



Digital Transformation in Capital Construction Projects

A Case Study in the Digital Transformation of Saudi Arabia,
Eastern Region

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Research Questions:

- 1- What are the best practices for integrating digital transformation into traditional project management methodologies in capital construction?
- 2- How does digital transformation impact the overall quality and durability of constructed assets in capital projects?
- 3- What are the most effective digital tools and technologies for enhancing efficiency in capital construction projects?
- 4- What are the barriers and challenges to implementing digital transformation in capital construction project?

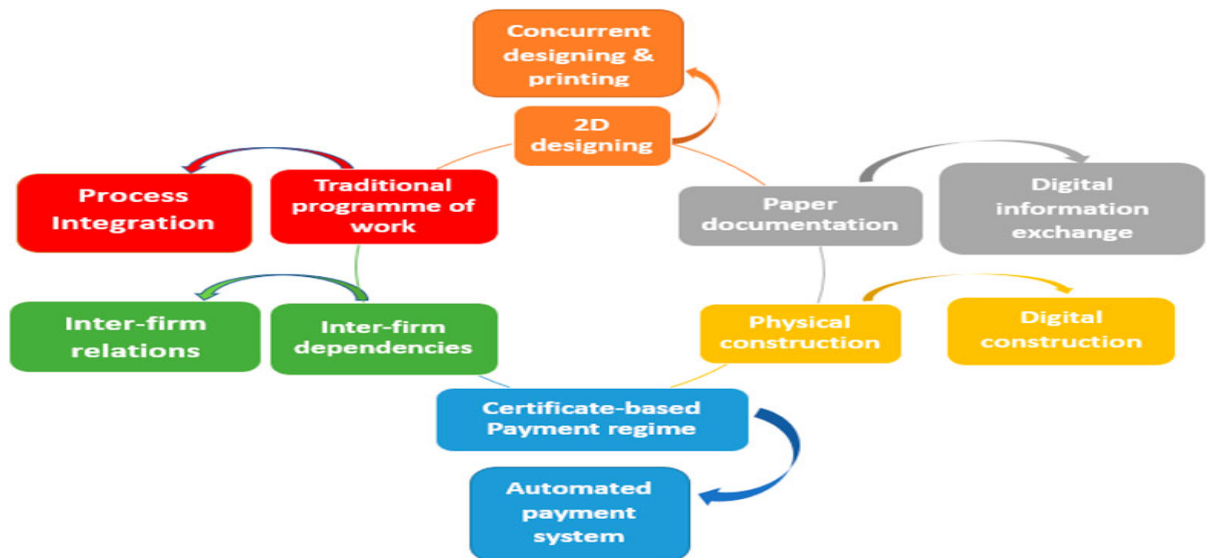
Research Objectives:

- Assess the current state and environmental sustainability benefits of digital adoption within capital construction projects.
- Develop recommendation and best practices for integrating digital transformation into existing project management frameworks in capital construction.
- Evaluate the effectiveness of various digital tools and technologies in streamlining project management processes.
- Analyze the barriers and challenges hindering the successful implementation of digital transformation in capital construction projects.
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Research Hypotheses:

- Digital transformation in capital construction project leads to increased productivity and efficiency in the construction process.
- Digital transformation improves the accuracy and efficiency of project management.

Research Model:

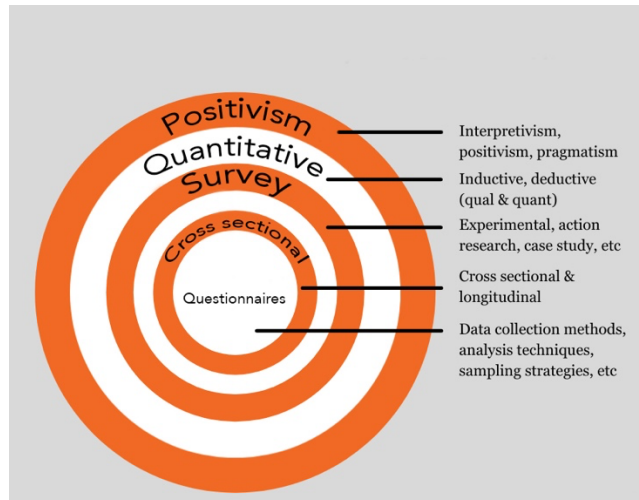


Research Methodology:

Quantitative methods

Process optimization: Improve workflow efficiency and optimize resource utilization throughout the construction process.

Organizational change: Provide training programs to equip employees to effectively utilize new technologies and tools, Secure leadership buy-in and support for digital transformation initiatives, ensuring alignment with strategic goals.



Scope of study:

Kingdome of Saudi Arabia – Capital Construction Projects (Roads, Bridges).

Suggested Project structure:

- Introduction.
- Literature Review.
- Research Methodology.
- Statistical Analysis.
- Finding 'Discussion and Conclusion.

Literature Review:

Digital transformation has become a cornerstone in the evolution of capital projects, reshaping the way infrastructure is developed, constructed, and managed. In an era defined by rapid technological advancement, the integration of digital tools and methodologies has emerged as a key strategy for driving efficiency, collaboration, and innovation in the capital project landscape. Capital projects encompass a wide range of endeavors, from building bridges and highways to constructing energy facilities and urban developments. Traditionally, these projects have been characterized by complex workflows, disparate stakeholders, and inherent risks. However, the advent of digital transformation has ushered in a new era of possibility, enabling stakeholders to overcome traditional challenges and unlock new opportunities for success. At the heart of digital transformation in capital projects lies the convergence of various technologies, including Building Information Modeling (BIM), Internet of Things (IoT), Artificial Intelligence (AI), and Augmented Reality (AR). These technologies, when integrated effectively, empower project

teams to streamline processes, enhance decision-making, and optimize project outcomes. This introduction explores the profound impact of digital transformation on capital projects, examining key trends, challenges, and opportunities shaping the industry. From improving collaboration and productivity to mitigating risks and enhancing sustainability, digital transformation promises to revolutionize the way capital projects are conceived, executed, and delivered in the 21st century.

Definition of Digital Transformation: Digital transformation is the combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace, or complement existing rules of the game within organizations, ecosystems, industries, or fields.

Hinings B., Gegenhuber T., Greenwood R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization*, 28(1), 52–61.

Definition of Capital Construction Projects: Project management researchers have often measured the effect that specific inputs have on project success. However, the concept of project success is complicated and there is no consensus as to how it should be measured. The research community and project management practitioners need a simple and direct measurement for project success that is based on objective measurements and can be used on projects of different types and sizes.

[Zhang, Yang;Li, Hui;Yao, Zeliang](#)

Engineering, construction, and architectural management, 12 Dec 2023,

Relationship between Digital Transformation and Capital Construction Projects

Findings

The study's results reveal that the performance of construction firms greatly depends on intellectual capital and its components. Furthermore, digital transformation plays a vital moderating role between intellectual capital and its components and construction firm performance.

- Referencing:

Jahanger, Q. K., Louis, J., Pestana, C., & Trejo, D. (2021). Potential positive impacts of digitalization of construction-phase information management for project owners. *Journal of Information Technology in Construction*, 26. <https://doi.org/10.1061/JCEMD4.COENG-12528>

Hinings B., Gegenhuber T., Greenwood R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization*, 28(1), 52–61.

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