LUISS

Department of Business
and Management

Course of Blockchain and Cryptocurrencies

The Future of Ride-Hailing: An Examination of Blockchain Technology's Impact on Urban Mobility

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Academic Year 2022/2023

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Abstract

Urban mobility has a significant impact on cities and their residents. Addressing the challenges associated with transportation is crucial for creating a sustainable and liveable urban environment. The transition to digital technologies in urban mobility is driven by a complex set of factors, including environmental concerns, technological innovation, changes in urban lifestyles, and policy restrictions.

Ride-hailing is a mobility service that has gained significant popularity in recent years due to its potential to provide a sustainable and cost-effective transportation solution. However, the current centralized ride-hailing platforms face various challenges. This thesis investigated the issues of the current centralized platforms and how blockchain technology can help in addressing these challenges and enhance the efficiency, security, and transparency of car-hailing services.

The research question is "Blockchain technology can improve car-hailing services?" To answer this question, it will be reviewed the existing literature on blockchain-based car-hailing platforms and analysed Drife, a real platform of car-hailing service that uses blockchain technology.

Chapter 1°

1.1 Urban Mobility

The concept of urban mobility is one of the most challenging issues of our times, gaining significant attention due to its impact on the quality of life in cities and the environment. This concept refers to the movement of people between destinations in urban areas.

Today 56% of the world's population lives in cities. As the world's population continues to grow and urbanize, it is projected that nearly 70% of people will be living in urban centres by 2050, according to estimates from the "World Bank Group". Given the rapid speed and magnitude of urbanization, issues like congestion, long commutes, noise, and pollution are expected to intensify. Consequently, managing urban mobility becomes crucial for providing the proper functioning of cities. Prioritizing the expansion and innovation of transportation networks is essential for the liveability and quality of life in urban centres.

Furthermore, cities account for more than 75% of global CO2 emissions, with a significant part originating from industrial activities and transport systems. According to a report by McKinsey in 2020, the transport sector alone is responsible for around 25% of global greenhouse gas emissions.

As a response, governments and institutions across the globe are establishing decarbonization goals to address these environmental concerns. An example of this is the European Green Deal, which aims to decrease transport-related greenhouse gas emissions by 90% by 2050. In the US, President Biden’s Administration has set a goal of achieving a carbon pollution-free power sector by 2035 and a net zero emissions economy by 2050.

Given the role that the transport sector plays in CO2 emissions, significant changes must be made for more sustainable urban mobility. Therefore, shifting towards alternative approaches of managing urban transportation is becoming increasingly imperative for the well-being of our cities and the health of our planet.

1.1.1 Smart Mobility

Smart mobility has emerged as an innovative approach to urban transportation, which implements technology and data-driven solutions to optimize urban mobility. By leveraging the power of artificial intelligence, the Internet of Things (IoT), and data analytics, smart mobility creates a network that connects vehicles, infrastructure, and users. Benevolo et al. (2016) state that smart mobility:

> "Could be seen as a set of coordinated actions addressed at improving the efficiency, the effectiveness and the environmental sustainability of cities. In other words, Smart Mobility

could consist of a hypothetically infinite number of initiatives often (but not always) characterized by the use of ICT".

However, this new approach to urban transportation extends beyond technological advancements, it encompasses a cultural shift and a change in mindset. People are starting to reevaluate their connection with automobiles and opt for more sustainable mobility solutions. The adoption of vehicle sharing and the integration of diverse transportation modes are becoming increasingly common.

1.1.2 Sharing Mobility

Sharing mobility, a prominent part of smart mobility focuses on providing short-term access to shared vehicles based on users' needs rather than requiring vehicle ownership. This concept encompasses various forms of shared transportation, including car-sharing, bike-sharing, scooter-sharing, shuttle services, ridesharing, and ride-hailing.

In a report released by Allied Market Research, titled, "Ride Sharing Market by Booking Type, Commute Type, and Vehicle Type: Global Opportunity Analysis and Industry Forecast, 2020–2027", the global ride-sharing market reached a value of $59.53 billion in 2020, and is expected to reach $205.83 billion by 2030, with a grow at a Compound Annual Growth Rate (CAGR) of 13.2% from 2021 to 2030.

By encouraging individuals to share rides, these services effectively reduce the number of private vehicles, resulting in decreased traffic congestion, parking problems, and carbon emissions. Sharing mobility also encourages a transition from private ownership to shared usage, increasing accessibility to transportation for all members of society.

1.2 Centralized Ride-Hailing Platform

One of the most successful applications of sharing mobility is ride-hailing, an on-demand mobility service where drivers of personal vehicles are connected, with riders that demand a specific trip. These ride-hailing applications use information and communication technologies to offer a level of service that surpasses traditional taxi services. Riders use these new forms of door-to-door mobility due to the various advantages they offer. Users report benefits such as shorter travel and waiting times, flexibility in ride planning, the convenience of avoiding finding or paying for parking, and enhanced comfort during journeys.

In the last ten years, the ride-hailing sector has experienced rapid expansion in numerous countries, primarily because of its convenient services. This growth has given rise to numerous Transportation Network Companies (TNCs) such as Uber, Lyft, Ola, and Cabify. The leading global

ride-hailing company is Uber, which is the first ride-hailing app on the market, launched in 2009. With 93 million active users, Uber is now available in 10,000 cities across 71 countries.

Most ride-hailing services operate on a central system where service providers act as intermediaries, handling incoming ride requests, matching riders with available drivers, calculating and estimating fares, managing payments, and reputation management. For these services, the platform charges a fee for each ride completed successfully. For example, Uber deducted around 25% of the fare. To use ride-hailing services, riders and drivers require an active Internet connection and a global positioning system (GPS) equipped smartphone with the service provider's installed app. The process performed by ride-hailing services typically involves the following steps:

1) The rider uses the corresponding service provider's app, whether on the web or mobile, to search for a ride.
2) The rider provides details such as time, pick-up and drop-off locations, person number, vehicle type, and payment mode.
3) The service provider receives the rider's request, queues it in the app, and matches it with a nearby driver. The platform determines the fare in advance, which is known and accepted by both passengers and drivers.
4) The matched driver and rider exchange information with each other.
5) After the trip is completed, the rider pays the fare to the service provider through the app. The service provider then sends the driver a payment after deducting the pre-specified commission value.
6) After concluding the trip payment, riders and drivers rate each other through the app, usually through a rating system of 1-5 stars, which encourages both parties to follow the rules of the app and prevents unwanted behaviour.

Every transaction and information exchange is conducted through the service provider's platform, which maintains control over all procedures and data.

1.2.1 Issues Faced by Traditional Ride-Hailing Platforms

There exist some issues regarding the management structure of traditional ride-hailing platforms, problems related to its centralized environment, namely:

1. *Control over User Data:*

   One significant concern is the central authority's control over all user data. This issue raises concerns about the safety and security of user information and their data. The compromise of the service provider's security could lead to the unauthorized exposure, manipulation, or even deletion of all stored data. For example, in late 2016, Uber suffered a significant data breach, compromising the personal data of 57 million users. As a consequence,

Uber had to pay a settlement of 148 million dollars to address the resulting investigation. Moreover, certain service providers sell user data to third parties without obtaining the users' consent.

2. *Lack of Transparency over Fare:*

Another issue lies in the complexity of fare calculations, which often involve hidden multipliers, resulting in a lack of transparency. These platforms have the capability to collect all data about their users including their location, gender, spending patterns and history, and even phone battery level. The analysis of this data allows them to offer personalized pricing or engage in discriminatory practices, exploiting users for their financial possibilities. Most firms currently use artificial intelligence to personalize the customer experience, implementing real-time pricing adjustments and customized promotions. Furthermore, these companies can introduce surge pricing into the platform without notifying either the driver or passenger.

3. *Single Point of Failure:*

Maintaining and managing a central server in centralized systems incurs significant costs and poses a high vulnerability to various attacks, mainly due to the presence of a single point of failure.

4. *Trust issue:*

In a centralized trust-based system, users trust the service providers for various aspects such as ride setup, tracking, cancellation, and fare calculation. However, the integrity of the entire ride experience can be compromised by any malicious activity occurring within the centralized server, as well as by drivers or riders. Upon completing a ride, riders can rate drivers. Unfortunately, a malicious rider can falsely claim a refund and give the driver a poor rating. The existing system lacks the ability to objectively evaluate the legitimacy of complaints raised, resulting in inconvenience for all parties involved and eroding trust in the platform.

5. *High Commissions:*

Operating on a central system, ride-hailing service providers act as intermediaries, managing the interaction between rider and driver. For this service, these platforms charge high commissions to drivers per ride. Over the years, these commission rates have increased from a modest range of 5%-8% to an alarming 25%-30%, significantly impacting driver earnings. A study conducted by the MIT Center in 2018, titled "The Economics of Ride-Hailing: Driver Revenue, Expenses, and Taxes," revealed concerning findings. It indicated that US ride-hail drivers, on average, earn USD $ 3.37 per hour before taxes, and 74% of drivers earn less than the minimum wage in their states. This worrying trend highlights the exploitation of drivers by these companies, as they fail to provide fair compensation for their services.

These challenges highlight the need for innovative approaches within the ride-hailing industry, aiming to deliver improved solutions that benefit both drivers and passengers. Consequently, these issues urged the research community to explore decentralization as a potential solution.

Chapter 2°

2.1 Blockchain Technology

Blockchain is a particular type of Distributed Ledger Technology (DLT), in which data is recorded, shared, and synchronised across a decentralized network of participants. This technology became widely known in 2009 with the launch of the Bitcoin network, one of the first cryptocurrencies.

The name blockchain comes from the specific way transactions are recorded and verified between parties. Every transaction, like money transfer, contract setup, or record sharing, is broadcast to the distributed network of nodes. To ensure validity, the transaction is verified by the network using an agreed set of rules reaching the consensus among the participants. Once verified, the transaction is grouped with others into a new block and added to the blockchain. This process ensures that each block is linked to the previous one and the following one, forming a continuous chain of blocks. Every node in the network holds a copy of the blockchain and constantly updates and synchronizes it.

Two fundamental components of blockchain technology are smart contracts and tokens. Smart contracts are self-executing fully digital contracts that use computer code to automatically enforce and verify the terms of an agreement between two or more parties. They are stored on a blockchain and can be executed without the need for intermediaries.

Tokens are digital assets that can be transferred or exchanged based on the terms of the contract and are necessary for smart contracts. Tokens can represent a variety of digital assets, such as cryptocurrencies or physical assets.

2.1.1 Key Driving Principles

The potential of blockchain relies on a unique combination of key features, namely:

1. *Decentralization:*

   Blockchain operates within a decentralized network, with no central authority controlling the system. Instead of depending on a central entity or intermediaries, trust between participants is based on a consensus mechanism that ensures the correct verification, validation, and addition of transactions to the blockchain. This system makes it hard for attackers to harm the blockchain because there is no single point of control.

2. *Tamper-resistant:*

   Thanks to the way blockchain works, its transaction records are tamper resistant. Each block is connected to the previous block, forming a highly secure and unchangeable chain of

transactions. This ensures the existence of a singular and historical version of the records that all blockchain participants can agree upon.

3. *Transparency:*

Blockchain is an open-source platform where all transactions are transparent and visible to all participants. This feature helps prevent fraud and simplifies the identification and tracking of any suspicious activity. As a result, the network gains increased auditability and trust.

4. *Security:*

Blockchain technology allows us to keep track and verify information in a secure way, as all transactions are publicly linked to a specific date and time. Moreover, blockchain utilizes asymmetric cryptography to ensure the authenticity and integrity of data exchanges and transactions. Participants have unique identities based on public and private keys to encrypt and decrypt messages. Public keys are shared openly with others in the network, while private keys are kept secret. Each user's private key is also used to generate a digital signature for their blockchain transactions. These signatures are used to verify the authenticity of each transaction and ensure that only authorized users can initiate transactions on the chain.

2.2 Blockchain-Based Ride-Haling Platform

Blockchain's rising popularity can be attributed to its aforementioned key features: decentralization, immutability, transparency, and security. This technology was initially known for its role in cryptocurrencies, but it is now gaining traction in a variety of industries. Its applications range from healthcare and finance to government and identity, providing solutions for a wide range of sectors.

Blockchain is a valuable tool for supporting the development of smart mobility. This new type of technology has been proposed as a potential solution to the challenges faced by the traditional, centralized ride-hailing industry, highlighted in the previous chapter. A ride-hailing system built on blockchain technology employs distributed ledger technology to facilitate direct person-to-person transactions among riders and drivers. This innovative approach has the potential to create a more secure, transparent, and cost-efficient platform.

A key benefit of using blockchain technology for ride-hailing is the possibility of building a decentralized network that connects passengers and drivers directly without using intermediaries. This has the power to significantly reduce the price of the services, resulting in lower costs for riders and increasing earnings for drivers.

Furthermore, by adopting blockchain technology to store driver and rider data, the risk of data breaches and identity theft can be significantly decreased as users are uniquely identified by digital signatures, and all transactions are recorded on an immutable ledger. Additionally, the use of smart contracts can automate and streamline payment processes, eliminating the need for costly intermediaries to oversee transactions and ensuring that all parties receive the quoted price on time. Currently, there are only a few ride-hailing platforms that are based on blockchain technology, an example of which is Drife.

2.3 Drife- Taxi 3.0

Drife is a ride-hailing platform that operates in a decentralized manner, leveraging blockchain technology to establish a peer-to-peer network connecting drivers and riders. It was founded in 2021 by Firdosh Sheikh, Surya Ranjith, and Mudit Marda. With its blue-and-white cabs, this service is currently live in Bengaluru, India. Drife utilises DRF as its native cryptocurrency.

According to the quarterly report Q2 2023, the active drivers on the platform amount to 33,595 while the active rider's amount to 136,094. Drife's innovative "Taxi 3.0" concept plans to establish a more transparent and fairer ecosystem, compared to the traditional centralized ride-hailing providers.

2.3.1 Type of Blockchain

Drife is developed on the Polygon blockchain, a blockchain compatible with Ethereum created as a solution to address some of Ethereum's limitations. Ethereum, introduced in 2015, is one of the most popular open-source, blockchain-based platforms that enables developers to build decentralized applications (dApps) and deploy smart contracts. However, as this platform has grown significantly over the years, it has faced challenges related to efficiency and scalability. Scalability refers to the ability of the Ethereum network to handle an increasing number of transactions, whereas efficiency refers to the number of computational resources required to execute transactions.

Firstly, Polygon is a Layer 2 scaling solution that runs parallel to the Ethereum blockchain. It is fully compatible with Ethereum but enables transactions to be conducted quicker and cheaper, thanks to its network of low-traffic sidechains. Currently, Ethereum can process 14 transactions per second (TPS)—while Polygon achieves speeds of up to 7,000 TPS.

Secondly, Polygon is an efficient blockchain as it operates on a Proof-of-Stake (PoS) consensus mechanism, which is an alternative to the energy-intensive Proof of Work (PoW) model used by Ethereum. In PoW, miners compete to solve complex mathematical problems to validate

transactions and create new blocks. The miner who solves the problem first is rewarded with a block reward in the form of cryptocurrency. On the other hand, in PoS, the participants are required to put their cryptocurrency into a specific wallet, that will be frozen. The validators are randomly chosen to validate transactions and create new blocks based on the amount of cryptocurrency they have staked or locked up as collateral. The more cryptocurrency a participant stakes, the higher the chances of them being selected to create the next block and earn the transaction fees. However, the selection process is also randomized to prevent any participant from dominating the network.

One of the primary advantages of PoS is its low energy consumption. By eliminating the need for miners to perform energy-intensive calculations, PoS is much more environmentally friendly than its PoW counterpart. Furthermore, PoS enhances the network's security by giving validators strong financial incentive to act honestly. Any attempt to manipulate the system or engage in malicious behavior puts their entire stake at risk, providing a powerful deterrent against such actions. The PoS model also diminishes the risk of centralization, as it ensures a more even distribution of authority, based on financial investment rather than computational power.

Moreover, the Polygon blockchain is a public blockchain where all users are free to join and participate in the core activities of the blockchain network. This helps achieve the self-governed, decentralized nature of Drife.

2.3.2 Key Features of Drife

Drife stands out as a unique ride-hailing platform due to its innovative defining features, namely:

1. *Zero Commission Structure:*

   One of the platform's key characteristics is its zero-commission model. Unlike traditional centralized ride-hailing services, in Drife drivers are not charged any fees or commissions for their earnings on the platform. This leads to better incomes for drivers and reduced costs for riders. With no commission charged from drivers, the company charges its driver-partners a nominal monthly subscription fee of 30 US$.

2. *Dynamic Pricing Mechanism:*

   Drife introduces a flexible pricing mechanism, as opposed to the static pricing structure usually offered by other platforms. Each ride has a base pay attached to it and each driver has the flexibility to modify and propose prices, either below or above the established base amount.

3. *Transparency & Freedom to Choose:*

   Transparency and freedom of choice are fundamental features of the platform that give users more control over their experience. Riders can select drivers based on various criteria, such as rating, fare price, pickup time, or specific needs, like child seats or disability access.

Additionally, drivers have the independence to negotiate their prices, choose the rides they want to take, and work the hours they prefer.

4. *Open Governance:*

The structure of the platform governance is based on a Decentralized Autonomous Organization (DAO) model, consisting of Drife's two primary components: the mother DAO and the city DAO. The primary governing body of the Drife ecosystem is the mother DAO, which makes decisions that affect the entire community. Every DRF token holder has the opportunity to participate in shaping the operations of the mother DAO through a voting process. This ensures that the community's needs and priorities are met to a high standard. In contrast, the city DAO handles decision-making at the local level. Each city where Drife operates establishes its own city DAO, composed of DRF token holders who are residents of that city. The city DAO is responsible for addressing city-specific issues, such as governance and tax decisions.

5. *Incentivized Participation:*

To encourage users to participate more in the Drife platform, reward programs exist. Drivers can get rewards by successfully fulfilling a specific quota of rides, attaining a good rating from riders, and providing feedback about the platform's features. This motivates drivers to offer great service and maintain a good reputation on the platform. Furthermore, riders also get rewards by reaching a certain quota of rides, giving feedback about drivers, and taking part in the platform's improvement through provided feedback. This encourages riders to use the platform more and provide feedback to improve the overall experience. The rewards come in the form of DRF tokens or other benefits that can be used to get discounts, free rides, or other advantages.

Chapter 3°

3.1 Limitations and Challenges with the Implementation of Blockchain Technology

Given its key features, including decentralization, immutability, transparency, and security, blockchain technology appears to be a suitable solution for addressing the challenges of the current centralized ride-hailing platform. However, despite its many advantages, this relatively new technology faces some obstacles and constraints. Fortunately, as blockchain is continuously evolving and improving, various solutions have already been developed to overcome these issues. The primary challenges and limitations associated with blockchain are as follows:

1. *Scalability:*

One of the key limitations of blockchain is scalability, which refers to the limited ability of the network to handle an increasing number of transactions. In a centralized architecture, transactions are faster because the controlling unit doesn't need to notify to other members. On the contrary, in the blockchain, most nodes need to authorize the transaction, and this requires time. This issue is described by the Vitalik Buterin trilemma, which states that achieving all three properties, scalability, decentralization, and security simultaneously is impossible, and a trade-off among them is necessary.

Various solutions have been developed to address blockchain's scalability issues, including sharding and the adoption of Layer 2 solutions. Sharding is a technique to enhance blockchain scalability by dividing the network into smaller, parallel chains called shards, reducing the workload and storage requirements for individual nodes. On the other hand, Layer 2 solutions are secondary protocols built on top of an existing blockchain. These solutions typically involve off-chain transaction processing, where transactions are aggregated, processed, and validated off the main chain, with only the final results being committed to the underlying blockchain.

The platform Drife doesn't have scalability issues as it is built on the Polygon blockchain, a Layer 2 scaling solution that runs parallel to the Ethereum blockchain.

2. *Efficiency:*

Many blockchain-based solutions, like Bitcoin and Ethereum, operate on a Proof of Work (PoW) consensus algorithm, which requires huge computational resources and energy to validate transactions and add new blocks to the chain. This creates worries regarding the environmental impact of this technology. A solution to improve the efficiency of this technology involves transitioning to the Proof of Stake (PoS) mechanism. PoS requires less energy consumption than PoW as it eliminates mining, making blockchain more sustainable.

Drife's success can be attributed, in part, to its utilization of the Polygon blockchain, which currently operates on a PoS consensus algorithm.

3. *Costs of Implementation:*

A challenge for companies that are looking to adopt blockchain technology is the cost of implementing and maintaining this network. Since blockchain technology is relatively new and complex organizations need to invest in training and educating their staff to understand and work with a blockchain-based platform. This includes both the developers and all stakeholders who may need to make strategic decisions related to blockchain adoption.

4. *Legal Formalities and Regulations:*

Blockchain technology operates within an evolving legal and regulatory environment. Meeting the existing regulations is a significant challenge for blockchain projects. Due to the blockchain's decentralized nature, there is no centralized authority to verify identity information. Users have the possibility to remain anonymous when interacting with blockchain networks, making it difficult for governments to monitor platform activities and ensure local regulatory compliance.

Moreover, blockchain characteristics can conflict with the General Data Protection Regulation (GDPR), a European law that established protections for the privacy and security of personal data. In a public blockchain is difficult to ensure the privacy of users' data as all transactions are visible to everyone. One of the requirements of GDPR is the ability to request the removal of personal information from the Internet. This is not possible in the blockchain due to its immutability, once data is recorded it becomes permanent and unchangeable.

However, as governments gain a better understanding of both the benefits and constraints of blockchain technology, regulatory measures are likely to increase. Such regulation could lead to greater transparency and trust among users, opening up more opportunities for businesses to adopt blockchain technology.

5. *Adoption and User Experience:*

Blockchain technology is relatively new and complex, with few people knowing how it works. Convincing users to adopt blockchain can be challenging, as is different from the familiar centralized platform they typically use. Moreover, users can be sceptics due to the absence of a central authority overseeing the platform. Simultaneously, companies may perceive the use of this innovative technology as risky, because not everyone is confident in using it.

To overcome these challenges, is essential that the platform provide a user-friendly interface, clear benefits, and offer educational resources, tutorials, and customer support. Furthermore, blockchain is gaining popularity, and investments in this technology are increasing. According to the

Business Research Company, the global blockchain services market is projected to grow from $3.28 billion in 2022 to $4.7 billion in 2023, with a remarkable projection to reach $19.76 billion by 2027.

3.2 Evaluation of Blockchain Technology's Use on Car-hailing

This thesis is motivated by the current challenges faced by ride-hailing platforms such as Uber, Lyft, and Bolt. All these services share a common characteristic, they operate within a centralized framework, acting as intermediaries between drivers and passengers. The centralization of these companies has raised concerns about the security and privacy of user data, as all information is under the control of a single authority. Additionally, this single point of control makes these platforms highly susceptible to various security threats.

Another significant issue with traditional ride-hailing platforms is the imposition of high commissions on drivers for each ride, as compensation for managing the interaction between riders and drivers. These commissions can often reach alarming rates up to 25% and even 30%, significantly impacting driver earnings and potentially leading to exploitation. Furthermore, there exists a lack of transparency over the fare calculation of each ride, as companies leverage user data analysis to offer personalized and discriminatory prices.

In response to these challenges, this thesis proposes a solution that leverages the core features of blockchain technology. This technology enables the creation of a decentralized ride-hailing platform that directly connects drivers and riders, eliminating the need for intermediaries. Consequently, blockchain-based platforms are expected to offer a more cost-effective service compared to traditional ride-hailing platforms, resulting in reduced expenses for riders and increased earnings for drivers.

For example, the blockchain-based platform Drife provides a zero-commission structure, meaning that drivers don't have a percentage of their earnings deducted as commissions, but they only have to pay a monthly subscription fee of 30 US$. Furthermore, the fare calculation system used by Drife is fairer compared to the discriminatory methods of typical ride-hailing platforms. This is due to the fact that each ride has a base pay, and each driver has the flexibility to adjust and propose prices.

Moreover, unlike centralized platforms, the decentralized model operates through a network of nodes that have the same authority. This structure eliminates single points of control, enhancing security and resistance to censorship. Additionally, in a decentralized network, all transactions are recorded in an open and public ledger, ensuring transparency and immutability. Once a transaction is recorded on the blockchain, it cannot be altered.

Furthermore, decentralization allows for community-driven governance. In this model, network participants have the ability to vote on decisions that impact the system. This empowers users and ensures that the network remains democratic. Drife has an open governance in which each DRF token

holder has a voice in the primary governing body of the entire Drife ecosystem, known as the mother DAO. This approach ensures that the community's needs and priorities are met.

Blockchain technology also enhances the security of ride-hailing platforms by employing asymmetric cryptography to ensure the authenticity and integrity of data exchanges, transactions, and user identities. The combination of low commission charges, decentralized control, transparency, immutability, and community governance provides a competitive advantage to a blockchain-based ride-hailing platform, setting it apart from its centralized counterparts.

However, to ensure the success of a platform, its blockchain infrastructure must exhibit scalability and efficiency. For instance, in the case of Drife, the platform enhanced its scalability by adopting the Polygon blockchain, which serves as a Layer 2 scaling solution running alongside the Ethereum blockchain. Furthermore, its choice of using a PoS (Proof of Stake) consensus algorithm contributes to its efficiency. The presence of operational platforms like Drife is a clear demonstration that the use of blockchain in the ride-hailing sector is possible and is able to bring improvement in these urban mobility services.

The main challenge for blockchain technology is addressing regulatory issues, high implementation cost, user scepticism, and perceived risks by companies.

However, despite these obstacles, the global blockchain services market is projected to grow substantially, indicating the potential for increased adoption and increased regulation in the coming years.

Conclusion

Urban mobility is an important aspect of modern cities that has a significant impact on the quality of life for urban residents. Sharing mobility services like ride-hailing platforms are an innovative approach to urban transportation that has the potential to address current urban mobility issues such as traffic congestion, lengthy commutes, pollution, and intensifying emissions.

Nowadays, most ride-hailing platforms face several issues, primarily related to their centralized environment. These challenges have inspired the exploration of innovative solutions, specifically a decentralized blockchain-based ride-hailing platform. The guiding question for this thesis has been, "Can blockchain technology improve car-hailing services?".

In order to answer this research question, an analysis of how the key driving principles of this innovative technology can be implemented in the ride-hailing platform has been conducted. According to this research, it can be concluded that the transformative power of blockchain technology in the car-hailing industry is evident, and the success of platforms like Drife bears witness to it. Blockchain has the potential to create a more equitable, efficient, and secure future for urban mobility.

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