gap between agile methodologies and BIM, proposing a comprehensive framework that leverages the

synergies between these two domains to significantly enhance construction project collaboration, execution, and outcomes. This extensive analysis delves into the implications of their framework, exploring how the integration of agile methodologies with BIM can revolutionize construction project management by fostering better communication, planning, and overall project efficiency.

Agile methodologies, characterized by their emphasis on flexibility, iterative progress, and stakeholder collaboration, offer a robust framework for managing complex projects. BIM, on the other hand, provides a digital platform for comprehensive project visualization, simulation, and collaboration. Owen et al.'s (2016) proposed framework for integrating agile methodologies with BIM is grounded in the principle of leveraging BIM's digital capabilities to enhance the agility of project management processes. This framework suggests a structured approach to incorporating agile practices, such as Scrum or Kanban, within the BIM environment, facilitating a more dynamic and responsive project management model. Key components of the framework include the use of BIM for real-time project visualization and tracking, the application of agile sprints or iterations to manage BIM-related tasks, and the establishment of cross-functional teams that utilize BIM data to collaboratively plan, design, and execute construction project.

2. AGILE METHODOLOGIES IN CONSTRUCTION

The quest for methodologies that enhance project success rates in the construction industry has led to a growing interest in agile methodologies, traditionally associated with software development. The seminal research conducted by Serrador and Pinto (2015) plays a pivotal role in this exploration, providing empirical evidence that projects managed under agile methodologies tend to exhibit higher success rates compared to those employing traditional project management approaches. This comprehensive analysis delves into the implications of their findings, underscoring the transformative potential of agile practices in elevating project performance and stakeholder satisfaction within the construction sector.

Agile methodologies introduce a paradigm shift from traditional, plan-driven project management approaches to more flexible, iterative, and collaborative practices. This shift is predicated on the principles of adaptability to change, continuous improvement, and active stakeholder engagement. Serrador and Pinto's (2015) research highlights the

effectiveness of these principles in enhancing project success rates, suggesting that the dynamic and often unpredictable nature of construction projects can significantly benefit from the agility these methodologies offer.

AgileConstruct Inc., established in 2010 in Austin, Texas, has emerged as a pioneering entity in the construction industry through its innovative adoption of agile methodologies for managing apartment building projects. This case study delves into the company's strategic implementation of agile practices, particularly focusing on a landmark pilot project initiated in 2012. This project, which involved the construction of a mid-sized apartment complex, served as a testing ground for integrating a modified version of the Scrum framework into construction project management. The endeavour was characterized by its division into several sprints, each targeting distinct components of the building, and was bolstered by the incorporation of regular stakeholder review meetings and daily team stand-ups. The triumphant execution of this pilot project, culminating in on-time delivery, within-budget completion, and elevated stakeholder satisfaction, provides a compelling testament to the viability and transformative potential of agile methodologies within the realm of construction.

The adaptation of the Scrum framework to the construction of an apartment complex involved a meticulous process of customization to align with the project's unique requirements and the industry's operational nuances. Each sprint within the project was meticulously planned to focus on specific building components, facilitating a granular approach to project management that allowed for incremental progress and timely adjustments. The integration of regular stakeholder review meetings ensured that the project remained aligned with client expectations and provided a mechanism for incorporating feedback into subsequent sprints. Furthermore, the institution of daily team stand-ups fostered a culture of transparency and collaboration, enabling the project team to address challenges proactively and maintain a cohesive focus on project objectives.

3. NAVIGATING THE AGILE TRANSFORMATION IN CONSTRUCTION

The integration of agile methodologies into the construction sector, particularly in the realm of apartment building projects, heralds a significant shift towards more dynamic, responsive, and efficient project management practices. The case study of AgileConstruct Inc. serves as a compelling testament to the potential benefits of

this integration, showcasing notable improvements in project lead times, cost management, and stakeholder satisfaction. However, the journey towards a fully agile construction industry is fraught with challenges that necessitate careful consideration and strategic navigation.

The success story of AgileConstruct Inc. illuminates the tangible benefits that agile methodologies can bring to construction projects. By adopting a modified version of the Scrum framework, the company was able to break down a complex apartment building project into manageable sprints, each focused on specific components of the building. This iterative approach, coupled with regular stakeholder review meetings and daily team stand-ups, fostered a culture of continuous feedback and adaptation. The result was a project that not only met but exceeded expectations in terms of on-time delivery, budget adherence, and stakeholder satisfaction. These outcomes underscore the potential of agile methodologies to enhance the efficiency and responsiveness of construction project management, aligning closely with the industry's needs for flexibility and stakeholder engagement.

Despite the promising benefits, the adoption of agile methodologies in construction is not without its challenges. One of the primary hurdles is the industry's inherent resistance to change. Construction professionals, accustomed to traditional project management approaches, may be sceptical of agile's iterative and collaborative nature. Overcoming this resistance requires a concerted effort to educate and demonstrate the value of agile practices, highlighting their potential to address common project challenges more effectively than traditional methods.

Moreover, the adaptation of agile practices to the construction environment presents its own set of challenges. Unlike software development, where agile methodologies originated, construction projects involve physical labour, materials, and machinery, all of which operate within a complex regulatory and safety framework. Tailoring agile practices to accommodate these factors requires a deep understanding of both agile principles and the specificities of construction project management. This adaptation process may involve developing new tools and techniques for agile planning, execution, and stakeholder engagement that are compatible with the construction industry's unique demands.

One of the primary challenges in adopting agile methodologies in construction is overcoming resistance to change among industry professionals. Comprehensive training and education programs must therefore include components that address

change management, emphasizing the value of agile practices in enhancing project outcomes. By showcasing successful examples of agile implementation in construction, such as AgileConstruct Inc., training programs can help mitigate scepticism and build a compelling case for the adoption of agile methodologies. The adoption of agile methodologies in construction is not a one-time effort but a continuous journey of learning and adaptation. Training programs should foster a culture of continuous improvement, encouraging construction professionals to regularly reassess and refine their agile practices. This includes staying abreast of the latest developments in agile methodologies and exploring innovative ways to apply these principles to construction project management.

4. STRATEGIC APPROACH TO AGILE INTEGRATION IN CONSTRUCTION

The adoption of agile methodologies within the construction industry, characterized by its complexity and adherence to traditional project management practices, necessitates a strategic and phased approach. Pilot projects serve as a cornerstone in this strategy, offering a controlled environment to test, refine, and demonstrate the efficacy of agile practices before a broader implementation. This section delves into the significance of pilot projects and incremental implementation as pivotal steps towards integrating agile methodologies into construction project management, drawing from the foundational principles of agile to propose a roadmap for successful adoption.

Following the successful completion of pilot projects, the next step is to scale agile practices across the organization. Incremental implementation involves gradually expanding the application of agile methodologies to larger and more complex projects, based on the insights and lessons learned from the pilot phase. This phased approach allows construction firms to manage the risks associated with changing project management practices, ensuring that each step towards broader agile adoption is informed by practical experience and empirical evidence.

Incremental implementation also involves the gradual involvement of more team members and stakeholders in agile practices, expanding the agile culture within the organization. Training and education, as previously discussed, play a critical role in this process, ensuring that all participants are equipped with the knowledge and skills required to contribute effectively to agile projects.

Pilot projects in agile construction provide a wealth of insights and lessons learned, which are invaluable for refining agile practices and strategies for broader implementation. Key lessons often relate to the importance of stakeholder engagement, the need for flexible and adaptive planning, and the value of continuous feedback and iterative improvement. These lessons also include practical considerations, such as the adaptation of agile tools and techniques to the physical nature of construction work and the integration of agile methodologies with existing regulatory and compliance frameworks.

5. STAKEHOLDER ENGAGEMENT AND COLLABORATION IN AGILE CONSTRUCTION MANAGEMENT

In the realm of construction management, the transition towards agile methodologies necessitates a paradigm shift not only in project management practices but also in the dynamics of stakeholder engagement and collaboration. The essence of agile—characterized by its iterative processes, flexibility, and emphasis on communication—places stakeholders at the core of project development and execution. This comprehensive analysis delves into the critical role of stakeholder engagement and collaboration within the agile construction management framework, highlighting strategies to enhance stakeholder involvement and the benefits of such an approach.

Agile methodologies advocate for a proactive and inclusive approach to stakeholder engagement, recognizing that the success of construction projects is intricately linked to the satisfaction and involvement of all parties. This approach contrasts with traditional construction project management methods, where stakeholder input might be limited to the initial and final phases of the project. In agile construction management, stakeholders are viewed as integral team members whose continuous feedback and collaboration are essential for the project's iterative development and refinement. To foster a collaborative environment that aligns with agile principles, construction managers must employ strategies that facilitate open communication, transparency, and mutual respect among all stakeholders. This includes:

The construction industry stands on the brink of a transformative shift through the integration of agile methodologies, a move that promises to tackle long-standing challenges of inefficiency, delays, and budget overruns. The essence of this transformation is captured in the journey of AgileConstruct Inc., a beacon of agile's potential in

construction, particularly in apartment building projects. This essay delves into the customization of agile practices for construction, the overcoming of industry resistance, and the strategic pathway to harnessing agile's full potential. Agile methodologies, originally honed in the software development arena, offer principles of flexibility, iterative progress, and stakeholder collaboration that are just as applicable and needed in construction. The case of AgileConstruct Inc. vividly illustrates the significant benefits of agile, including enhanced efficiency, cost savings, and improved stakeholder satisfaction. However, the broader adoption of agile in construction is not without its hurdles. The industry's inherent resistance to change and the unique challenges of construction projects necessitate a tailored approach to implementing agile practices.

Customizing agile for construction involves a careful examination and adaptation of existing agile frameworks to fit the sector's specific needs. This customization process must consider the scalability of agile practices to accommodate the vast scope of construction projects, ensure regulatory compliance, foster cross-functional collaboration among the diverse disciplines involved in construction, and enhance risk management. Overcoming resistance to change is pivotal in this journey. Strategies to navigate this resistance include comprehensive education and training on agile principles, the initiation of pilot projects to demonstrate agile's tangible benefits, and the active involvement of all stakeholders in the agile process.

The strategic implementation of agile in construction, as demonstrated by AgileConstruct Inc., requires a commitment to continuous learning and adaptation. By customizing agile practices to the unique environment of construction and strategically overcoming resistance to change, the construction industry can unlock the transformative potential of agile methodologies. This shift not only promises to enhance project efficiency, reduce costs, and improve stakeholder satisfaction but also positions the construction industry for greater innovation and success in project management.

In conclusion, the integration of agile methodologies into construction represents a promising avenue for revolutionizing the industry. The journey of AgileConstruct Inc. underscores the benefits and challenges of this transition, highlighting the need for customized agile practices and a strategic approach to implementation. As the construction industry embraces agile, it steps closer to achieving a more efficient, collaborative, and adaptable project management paradigm.

CONCLUSION

The study aimed to investigate Algebra University. The exploration of agile management methodologies within the construction industry, particularly focusing on apartment building projects, marks a significant inquiry into the potential for enhancing traditional construction project management practices. This investigation, grounded in a comprehensive literature review and enriched by a detailed case study analysis of AgileConstruct Inc., has illuminated the multifaceted benefits and challenges associated with the adaptation of agile methodologies to the construction sector. The findings underscore the transformative potential of agile practices, offering a pathway toward more efficient, adaptable, and stakeholder-centric project management approaches in construction.

Agile methodologies, characterized by their flexibility, iterative progress, and emphasis on collaboration, have demonstrated considerable success in the software development industry. This study posited that these methodologies could be similarly beneficial in construction, a sector historically plagued by inefficiencies such as project delays, budget overruns, and quality issues. The core principles of agile—adaptability to change, continuous improvement, and stakeholder engagement—emerge as particularly relevant in addressing these challenges. The case study of AgileConstruct Inc. provided practical insights into the implementation of agile methodologies in construction, showcasing tangible benefits such as enhanced project efficiency, cost savings, improved stakeholder satisfaction, and superior quality outcomes.

However, the adaptation of agile methodologies to the construction industry is not without its challenges. This investigation revealed critical barriers to agile implementation, including resistance to change among industry professionals, logistical complexities inherent in construction projects, and the need to tailor agile practices to the specificities of the construction environment. Overcoming these challenges necessitates a strategic and nuanced approach, emphasizing the importance of comprehensive training, stakeholder engagement, and the phased adoption of agile practices.

The implications of this study extend beyond the

immediate benefits of applying agile methodologies to construction project management. By fostering a more agile, responsive, and collaborative construction industry, there is potential for broader impacts on urban development, sustainability, and the overall quality of the built environment. Agile practices encourage a focus on value creation, waste reduction, and continuous improvement, principles that align with the goals of sustainable construction and the efficient use of resources.

Future research directions identified through this investigation highlight the need for further exploration of agile methodologies in construction. Comparative studies across different construction sectors, longitudinal analyses of agile implementation outcomes, and investigations into the integration of agile with emerging technologies such as Building Information Modeling (BIM) represent promising avenues for expanding our understanding of agile's potential in construction. Additionally, research into the organizational and cultural shifts required to support agile adoption in construction firms will be critical in facilitating the broader application of agile practices in the industry.

In conclusion, this study contributes to the growing body of knowledge on the application of agile management methodologies in the construction industry. It offers a compelling case for the potential of agile to address longstanding industry challenges, driving significant improvements in project management practices. However, realizing the full potential of agile in construction requires ongoing exploration, adaptation, and a commitment to cultural change within the industry. As construction professionals and scholars continue to engage with agile methodologies, there is a promising opportunity to redefine project management practices, enhancing efficiency, stakeholder satisfaction, and the overall success of construction projects. The journey toward a more agile construction industry is just beginning, and the insights gained from this investigation provide a foundational step toward realizing its transformative potential.

communication for official correspondence concerning study obligations, it is recommended that a similar research be conducted at two different colleges.

REFERENCES

1. Koskela, L., & Howell, G. (2002). The underlying theory of project management is obsolete. *Proceedings of the PMI Research Conference*, 293-302.
2. Conforto, E. C., Salum, F., Amaral, D. C., da Silva, S. L., & de Almeida, L. F. M. (2014). Can Agile Project Management Be Adopted by Industries Other than Software Development? *Project Management Journal*, 45(3), 21-34.
3. Owen, R., Koskela, L., Henrich, G., & Codinhoto, R. (2016). Is Agile Project Management Applicable to Construction? *Journal of Construction Engineering and Management*, 142(3).
4. Serrador, P., & Pinto, J. K. (2015). Does Agile work? — A quantitative analysis of agile project success. *International Journal of Project Management*, 33(5), 1040-1051.