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SMART CONTRACTS AND FUTURE DEVELOPMENTS: A COMPREHENSIVE REVIEW OF APPLICATIONS AND CHALLENGES

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ABSTRACT
The evolution and restructuring of traditional corporate, economic, and industry processes have been made possible by smart contracts. The implementation of smart contracts in various industries was made possible by the favourable global evolution. Smart contracts are digital agreements that are incorporated into blockchain technology and are executed when certain requirements are satisfied. In a nutshell, smart contracts are programs on computer that attempt to carry out the actions specified in the contract. The removal of trusted third parties, arbitration fees, and potential frauds are the main benefits of smart contracts, which smart contracts have been able to successfully support. Smart contracts have vowed to lead the way in company advancement. Smart contracts can also be divided into different sorts according to their intended use. Despite the assurances, smart contracts present few issues and limitations to consider. The current legal framework does not recognise that smart contracts are legally binding. Security risk, immutability, and flexibility are all perceived as obstacles. Anticipating a significant change in future smart contracts offers a lot more. This paper attempts to make smart contracts, in the context of banking sector, a topic of discussion by highlighting what smart contracts are and what they have to offer to the world, while also addressing their strengths and weaknesses.

Keywords: Smart contracts, Blockchain, Contract, Legal Framework.

1. INTRODUCTION

Contracts enforced by physical property like hardware and software rather than law was the very first definition of Smart Contracts. Nick Szabo was the first person to use the word Smart Contracts which described it comparing it to vending machines. A smart contract is a computer program or transaction protocol designed to automatically execute, control, or document events and activities based on the conditions of a contract or agreement. Smart contracts aim to reduce the need for trusted intermediaries, arbitration fees, fraud losses, and malicious and inadvertent exceptions(Kemmoe et al., 2020). Smart contracts are often connected with cryptocurrencies, and the smart contracts introduced by Ethereum are widely regarded as a basic building block for decentralised finance (DeFi) and non-fungible token (NFT) applications. Smart contracts have the potential to derive digital contracts from a physical contracts. Without the central administration control, smart contracts helps users to cipher their terms and conditions by providing automated transactions. To avoid contract getting misused smart contracts are embedded in blockchain. All the operations and enforcement are done by computers and blockchain software ensures that personnel errors are minimised to avoid futile confrontations.

All contracts and transactions are visible to everyone through blockchain technology ensuring lucidity and culpability. No manipulation or administrative control is suffered by blockchain, data cannot even be altered by any personnel. Blockchains cryptographic algorithms resistant technology safeguard against tampering of stored data. All officials and personnels always look forward to abstain from the hassle created by middleman and independence. Therefore, all sectors of the industry are keen to adopt blockchain and smart contracts like, banking, marketing, export, import and hospitality. Smart contracts are pragmatic and free from disruption as necessity to have lawyers or brokers for the enforcement of contracts and transactions are reduced.

The paper attempts to provide an overview on smart contracts, its impact on banking sector and the dimension of legality. In the context of smart contracts transforming all sectors and all set to get adopted by different industry, this paper focusses on the following research questions:

Research Question 1: How do smart contracts differ from traditional contracts?

Research Question 2: What is the role of smart contracts in the banking sector?

Research Question 3: What is the legality of a smart contract?

2. SMART CONTRACTS: AN OVERVIEW

The section provides an overview of the concept of smart contracts and the platforms used for their development.

2.1 EVOLUTION OF SMART CONTRACTS

1994 witnessed the emergence of the word smart contracts through a computer scientist, Nick Szabo. Release of Ethereum was the point where smart contracts gained its momentum which made it easier to transform contracts int computer codes.

In 1998 Szabo published his another paper on smart contracts " the bit gold protocol" , bit gold project was not implemented and didn't gain much attention then.

Askemos used contract script language to create a prototype smart contract in 2002.

In 2008 bitcoin white paper was published and bitcoin network was launched as the first blockchain-based system to implement smart contracts.

2013 marked the launch of Ethereum. Ethereum is the first blockchain technology that used in smart contract build-in Turing-complete programming language which got wide acceptance due to its feature of creating Dapps-decentralized applications.

In 2016 Decentralized Autonomous Organization was hacked which caused the loss of Ether worth $50 million. This event pointed out the security risk of smart contracts.

In 2018 ICO- initial Coin Offering bubble busted and which led to the reduction in price of ether but the development in smart contracts was still in momentum.

DeFi (Decentralized Finance) movement took off which led to the increase in Dapps launches and provided them with the financial services without the involvement of intermediary.

In 2020, the world witnessed the greatest havoc" covid-19" which was positive in the adoption of blockchain as businesses across the world wanted to digitize their operations.

In 2021 total value of locked in DeFi protocols reached $200 million and number of Dapps continued to grow.

2.2 SMART CONTRACT PLATFORMS

2.2.1 ETHEREUM

Ethereum is regarded as one of the most frequently used block chain platforms which has its own cryptocurrency known as ether. It is one of the first platform and known as the efficient one which is often used to create finance apps, gaming apps, wallets and so on. All smart contracts are executed by the software called Ethereum virtual machine which uses solidity as its programming language. Ethereum is still racing to be on the top of technology being the number one in market capitalisation. Ethereum is considered as block chain 2.0 due to its versatility and security. Real world application of Ethereum is voting, agreements, shipping, crowdfunding and so on. Some of the features that make Ethereum the best is deployment of smart contracts, privacy, restricted membership, tokenisation.

2.2.2 HYPERLEDGER FABRIC

Hyperledger is one of the most commonly used private blockchain to execute smart contracts or 'chain-codes'. It is an open-source Linux project that facilitates teamwork in creating distributed ledgers based on blockchain technology. For a suitable deployment, it was predicated on a microservice architecture. It is an ideal smart contract platform that has demonstrated its ability to serve as an Ethereum smart contract platform substitute. Like Ethereum, Hyperledger developers have produced a suite of incredibly helpful tools,

such as Hyperledger Composer and JavaScript-based tools, that enable all the developers to code smart contracts more quickly and simply. Hyperledger is made of free tools and framework which is of great help to those developers and enterprises. It is well known for its use in different industries.

2.2.3 STELLAR

Stellar is widely used for economical transaction beyond boundary and is a platform based on blockchain. Stelar is not used for sophisticated contracts or transactions, it can be used only for simple basic applications that uses simple functionalities. Stellar is a good option to create basic applications due to its reduced cost, simplest solution and time saving. Lumen is the crypto coin used in stellar. Thousands of transactions per second are made possible by the network's decentralised and open database, which also permits smart contracts and multiple signatures. A fixed 1% annual inflation rate. The confirmation time is only 3 to 5 seconds.

2.2.4 WAVES

Waves is a open source platform for blockchain based smart contract. The Scala programming language, on which it is built, aims to overcome several current obstacles to the wider use of blockchain technology, including those related to speed and scalability. With its help, users can develop their own cryptocurrency token and facilitate with Decentralised Exchanges (DEX) . Users can create, supply, transfer, and transact customised tokens in five minutes with the help of this platform. It is used to create very on own tokens and there is no need of sophisticated background knowledge.(Suvitha & Subha, 2021)

3. REVIEW OF LITERATURE

(Zibin et al.,2020) researched about the smart contracts and blockchain. The challenges of smart contracts and challenges and talks about the solutions to face this challenges and compare between the smart contract platforms and broad spectrum of application of smart contracts are studied in detail.(Zheng et al., 2020)

(Luu et al., 2016) research focuses on the investigation done on the security of running smart contracts based on Ethereum in an open distributed network like cryptocurrencies. New security problems where people can manipulate smart contract and gain profit. (Luu et al., 2016)

(Khan et al., 2021) researches about the application challenges and the future of smart contracts. A detailed survey on the block chain based smart contracts from different view points and discusses about the study conducted under smart contracts.(Khan et al., 2021)

(Kemmoe et al., 2020) talks about the history of smart contracts and introduce state of art technologies of smart contracts protocol. Attacks on the smart contract software are talked about in detail(Kemmoe et al., 2020)

(Rupa et l., 2021) is based on the discussion about the design and development of a distributed application for managing medical certificates. The paper also talks about the creation of new certificate without deleting the existing certificate that uses a different technology which help to quickly analyse the birth, death and sick rates in relation to certain features.(Rupa et al., 2021)

(Xu et al., 2021) discussed about different functions and advantages of smart contracts in the growing economy is stated and discussed. The application of smart contracts in different industry and their current status and relevance is talked and the challenges.(Xu et al., 2021)

(Palta et al., 2024) reports about application of block chain based smart contracts in the banking and finance industry also the challenges associated with the use of such technology. Transformation from industry 4.0 to 5.0.(Palta et al., 2024)

The banking sector has traditionally been characterized by manual, paper-based processes, intermediaries, and centralized systems. However, the influence of the new technology: blockchain and smart contracts promised a significant transformation in the industry as a whole. Despite growing interest in blockchain technology and smart contracts and its multi-faceted applications, there is a scarcity of comprehensive research on their applications in the banking sector. Of the existing studies many focus on the technicality of smart contracts and their legal potential. This research aims to bridge the gap by exploring the potential applications of smart contracts in the banking sector and their future implications.

4. METHODOLOGY

Review article adopts a systematics review approach to examine the existing literature on smart contracts and future developments. A comprehensive literature search was conducted using various

databases including web of science, Scopus, IEEE Xplore, google scholar and science direct. The search terms used were “smart contracts”, “ blockchain” , “distributed ledger”.

4.1 INCLUSION AND EXCLUSION CRITERIA

Studies were included if they:

1. Focused on smart contracts and their applications
2. Were published in English
3. Published between 2021 and 2025

Studies were excluded if they:

1. Were not focused on smart contracts and its applications
2. Were not published in English
3. Were not published in 2021 and 2025

A brief conversation with an expert in this field was conducted which helped in gaining insights about the validity and practical application of smart contracts in banking sector. A A total of 22 research articles were included; after validating its relevance, context and scope for future research, 11 articles were finalised for the actual research.

5. FINDINGS AND DISCUSSION

5.1 SMART CONTRACTS VS TRADITIONAL CONTRACTS

Based on the articles reviewed, the comparison of traditional contracts with smart contracts revealed the following:

Basis of Difference	Smart Contracts	Traditional Contracts
Legality	It can only be considered legally valid only if they are in compliance with law	It is legally binding and is enforceable in court.
validity	Anyone in the blockchain can validate	Validity comes to point only when both the offeree and offeror signs the contracts
modification	Modification is not possible as once entered into block chain it is hard to modify	Modification can easily take place with the consent of the parties on contract.
Security	Highly secure due to security and anti-tampering features of blockchain	Less or no security as paper contracts are subject to damage and tampering.
Accuracy	Accurate to the point as the use of code is involved	Less accurate as human made contracts are subject to errors.

Smart contracts compared to traditional contracts have numerous benefits and its own drawbacks. The absence of third party and low arbitration cost make smart contracts appealing where as the knowledge and awareness about smart contracts is still a question. Smart contracts once deployed to blockchain cannot be edited or taken back, where as any change or error in a traditional contract is always open for correction. Software bugs are another problem that might affect smart contracts but once safely stored in blockchain there is no room for damage or loss of data, where as traditional paper contracts are subject to malpractice and damage by other forces. (Szabo, 2017)

5.2 VALIDITY OF SMART CONTRACTS IN INDIA

For a contract to get legal validation in India, it must follow the criteria given below:

- The parties involved must be competent to contracts
- Free consent
- Lawful consideration and object
- Should not be declared void.

If all these conditions are met a smart contract is legally enforceable in India.
Indian Technology Act 2000 had laid down that digital signatures are valid and acknowledge a contract as authentic and enforceable as per sections 5 and 10. Section 65B of the Indian Evidence Act 1872 gives digitally signed contracts the same status as that of a normal contract. Smart contracts will be valid in the eyes of the law if the consideration is mutual. Smart contracts entered without mutual consideration are valid but a breach of such contract will not be viewed as a breach of contract because mutual consideration is one of the key factors to make a contract enforceable. The Indian legal standard permits the use of smart contracts, but legal protection is not given to parties involved when he/she incurs loss or is found liable, however, the law is trying its best to assist if the smart contracts fall under the framework and limits of contract law.(Vijayakumaran, n.d.)

5.3 SMART CONTRACTS AND BANKING SECTOR

By enabling peer-to-peer transactions, frictionless KYC processing, transparent auditing, error- free insurance claims processing, and more, smart contracts have the potential to revolutionise the banking sector. Smart contracts enable anonymous communication between two parties with "if-when-then" constraints. Along with independence and self-execution, smart contracts come with built-in compliance and control. They can self-verify by using external data as a source. They are safer and more resistant to tampering when there are no middlemen involved.
A lot of sensitive data can be handled with ease by smart contracts, and the data will be stored on the blockchain for later use. Encrypted digital signatures are perfect for final contracts since they confirm contract involvement. The advancements in speed and transparency brought about by smart contracts are starting to be noticed across the majority of economic sectors. Financial services is at the forefront of blockchain innovation and is not an exception.(Xu et al., 2021)

- *Transaction costs*- Banks can pass on cost savings from the elimination of middlemen like clearing houses and notaries to their customers or reinvest in technology development. Smart contracts also help in reducing costs by self-regulating and recordkeeping.
- *Error-free insurance claim processing*- The process of idrntifying whether an insurance claim is legitimate takes a lot of time. Verifying the claim and cross- checking the provisions of a manual contract requires the expertise of humans and it is a time consuimg process. Smart contracts powered by blockchain technology provide the banking sector with automated insurance claim processing. Smart contracts provide automated validation and simple claim filing using the blockchain network's decentralised ledgers. It lowers the possibility of paying for false claims made by the financial organisation.
- *Transparent auditing*- keeping up to date records is necessary to make audits easier. Banks must spend money managing traditional contracts, which need a lot of paperwork. Smart contracts driven by blockchain facilitate sophisticated bookkeeping software. These rely on distributed, incorruptible codes existing in the Blockchain network. The solutions remove any chance of invasion while improving the transparency of the documents.
- *Streamlined KYC process*- In financial services, KYC plays a crucial role. Banks and institutions verify client identities before approving loans or other transactions. Smart contract technology streamlines this for banks by leveraging blockchain to validate identities and credit scores efficiently. Accounting firms also benefit from real-time handling of compliance requirements, like processing tax returns.
- *Smooth peer-to-peer transactions*-Because banks are customer-focused, they want to make sure that whatever technology they use benefits their clients as well as themselves.
  Smart contracts leverage Distributed Ledger Technology (DLT) to eliminate third-party intermediaries. This reduces costs and simplifies transactions for the unbanked. Retailers increasingly accept cryptocurrency, enabling seamless peer-to-peer payments. Smart contracts facilitate such transactions—including cross-border ones—without trusted third parties, delivering reliability and conveni.(Xu et al., 2021)

5.3.1 APPLICATIONS OF SMART CONTRACTS IN THE BANKING SECTOR

There are several potential applications for smart contracts in the financial sector, especially in the loan space. completely automate the loan origination process, increasing productivity and decreasing paperwork can all be done through smart contracts. Smart contracts are used by JP morgan chase to negotiate changes on loan provisions and make payments under predetermined guidelines The banking industry earns profit from a number of additional applications where smart

contracts can improve and automate procedures linked to credit. Bexpedite loan applications, run credit background checks, and make sure loan repayments are made can be before the release of funds. Smart contracts helps in the effective colletral management by automating the process and removing access to property titles in the event that borrowers default on their payments. Additionally, smart contracts allow parties to negotiate directly by eliminating the middlemen and using digital assets like cryptocurrency. Protocols like loanable funds (PLF) and platforms like R3 Corda also investigate how smart contracts could be used to enhance transaction security and efficiency in credit and finance applications.

Smart contracts present a plethora of chances for process automation and optimisation in the insurance sector. Smart contracts can be applied to automate benefit payments, claims processing, and insurance underwriting. Smart contracts helps to confirm eligibility of claimant Before granting insurance coverage, make sure all terms are fulfilled. Smart contracts are used in several areas of insurance to increase transparency and efficiency. Smart contracts helps save administrative expenses, payments and risk against fraud By automating all insurance policies. Smart contracts can be used to access Real-time data to automate insurance systems to decide claim payouts. smart contracts are increasingly employed to automate the claims settlement process and save agency costs.
providing reliable services and tailored solutions, smart contracts have the advantage of improving clients experience. For example, Bank of America has shown how using smart contracts to settle financial instruments automatically can improve client experiences and deliver tailored financial products. loyalty programs which are blockchain based are another use ; these programs employ smart contracts to create a safe and transparent incentive systems that increases consumer happiness and loyalty. Furthermore, smart contract-enabled dynamic electricity pricing gives customers more affordable and flexible ways to control energy use by deploying smart contract enabled dynamic electricity pricing has been on of the reason for increasing customer satisfaction.

smart contracts are vital for banking and financial compliance as they automate numerous procedures and guaranteeing compliance with relevant rules and regulations and
By guaranteeing that all participants to a transaction adhere to the pertinent legal standards, smart contracts are also essential for automating compliance operations. smart contracts guarantee compliance, helps in assisting banks and financial institutions in reducing risks and eliminating fines for breaking the law by streamlining data required for adherence to regulatory needs. Additionally, smart contracts can easily make compliance and monitoring a easy job by automating the recording and reporting of financial transactions . This method improves the transparency and effectiveness of the compliance process by enabling real-time monitoring and prompt identification of questionable or non-compliant
activity. Deployment of smart contracts for creating a control compliance financial and banking sector is proved to be more efficient.

5.3.2 FURTHER APPLICATIONS OF SMART CONTRACTS

5.3.2.1 DIGITAL IDENTITIES

For providing more security and control over personal data, smart contract have proved to be a potent instrument in the banking sector. Smart contracts make it easier to create and maintain risk free data and moreover giving individuals more power over their personal data and right to share them with the permitted ones only. Increased trust of stakeholders and protection are increased with this strategy. Moreover, smart contracts are used in sophisticated applications like blockchain-based identification and reputation systems to enable data exchange and digital identity verification. These system nurture privacy, transparency and efficiency through the optimization of KYC process and strict adherence of regulatory norms.

5.3.2.2 RISK MANAGEMENT

Efficient risk management is yet another advantage of inculcating smart contracts in banking sector. Financial firms like Deutsche Bank and Goldman Sachs may enhance decision-making within their investment portfolios and streamline their risk analysis procedures by utilising real-time risk assessment and monitoring capabilities. Improved risk allocation and automatic execution of transactions is done through smart contracts and it

has proved to be a game changing application. This technique increases productivity, reduces mistakes, and delivers real-time risk monitoring and assessment. Furthermore, streamlining of procedures, reduction of human errors, decreased risk and assured transparency are key drivers of effortless credit risk analysis

5.3.2.3 NEGOTIATION AND SETTLEMENT PROCESS

Negotiation and settlement process is now revamped and streamlined with the advent of Smart contracts. Organisations like Barclays and ING Group have investigated the use of smart contracts to automate negotiation and settlement procedures To increase transaction speed, efficiency, and accuracy while reducing administrative overhead and human error. There are ample perks for employing smart contracts to automate the negotiation and settlement process, includes improved transaction transparency, integrity, and confidence. smart contracts encourage more dependable and effective transactions, which improve operational effectiveness and save money by cutting out middlemen and implementing automated procedures.

5.3.2.4 ASSET MANAGEMENT

Financial institution like UBS uses smart contracts for the effective management and distribution of assets, including stocks, bonds, and mutual funds and other financial instrument. Asset management procedures are streamlined by smart contracts, which decrease human processing and improve the correctness and transparency of ownership transfers. Smart contracts have made asset management more transparent and accessible. Less seasoned investors can make advanced asset management tools and platforms accessible. Investors can always easily track and keep a check on their holdings when financial organisations like UBS employ smart contracts to improve asset management's efficiency and transparency.

DERIVATIVE MANAGEMENT

Smart contracts, which provide automated and safe trading market solutions, have revolutionised the management of financial derivatives.

Smart contracts can help financial organisations like Société Général and HSBC optimise derivatives trades, automate contract execution, and lower settlement risks. Financial organisations can automate transaction confirmation, margin computations, and settlement, among other derivatives management procedures, by leveraging smart contracts. automation eliminates the risks connected with manual interventions by improving efficiency, accuracy, and transparency.

Additionally, smart contracts can easily create derivative products like futures and options contracts that can run automatically based on predetermined criteria. This increases accessibility and efficiency in the derivatives market by doing away with middlemen and reducing transaction costs. (Palta et al., 2024)

5.3.3 TRANSFORMING THE BANKING SECTOR

Particularly in light of Industry 5.0, financial institutions, the banking industry, the academic community, and technology developers have shown a great deal of interest in blockchain-based smart contracts, a new technology. These industries are aware of the enormous potential for innovation and advantage that smart contracts provide. Smart contracts are viewed as an important ingredient for the shift to a more effective, safe, and transparent industry because of their self-executing, adaptable, and impenetrable nature.

Technology breakthroughs are driving a major transition in the banking and financial services sectors. Of these, smart contracts are particularly noteworthy as a ground-breaking invention that has the power to completely alter the terrain. The digitisation Of financial instruments including smart contracts, digital assets, and programmable money takes the advantages of blockchain technology to the next level and making By enabling previously unheard-of levels of connectedness between goods, holdings, and assets.

Smart contracts enabled by blockchain technology give banks the opportunity to expedite trade clearing and settlement processes. Because multiple parties must be involved for approvals and reconciliations, the procedure is typically time-consuming and prone to mistakes. By creating an effective equity settlement system, smart contracts assist in preventing inconsistencies and reducing expenses. Wall Street is now using smart contracts for testing clearing and settlement

solutions alongside 40 international institutions in the R3 consortium. Likewise, the Depository Trust & Clearing Corporation (DTCC) and the Australian Securities Exchange are developing a post-trade platform based on smart contracts(Kemmoe et al., 2020). Blockchains' decentralised ledgers facilitate the simplification of trade financing and supply chain documentation. They drastically cut down on processing time and are more effective than paper-based solutions. However, due to the increased risk of forgery, digitising bills of lading and letters of credit is also not practical. Blockchain provides safe and convenient transaction receipts. With digital signatures, smart contracts simplify workflow management and documentation. For example, the startup platform Wave has teamed with Barclays Corporate Bank. It stores bill-of-lading records on a blockchain. The software automates the payment and log change of ownership processes with smart contracts. Additionally, seven institutions have provided proof-of-concept testing for their organisations, including the Development Bank of Singapore, Standard Chartered, and Bank of America. (Palta et al., 2024)

Businesses need to examine their internal procedures and consider whether blockchain tec hnology might streamline complicated ones.They can use smart contracts to enable interd ependent transactions and automate manual operations.By providing transparency, corpor ations can also build confidence amongst parties to multiparty agreement. The difference between the interest rates paid to investors and those charged to borrowers is the source of income for legacy systems. Large numbers of applicants are unable to satisfy the strict lending requirements of conventional lending organisations. Installing a smart contract system makes it easier to keep an eye on these borrowers' loans. DLT reduces the timeframes for obtaining loans by enabling borrowers who are not eligible for bank loans to borrow directly from investors. Even lending against cryptocurrency collateral with clearly defined terms for interest payments is made possible by BlockFi. Blockchain has made a name for itself as a platform that offers secure and reliable procedures. Financial institutions can reduce the risks connected with cryptocurrencies and the market volatility that fuels them by implementing tokenisation. Stablecoins, which are transactional fractions of major currencies, are among the token versions they now provide. stability and risk coverage are provided by smart contracts against market swings by being linked to dollars or euros. It involved high human capital deployment during the onbairding procedures. Accessibility for SMBs is diminished by lengthy documentation and multi-step verification. Startup’s and MSME’ found their entrance to market easier with smart contracts. For example, DeFi provides blockchain solutions that hasten the adoption of conventional financial systems.By utilising the potential of decentralised ledgers, they can introduce new instruments and transform conventional financial models. It makes sense that small and medium-sized organisations are increasingly requesting IoT development services. (Luu et al., 2016)

5.3.4 CHALLENGES

While Blockchain technology in smart contracts presents numerous benefits and the potential to revolutionize sectors such as finance and banking, significant challenges persist, including limited interoperability, security and privacy concerns, regulatory complexities, and high implementation costs. This section aims to bring light one these primary limitations and suggest all possible solutions to address them Since the legal status of smart contract is not well developed and is under evolution it mandatory for the creators of smart contracts and its user to strictly adhere and comply with laws governing the respecting area. with the feature of blockchain, smart contracts are the most secure it is still under the threat of vulnerability hackers can make use of the codes and exploit the highly confidential banking information’s. The use and deployment of data and code to smart contract software require the expertise of techies, this might be a reason for smaller financial institution in using smart contracts

The restricted compatibility across various Blockchain networks is one of the key obstacles to integrating blockchain technology into smart contracts. Specifically, interoperability amongst blockchain networks is challenging since they may employ distinct protocols. Furthermore, the inability of smart contracts to retrieve data from sources other than the Blockchain may restrict their applicability in some situations. Additionally, data that is already part of blockchain can only be retrieved, they are constrained by conditional events. For broader use, interoperability across several smart contract systems is essential. But smart contracts made on several platforms might not work together.

Data security and privacy are the serious obstacles of using blockchain. Blockchain is not impervious to attacks, despite being widely acknowledged for its security. Blockchain-based

banking and financial systems need to be strong enough to resist possible intrusions and protect data from hacking and privacy violations. For example, it may be vulnerable to programming mistakes, hacking, and design defects, all of which could jeopardise the security and integrity of financial transactions. Even with improvements in security, smart contracts are still susceptible to programming flaws and hacking assaults. Since smart contracts are frequently written in intricate programming languages, finding security flaws can be difficult.(Palta et al., 2024)

Future studies can focus on the further application and adoption of smart contracts in banking sector and on the need of change in legal frameworks for the better adoption of smart contracts.

6. CONCLUSION

The arrival of smart contracts gives us hope for further involvement of technology in day to day activities. Smart contracts are offering a paradigm shift in all sectors. Similar innovations require more beneficiaries, and people need awareness about the technological transformations progressing in the world(Xu et al., 2021). Smart contracts undoubtedly offer a reduction in millions of dollars of expenses while making the entire system the best and user friendly. Amidst of the possible challenges, proper development in Indian legal framework should promote the complete acceptance of smart contracts.

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