INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT & MANAGEMENT

IJRCM

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NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESIS (ES)

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

LIMITATIONS

SCOPE FOR FURTHER RESEARCH

REFERENCES

APPENDIX/ANNEXURE

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BOOKS

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

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- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–23

UNPUBLISHED DISSERTATIONS

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

ONLINE RESOURCES

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WEBSITES

- Garg, Bhavet (2011): Towards a New Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

BLOCKCHAIN TECHNOLOGY - ROLE IN OIL AND GAS INDUSTRY

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ABSTRACT

Blockchain is a public digital and distributed database solution providing decentralized management of transaction data. Since the introduction of Bitcoin crypto-currency, which was the first implementation of the Blockchain technology in 2008, the interest in Blockchain technology has been constantly increasing. Blockchain is not applicable only in financial transaction systems but it is transforming our society from the way we use our cars, smartphones, healthcare, vote, and even personal identification. As such, when the Blockchain implementation, it is really observed in three different things: Blockchain ledger, Blockchain network and clients. Modern Blockchain implementations have to adapt and modify to technical challenges and limitation in Blockchain technology. In this paper, author aims to analyze the evaluation of blockchain application of blockchain in oil and gas and finally the current quality issues in the Blockchain implementation. A literature review is conducted to investigate the current quality requirements for Blockchain implementation. This paper identified the quality requirements for Blockchain implementation is still in its early stage and the future study may enhance better implementation of blockchain in various sectors successfully.

KEYWORDS

Blockchain, Bitcoin and Oil & Gas.

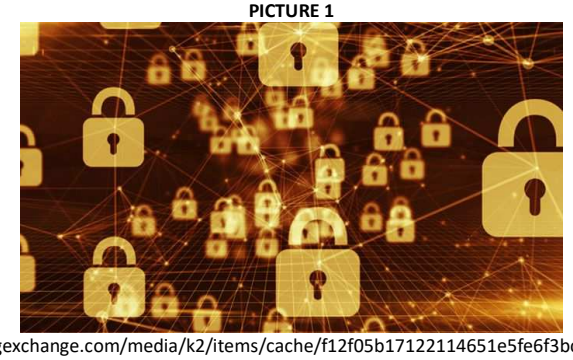
JEL CODE

O30.

INTRODUCTION

Blockchain technology is commonly associated with Bitcoin and other cryptocurrencies, but that is only the tip of the iceberg. Some people think blockchain could end up transforming a number of important industries, from health care to politics.

PICTURE 1



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BLOCKCHAIN BEYOND BITCOIN

Bitcoin is the beginning, but it is far from the end. To help you wrap your head around why, we are taking a deep dive into the world of blockchain. In this article, we will go beyond Bitcoin and hone on blockchain applications that could reshape oil and gas industry.

OBJECTIVES OF THE STUDY

1. To explore the concept of the Blockchain technology.
2. To identify its applications in Oil and gas industries.

RESEARCH METHODOLOGY

1. Researcher used secondary data for research using magazines, web analysis, and articles.
2. Researcher developed the article based on qualitative method to deliver the concepts of Blockchain technology and its implications in Oil & gas industry.

WHY ARE PEOPLE SO EXCITED ABOUT BLOCKCHAIN?

In their pursuit of offering attractive environments for investment, many of the governments experimenting with blockchain seem to recognize the inherent advantage of being first movers in an emerging area. However, the gains will likely not just go to those who attract industry. What many public sector actors are realizing is at once profound and simple: Technology need not be revolutionary to be highly impactful. By reducing dependence on existing intermediary institutions and their accompanying layers and costs, blockchain can potentially eliminate significant resource burdens. Moreover, by accelerating transactions and simultaneously lowering their costs, blockchain can help to eliminate layers of redundancy, ease regulatory compliance burdens, and introduce recordkeeping efficiency and generally smooth government operations across a number of areas. Harnessing those advantages and applying them toward public institutions' mission goals provides an opportunity for realizing both agency-specific and whole-of-government benefits that can foster more efficient and effective mission

delivery in these challenging times. Three key characteristics of blockchain may help to explain the depth of public sector interest in the topic and many of the pilots taking place around the world (Distributed Ledger Technology, 2017).

WHERE DID BLOCKCHAIN COME FROM?

Although blockchain technology has only been effectively employed in the past decade, its roots can be traced back far further. A 1976 paper on New Directions in Cryptography discussed the idea of a mutual distributed ledger, which is what the blockchain effectively acts as. That was later built upon in the 1990s with a paper entitled', 'How to Time-Stamp a Digital Document'. It would take another few decades and the combination of powerful modern computers, with the clever implementation with a cryptocurrency to make these ideas viable.

Data security is failing and there has to be a better system. Blockchain creates a secure, unalterable public record and is poised to dramatically improvement in the world around you. The blockchain is proposed and practiced to use in various industries like energy sector, oil and gas, government sector, finance industry and so on.

In order to validate the blocks in the same manner as a traditional private ledger, the blockchain employs complicated calculations. That, in turn, requires powerful computers, which are expensive to own, operate, and keep cool. That is part of the reason that bitcoin acted as such a great starting point for the introduction of blockchain technology, because it could reward those taking part in the process with something of financial value.

Bitcoin ultimately made its first appearance in 2009, bringing together the classic idea of the mutual distributed ledger, the blockchain, with an entirely digital currency that was not controlled by any one individual or organization. Developed by the still anonymous "Satoshi Nakamoto," the cryptocurrency allowed for a method of conducting transactions while protecting them from interference by the use of the blockchain.

THE THREE CHARACTERISTICS OF BLOCKCHAIN

DECENTRALIZED AND DISTRIBUTED

Ledger storage and integrity

- Ledger replicated across parties, each keeping a full record of transactions
- Distributed system operation, no single point of failure
- Transactions verified cryptographically and updated immediately across all parties
- Provides unbroken and timely recordation of authoritative truth

IRREVERSIBLE AND IMMUTABLE

Each transaction record is indelible

- The ledger is append-only, invalid transaction errors are surfaced and rejected immediate reconciliation
- All transactions encrypted and include time, date, participants, and hash to previous block
- Trust enabled via consensus protocols, cryptography, and collective bookkeeping
- Allows trusted value exchange

NEAR REAL TIME

Transactions verified and settled in minutes vs. days

- Parties interact directly no third-party intermediary
- Moves parties from information exchange to value exchange
- A transaction may include code to run against the ledger
- Enables smart contract automation and enforcement

WHAT IS BLOCKCHAIN

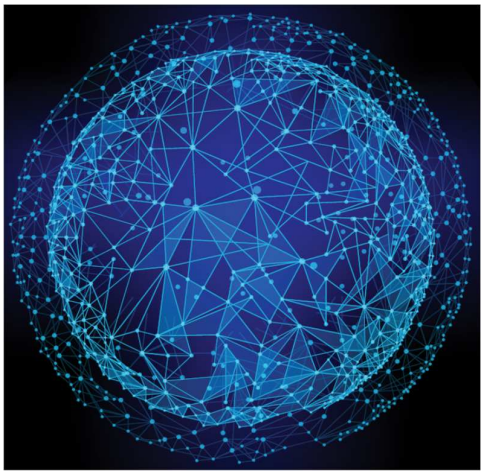
While blockchain technology is not simple when you dig into the practical details, the basic idea is not too hard to follow. It is effectively a database that is validated by a wider community, rather than a central authority. It is a collection of records that a crowd oversees and maintains, rather than relying on a single entity, like a bank or government, which most likely hosts data on a particular server. Of course, tens of thousands of peers could never manage a physical database kept on paper. That is where computers, and the internet, come in.

Each "block" represents a number of transactional records, and the "chain" component links them all together with a hash function. As records are created, they are confirmed by a distributed network of computers and paired up with the previous entry in the chain, thereby creating a chain of blocks, or a blockchain. The entire blockchain is retained on this large network of computers, meaning that no one person has control over its history. That is an important component, because it certifies everything that has happened in the chain prior, and it means that no one person can go back and change things. It makes the blockchain a public ledger that cannot be easily tampered with, giving it a built-in layer of protection that is not possible with a standard, centralized database of information.

While traditionally we have needed these central authorities to trust one another, and fulfill the needs of contracts, the blockchain makes it possible to have our peers guarantee that for us in an automated, secure fashion. Though generally not used for it yet, blockchain could be used to maintain a variety of information.

POTENTIAL APPLICATIONS FOR OIL AND GAS MARKET

PICTURE 2



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Big Oil is due for a disruption. The world's most important industry has been carrying on without any significant changes in its day to day routine for far too long. Now, the new tech on the block has its sights set on the multi-trillion-dollar oil and gas sector. It is official: Blockchain technology has infiltrated Big Oil. The hype behind blockchain has reached a full-blown frenzy.

The technology, which creates secure ledgers for digital transactions and rapidly accelerates the pace at which transactions can be made, has the potential to disrupt every major industry: real estate, shipping, banking and healthcare.

Blockchain is truly revolutionary, and Big Oil is finally catching on. In an industry that has used technology to reduce breakeven costs to all-time lows, create gigantic drilling rigs run by robots, and even tap reserves located 10 miles below the sea, the oil and gas sector has been slow to jump on the blockchain bandwagon until now.

According to a report from the World Economic Forum from 2017, a digital transformation has already swept across the energy industry. Major Corporates like BP and Shell are making headlines with plans to utilize blockchain technology to completely transform the process of buying and selling.

Smaller players with big ambitions like Canada's Petroteq are preparing to revolutionize the day to day operations of potentially every oil operation on the planet. Petroteq could utilize new technologies to tap massive new reserves of energy, such as the Utah oil sands, while radically reducing environmental risk. Integrating blockchain into supply-line management and logistics could dramatically cut costs.

LEADING USE CASES OF BLOCKCHAIN AND POTENTIAL APPLICATIONS FOR OIL AND GAS COMPANIES

The oil and gas industry presents a particularly compelling opportunity to leverage blockchain technologies due to the high transactional values (and therefore risks) and economic pressures to reduce costs. A secure system that mitigates risk, increases transparency, provides an audit trail and speeds-up transactions and significantly, reduced cost may be appealing to oil and gas companies. Taking some of the main applications of blockchain, we will now explore how these could be applied to the oil and gas sector. Cross-border payments. One of the advantages of cryptocurrencies, such as bitcoin, is the significantly lower costs associated with cross-border payments, in addition to the instant transfer, cutting out the need for intermediaries and the time required for them to validate and clear the funds.

Oil and gas sold in large volumes and as such entail significant value, not unlike the size and scale of transactions between banks. The frequency of transactions is also high; for example, a 300,000 barrel per day oil refinery will need to source a large crude carrier every week to maintain adequate volumes, and cargos can cost as much as USD 100 million (two million barrels at USD 70 per barrel). Oil companies also need to be aware of where crude is ultimately sourced. Some exporting nations are from time-to-time under sanctions to prevent trade in this commodity. Blockchain could provide a fully transparent and secure record of the entire supply chain. Using a distributed ledger, digital tokens can be used to represent the asset being transacted. These tokens can be issued by a trusted authority for the needs of the companies or participating parties; for example, if oil and gas companies used a blockchain ledger to buy and sell barrels of oil, transactions could include digital tokens named Brent or WTI. These tokens would represent the underlying asset of a barrel of oil and would remain digitally attached through-out its supply chain journey. Currently, around nine percent of crude oil transactions are disputed, which equates to around USD 150 billion each year. By using tokens in a blockchain, payment could be processed more quickly, paper work such as title transfers would be eliminated, and disputed transactions could be significantly reduced. It is important to note that the token being exchanged will be subject to gains or losses based on the strength of the underlying fiat (local) currency. If 50 WTI tokens (Western Technology Investment) are purchased using US dollars, the value of these tokens are exposed to fluctuations in the US dollar. As the use of cryptocurrencies increases, governments are forming positions on the taxation implications of cryptocurrencies and their exchange for fiat currency.

RECORD MANAGEMENT

Oil and gas companies need to acquire rights to access land to prospect for, explore, appraise, and then produce oil and gas. Property transactions provide an excellent example of how the use of blockchain can help business to keep accurate and readily accessible records. Understanding land provenance and reported value can be difficult and multiple records of conflicting ownership and value can exist within independent silos of data. There is often no accurate history of the transactions. In this mostly paper-based environment, land transactions are highly susceptible to fraud, especially in countries with higher levels of corruption (Anna Irrera 2017).

Blockchain technology can be employed to resolve this problem and is being trialed in certain countries, such as Georgia and Ghana, which experience high levels of undocumented land ownership and land seizures. Applying the same model to the oil and gas industry by recording sales and transfers of land in a blockchain will create an immutable audit trail of land movement, value, and ownership. This will reduce the occurrence of lost or mismatching titles, ownership disputes, and provide tax authorities with transparency in respect of land transactions, recording accurate transfers of value as they occur in real time.

Supply chain management, Global supply chains in the oil and gas industry comprise a complex web of suppliers, shippers, and contractors. The complexity and scale of this network requires substantial administration and creates opportunities for errors. From the tax authorities' and customers 'perspectives, there also is a concern that suppliers might manipulate invoice values, potentially avoiding taxes or inflating costs, as goods are sold and shipped around the world. Utilizing blockchain technology to record and manage them movement of goods and related invoices will significantly mitigate the risk of errors and the opportunity to alter invoice values or recipients. Goods will be tracked from source to customer, reducing time, costs, and providing insight into the supply chain process that could be used to create efficiencies. Invoices will be recorded in the blockchain, creating an immutable record of its contents. The movement of invoices also can be addressed in the blockchain using public and private keys, preventing unapproved parties from accessing the invoices. This again could help to reduce the administrative burden on companies to report transactions to authorities and reduce the time taken by tax authority audits because of the reliability and trans-parency of data in the blockchain. The issue of security in data transfer is important to both individuals and companies. Public and private keys allow data to be encrypted and sent to another party, so that only that party can access the encrypted data. If the party can sign the invoice with its private key before sending, and any subsequent alteration of the invoice would invalidate the signature and the fraud would be apparent.

SMART CONTRACTS

Oil and gas contracting can be complex, with lengthy contracts and agreements. A contract is often adjusted by a change order that needs to be tracked, and in some cases, contracts may be agreed some years before they are due to be completed. Smart contracts are self-executing contracts based on agreed criteria and written in code, removing the ambiguity of terms and reducing the requirement for lawyers to draft and interpret. When the criteria of the contract are fulfilled, ownership or payment, for example, will be automatically transferred. A smart contract could be amended if the parties agree, and would maintain a record of all versions and amendments to the contract. It then would automatically complete once the criteria of the most up to date version are satisfied. Criteria could include payment or even government approval for the transaction. This may save time and costs for interpreting legal terms and tracking records, and government au-thorities could potentially access relevant parts of contracts to audit or pre-approve the taxation treatment. Joint ventures are common in the oil and gas industry and generally require a suite of complex agreements (for example, relating to the sharing of costs or revenues), which could be implemented as smart contracts. Most contracts contain audit clauses giving the parties the right to audit each other to make sure that all parties are complying with the contract. Introducing a blockchain ledger to record joint venture transactions and using smart contracts to define, negotiate, and execute the contractual conditions will provide all involved parties, including the tax authorities, with transparency and consensus on what has occurred. This single audit trail, agreed upon by all participants, will significantly reduce the effort needed to ensure timely tax compliance and reporting, as well as the effort needed by the tax authorities to understand tax positions. As part of a global industry, oil and gas companies have to consider double taxation and transfer pricing implications. The use of smart contracts for transfer pricing profit allocation is another area of potential for simplification, increased transparency, and overall cost reduction.

IMPLICATIONS

There are many ways the blockchain will impact commodity market participants that we did not begin to touch on. Intermediaries such as brokers, exchanges, price reporting agencies and clearing houses entire business models could be disrupted by widespread adoption of blockchain-based applications. The cost and

nature of fee based transacting will be impacted. The role of regulators and ability for market participants to meet compliance obligations will need to be examined in careful detail, and in some cases regulation may ultimately evolve in alignment with new ways of working. The issue of anonymity and payments will need to be addressed, as will the ultimate link between the digital conveyance of value over the blockchain and the actual conveyance of value through an acceptable means of payment (i.e. Currency). If certain regulatory hurdles can be overcome (and this will be no small task), access to markets will open up significantly. Marketplaces will consolidate, and accessibility will explode, significantly compressing margins at the transactional level. Trading activity may increasingly involve direct transactions with members of the public or public 'consortiums'. Further still, the role of the trader itself may be disintermediated as end users transact (organisations and/or individuals, and again likely in groups) directly with suppliers. The role of an energy trader in a world where a smart home hub can connect to a global energy market and continuously balance your home's energy use in real time by sourcing electricity or natural gas at market rates from a source supplier. The examples above are by no means exhaustive, but they provide some hint of the potential disruptive power of widespread adoption of blockchain technologies.

CHALLENGES

One of the most significant challenges of emerging markets is their ability to hire, train, and develop regulatory officials. In particular, finding and developing the officials to oversee and administer taxation affairs is a key concern. The application of tax laws to different pieces of the value chain is extremely complex and an overbearing burden for many developing countries. The application of blockchain can alleviate this acute pain point for developing countries and provide confidence in the application and regulation of their resource regime.

FUTURE CONSIDERATIONS

The potential uses of blockchain are wide and varied, and the technology is becoming more prevalent. In the oil and gas industry, like many others, companies may face the choice of deciding whether to pioneer new technologies and in the process disrupt their own business model and industry, or to continue to focus on their core business and wait for the market to be disrupted by others. The pace at which blockchain will be adopted and will disrupt markets is unclear, and may be decided, to some extent, by the largest companies that will need to work together to drive innovation and solutions due to the global and collaborative nature of blockchain. Potential considerations for oil and gas companies are to set up or join working groups to explore blockchain and its potential applications or to launch a trial with an existing trusted business partner to better understand blockchain and the value it could create.

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