INTRODUCTION

challenges that hinder its eff ciency and productivity. Since the 1960s, productivity in construction has steadily declined year after year. Among these challenges are persistent manpower shortages, increasing project complexity due to design and code compliance, and frequent delays leading to signif cant cost overruns.

According to a report by McKinsey & Company, large construction projects typically take 20% longer to complete than initially scheduled and can run up to 80% over budget. These ongoing issues highlight the urgent need for innovative solutions like artif cial intelligence (AI). AI offers various tools to tackle specif c problems in the construction industry, making its early adoption essential for overcoming current challenges and ensuring future success.

UNDERSTANDING AI AND ITS APPLICATIONS IN

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Robotics in construction involves using automated machines to perform repetitive and hazardous tasks, reducing the need for manual labor and improving worker safety. Robots can handle tasks like bricklaying, historical project imaging, in-plant welding and fabrication, and laying out trade installations from BIM to the real world.

NLP, a significant advancement through the development of LLMs, enables machines to understand and interact with human language. This technology facilitates tasks such as document analysis, virtual assistance, and communication management. NLP can quickly analyze large volumes of documents, extracting relevant information and providing summaries, which is invaluable for project managers needing to stay informed about various project aspects.

The AI market currently offers several models and tools that can provide immediate value to most construction firms without significant investment. For instance, ChatGPT by OpenAI can serve as a versatile tool for conversational tasks like answering frequently asked questions, providing grammar and spell-checking, and offering communication advice tailored to specific situations and audiences, thm   M

project management tools provide the necessary insights to foresee potential risks and optimize resource allocation, leading to substantial gains in project efficiency and cost savings."

MANAGING INCREASED CONSTRUCTION COMPLEXITY

and processing, the technology ultimately led to significant improvements in project efficiency and safety.

AI can also automate administrative tasks such as document management, communication logs, and compliance tracking, reducing the burden on project managers and improving efficiency by allowing them to focus on construction productivity. For example, software like PlanGrid and Procore can automatically organize and retrieve project documents, maintain detailed records of all project communications, and track compliance with regulatory requirements. Companies using these tools have reported reduced administrative workloads and more streamlined project management processes.

AI can also improve contract compliance by creating models based on job-specific contracts, monitoring adherence to contract terms, and reducing legal disputes. For example, AI can analyze contract terms to identify potential areas of non-compliance and alert project managers to potential issues and even prepare a draft write-up as outlined in the project contract. By ensuring that all parties adhere to agreed terms, AI enhances accountability and minimizes conflicts while creating a system of checks and balances to ensure that a construction manager can keep the construction team within contractual compliance.

Case studies demonstrate that AI adoption leads to reduced delays and cost savings. For example, a report by Deloitte found that using AI in construction project management can reduce delays by up to 30% and cut costs by up to 20%. These findings highlight the potential of AI to transform project management and improve efficiency, ensuring that construction projects are completed on time and within budget.

THE FUTURE OF AI IN CONSTRUCTION MANAGEMENT

As AI technology continues to advance, its potential applications in construction management are expanding. Emerging trends and innovations, such as AI in sustainable

project. This tool can help manage schedules, track progress, and analyze data to identify potential risks. By starting with a manageable scope, firms can evaluate the tool's impact and gradually expand its use. Additionally, collaborating with AI experts can help tailor the tool to the firm's specific needs, ensuring a smooth and effective integration.

Whitepapers and industry guidelines provide insights into successful AI integration strategies, ensuring that construction firms can effectively leverage AI to enhance their operations. For example, industry guidelines can provide best practices for AI implementation, helping construction firms avoid common pitfalls and maximize the benefits of AI technology.

CONCLUSION

AI, especially with cost-effective and easily attainable products like those mentioned in this paper, offers significant benefits in addressing manpower shortages, managing increased complexity, mitigating delays, and ensuring adherence to contractual requirements in modern construction projects. Early adoption and continuous innovation in AI technologies by construction and construction management firms are crucial for maintaining a competitive edge in the industry. As AI continues to evolve, it holds the potential to revolutionize the construction industry, making it more efficient, sustainable, and resilient. The construction industry must embrace AI to overcome its current challenges and build a future of innovation and success.

About the Author

Garrett Miller, CCM, has 12 years of experience in the construction industry. Holding a Master's of Science in Construction Management from Arizona State University, he currently serves as the Executive Director of Construction and Program Management at Huckabee Inc. Garrett is a Certified Construction Manager (CCM) with the Construction Management Association of America (CMAA) and actively contributes to the Certified Construction Manager (CCM) committee for the Southern California Chapter of CMAA.

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