DEVELOPING A BLOCKCHAIN NETWORK FOR EFFICIENT PUBLIC-PRIVATE PARTNERSHIP PROJECTS IMPLEMENTATION IN SRI LANKA

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MSc. By Research

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Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree

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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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The above candidate has carried out research for the PhD/MPhil/Masters thesis/dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Prof. Udayangani Kulatunga

Dr. Adeesha Wijayasiri

Signature of the Supervisor: Date:

06.08.2024

06.08.2024

DEDICATION

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ABSTRACT

Over the past decades, the demand for infrastructure has increased exponentially to cater to the public's needs. In contrast, the public funds to develop them remain the same. This led to the inception of public-private partnerships (PPPs), in which private and public sectors enter into partnerships to cater to infrastructure needs. However, PPPs globally suffer from issues like poor coordination, lack of transparency and accountability, lack of trust and confidence, and societal discontent. The inception of blockchain is often dubbed as the next disrupter of Information Technology. It is a decentralized database that chronologically and securely records transactions, utilizing avant-garde cryptography. A preliminary review of blockchain reveals that it has several key features like decentralization, persistence, anonymity, security, veracity etc. A closer look at these features of blockchain reveals that several barriers to PPPs, such as lack of trust, transparency and accountability, could be directly addressed by integrating blockchain due to its key features like decentralization, transparency, and auditability. Based on this, this study intends to explore how blockchain integration would contribute to the success of PPPs and how they could be integrated with the PPP processes and develop a blockchain network to be used in PPPs, with the Sri Lankan PPP sector as its context. Accordingly, it was identified that integrating blockchain has the potential to address corruption, lack of transparency and accountability in procurement, evaluate unsolicited proposals, and communicate feasibility studies of Sri Lankan PPPs. Finally, based on the above findings, a private blockchain is developed using the HyperLedger Fabric platform to be integrated into the evaluation and approval processes of Sri Lankan unsolicited proposals. The functionality of blockchain has also enhanced communication among the relevant stakeholders while effectively addressing corruption issues, lack of transparency and accountability in the Sri Lankan PPP sector.

Keywords: Blockchain; Distributed Ledger Technologies; HyperLedger Fabric; Public-Private Partnerships; Unsolicited Proposals.

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LIST OF ABBREVIATIONS

Abbreviation	Description
BIM	Building Information Modelling
BOQ	Bill of Quantities
CEO	Chief Executive Officer
CLI	Command-Line Interface
CSF	Critical Success Factor
cURL	Client for URL
GUI	Graphical User Interface
ID	Identifier
IMF	International Monetary Fund
IPFS	InterPlanetary File System
IT	Information Technology
MSP	Membership Service Provider
NAPPP	National Agency for Public-Private Partnerships
NGO	Non-Government Organization
PC	Project Committee
PDF	Portable Document Format
PPP	Public-Private Partnerships
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
ROI	Return on Investment
SCARC	Standing Cabinet Appointed Review Committee
SLR	Systematic Literature Review
TEC	Technical Evaluation Committee
URL	Uniform Resource Locator
USP	Unsolicited Proposal
WSL	Windows sub-system for Linux

LIST OF APPENDICES