



بسم الله الرحمن الرحيم

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Cairo University

# **Exploitation Blockchain and BIM Technology in Developing Construction Smart Contracts**

By

**Mohamed Adel Mahmoud Kamel**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**MASTER OF SCIENCE**  
in  
**Structural Engineering**

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**Title of Thesis:**

Exploitation Blockchain and BIM Technology in Developing Construction Smart Contracts

**Key Words:**

Cashflow management; Construction Contracts; Blockchain; Smart Contracts; BIM.

**Summary:**

Poor payment practices are perceived as one of the biggest challenges facing the construction industry. This research proposes a framework that improves the contract management process and enhances construction projects' cashflow. The proposed framework encompasses three main scenarios to explore the benefits of the framework based on the level of framework's adoption in the construction industry. The developed framework has the potential to reduce the problem of poor payment practices, time-barring of some contract clauses, record keeping and paperwork. A case study is presented to illustrate the main features of the proposed framework. The results of the case study reveal that the first scenario could save a portion of banking transactional fees of invoices as they are significantly higher than blockchain transaction fees. Whereas the second scenario shows an enhanced cash flow with less overdraft values due to the secured payments through blockchain. Finally, the third scenario have much less overdraft due to the expedited works approval that leads to shorter cashflow cycle.

## **Disclaimer**

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.  
I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: \_\_\_\_\_ Date:     /     /2022

Signature: \_\_\_\_\_

## Dedication

*“To my father who has always guarded our ship.”*

*“To my brother who stayed up to the next morning supporting me with my secondary school History exam.”*

*“To my beloved mother who saved me from the punches of life with her kind slap. We are about to make it. I miss you.”*

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# **List of symbols, Abbreviations and Nomenclature**

API: Application Program Interface  
BIM: Building Information Modelling  
BTC: Bitcoin  
CBC: Construction Blockchain Consortium  
DAPP: Distributed Applications  
DLT: Distributed Ledger Technology  
ETH: Ethereum  
FIDIC: International Federation of Consultant Engineers  
FinTech: Financial Technology  
JCT: Joint Contract Tribunal  
NEC: New Engineering Contract  
NSW: New South Wales  
OBS: Organizational Breakdown Structure  
PPC: Project Partnering Contract  
SC: Sub-Clause  
SHA256: Secure Hash Algorithm 256  
URL: Uniform Resource Locator