AI-Driven Innovations in Cost Estimation and Quality Control in Sri Lankan Construction Projects

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The integration of artificial intelligence (AI) in construction project management has significantly enhanced cost estimation and quality control processes. This study, employing a mixed-method research design, explored the impact of AI-driven innovations on these critical aspects of the construction industry. Through a comprehensive analysis involving surveys and regression analysis, this study investigated the adoption rate, benefits, challenges, and overall influence of AI on project outcomes. Data were collected using stratified random sampling techniques to ensure a representative sample of quantity surveyors, civil engineers, project managers, and quality control engineers. The findings revealed a high adoption rate of AI tools among respondents, resulting in notable improvements in accuracy, efficiency, and predictive capabilities. The positive correlation between AI adoption and project outcomes, such as cost savings, quality enhancements, project timeliness, client satisfaction, and return on investment (ROI) underscores the transformative potential of AI technologies. Despite the challenges like high initial costs, lack of skilled personnel, and data privacy concerns, the advantages of AI, including increased accuracy and data-driven decision-making outweigh the drawbacks. The study also highlights AI's versatility, extending its applications to project scheduling, risk management, and procurement, thereby enhancing communication and collaboration among stakeholders. The paper concludes with recommendations for construction companies to maximize the benefits of AI adoption, including investing in AI tools, training personnel, ensuring data security, developing integration strategies, fostering a culture of innovation, conducting pilot projects, and complying with industry regulations. By addressing these aspects, construction firms can harness AI's full potential, leading to more successful and sustainable project outcomes.

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