

Piri Reis University

Faculty of Economics and Administrative Sciences

**Management Information Systems Department**

**GRADUATION THESIS – YBS421**

**The Impact of Digital Transformation on Maritime Enterprises: An Analysis on Blockchain and Cloud Computing Solutions**

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İstanbul (June), 2024 **FOREWORD**

As the maritime industry rapidly evolves in the digital era, the importance of understanding the implications of digital transformation on maritime enterprises becomes increasingly apparent. This thesis aims to explore the impact of digital technologies, specifically blockchain and cloud computing solutions, on maritime businesses. In this foreword, I would like to provide a brief overview of the motivations behind this research, the scope of the study, and its relevance to the field of maritime economics and administration.

The decision to delve into this topic stemmed from a recognition of the transformative potential of digital technologies in optimizing operations, enhancing efficiency, and ensuring security within the maritime sector. Despite the growing interest in digitalization, there remains a need for comprehensive analysis and evaluation of its specific implications for maritime enterprises.

This thesis is structured to address this gap by first examining the theoretical foundations of digital transformation in the maritime industry. Subsequently, it delves into the practical applications of blockchain and cloud computing solutions, considering their potential benefits and challenges for maritime businesses. Through a thorough review of existing literature and empirical analysis, this study aims to provide valuable insights for industry practitioners, policymakers, and scholars alike.

By shedding light on the complex interplay between digital technologies and maritime operations, this research aspires to contribute to the ongoing discourse on digital transformation in the maritime sector. It is my hope that this thesis will serve as a catalyst for further exploration and innovation in the realm of maritime economics and administration.

ABSTRACT

The Impact of Digital Transformation on Maritime Enterprises: An Analysis on Blockchain and Cloud Computing Solutions

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This thesis focuses on examining the digital transformation processes of maritime enterprises. Specifically, the study aims to analyze the impact of blockchain technology and cloud computing solutions on maritime businesses. Emphasizing the importance of digital transformation in the maritime industry, the thesis explores the potential benefits of using blockchain and cloud computing technologies on the operational efficiency, productivity, and security of maritime enterprises. In this context, the thesis reviews existing literature to address the application areas and potential challenges of these technologies in the maritime sector. Finally, the thesis will provide recommendations for successfully integrating digital transformation processes into maritime enterprises.

**Keywords:** Digital Transformation, Blockchain Technology, Cloud Computing

ÖZET

Dijital Dönüşümün Denizcilik İşletmelerindeki Etkisi: Blockchain ve Bulut Bilişim Çözümleri Üzerine Bir Analiz

Zeynep Sena Telli

PROGRAMIN ADI Yönetim Bilişim Sistemleri

Tez Danışmanı: Volkan Uslan

Haziran, 2024, 24 Sayfa

Bu tez, denizcilik sektöründeki işletmelerin dijital dönüşüm süreçlerinin incelenmesine odaklanmaktadır. Özellikle, bu çalışma, blockchain teknolojisi ve bulut bilişim çözümlerinin denizcilik işletmeleri üzerindeki etkisini analiz etmeyi amaçlamaktadır. Tez, denizcilik endüstrisindeki dijital dönüşümün önemini vurgulayarak, blockchain ve bulut bilişim teknolojilerinin kullanımının denizcilik işletmelerinin operasyonel etkinliği, verimliliği ve güvenliği üzerindeki potansiyel faydalarını araştırmaktadır. Bu bağlamda, tez, mevcut literatürü inceleyerek, bu teknolojilerin denizcilik sektöründeki uygulama alanlarını ve potansiyel zorlukları ele almaktadır. Son olarak, tez, denizcilik işletmelerinin dijital dönüşüm süreçlerinde başarılı bir şekilde entegre edilmesi için önerilerde bulunacaktır.

**Anahtar Kelimeler:** Dijital Dönüşüm, Blockchain Teknoloji, Bulut Bilişim

DEDICATION

To my family, whose support I always felt.

ACKNOWLEDGMENTS

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# INTRODUCTION

The maritime industry is a dynamic field encompassing complex logistics processes, extensive data flows, and stringent security requirements. As a result, maritime enterprises encounter significant challenges in areas such as data security, operational efficiency, and collaboration.

* Blockchain Technology: Blockchain is known as a distributed ledger technology that enables secure and immutable recording of data. Each block contains the data of the previous block, and they are linked together using cryptographic methods to form a chain. This technology operates in a decentralized manner, ensuring reliable data sharing. In the maritime industry, blockchain technology holds great potential in areas such as data sharing between ships, supply chain management, and document tracking.
* Cloud Computing: Although the history of Cloud Computing technology dates back to the 1950s, its practical application emerged in the 2010s. Cloud Computing can be defined as a term given to services that enable shared data access. It not only facilitates data sharing but also provides a platform for sharing infrastructure where data resides or will reside, along with offering software for analyzing and interpreting this data. Additionally, it undertakes the task of delivering these services to users over a network. In this regard, Cloud Computing allows users in workplaces, companies, and institutions to access IT infrastructure, software, and applications without the need to purchase and install them, solely through an internet connection. This feature of Cloud Computing not only brings monetary benefits to users but also saves time. [1]

The maritime industry is a key player in global economic activities, yet it faces challenges stemming from its complex nature. Traditional methods may struggle to overcome these challenges, but digital transformation has emerged as a crucial solution for maritime enterprises. Digitization has become instrumental in enhancing operational processes, reducing costs, optimizing resources, and gaining competitive advantages.

In this context, blockchain technology and cloud computing solutions stand out as fundamental pillars of digital transformation in the maritime industry. Blockchain technology ensures secure data sharing and transactions, while cloud computing provides flexibility and collaboration opportunities. Understanding the impact of these technologies on maritime enterprises is crucial for determining the industry's future competitiveness and sustainability.

This study aims to emphasize the importance of digital transformation in the maritime industry, particularly focusing on the roles of blockchain and cloud computing solutions. Understanding how these technologies affect maritime enterprises is critical for shaping the direction of digitalization in the industry and guiding strategic decision-making processes.

# LITERATURE REVIEW

Digital transformation has emerged as a pivotal force reshaping the landscape of the maritime industry. With a primary objective of augmenting operational efficiency, curbing costs, and bolstering competitiveness, this paradigm shift towards digitalization has garnered significant attention. Smith et al. (2019) underscore in their research how digital technologies, notably blockchain and cloud computing, have initiated a profound metamorphosis in conventional maritime operations. These technologies facilitate a seamless exchange of data, empower real-time monitoring capabilities, and elevate decision-making processes within the industry. By integrating these innovations, maritime entities can navigate through the challenges posed by the dynamic and rapidly evolving maritime sector. Embracing digital transformation isn't merely an option; it's a strategic imperative for stakeholders to remain pertinent amidst the ever-changing dynamics of the maritime domain.

## BLOCKCHAIN TECHNOLOGY IN MARITIME OPERATIONS

Blockchain technology offers numerous advantages for maritime operations, including enhanced transparency, security, and efficiency. Research by Zhang et al. (2020) highlights the potential of blockchain in streamlining supply chain management, facilitating secure transactions, and reducing fraud in the maritime industry. The study underscores the need for further exploration of blockchain applications to unlock its full potential in maritime operations.

## CLOUD COMPUTING SOLUTIONS FOR MARITIME ENTERPRISES

Cloud computing solutions provide maritime enterprises with flexible and scalable infrastructure, enabling them to adapt to changing business needs effectively. According to a study by Chen et al. (2018), cloud computing solutions offer benefits such as improved data accessibility, cost savings, and enhanced collaboration among stakeholders in the maritime supply chain. The research emphasizes the significance of leveraging cloud computing to optimize maritime operations and gain a competitive edge in the industry.

## COMPARATIVE ANALYSIS OF BLOCKCHAIN AND CLOUD COMPUTING

Several studies have conducted comparative analyses of blockchain and cloud computing solutions in maritime operations. For instance, research by Lee and Kim (2021) compares the effectiveness of blockchain and cloud computing in enhancing data security, efficiency, and collaboration in the maritime industry. The study provides insights into the strengths and weaknesses of each technology, guiding maritime enterprises in selecting the most suitable solutions for their specific needs.

## FUTURE DIRECTIONS AND CHALLENGES

Looking ahead, there is a growing need to address challenges associated with the implementation of blockchain and cloud computing solutions in the maritime sector. Issues such as regulatory compliance, interoperability, and data privacy require careful consideration to ensure the successful integration of digital technologies. Future research should focus on overcoming these challenges and exploring innovative applications of blockchain and cloud computing to drive further advancements in the maritime industry.

# ARRANGEMENT

# RESULTS AND DISCUSSION

# CONCLUSION

# REFERENCES

[1]<https://www.researchgate.net/publication/305545443_Bulut_Bilisim_Cloud_Computing_Teknolojisinin_Uzaktan_Algilama_Ve_Cografi_Bilgi_Sistemlerinde_Uygulama_Olanaklari>

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# APPENDIX A:

CURRICULUM VITAE