Assessing the Feasibility and Effectiveness of Blockchain Technology for Safeguarding Governmental Data Integrity: Focus on Sensitive Diplomatic Communications

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I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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DECLARATION

This is to certify that the work is entirely my own and not of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Sri Lanka Institute of Information Technology or to any other institution for assessment for any other purpose.

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ABSTRACT

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This thesis investigates the feasibility and effectiveness of implementing blockchain technology to safeguard governmental data integrity, with a specific focus on sensitive diplomatic communications. Given the increasing importance of data security in an era of digital transformation, this research adopts a comprehensive mixed-method approach. It combines quantitative surveys and qualitative interviews with government IT professionals, blockchain experts, and policy makers to assess the technological, operational, and regulatory dimensions of blockchain implementation.

The study reveals that blockchain technology offers substantial benefits in enhancing data security, primarily due to its inherent characteristics such as immutability, transparency, and decentralized architecture. These features are particularly crucial for maintaining the integrity and confidentiality of sensitive diplomatic communications, which are often vulnerable to unauthorized access and tampering. The research highlights that blockchain's ability to create tamper-proof records and ensure transparent transactions aligns well with the needs of secure diplomatic exchanges.

However, the study also identifies several significant challenges that need to be addressed. Issues such as scalability, high energy consumption, regulatory compliance, and the complexity of integrating blockchain with existing governmental IT systems are notable barriers to effective implementation. To address these challenges, the study proposes a detailed framework that includes technical solutions, policy adjustments, and strategic recommendations. This framework

aims to facilitate the strategic adoption of blockchain technology within government sectors, providing a structured approach to overcoming obstacles and leveraging blockchain's potential to enhance data integrity and security in sensitive areas such as diplomatic communications.

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