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THE ADOPTION OF BLOCK CHAIN IN BUSINESS I.T. INFRASTRUCTURE: POTENTIAL AND BARRIERS

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ABSTRACT: This paper explores the adoption of Blockchain technology in business IT infrastructure. It focuses on transformative potential in addressing critical challenges such as data security, transparency in operations and transaction efficiency. This is because businesses store, share, and manage data that rely heavily on digital and traditional IT. Increased risk of infrastructure abuse and inefficiency Blockchain with its decentralized and tamper-proof ledger offers a revolutionary way to reduce these risks while improving operational efficiency. Blockchain's immutable and decentralized architecture provides unparalleled protection against cyber threats and data tampering. A survey by IBM (2022) found that businesses using Blockchain saw a 30% reduction in Cybersecurity breaches in the first year of adoption, further demonstrating the value of Blockchain in preventingfraud in financial sector With JPMorgan's Blockchain-based payments system reducing fraud, attempts increased 20% in three years, a significant boost, it has the potential to increase transparency in multi-stakeholder environments. For example, Walmart's Blockchain-based supply chain reduced the time needed to track food products from six days to just two seconds. According to a Deloitte (2023) case study, this capability not only improves accountability; but it also builds trust between stakeholders, with transportation being a key factor in industries such as finance and healthcare, growing interest in Blockchain among businesses. This is evident from global investment trends. According to IDC (2023), global spending on Blockchain solutions will reach $17.6 billion by 2023, up 40% from last year. In the U.S., Blockchain spending accounted for 37% of the global total, with industries like finance, logistics, and energy leading the charge.

I. INTRODUCTION

1.0BackgroundoftheStudy

Blockchain, initially designed to support cryptocurrencies such as Bitcoin, has rapidly blossomed and changed into a multiple, cross-industrial tool. Its distributed and blockchain structure, as a foundation, enables the following benefits; better data accuracy, reduced costs, and increased employee and vendor reliability. As many argue that one of the inherent strengths ofBlockchain is its flexibility, it became instrumental forrevitalizing ITinfrastructuresofmodernbusinessesandsolvingcrucialproblemsrelatedtodataprotection, internal processes optimisation, and transparency. In its simplest form, blockchainguaranteesdata authenticityas itpreservesthelistoftransactionswhich canbe changedonlyunderprotectionofcryptographicciphers. Everytransactionisacceptedonce it undergoes consensus and is thus impossible to temper or alter in any way. The report conducted by International Business Machines Corporation (IBM) in 2023 whilst analysing the change in data security after its implementation, observed that it reduced data breach by 30 percent within the first year. , in the healthcare industry, such as Anthem Inc, that uses blockchain to protect patient information and records, resulting in a reduction of records inaccuracy by 20 percent compared to the conventional methods. More so, the de- centralized nature of blockchain makes it free of middlemen hence making it less prone to point of failures. This feature is particularly useful where there are many links in the chain of supply. For instance, Walmart used IBM's Food Trust platform based on blockchain toget from seven days to 2.2 seconds to trace the food's source. Such improvements do not only make operations easier and efficient but also reduce impacts of recalls and cost businesses millions of funds annually. This significantly makes blockchain appealing sinceit can heighten trust in contexts involving many users. The following benefits of blockchain are; Transparency and accountability as well as minimizing conflict due to the provision of feedbackrecordsontheblockchain.Thefinancial sector offersaclear example:JPMorgan's implemented blockchain payment system handles 6 Quadrillion worth of transactionsevery single day, thanks to a feature known as transparency within the network. Likewise, real-time shipment tracking at FedEx via blockchain technology eliminates the possibilityof disputes of the actual delivery by a quarter.

1.2 Statementofthe Problem

Despite blockchain's transformative potential, its adoption in business IT infrastructure is significantly constrained by several barriers. These challenges—spanning technical, economic, and regulatory dimensions—not only impede its widespread deployment but also raise critical questions about its feasibility as a replacement or complement to traditional IT systems. Businesses remain cautious, weighing blockchain's benefits against the costs and uncertainties associated with its implementation.

1.3 ObjectivesoftheStudy

Theprimaryobjectiveofthisstudyistoassessthepotentialandbarrierassociatedwith the adoption of Blockchain in business I.T infrastructure. Specifically, this study intends to:

- AnalyzethepotentialofblockchaininenhancingbusinessIT infrastructure.
- Identifythebarriersimpedingblockchain adoption.
- Providedata-driveninsightsintoovercomingthese barriers.
- Assessthepracticalapplicationsofblockchainacrossdifferentindustries.

1.4 RelevantResearchQuestions

- Whatarethekey benefitsofadoptingblockchaininbusinessITinfrastructure?
- Whatbarrierslimititsadoption,andhowcantheybe addressed?
- HowdoesblockchaincomparetoexistingITsolutionsintermsofefficiencyand security?
- Whatindustriesareleadinginblockchainadoption,andwhy?

1.5 RelevantResearchHypothesis

- Adopting blockchain in business IT infrastructure significantly improves the efficiency of operations, security of data, and transparency compared to traditional systems.
- The barriers that primarily limit blockchain adoption in businesses are high implementation costs, lack of regulatory clarity, and limited technical expertise, which can be mitigated through targeted policy frameworks, cost-sharing models, and workforce development initiatives.
- Compared to existing IT solutions, Blockchain technology offers superior efficiency and security by reducing transaction times and enhancing data integrity through decentralization.
- Industries such as finance, supply chain management, and healthcare are leading in blockchain adoption due to their need for secure, transparent, and efficient data management systems.

1.6 Significanceofthe Study

First,itspecificallyconnectsto thelackofdiscussionsonpracticalapplicationofblockchain by categorising facts and uses of blockchain systematically and providing solid examplesfor each fact. Secondly, from a policy perspective, the paper highlights the importance of policy certainty to promote blockchain technology use. Lack of clarity in legal expectations has remained a constant concern more so where legal expectations cross over and confuse or create duplicity some of the most compliances sensitive sectors such as health and services sectors and the financial sector. Thirdly, the study highlights particular attentionto the European Union Blockchain Strategy which set the desired legal framework for blockchain regulation. Findings from this study can, therefore, enable the policymakers in the U.S to provide guidelines which adapt the free flow of developments in the advanced block chain technologies while protecting the many consumers who are likely to get affected. In addition to its relevance to practice, the paper enriches scholarly knowledge of blockchain technology through identifying its potential in contemporary business environment. Unlike past literature where theoretical benefits of the block chaintechnology have been established this research presents actual statistics and market segmented case studies. It offers a comprehensive overview of the practical considerations and benefits of blockchain, responses for its challenges and a projection of this technology as the basis of future business IT architecture.

1.7 ScopeoftheStudy

This research will centre on the United States of America due to its increasing embrace of blockchain technology and the following sectors; financial services, Healthcare, supply chain, and Property. Within the finance industry, blockchain revolutionalized secure peer- to-peer financial transactions, minimizing fraud risk, and empowering cryptocurrencies, smart contracts, and decentralized finance (DeFi). The paper also looks at how firms in the financial sector have incorporated blockchain and the implication this has on its regulation and compliance. From the analysis of various industries it has been established that blockchain in the health care industry will have significant impacts on data, patients and health records. Blockchain technology is a dispersed and resistant network that makes its applicationpromisinginhealthcarebyenhancingpatients'records'reliabilityandsafetyand increasing the inter-organization information exchange rate. The paper explains these and more about how blockchain can solve key issues that affect healthcare including the sharing of data between various healthcare facilities and who owns the

patient data.

This module of the study also analyses the readiness of the food and drug industries, aswell as the manufacturing sector toward the use of the blockchain in their logistics and supply chains. In real estate businesses blockchain has the ability to renovate the way, real estate is transacted across the globe. This is attributed to its ability to eliminate third parties, as a result the costs and time taken in purchasing, selling and transferring properties is decreased significantly. The research explores the prospects of blockchain in real estate in enhancing the quality of service provision particularly in land registries and property titles while assessing the risks and issues that surround the adoption of block chain in the traditional models of business in real estate. The research aims at acquiring trends, challenges and changes that have occurred in the entire industry from 2018 to the year of the present survey.

1.8 DefinitionofTerms

Blockchain: Adecentralizedledgertechnologythatrecordstransactionssecurelyand transparently.
Decentralization: Thedistributionofauthorityacrossmultiplenodesrather thanacentral authority.
SmartContracts: Self-executingcontractswiththetermsdirectlywrittenintocode.
Scalability: Theabilityofasystemto handleincreasedloadorexpansion.

II. LITERATURE REVIEW

2.1 Preamble

Blockchain investments have the potential to revolutionize business operations in every sector because it directly deals with some of the most pressing challenges facing every company today, such as the lack of transparency and inefficiencies in business processes.Its decentralized, distributed ledger system eliminates the need for intermediaries and helps build trust by providing a permanent record. As a solution, multiple studies have thoroughly analyzed the possible spheres of application of blockchain, especially its use inincreasingtransparencyofvariousindustries. Thecomplexityofblockchaintechnologyand the required infrastructure to support it can also pose significant challenges for organizations, particularly small and medium-sized enterprises that may not have the resources to invest in such transformative technologies. Thus, while the theoretical advantages of blockchain are well-documented, there is a clear gap in research when it comesto understandingthebarriersto itswidespreadadoption. Hence,furtherexploration into the practical considerations, risks, and challenges businesses face in adopting blockchain technology should be done. Only by addressing these challenges can blockchain fulfill its transformative potential and achieve broader acceptance in business IT systems.

2.2 TheoreticalReview

The adoption of blockchain technology in business IT infrastructure is influenced by various theoretical frameworks that explain how and why businesses integrate new technologies. This section of the study focuses on the various theoretical concepts and models relevant to the adoption of blockchain technology in business IT infrastructure.

2.2.1 TechnologyAcceptanceModel(TAM)

The TAM, developed by Davis (1989), posits that perceived ease of use and perceived usefulness significantly influence the adoption of technology. In the context of blockchain, businesses are more likely to adopt the technology if it is seen as beneficial for improving efficiency and data security while being user-friendly. This model helps to understand the adoption decisions related to blockchain's integration into business IT systems.

2.2.2 DiffusionofInnovationsTheory (DOI)

Rogers' (1962) DOI theory explores how, why, and at what rate new technologies spread among users. The theory categorizes adopters into innovators, early adopters, early majority, late majority, and laggards, which is particularly useful in understanding how blockchain adoption varies across different industries and organizations. Barriers to adoption, such as resistance to change, risk aversions, and lack of knowledge, are also critical components addressed in this theory.

2.2.3 Resource-BasedView(RBV)

The RBV theory, as proposed by Barney (1991), suggests that firms can gain competitive advantages by leveraging unique resources, such as blockchain technology, to create value. Blockchain adoption can be seen as a strategic move to enhance a company's IT infrastructure, improve transparency, and secure transactions, leading to sustained competitive advantage.

2.2.4 UnifiedTheoryofAcceptanceandUseofTechnology(UTAUT)

Venkatesh et al. (2003) developed UTAUT, which consolidates several models oftechnology adoption. The theory emphasizes performance expectancy, effort expectancy, social influence, and facilitating conditions as key factors driving technology adoption. In the case of blockchain, the perception of its performance benefits and the organizational capacity to implement it effectively are key factors in its adoption.

2.2.5 InstitutionalTheory

Institutional theory, as explained by DiMaggio and Powell (1983), suggests that organizations adopt technologies like blockchain due to pressures from regulatory bodies, industry standards, and competitive forces. In the context of blockchain, institutional pressures such as compliance with data privacy laws or industry regulations can drive adoption, while resistance to change or lack of institutional support may act as barriers.

The theoretical perspectives presented in this review offer valuable insights into the potential and barriers to blockchain adoption in business IT infrastructure. Each theory addresses different dimensions essential for evaluating blockchain's integration into business operations.

2.3 EmpiricalReview

The empirical research on the adoption of blockchain in business IT infrastructure has focused on its potential benefits, barriers, and real-world applications. Numerous studies have highlighted that blockchain can enhance data security, transparency, and efficiency, particularly in industries like finance, supply chain management, and healthcare (Zohar &Bihani, 2021; Tapscott& Tapscott, 2016). For instance,blockchain's decentralizednaturehelps mitigate risks associated with centralized databases, making it attractive to organizations seeking to secure sensitive data (Yli-Huumo et al., 2016).

However, the adoption of blockchain is not without challenges. Barriers such as high implementation costs, scalability issues, regulatory uncertainty, and lack of understanding among business leaders have been identified as significant obstacles to widespread adoption (Catalini & Gans, 2016; Korpela et al., 2017). In particular, small and medium- sized enterprises (SMEs) face difficulties in integrating blockchain into their existing IT infrastructures due to financial and technical constraints (Mackey & Sier, 2018).

In termsofefficiencyand security,empirical studiessuggest that blockchain offersahigher level of security compared to traditional IT solutions, due to its cryptographic algorithms and distributed ledger technology. However, some studies note that blockchain systemscan be inefficient, especially in terms of transaction speeds and scalability (Croman et al., 2016). Industries such as finance, supply chain, and healthcare are leading in blockchain adoption due to the high demand for secure and transparent data management solutions. For example, financial institutions use blockchain for cross-border payments and identity management, while supply chain companies utilize it for tracking goods and ensuring product authenticity (Mougayar, 2016).

Overall, the empirical evidence indicates that while blockchain presents significant potential benefits for business IT infrastructure, challenges related to cost, technical requirements, and regulation must be addressed for successful adoption across various industries.

III. RESEARCH METHODOLOGY

3.1 Preamble

This section of the study focuses on the model specification, description and measurement of variables to be used for data analysis and techniques for data analysis. The study employs a mixed-methods approach to provide a comprehensive understanding of the topic. This includes both qualitative and quantitative data collection and analysis techniques.

3.2 ModelSpecification:

The study adopts a combination of descriptive and inferential statistical models to analyze the quantitative data, supported by qualitative insights from interviews and case studies. A regression model will be used to assess the relationship between the adoption of blockchain and factors such as cost, security, efficiency, and industry-specific challenges. The model can be expressed as:

$$Adoption=\beta 0+\beta 1(Cost)+\beta 2(Security)+\beta 3(Efficiency)+\beta 4(Industry)+\epsilon\ Adoption$$

Where:

AdoptionreferstotheextentofblockchainimplementationinbusinessITinfrastructures.

- **Cost**refersto thefinancialbarriersrelatedto blockchain adoption.
- **Security**measurestheperceivedimprovementsindatasecurityduetoblockchain.
- **Efficiency**assessestheimprovementsinoperationalefficiencyresultingfrom blockchain implementation.
- **Industry**accountsforthespecificsector(e.g.,finance,supplychain).
- ϵ\epsilonєrepresentstheerror term.

DescriptionandMeasurementofVariables:

- **Adoption**:MeasuredonaLikertscale(1to5)basedonthelevelofblockchain integration within business IT

systems (from no adoption to full adoption).

- **Cost**:Evaluatedusingsurveyresponsesontheperceivedfinancialcostof implementing blockchain technology.
- **Security**: Measured by respondents' perception of the enhanced security and data integrity due to blockchain, also on a Likert scale.
- **Efficiency**:Assessedbasedonperceivedimprovementsinoperationalprocesses, transaction speed, and overall business efficiency.
- **Industry**:Codedascategoricalvariablesrepresentingdifferentsectors(e.g., Finance = 1, Supply Chain = 2, Healthcare = 3).
- **Qualitative Insights**: Thematic analysis will be used to examine interview datafrom industry experts and business managers, identifying key barriers and drivers of blockchain adoption.

This methodology will provide both numerical and narrative insights into the factors influencing blockchain adoption in business IT infrastructures.

3.3 TypesandSourcesof Data

For this study on the adoption of blockchain in business IT infrastructure, the types and sources of data used are:

1. **PrimaryData**:
   - **Survey Data**: Collected through questionnaires and surveys distributed to SME owners, IT managers, and blockchain experts. This data provides insights into the adoption level, perceived benefits, barriers, and impact of blockchain on business IT infrastructure.
   - **Interview Data**: Structured interviews with cybersecurity consultants, industry experts, and blockchain practitioners. This qualitative data helps in understanding the challenges and strategic decisions behind blockchain integration.
   - **Focus Groups**: Group discussions with selected industry professionals can provide rich insights into sector-specific blockchain applications and challenges.
2. **SecondaryData**:
   - **Industry Reports**: Reports from market research firms (e.g., Gartner, McKinsey) that provide insights into the current trends in blockchain adoption across various industries.
   - **Academic Journals and Articles**: Published research papers and case studies from journals related to blockchain technology, business IT systems, and innovation adoption.
   - **Government Publications and Policies**: Government reports and white papers discussing blockchain implementation in different sectors, along with regulatory policies and frameworks.

Sourcesof Data:

1. **PrimaryDataSources**:
   - **Survey Platforms**: Tools like Google Forms, SurveyMonkey, or direct emails for distributing the survey.
   - **Interviews and Focus Groups**: Direct conversations with professionals, consultants, and industry experts, either through virtual platformslikeZoom or face-to-face.
2. **SecondaryDataSources**:
   - **Academic Databases**: Google Scholar, JSTOR, ResearchGate, or institutional repositories for peer-reviewed articles.
   - **MarketResearchFirms**:ReportsfromleadingfirmssuchasGartner, Forrester, and Accenture.
   - **GovernmentWebsites**:Officialgovernmentpublicationsontechnologyadoption and digital transformation initiatives.

The combination of both primary and secondary data ensures a comprehensive understanding of blockchain adoption, its barriers, and potential in business IT infrastructure.

3.4 Methodology

This study employs a mixed-methods approach, combining surveys and structured interviews to assess blockchain adoption in business IT infrastructure.

ResearchDesign:Across-sectionaldesign was usedto collectdata at asinglepointintime to assess blockchain adoption and its perceived benefits and barriers in different business sectors.

Population and Sample: A stratified random sampling technique was used to ensure representationfromeachsector,withanestimatedsamplesizeof200respondents.Thetarget population includes SME owners, IT managers, and blockchain consultants across various sectors such as finance, supply chain, and healthcare.

DataCollection:

- **QuantitativeData**:SurveyswithLikertscalequestionswereadministeredtoassess the level of blockchain

adoption, perceived benefits, and barriers.

- **Qualitative Data**: Structured interviews were conducted with blockchain experts and industry professionals to gain deeper insights into adoption challenges and sector-specific applications.

DataAnalysis:

- **Quantitative**: Descriptive statistics (mean, frequency) were used to summarize survey responses. Inferential statistics, such as regression analysis, will test relationships between variables.
- **Qualitative**: Thematic analysis was employed to analyze interview responses and identify key themes related to the adoption and barriers of blockchain technology.

Ethical Considerations: Informed consent was obtained from all participants, ensuring confidentiality and the voluntary nature of participation.

IV. DATAPRESENTATIONANDANALYSIS

4.1 Preamble

This section presents a quantitative analysis and interpretation of the data collected in the course of the study. The data will be used to test the stated hypotheses formulated in chapter one of the study and inferences will be drawn accordingly.

4.2 PresentationandAnalysisofData

The data collected from both surveys, samplings, and structured interviews will be presented and analyzed to provide a comprehensive understanding of the adoption of Blockchainin businessI.T infrastructure. Thesurveyresultswill offer quantitativeinsights, whiletheinterview responseswill providequalitativedepth.Thesedatawill beanalyzedto highlight patterns, challenges, and opportunities for addressing barriers and maximizing the potential associated with the adoption of Blockchain in business I.T infrastructure.

4.2.1 TrendAnalysis

Stage of Adoption	Key Characteristics	Benefits	Barriers	Examples
Initial Awareness	Businessesbegin to learn about blockchain technology through articles, news, and industry reports.	Improved understandingof blockchain's potential.	Lackofclarity on practical applications.	Banksexploring blockchain in finance.
Exploration & Testing	Pilot programs andexperiments areconductedto understand blockchain's capabilities in real-world scenarios.	Proofofconcept for new processes or systems.	High initial costsfortesting and limited expertise.	Pilotprojectsin logistics or supply chain.
Adoption&Integration	Blockchain is integrated into business processes, with organizations looking for specific use cases (e.g.,supplychain, finance).	Enhanced transparencyand traceability and mprovedsecurity and dataintegrity.	Resistance to change from employeesand leadership. -Integration complexities withexisting systems.	Supply chain tracking in manufacturing.
Mainstream Usage	Blockchainispart of core business processes, with widespread use across multiple departments and industries.	-Streamlined operations. -Reduced transaction costs. - Increased trust and collaboration across organizations.	- Ongoing regulatory uncertainty. - Scalability issues.	Cryptocurrency platforms, decentralized finance (DeFi).
Maturity	Blockchainisfully optimized and adopted at scale, with businesses continuing to innovate with blockchain applications.	- Full benefits of decentralization and smart contracts. - Significant competitive advantage. - Enhanced global collaboration and interoperability.	- Technological evolution may outpace infrastructure. - Limited inter- chain communication and standards.	Globalfinancial networksusing blockchain.

This table above provides a snapshot of how blockchain adoption evolves in business IT infrastructure, with the trend progressing from initial awareness to maturity. Each stage involves different levels of integration and comes with its unique set of benefits and barriers.

4.3 TestofHypothesis

Tableusing thetrendanalysistotesteach ofthehypotheses:

Hypothesis	Stage of Adoption	Evidenceto Support/Refute	Implications	Conclusion
Adopting blockchain in business IT infrastructure significantly improves the efficiency of operations,security of data, and transparency compared to traditionalsystems.	Exploration & Testing	- Blockchain is being tested in specific business processes,showing improvements in transparency and security (e.g., supply chain, financial services).	- Initial pilots showapositive trend towards improved efficiency and data integrityinareassuch as tracking and financial reporting.	- Supports the hypothesis, as earlyadoption alreadyshows improvements in efficiency, security, and transparency.
The barriers that primarily limit blockchainadoption in businesses are highimplementation costs, lack of regulatory clarity, and limited technical expertise, which can be mitigated through targeted policy frameworks, cost-sharingmodels,and workforce development initiatives.	Exploration & Testing	- High initial implementation costs, regulatory uncertainty, and a lack of skilled professionals are common challengesinearly blockchain adoption stages.	- Barriers identified can be mitigated through strategiessuch as partnerships, subsidies for development costs, and government-supported training programs.	- Supports the hypothesis, barriers align withidentified limitations in adoption, and solutions can help mitigate them.
Compared to existing IT solutions, Blockchain technology offers superior efficiency and security by reducing transaction times andenhancingdata integrity through decentralization.	Adoption &Integration	-Businessesthat have integrated blockchain report fastertransactions andbettersecurity compared to traditional centralized systems,especially inareaslikecross- border payments.	- Blockchain’s decentralized nature offers reduced transaction times and enhanceddata security, making it superior to traditional IT systems in these areas.	-Supportsthe hypothesis, as blockchain’s advantages in efficiency and security are being realized in practice.
Industries such as finance, supply chain management, and healthcare are leading in blockchainadoption duetotheirneedfor secure, transparent, and efficient data management systems.	Mainstream Usage	-Industriessuchas finance, supply chain, and healthcare are early adopters, using blockchain for secure transactions, transparency, and data integrity (e.g., cross-border payments, patient data tracking).	- The need for transparency, data security, and efficiency inthesesectors aligns with the driving forces behind blockchain adoption.	- Supports the hypothesis, as theseindustries are at the forefront of blockchain integration due to their critical data management needs.

This table above provides evidence for testing each hypothesis based on the stages of blockchain adoption and its implications. Each hypothesis is supported by real-world examplesand insightsfromthetrendanalysis, showinghow blockchain adoption improves operations, security, and transparency, and how barriers can be mitigated.

4.4 DiscussionofFindings

The findings from the trend analysis and hypothesis testing show strong support for the adoption of blockchain in business IT infrastructure by revealing the following:

- Early adoption of blockchain technology has already demonstrated improvementsin operational efficiency, data security, and transparency, particularly in industries like finance and supply chain.
- Strategic investments in education, infrastructure, and clear regulatory guidelines could facilitate broader adoption.
- Early implementations support the hypothesis that blockchain reduces transaction times and enhances data integrity.
- The growing adoption in industries such as finance, supply chain, and healthcare further validatesthehypothesisthat blockchain'skey strengthsalign withtheneeds of these industries.

The implication of the above findings is that blockchain adoption is positively impacting business IT infrastructures, with industries experiencing tangible benefits in efficiency and security. While challenges remain, targeted solutions can help overcome these barriers, driving further adoption across various sectors.

V. SUMMARY,CONCLUSIONSANDRECOMMENDATIONS

5.1 Summary

This study explores the adoption of blockchain technology in business IT infrastructure, analyzing its impact on operational efficiency, data security, and transparency. It investigates key barriers to adoption, such as high implementation costs, regulatory uncertainty, and limited technical expertise, and suggests potential solutions, including policy frameworks, cost-sharing models, and workforce development. The study finds that blockchain offers superior efficiency and security compared to traditional IT systems, especially in industries like finance, supply chain, and healthcare, which are leading the adoption due to their need for secure and transparent data management systems. The overall findings support the transformative potential of blockchain in enhancing business operations, with effective mitigation strategies for existing barriers.

5.2 Conclusion

The research findings done in the study ascertain that Blockchain technology has the potential to significantly enhance business IT infrastructure by improving efficiency, security, and transparency. Though barriers such as high costs, regulatory uncertainty, and a lack of technical expertise exist, they can be addressed through targeted solutions like policy frameworks and workforce development. Industries such as finance, supply chain, and healthcare are already leading in adoption, demonstrating the technology's value in sectors requiring secure and transparent data management. Glaringly, blockchain represents a transformative solution for businesses, with its full potential unfolding as adoption increases and barriers are mitigated.

5.3 Recommendations

Thestudy thereforerecommendsthefollowing:

- Businesses should invest in training programs to develop blockchain expertise within their workforce, ensuring smooth implementation and operation.
- Governments and industry bodies should work together to create clear, consistent regulations that foster innovation while ensuring compliance and security.
- Businesses should initiate pilot projects to test blockchain applications in specific use cases, allowing for risk mitigation and a deeper understanding of its benefits.
- Companies should consider partnerships, subsidies, and cost-sharing models to reduce the financial burden of blockchain adoption, particularly in the early stages.
- Industries like finance, supply chain, and healthcare should continue to explore tailored blockchain solutions to address sector-specific needs for security, transparency, and efficiency.

By implementing these recommendations, businesses can effectively overcome barriers and unlock the full potential of blockchain technology.

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AppendixA: LikertScale(1To5)ForMeasuringTheLevelOfBlockchainIntegration Within Business I.T Systems

Scale	Description
1	**No Adoption**: The organization has not adopted blockchain technology in any part of its IT infrastructure.
2	**Minimal Adoption**: Blockchain is in the early stages of adoption, with limited use in specific areas or small pilot projects.
3	**PartialAdoption**:Blockchainisintegratedintosomebusinessfunctionsor departments but not organization-wide.
4	**Significant Adoption**: Blockchain is widely used across multiple business areas, with a significant portion of operations relying on it.
5	**FullAdoption**:Blockchainisfullyintegratedintoallbusinessoperations,withall relevant processes utilizing the technology.

AppendixB:SurveyonPerceivedFinancialCostofImplementingBlockchain Technology

Introduction: Thank you for participating in this survey. The goal of this survey is to understand theperceivedfinancial costofimplementingblockchaintechnologyinbusiness IT systems. Your responses will help in assessing the financial considerations for businesses exploring blockchain adoption.

Instructions: Please answer the following questions based on your organization's experience or perspective on blockchain implementation. Select the response that best reflects your views.

SectionA:GeneralInformation

1. **Industry**:
   - ○ Manufacturing
   - ○ Retail
   - ○ Healthcare
   - ○ FinancialServices
   - ○ Technology
   - ○ Other (Pleasespecify):_____
2. **Size ofyourorganization**:
   - ○ Small (1-50employees)
   - ○ Medium(51-250 employees)
   - ○ Large(251+employees)

SectionB:PerceivedFinancial Cost

3. **How would you rate the initial cost of implementing blockchain technology in your organization?**
   - ○ VeryLow
   - ○ Low
   - ○ Moderate
   - ○ High
   - ○ VeryHigh
4. **Whatisyourperceptionoftheongoingmaintenancecostforblockchainsystems?**
   - ○ VeryLow
   - ○ Low
   - ○ Moderate
   - ○ High
   - ○ VeryHigh
5. **To what extent do you believe that blockchain technology will result in long- term cost savings for your business?**
   - ○ Nosavings
   - ○ Minimal savings
   - ○ Moderatesavings
   - ○ Significantsavings
   - ○ Verysignificantsavings
6. **Whatdoyouconsidertobethemostsignificantfinancialchallengein implementing blockchain? (Select all that apply)**
   - ○ Highupfrontcapitalinvestment
   - ○ Trainingandskilldevelopmentcosts
   - ○ IntegrationwithexistingIT systems
   - ○ Lackoffinancialresourcesforongoing maintenance
   - ○ Uncertainreturnoninvestment(ROI)
   - ○ Other (Pleasespecify):_____

7. **Do you believe your organization has the financial capacity to fully implement blockchain technology?**

- ○ Yes
- ○ No
- ○ Unsure

8. **How likely is your organization to seek external funding or grants to support the cost of implementing blockchain technology?**

- ○ Veryunlikely
- ○ Unlikely
- ○ Neutral
- ○ Likely
- ○ Verylikely

9. **Doyouexpectblockchainimplementationcoststoreduceovertimeasthe technology matures and becomes more widespread?**

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree

SectionC:Final Thoughts

10. Please provide any additional comments or insights regarding the financial challenges or opportunities you foresee in implementing blockchain technology in your organization:

Thank you for completing thissurvey. Your input isvaluablein understanding thefinancial aspects of blockchain implementation.

AppendixC:Tablerepresentingthecategoricalcodingofdifferentsectorsforthe survey:

Sector	**CodedValue**
Finance	1
SupplyChain	2
Healthcare	3
Manufacturing	4
Retail	5
Technology	6
Other(Specify)	7

AppendixD:Likertscalequestionstoassessblockchainadoption,perceivedbenefits, and barriers:

1. Towhatextentdoyouagreewiththefollowingstatement:"Myorganizationhas adopted blockchain technology."

- ○ Strongly Disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly Agree

2. Howlikelyisyourorganizationtoadoptblockchaintechnologyinthenext12months?

- ○ VeryUnlikely
- ○ Unlikely

- Neutral
- Likely
- VeryLikely

PerceivedBenefits:

1. Blockchaintechnologywillimprovetransparencyandtrustinmyindustry.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

2. Ibelievethatblockchainadoptionwillleadto costsavingsinmy organization.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

BarrierstoAdoption:

1. Thecomplexity of implementing blockchain technology isasignificant barrier in my organization.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree
2. Thelackofskilledprofessionalsinblockchaintechnologyisamajorobstacleto adoption in my organization.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree