SYNOPSIS of PhD DISSERTATION

Addressing the Gaps in Legal Frameworks for Blockchain Technology: A Comparative Analysis of Regulatory Approaches and Challenges

On the Way to a Decentralized World

by

Bedrettin Gürcan

Supervisors:

Dr. Peter Mezei

Dr. Erzsébet Csatlós

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Doctoral School of Law and Political Sciences

University of Szeged

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1. Background of the Dissertation

1.1. Motivation and Objective for the Research

To understand the motivation behind this study, I would like to reference the 1960s, a time when there were no significant intercontinental connections. Communication between two continents, such as the United States and Europe, was quite challenging, and access to technological developments was limited. In the years following the Second World War, technological development accelerated and became highly competitive, particularly during the Cold War between the Soviet Union and the United States. The regulatory approach to the internet emerged much later as an issue.

It could be argued that this unregulated environment facilitated the development of the internet. The primary motivation behind regulations has often been the taxation of commercial activities. However, as we will discuss further in this study, the internet began as a military project and later evolved into a research initiative. While we imagined flying cars by the 2020s, we instead entered a new era of the internet and social media, a development that was difficult to foresee in the 1960s.

When regulatory approaches are designed before technological development, they may inadvertently hinder progress—or be intentionally designed to do so. As we will explore through examples from various countries, regulatory frameworks are typically established after technological advancements have already made significant progress. Blockchain is one of the most discussed technological developments since its inception in 2009 and has introduced a deeper understanding of decentralization.

In my dissertation, the motivation is to provide lawmakers and scholars with a comprehensive resource to understand blockchain technology, supported by examples of regulations from around the world tailored to its specific features. In my view, successful regulation requires three key components: clearly identifying the purpose of the regulation, ensuring the purpose is beneficial to society and citizens, and executing the regulation effectively.

However, I have observed that some regulatory approaches to blockchain are neither clear nor beneficial in fostering a more competitive society. Additionally, many are not executable due to a lack of understanding of the technology's capabilities (e.g., the notion of “shutting down” Bitcoin, which is not currently possible).

Hence, this dissertation aims to explain what blockchain is and its key features, highlight what must be understood before drafting any new or existing regulation, and analyze the executive bodies authorized to implement these regulations.

In the existing literature, many works focus on just one feature of blockchain technology, often missing the broader ecosystem and its capabilities. This narrow focus can result in incomplete lawmaking and a failure to fully understand the technology itself. In this study, we will evaluate the legal approaches of different countries through a comparative analysis, while also providing a detailed description of blockchain technology and its various capabilities.

1.2.Research Questions and Research Hypotheses

In this part of my dissertation, we aim to clarify the research questions and formulate the research hypotheses to be addressed. Without the determination of well-structured and well-defined research questions, the purpose of scientific research would not be clear. These research questions and research hypotheses are interrelated. Based on this understanding, the following research questions and hypotheses are proposed:

Research Question 1: Does the present legal framework in various countries effectively address the unique features of blockchain technology?

Hypothesis 1: Existing legal frameworks across many countries often fail to properly address the distinctive characteristics of blockchain technology. In the absence of a full understanding of blockchain's technological attributes, these frameworks are often ineffective and do not support the technology. Recent developments, such as the Markets in Crypto-Assets (MiCA) legislation, have made significant strides in tackling these issues by enhancing the comprehension of technical elements. Through the examination of these legal frameworks and their development, we can

identify essential modifications to guarantee legal clarity, safeguard investors, and enhance governance, thereby profoundly influencing the legal system, market dynamics, and technological advancements. To address this hypothesis, we begin by evaluating the technical aspects of blockchain technology in Chapter IV, however, the primary debate will occur in Chapter V. Following of Chapter V, Chapter VI investigate and discuss the research question one and three together.

Research Question 2: Do current regulatory frameworks in different countries effectively handle the distinctive features and applications of various cryptocurrency kinds, including stablecoins, utility tokens, and privacy coins?

Hypothesis 2: Current legislative frameworks in many countries often fail to effectively address the distinct features and applications of various cryptocurrencies, including utility tokens, stablecoins, and privacy coins. This regulatory inadequacy results in inconsistencies in classification and treatment, creating obstacles to the integration and innovation of cryptocurrencies within the financial system. A more flexible and coherent global regulatory framework is essential to accommodate all aspects of the blockchain ecosystem. As with the first research question, we first clarify core features of blockchain and their legal implications , particularly regarding the many categories of cryptocurrencies in Chapter IV, while we conduct an in-depth examination of cryptocurrency classification at the beginning of Chapter V. However, given that cryptocurrencies are integrally linked to several blockchain applications, Chapter VI also presents various analyses of the legal approaches to cryptocurrencies via a comparative methodology.

Research Question 3: Are current legal frameworks sufficiently prepared to address the advancements in blockchain technology, and which innovations—such as Decentralized Finance (DeFi), Decentralized Autonomous Organizations (DAOs), the Metaverse, and Artificial Intelligence (AI)—present more significant legal challenges through a review of their technical requirements and different regulatory efforts across jurisdictions?

Hypothesis 3: The broad comprehension of blockchain technology by regulators and lawmakers greatly influences the successful outcome of legal frameworks. When the regulatory framework highlights merely its overall context while neglecting complex aspects such as Decentralized Applications (DApps), Decentralized Autonomous Organizations (DAOs), Decentralized Exchanges (DEXs), Non-Fungible Tokens (NFTs), the Metaverse, Decentralized Finance (DeFi), Layer-2 solutions, and the integration of Blockchain and Artificial Intelligence (AI), it proves insufficient. An in-depth knowledge of these various fields is essential for formulating suitable regulations that promote innovation while safeguarding investor security. Through the comparison of several legislative examples, we aim to determine which regulatory approaches are most effective in addressing the distinct issues presented by these emerging technologies. Notably, certain developments, such as DeFi, pose greater challenges to regulators due to their capacity to disrupt established legal frameworks, while others, such as AI and NFTs, may present comparatively fewer regulatory difficulties.

We examine the infancy period of the blockchain ecosystem, its adolescence, and its future aspects, creating a way of thinking about how to regulate this new decentralized world. We began our dissertation with the technical aspects of blockchain technology through the lens of a legal perspective. Since understanding the technological aspects plays a crucial role before making any regulatory action or critique, it is an essential foundation. By the end of our research, we even touch upon Artificial Intelligence and its connection with blockchain, aiming to propose innovative approaches not just for blockchain but for all emerging technologies. The history of the legal framework surrounding blockchain technology is briefly described in this thesis; however, the main focus is to analyze and discuss the existing legal structures for blockchain while outlining the institutional duties across different jurisdictions.

The purpose of this research is to summarize how blockchain technology works and discuss potential qualifications of these new terms to help regulatory bodies understand and take informed steps. Based on our comparative research, while some countries have made valuable progress in their regulatory approach to blockchain technology, others have failed to establish progressive regulations. At the end of the chapter V, we a have set of recommendations to policy makers.

The structured organisation of research questions, hypotheses, and chapter structure in this dissertation is the basis of it's analytical framework, directly addressing specificity, clarity, and methodological practicality. This dissertation explicitly links each question to particular chapters. Technically, the basis of blockchain with its legal implications in Chapter IV, comparative legal analysis and policy recommendations in Chapter V, and comprehensive explorations in Chapter VI aims to ensure that the analysis here is not merely descriptive but critically addresses the doctrinal and comparative legal challenges of blockchain technology.

Moreover, the hypotheses have an evaluative perspective as they not only describe current legislation but also discuss its sufficiency in addressing the disruptive and decentralised characteristics of blockchain. This dissertation's framework recognises the limitations of a rapidly advancing technical area, encouraging constant debate and going beyond mere description to provide analytical insights and pragmatic suggestions for future regulatory modifications based on their technical and practical aspects with the risk evaluations.

1.3. Research Methodology and Data Collection

To achieve its purpose, this research employs the following methods: a literature review, comparative legal analysis, analysis of blockchain technology, technical description reports known as white papers, official public statements from institutions in several countries, legal codes, evaluations of countries' perspectives on blockchain technology and its future, media reports, and critical articles on similar topics. This research is grounded in legal theory, exploring international law, domestic law, and relevant legal concepts.

Several blockchain-related textual data sources are publicly accessible, such as news stories that often report on cryptocurrency performance and technical innovations. Digital platforms such as GitHub, Reddit, and social media like Twitter also function as hubs for developers and regulatory news.

The research topic is based on blockchain technology, which has a history of less than two decades. Moreover, even the technical aspects of this technology are still being explored by experts. The legal side of blockchain technology, however, has not yet been examined in detail within the

literature. While some researchers focus on narrow aspects of the legality or qualifications of blockchain technology's features, this dissertation takes a broader approach. It examines various regulatory actions from a global perspective, offering an extensive analysis of the legal frameworks surrounding blockchain technology to determine whether the present legal frameworks in different countries effectively address the unique features of blockchain technology.

Several challenges are anticipated in this dissertation, including the limited availability of sources due to the novelty of blockchain, countries' evolving approaches, a lack of regulations, unclear definitions, and the complexity of the technology. Accordingly, desktop research involves delving deeper into the features of blockchain technology and evaluating the legal problems and scope of regulations. The methodology of this research is designed to showcase comparable approaches worldwide to blockchain technology and provide a roadmap for regulatory bodies.

We have undertaken an extensive literature review on two primary aspects: the technological aspect and the legal aspect. Based on our analysis of the available literature, we have identified gaps in the research on key legal problems related to blockchain technology that have not yet been adequately investigated. We have conducted a thorough examination of certain components, while other areas have not been explored in depth due to their current level of relevance. This research seeks to serve as a comprehensive guide for lawmakers, equipping them with a technical understanding of blockchain from a regulatory perspective to develop effective legal frameworks.

In this regard, our research adopts a mixed-methods approach, including the literature review method and comparative law method, to provide a holistic understanding of the blockchain matter, combined with desktop research on the existing regulatory frameworks of different jurisdictions to address the dissertation's research questions.

This dissertation aims to analyze different leading countries and compare their regulatory approaches to various blockchain features and applications, including cryptocurrencies, non-fungible tokens (NFTs), the Metaverse, and even their connection with artificial intelligence. The analysis will focus on examining differences in legal strength and technological integration across these jurisdictions. These discrepancies are believed to stem from variations in technical

knowledge among these countries. Based on the research, the United States, the United Kingdom, and Germany are the top three countries by the number of academic papers published on blockchain. For this reason, we examine these countries, among others, and the regulatory bodies responsible for blockchain-related legal issues.

We propose that the regulatory frameworks governing blockchain technology display considerable variability among different international jurisdictions, such as the USA, the UK, Australia, and El Salvador, primarily as a result of differences in technological capacity, legislative agility, and cultural approaches to technology governance. The ability of these legal systems to adapt to rapidly evolving digital developments significantly influences the effectiveness of their blockchain regulations.

This dissertation will comprehensively analyze successful regulatory examples, focusing on key aspects that contribute to variations in regulations, including technical knowledge, legislative responsiveness, and cultural attitudes towards technology and innovation. We aim to assist different stakeholders, such as policymakers, lawmakers, and legal experts, in developing a unified and flexible legal framework that can be applied on an international basis and promoting the global adoption of blockchain technologies by outlining the optimal methods and challenges identified during the research. We seek to create a standardised approach to rules of law that supports technological innovation, ensures powerful regulatory compliance, and fosters international legal coherence across the different jurisdictions to evaluate current regulatory frameworks in different countries—whether they can effectively handle the distinctive features and applications of various cryptocurrency kinds.

In this dissertation, relevant academic publications, regulatory frameworks, legal texts, and several case studies concerning blockchain technology, legal difficulties, and taxes in various countries have been reviewed through a comprehensive literature review. This approach will clarify deficiencies in existing data and guide our hypotheses, offering a thorough understanding of the current state of blockchain technology and its legal implications. Additionally, we aim to develop a theoretical framework and contextual foundation for our research enquiries. The literature review serves as the cornerstone of every research effort, including this dissertation. It establishes the

research's general framework, clarifies the scope of inquiry, and provides justification for the chosen methodologies.

To conduct a comprehensive analysis of the research topic and provide pragmatic insights into the practical implementation of the theoretical principles discussed, we use secondary sources, including judicial proceedings, statutes, and relevant documents. By synthesizing primary and secondary sources, we aim to provide a detailed and in-depth study that reflects the complex nature of blockchain technology and its legal framework.

Additionally, a comparative approach is employed to analyze the various methods taken by different nations on specific themes, where applicable. We use contrast analysis to evaluate regulatory approaches worldwide, focusing on countries like Australia and Japan, which are pioneers in blockchain-related regulations. How do different countries address blockchain-related challenges? We examine the legal frameworks of blockchain-related fields, enforcement mechanisms, and compliance requirements, highlighting similarities and differences to help create a roadmap for regulatory bodies.

The method of comparative legal analysis is particularly beneficial in new fields characterized by inconsistent regulation. This method is particularly well-suited to blockchain, as it facilitates a thorough understanding of the diverse strategies used by different countries. It will be used to investigate research problems and prove or disprove the hypotheses of this research. For example, national regulations can provide justification for regulating blockchain technology, while restrictive regulations may demonstrate how they could become obstacles to technological development, as seen with certain data protection rules. This method will be used to understand opinions, underlying reasons, and motivations behind regulations and to qualify the features of blockchain technology.

The scientific foundation for this research will be the theory of international law and domestic law, including international relations and finance concepts such as currency, commodity, and security classifications, as well as cross-border business and regulations like the General Data Protection

Regulation (GDPR), the Markets in Crypto-Assets (MiCA) legislation, the Anti-Money Laundering Act, and the Know Your Customer Act.

In the comparative research, six different methods have been described by Mark Van Hoecke: the functional method, the structural method, the analytical method, the law-in-context method, the historical method, and the common-core method. This dissertation aims to determine whether better laws are possible for blockchain technology. The functional method does not compare primary rules but focuses on solutions to practical problems involving conflicting interests in different jurisdictions. In this dissertation, we primarily use the functional method to evaluate the existing regulatory approaches of different countries and assess whether they are suited to blockchain technology.

We also partially employ the law-in-context method to understand the different regulations as a foreigner to these legal systems and to explain why the law is designed the way it is. Additionally, the functional method inherently refers to context by considering which problem is solved using what kind of legal construction.

In this dissertation, we use the functional method to first identify the actual problems: whether the legal frameworks in various countries effectively address the unique features of blockchain technology, how these challenges are resolved using similar or differing strategies (e.g., restrictive or supportive approaches), and with what outcomes. For instance, this is evident in the case of El Salvador, which we will discuss below.

The method of data collection is based on an overview of local regulations and reports from international institutions to provide an objective perspective alongside a literature review. We analyze official statements, legal codes, and regulatory actions to construct a global perspective on the blockchain ecosystem. This research aims to offer an objective overview to regulatory bodies while also providing some suggestions. Moreover, we critique existing regulations and official approaches to blockchain technology. Integrating these data sources is essential due to the multidisciplinary nature of blockchain research. Collecting key legal documents ensures an accurate understanding of existing legal frameworks, while secondary literature evaluations, such

as judicial proceedings and statutes, provide theoretical perspectives and contextual backgrounds for the regulations.

The objective data is sourced from prominent and reliable references to obtain figures on the market capitalization, market value, and investment numbers of cryptocurrencies. We collect data on cryptocurrency market size, cryptocurrency investments, and other relevant metrics, such as the size of specific tokens. We also use the functional method to analyze this data effectively. Well-established sources are leveraged to ensure accuracy in market analysis and to support our approach. Blockchain technology holds vast potential for development in the coming years; however, regulations will inevitably follow these advancements.

Another method employed is the structural method, used to compare the legal systems of countries pioneering blockchain technology. Using the functional method, we first identify the key components of the blockchain ecosystem, namely cryptocurrencies, regulatory frameworks, technological infrastructure, and smart contracts. We then assess practical implications by evaluating how these legal frameworks function in practice within the blockchain ecosystem, incorporating case studies, regulatory decisions, and real-world applications of blockchain technology.

We also conduct critical evaluations of existing or planned regulations, such as MiCA, and official approaches. Will these measures effectively address blockchain's legal implications? We provide constructive feedback and propose improvements where necessary.

This dissertation acknowledges certain limitations, such as the rapid evolution of blockchain technology, which may outpace current analyses, potential biases in the selection of legal or other sources, and the challenges in accessing proprietary or sensitive information from different jurisdictions.

In this dissertation, We mainly utilise doctrinal legal methodology and scholarly sources for its fundamental examination, while also incorporating a limited number of grey literature, such as news, articles or ecosystem data to demonstrate the historical and technical development of

blockchain in areas where academic literature is still developing. It plays a significant role in understanding ecosystem dynamics to discuss a responsive regulatory approach, which we will discuss further.

These inclusions are carefully contextualised and are not considered the basis for main claims. Despite the fast evolution of blockchain legislation, many educational shortcomings persist. Still, the legal aspects of this dissertation are carefully grounded in scholarly research, peer-reviewed literature, and authoritative legal analysis. The multidisciplinary framework as historical, technological, and legalis crucial for addressing the research questions and justifies the limited and conditional utilisation of non-academic resources.

This dissertation describes the legal challenges within the larger historical and technical framework while critically examining the regulatory and doctrinal implications that develop. The parts of the recent development history of blockchain and ecosystem related parts show the growing context, while the analysis goes beyond basic explanation by questioning whether present legislative frameworks sufficiently address the cross-border and unique decentralised nature of blockchain applications. This involves evaluating how gaps in legal definitions (for example, in the decentralized apps) might provide regulatory arbitrage possibilities.

We employ a comparative methodology as we discussed above, specifically evaluating the laws and regulations governing various blockchain applications across different jurisdictions. Thus it is ensuring the dynamics of the blockchain ecosystem, examined in its context, taking into account legal principles, policy coherence, and enforceability. This approach strengthens the dissertation's purpose to both describe and critically assess the effectiveness of regulatory solutions to the technological and socio-economic complexities of blockchain.

1.4.The Overall Presentation of the Dissertation

This dissertation has been structured to provide an extensive and critical examination of the legal frameworks regulating blockchain technology, emphasising its flexibility to the disruptive and decentralised nature of this technological development. We employ a comparative and multidisciplinary methodology, integrating legal theory, technology analysis, and policy

evaluation to overcome recognised research gaps in order to provide bird's eye look to the overall topic.

The dissertation has three main chapters, each systematically building upon the prior to create an overall framework.

The following of presentation the research topic, we explain the purpose, goals, methodologies and scope of the study, and articulates the major research questions and hypotheses that direct the analysis. The chapter of Core Features Of Blockchain And Their Legal Implications examines the progression of blockchain technologies, from first emergence of blockchain to technological framework of blockchain, including cryptocurrencies, blockchain concepts and blockchain gvernance models. Each aspect is examined from the perspective of law to identify any regulatory challenges.

The following chapter of Comparative Legal Examination of Jurisdictions analyses and compares methodologies in prominent jurisdictions, including the USA, UK, Germany, Switzerland, Singapore, Japan, and the European Union. It analyses the impact of frameworks such as MiCA, FATF guidelines, and sandbox models on promoting or hindering innovation.

And in chapter VI, The Future of Blockchain - Addressing Current Legal Challenges and Anticipating Future analyses the short history of the internet and Web 3, and concepts of the DAAPS, DAO, DEX, NFT, METAVERSE, DEFİ, Layer 2, and AI. We assess the potential and existing legal challenges of these concepts.

We consolidate the results to highlight inadequacies in existing rules, especially with cross-border enforcement with different countries, conflicts in data protection, discrepancies in token categorisation.

The framework of dissertation provides that the dissertation progresses from a broad comprehension of blockchain technology and its implications to particular legal difficulties and practical regulatory solutions by comparison method. Each chapter tackles one or more research

enquiries, ensuring a coherent connection between theoretical discourse, empirical findings, and policy recommendations. This dissertation provides a comprehensive and critical examination of the regulatory challenges of blockchain technology, enhancing academic research and delivering practical insights for legislators, regulators, and industry participants.

2. Main Research Findings and Recommendations

The rapid spread of technology often brings forth a wide array of technological developments. While we sometimes hear concepts like the metaverse and NFTs discussed singularly, the puzzle pieces do not fit perfectly without a full understanding of the main concept.

In this study, we aim to highlight the primary legal issues of blockchain technology to create an overview of cryptocurrencies and blockchain. Based on the current literature, it seems fair to conclude that the legal framework of blockchain technology would fall under a sub-branch of IT law.

From the lawmaker's point of view, blockchain is a disruptive technology due to the decentralized nature of its system. Implementing rules in a system with no owner or central provider presents significant challenges. Therefore, lawmakers will need to understand the core features of blockchain technology itself.

The regulatory trend for blockchain technology is determined by the purpose of regulation. If the purpose is taxation, the trend leans toward accepting cryptocurrencies as money or payment methods while excluding them from value-added taxes. For data protection, however, many concerns arise.

In my dissertation, I have examined the existing legal frameworks governing blockchain technology across different jurisdictions. The comparison of regulatory approaches, such as those in the United Kingdom and China, demonstrates their influence on the development and utilization of blockchain technology, as well as the discrepancies in compliance requirements for investors and businesses.

I have also examined several case studies, such as the development of centralized cryptocurrencies to Bitcoin, the first decentralized cryptocurrency, and listed key legal challenges posed by the adoption and integration of blockchain technology across different jurisdictions, focusing on leading countries in the market. The decentralized nature of blockchain technology creates significant challenges for traditional legal frameworks, as illustrated by the example of decentralized finance (DeFi). I emphasize the need for new regulatory methods that address the unique features of blockchain.

We have analyzed the legal systems of several countries, focusing on the technical aspects from early centralized cryptocurrencies to Bitcoin, the first decentralized cryptocurrency. The result determines significant legal challenges associated with blockchain adoption in various jurisdictions, especially in popular markets, in accordance with our first research question and hypothesis, which points out the failings of current frameworks in addressing the distinctive characteristics of blockchain technology in many jurisdictions.

The decentralized characteristics of blockchain present serious challenges for conventional legal systems, as shown in instances such as Decentralized Finance (DeFi), emphasizing the pressing need for creative regulatory strategies adapted to blockchain's unique characteristics. Bitcoin emerged following the 2008 financial crisis as a response to the need for decentralization and an unreliable financial system. Regulators had difficulties understanding the technology, resulting in postponed essential safeguards.

Restrictive rules in nations such as China, intended to curb blockchain, have instead hindered innovation, while countries like Singapore have embraced blockchain with transparent, supportive frameworks, establishing themselves as pioneers. This methodology, when combined with regulatory sandboxes, encourages innovation while safeguarding investors and avoiding market monopolization by dominant companies whose failures might yield severe repercussions.

The SEC in the United States adopts a strict enforcement-oriented strategy. It imposes hurdles for startups and smaller entities, emphasizing investor protection at the expense of innovation. In

contrast, Singapore takes an intelligent strategy by exempting some targeted digital payment tokens from the Goods and Services Tax (GST) to encourage specific blockchain technologies without providing general support, which may cause problems.

In some countries, there is hesitation in supporting stablecoins, which risk financial institutions, while supporting advantageous platforms such as DeFi, which might provide necessary liquidity and function as a direct form of foreign investment, especially for countries with limited credit access.

Despite these advanced instances, broader regulatory approaches sometimes fail to regulate effectively. Frameworks such as MiCA often overlook decentralized blockchain features, resulting in significant legal inadequacies. In contrast, Switzerland adopted the Blockchain Act to establish itself as the global crypto hub, with Zug developing as a center for blockchain innovation. This method stands out from the restrictive policies of countries such as China and India, which hinder innovation and market growth. The achievements of hubs such as Switzerland, Singapore, and London illustrate the importance of transparent, equitable frameworks, focused policies and institutions, and collaboration with industry players.

The global regulatory framework for blockchain is progressively influenced by cross-jurisdictional factors and legal transmission. The European Union’s Markets in Crypto-Assets Regulation (MiCA) standardises crypto-asset regulations within the EU member states and extends its impact to EFTA states via dynamic alignment treatments to maintain market access. To avoid this the cross-border legal standardization plays a significant role.

MiCA's comprehensive approach to crypto-asset services shows a partly solid understanding of the ecosystem. MiCA encourages openness and trust by categorizing services such as custody, trading platforms, and exchanges. The categorization of significant asset-referenced tokens imposes stricter regulations for large-scale projects while easing the restrictions on smaller enterprises, hence encouraging innovation. MiCA intentionally excludes the regulation of decentralized platforms such as Bitcoin, possibly reflecting legislators' intention to avoid interference in areas where they have little skill or understanding.

Despite these benefits we discussed, MiCA's stringent stablecoin requirements and disjointed oversight, alongside frameworks such as MiFID II governing security tokens, result in regulatory challenges. This kind of complex regulatory requirement will slow down the European ecosystem, while competitors like the British fintech market can gain the upper hand in innovation. A wider structure may reduce complexity and guarantee uniformity, providing a clear framework for startups, especially.

Recommendations include the incorporation of more detailed and comprehensible standards for decentralized applications, the setting up of sandbox models to promote innovation (as seen in examples from our comparative research), and the integration of MiCA with other regulatory frameworks rather than avoiding interference altogether. MiCA represents an important and detailed step in cryptocurrency regulation, striving to find a balance between structure and flexibility. Nonetheless, more development is necessary to effectively manage decentralized systems and achieve complete oversight harmonization. Lastly, it should take less than six years to establish such regulations, as technology has evolved significantly over these past six years and is expected to continue accelerating in the coming years.

Following on to the discussion here, it is obvious that although MiCA offers a commendable framework, particularly via the classification of significant asset-referenced tokens to reduce regulatory demands on smaller enterprises like startups while securing against systemic risks as big collapses.

It nevertheless shows a risk-averse legislative position by excluding NFTs, security tokens, and entirely decentralized crypto-asset services such as Bitcoin. Mica's exclude the areas of which are considered remarkable in the crypto-asset space such as DeFi constructs, Central Bank digital currencies (CBDC), NFTs, crypto-staking, smart contracts, and crypto-lending services. This exclusion supports our argument that regulators intentionally exclude areas where enforcement is uncertain.

Furthermore, the bureaucratic features of MiCA's compliance framework swift concerns regarding the technical competence of supervisory bodies in effectively assessing blockchain systems,

strengthening our prior conclusion in Chapter IV about the essentiality of technological understanding for legal practitioners.

While MiCA's uniform execution across the EU represents a notable advantage, its framework is mostly defensive, aimed at safeguarding EU people as consumers, rather than proactively improving the worldwide competitiveness of EU-based cryptocurrency/blockchain firms.

EU may take the example of the Swiss Regulative Approach as discussed above. As we investigate more blockchain developments, we aim to bring an opportunity to combine our legal and technological assessments at chapter IV and V and inquiry how new blockchain features impact and are impacted by regulatory frameworks.

In the same way, the FATF's 40 Recommendations, acting as soft law tools, have been widely incorporated into national AML frameworks, influencing legislation across more than 200 countries. The FATF's guidelines has established worldwide standards for crypto-related AML compliance, while being non-binding, given to its effects for reputation and market access. This dual-track model with enforcable international standards and impactful soft law develops together and by conclusion it shows the openness of legal borders in the era of the global internet world.

A balanced regulatory framework, demonstrated by progressive countries, is crucial for the thriving of blockchain innovation. Countries must implement specialized regulatory agencies, flexible frameworks like sandboxes, and sector-specific laws to ensure sustainable development. The Swiss approach shows how smart regulation can harness blockchain's revolutionary possibilities while mitigating concerns and promoting global leadership in this rapidly evolving sector. By adopting such strategies, governments may leverage blockchain innovations while protecting financial institutions and encouraging technological advancement.

I have examined the technological differences and features to qualify some aspects of blockchain technology, for instance, cryptocurrencies as money, securities, or other classifications. Classifying cryptocurrencies as securities results in more rigorous regulatory obligations in several jurisdictions, potentially hindering innovation in the blockchain field.

I have examined the different types of tokens/coins and compared their respective regulatory frameworks. As discussed during the dissertation, in many jurisdictions, current regulatory models for cryptocurrencies fail to adequately address the complexities of cryptocurrency activities, particularly in a cross-border context.

As we aim to analyze our second research question, it is evident that current regulatory structures often fail to accommodate the distinctive features of various cryptocurrencies. Stablecoins, given their systemic risks, and privacy coins, facing issues associated with anti-money laundering and counter-terrorism financing, are regulated strictly, which is reasonable in nature.

However, in the case of utility tokens, mostly used for accessing services, it would be better to adopt supportive approaches, as successfully seen in Switzerland. For relatively risky categories such as security tokens—many projects might easily fall into this category due to the Howey Test—sandboxes may offer an equitable strategy allowing controlled experimentation while ensuring compliance with AML/KYC and investor protection requirements.

The sandbox method, as applied to DeFi, may similarly promote innovation without imposing overly burdensome standards on startups. A globally unified framework by key stakeholders is needed to address categorization errors and promote innovation, especially for the classification and definitions of these tokens/coins. Switzerland's supportive yet structured rules represent a respectable model for other countries, harmonizing legislation with growth in the blockchain ecosystem.

In this dissertation, we seek not only to identify legal gaps in blockchain regulation but also to help regulators in understanding the constantly evolving needs of the blockchain ecosystem. Our comparative study of key jurisdictions and technologically advanced countries established an organised foundation for cross-border policy ideas. Our study, however not comprehensive of all legal systems, deliberately focusses on nations distinguished by their creative governance or market impact to formulate meaningful and comparative findings linked with our research questions.

In light of the regulatory legal gaps identified in previous chapters, we offer a strategy framework based on academic research and comparative analysis.

We promote not deregulation, but rather intelligent, adaptable regulation that recognises both innovation and the public interest.

This analysis is based on comparative legal methods, acknowledging its limits, which do not assert universality but provide a scalable framework for adaptation and expansion via upcoming legislative and academic endeavours.

In this research, we have started with the birth of the Bitcoin, which is the first decentralized cryptocurrency to decentralized applications in the chapter VI. However, on regulative side, during our work on this dissertation in the USA, the Biden administration was not so friendly to blockchain and especially cryptocurrencies. However, now in the era of Donald Trump, the president has his own coin (Trump Coin). In this research, the regulative history has been shaped deeply even during this study.

I have arrived at the future of the internet and blockchain with the example of Artificial Intelligence as well. I have examined the history of the internet and its evolution to ascertain what lies ahead in the future. The future will bring a shift in contract law, enhancing efficiency while scrutinizing enforceability and liability over jurisdictional difficulties.

The birth of Bitcoin, the first decentralized cryptocurrency, was a kind of rebellion against today's centralized institutions, which can be considered cumbersome, and served as a solution proposal. Social media and technology giants, which emerged with the promise of bringing more freedom to the masses, have now entered even the most private spaces of our homes through our personal data. They have become entirely unwilling to take steps that would remove people from the internet world on their own initiative. Although I disagree with his political views in his first presidency period, I consider the permanent blocking of former American President Donald Trump by a private company, Twitter, without question, as a violation of freedom of expression. Moreover, the

power of the central system over normal citizens—which so conveniently blocks even a powerful person like Trump—has become disproportionate.

This disproportionate power has manifested itself not only in social media but also in the banking system. The economic crisis of 2008 arose mainly due to the personal mistakes of a handful of people, ruining the lives of millions. Although it is difficult to predict the next decade of blockchain technology, I can say that the concept of decentralization behind it will grow in prominence every day. This decentralization will also require sacrifices from some of the advantages provided by the centralized system.

At this point, the concept of decentralization can be built upon high technology, transparency, recordability, and trust principles to protect our future from monopolization. I am confident that we will be able to approach the future more confidently and securely in this journey that started from the past of blockchain technology.

In sum, blockchain technology is a cutting-edge innovation that offers several benefits for many applications while also presenting certain risks. A supportive approach to technology, combined with protective measures, will facilitate the adoption of blockchain technology within the existing legislative framework.

3. The List of the Candidate's Publications Written Within the Topic of the Dissertation

1. The Legal Framework of the Cryptocurrencies and Initial Coin Offerings (ICOs)- Budapest Business School Faculty of International Relations- Master Thesis- 2018

2. Book: Blockchain Teknolojisi In Turkish – (Blokchchain Technology, On the way of Decentralized World, Yesterday Today and Tomorrow): https://www.seckin.com.tr/kitap/blockchain-teknolojisi-teknoloji-ve-hukuk-dizisi-bedrettin-gurcan-s-p-389816957- October 2022

3. Jurisdiction On The Blockchain 2020, ICBEMM 2020 (Oxford) 11th International Conference On Business, Economics, Management And Marketing- OXFORD

CONFERENCE SERIES | MARCH 2020 |CONFERENCE PROCEEDINGS | (Could not be found on MTMT list)

4. Application Of Blockchain Technology To The International Trade And Custom Regulations
   Central And Eastern European E|Dem And E|Gov Days, 2021-
   DOI: 10.24989/ocg.v341.30 Conference Proceedings

5. Potential Implementation of Blockchain Technology by Non-Governmental Organizations and the Legal Framework of the Tokenization for Donations
   Nottingham Insolvency and Business Law Journal, 2022

6. Blockchain, Virtual Currencies, Money Laundering And Potential Ways To Apply Blockchain Technology For The Protection Of Trade Secrets
   Bedrettin Gürcan Ádám Ibrahim
   University Of Szeged, Faculty Of Law And Political Sciences, Institute Of Comparative Law And Legal Theory

7. Various Dimensions and Aspects of the Legal Problems of the Blockchain Technology, Comparative Law Working Papers – Volume 3. No. 1. 2019 Institute for Comparative Law and Legal Theory

8. AI AND BLOCKCHAIN IN LOCAL PUBLIC EMPLOYMENT. EU Regulatory Frameworks and Implementation Challenges EU Law journal: https://arsboni.hu/folyoirat/