



Munich Personal RePEc Archive

"The Impact of Blockchain Technology on the Real Estate Sector Using Smart Contracts"

Uzair, Muhammad Mansab and Karim, Emadul and Sultan,
Prof. Dr. Shair and Ahmed, Syed Sheeraz

Greenwich University, Karachi

April 2018

Online at <https://mpra.ub.uni-muenchen.de/89038/>

MPRA Paper No. 89038, posted 17 Sep 2018 13:45 UTC

“The Impact of Blockchain Technology on the Real Estate Sector Using Smart Contracts”

Muhammad Mansab Uzair*, Emadul Karim**,
Prof. Dr. Shair Sultan*** and Syed Sheeraz Ahmed****

ABSTRACT

The block chain technology has been in the topic of much discussion due to its successful application in the crypto currency known as “Bitcoin” which has investment experts, economists, billion dollar financial institutes, big banks as well as governments taking sides on whether it should be legitimized and used as a currency or make it illegal to be used as a means of exchange. However, experts from different field like supply chain management and even from the medical field are more interested in how the block chain technology’s decentralized record keeping and numerous other benefits can be of use to them in their fields of work. This study concentrates on the block chain being used for real estate record keeping, since most geography’s have different procedures for record keeping, this study focuses on Defence Housing Authority in Karachi to check what the impact of applying the block chain technology to this area in Karachi would have on investors, real estate agents, residents and the government.

Keywords: *Block chain, Real Estate, Karachi, Pakistan*

INTRODUCTION

The real estate sector in Pakistan is one of the most lucrative industries in the world with returns growing higher every year, even considering the unstable political conditions that prevail over the country due to the abundant corruption among numerous sectors in the country. Real estate sector is no exception to this sad reality.

One of the main reasons for this corruption is the incorrect values of the real estate which are recorded as the government organizations which record land transactions of different areas of the country. This can be combatted with the correct recording of the value of these properties so that all parties are aware of the prices; this is where the block chain comes in.

The block chain is a distributed ledger for record keeping in which all the transactions can be viewed by anyone on the block chain and even observers from outside the block chain can view these transactions and their value. That means it’s a technology which is formed around open data which is accessible to numerous users on the network and even to users who are not a part of the network making it much like a public market place, much more detailed than a stock market or a foreign exchange market.

One if the most commendable features of transacting on the block chain are that unlike traditional market places, theft can be avoided because in the open ledger system that the block chain employs, the ledger needs a form of identity to and from which the transactions take place. This identity id created in the form of a wallet for most applications with a unique identification code. Therefore, when transacting, the transactions are verified by users on the network and thus it is defined as a market place where parties who are exchanging assets can be verified (Malviya, 2015).

*Student of Greenwich University, Karachi

**Assistant Professor at Greenwich University, Karachi

***Director Quality Enhancement cell (QEC), Greenwich University, Karachi

****HOD, IT, Greenwich University, Karachi

Smart contracts are contracts which can be completed without any human interaction. It serves as an escrow but automated. This means that through smart contracts a person can exchange anything of value, be it real estate, shares of a company or any legal binding contract using a transparent process which is executed only when the conditions of the contract are met and all this without the services of a middle man.

This study investigates what the impact of the block chain technology would be, if it was used for recording data for real estate in Karachi, Pakistan. The technology employs the use of smart contracts to record similar data on block chains. This study will be checking if, for one, the new era technology can actually be applied to this profitable sector or not? Can it be applied in this particular country and city? How it would be done and what would be the impact of using this technology to record real estate transactions.

If this technology is applied to the real estate sector in Pakistan, it would not only create transparency in transactions but would also make commission-based businesses like real estate dealers in the country obsolete as they would not be needed in the process of buying and selling property. This would be beneficial for the parties conducting the actual transactions because they would not need to pay extra in the name of commission to these agents who introduce both parties and also conduct the necessary processes to get the documentation verified and signed by the parties involved in the transaction.

It is being applied in most developed countries in the world including the United States of America, Germany and even in India so that property valuation can be monitored by not only the government officials who are in charge of the sector but also by the buyers and sellers in the market, in other words, to create transparency amongst all parties involved in the transactions.

Therefore, the research questions are given as under:

Research Questions:

The main research questions were:

1. What is the impact of block chain using smart contracts on real estate?
2. What is the impact of block chain using smart contracts for consumers?
3. What is the impact of block chain using smart contracts on real estate dealers?

Objectives of the study:

This study was carried out under the following specific objectives:

1. To study the impact of block chain on real estate.
2. To study the impact of block chain using smart contracts on real estate.

Hypotheses:

H₁: Block chain using smart contracts has a significant effect on the real estate sector.

H₂: Block chain using smart contracts has a significant effect on consumers of real estate.

H₃: Block chain using smart contracts has a significant effect on real estate brokers.

LITERATURE REVIEW

The world over, researchers claim that the block chain technology is how people in the future, will be keeping records and histories of transactions and events and which would be very beneficial if it was applied to the property sector but acceptance will take time as it's a new technology and can be complicated and as yet, the benefits do not outweigh the costs for implementing such a technology. Explaining block chain to people with little or no knowledge of technology can be a daunting task as it is really very difficult to assess where the exact or let's say correct starting point would be. One the easiest explanation is that is a tool for record keeping and managing information about the transactions being conducted on that specific network. The thing that makes it so unique is that all the users or nodes on the network has a partial or complete copy of the transaction history on the block chain. What eradicates the need for a central database is that, firstly, all the transactions are not only time stamped but also no single user can change the data to create any unfair benefit for himself or any other party involved. However, another approach to understanding the system that the block chain employs is to call it an economic layer for the internet, similar to the internet if things, but for financial transactions or transactions which involve assets to be exchanged amongst users without the intervention of middle men or agents (Speilman, 2016).

Agreed upon by numerous technology gurus and researchers, the block chain technology has the potential to disrupt many outdated business models which rely heavily on accurate record keeping. Numerous startup and venture capital funds and not to forget bug corporations are funneling money into the research of the applications of the block chain technology and how it can be applied to their industry. In the case of a decentralized and distributed database, much like the database that the crypto currency Bitcoin operated on, everyone has possession of the complete copy of the database. This makes it impossible for hackers to hack and change records as unlike traditional financial institutions or any organization which depends on the database being a central one with only a limited number of people have access to the data, the block chain data has numerous copies on systems throughout the network making is impossible for hackers to edit each and every record to make the change in data completely untraceable. The process which makes is necessary for all parties to agree on only on correct version of the record is what most people call the second and most fundamental pillar of the block chain technology (Maximilian Friedlmaier, 2016).

However, the block chain does have limitations but, in most cases, these become not so important or even relevant. An example of this is that block chain networks are public, and the transactions can be seen by anyone and certain algorithms can be used to track the people using a certain wallet code. However, this does not matter in all the cases and uses of the block chain because in the case of a public registry, it would be beneficial for the records to be public or even in the process of taxes so that citizens of a country would know where their tax dollars went and where they were used (CSIRO, 2017).

A block chain network has the unique attribute that allows is to not only have a distributed ledger but allows non-trusting members of the network to transact and interact with each other without the need of a trusted intermediary while still being easy to verify whenever the need be. A very useful and significant feature of the block chain is the use and exchange of assets of value through smart contracts which enable transactions with the underlying assets being of significant value. Therefore, the block chain is a revolutionary part of the internet of things and especially for the world we live in as the technological advances are coming at such a rate that it can be difficult to keep track. Thus, the block chain technology and smart contracts indeed do have the potential to pave the way for, not only new processes inside organizations but also innovative business models using distributed applications to drive business in the years to come (Christidis & Devetsikiotis, 2016).

Smart contracts are although programmed much like the normal programming languages used today but differ in the way that they are user defined programs that stipulate regulations in transactions of the underlying asset. Also, compared to outmoded financial or real estate contracts, they would have lower legal and transactional fee and might be able to lower the barriers for entry of new users (Kevin Delmolino, 2015).

The primitive methods of recording real estate data have had a significant impact in the valuations of property in Pakistan. However, our neighbor India also has the same problem in recording real estate data since its inception and block chain technology has the capability to overcome the problems arising from it like manipulation of data and inordinate delays. Therefore, an incorruptible technology should be implemented. There is a difference in which land registration and the keeping land records has evolved over the years. In India, throughout the colonial period, forests and urban areas were excluded from the recording system and instead, areas with potential for agriculture were documented. This was mostly due to the agricultural potential of those areas for which the farmers had to pay taxes which had become one of the main sources of the government income at the time. After independence, the newly formed government of India decided to keep the same method of record keeping. Rural areas were handled in the same way with the Revenue Department maintaining all the records of the land as well as keeping a record of the tax collection from these areas and in urban areas, people relied on deeds which were verified through the Stamps and Registration Department of the locality. As time passed, little or no attention was paid in making this system up to date or amending it to provide transparency. This has caused enormous gaps between the legislation and the policy which can be blamed on the political influences of the country not taking it seriously or for their own benefits and unfair gains (Bal, 2017).

METHODOLOGY

The geographic distribution is chosen due to fact that this paper wants to determine the impact of the block chain technology on not only consumers but also on the economic implications that it would have on the real estate sector in Karachi, Pakistan as the real estate sector in Karachi is worth billions of rupees and the impact if the block chain would be implemented would be massive and which would affect millions of people residing in the city as well as investors abroad.

The methodology which will be applied for this research paper is by making a questionnaire which would be a universal one and would be filled out by real estate agents, developers, investors, people who are currently working on the block chain technology in Pakistan as well as people in the fintech space working in Pakistan.

Once that is complete, the data collected with analyzed using the latest SPSS software. SPSS stands for Statistical Package for the Social Science. It is the most well-known software used for analysis of data and has been used in numerous studies across the globe. It can perform all kinds of analysis as well as handle large amounts of data.

Therefore, the research design was formed by deciding on the objectives of the study which included block chain implementation first and then moving on to the research questions with followed. This led to the development of the hypothesis and the questions being researched upon. Next came the data collection and then analyzing the data through the latest version of the SPSS Ver. 23 software and checking it through the correlation test to get the results which then led to the conclusion and recommendations on the topic.

This research conducted in Positivism Paradigm, and Pure Quantitative research based available constructs. The research is explanatory based on selected independent and dependent variables we will explain the relationship of effect on Block chain and real estate. The research conducted through Questionnaire adapted from previous empirical researches.

The research was conducted using a questionnaire. The questionnaire would have questions with close ended answers using the Likert scales which offer a range of options for answers in questionnaire's so that the subject's most accurate response could be recorded. They typically do have a moderate point with end perspectives ranging from very good to very bad. Therefore, the Likert scale would assist in getting degrees of opinions that would be more precise than answers with only two options.

The impact of applying the block chain to the real estate sector for this study is determined by using a questionnaire with thirteen questions to get information from real estate brokers operating in the buying and selling of properties in DHA as well as developers of property, people using the block chain technology for their daily purposes as well as investors who investing property in DHA. These groups of people were selected as although their views may differ, the study could get an accurate conclusion as to how the technology would impact the real estate sector is this area in Karachi, Pakistan.

The variables that were used were:

- Independent Variable1:** Block chain
- Independent Variable2:** Smart Contracts
- Dependent Variable:** Real Estate

The conceptual framework is designed to test how the block chain technology would influence the buying and selling of real estate in Karachi, Pakistan. Also, since all transactions are done on paper and only have records maintained by a centralized digital register owned by the government organizations which are responsible for real estate title registry so what part would smart contracts play if they were implemented instead of the current system.

DATA ANALYSIS, FINDINGS, AND DISCUSSION

Reliability Testing and Analysis

Table 1: Scale Measurement of Collected Data

Variables	Items	Cronbach’s Alpha
Block Chain	5	0.7
Smart Contracts	5	0.6
Real Estate	5	0.9

The Cronbach’s Alpha value shows that the reliability of collected data from the respondents is 0.70 which in percentage is 70%. This result is more than acceptable since the minimum requirement of acceptability is 70%. It further shows that the results are consistent and reliable for further analysis. Hence, the block chain is considered as significant factor as found through 5 items on Likert-scale with consistency of the responses at 70%. The above table shows the responses over Smart contract. The Cronbach’s Alpha value shows 0.60 which means 60% data is consistent. The collected data over the items of the Real estate are consistent in nature and further tests applied to see the impact of the block chain to the real estate sector using smart contracts.

Correlation Analysis

Table 2: Correlation Matrix with Dependent variable

Correlations

		Real Estate	Block Chain	Smart Contracts
Real Estate	Pearson Correlation	1	.058	.076
	Sig. (2-tailed)		.494	.369
	N	140	140	140
Block Chain	Pearson Correlation	.058	1	.156
	Sig. (2-tailed)	.494		.065
	N	140	140	140
Smart Contracts	Pearson Correlation	.076	.156	1
	Sig. (2-tailed)	.369	.065	
	N	140	140	140

The Correlation analysis table shows the relationship between the independent variables with dependent variables at two tailed as data normally distributed collected from the respondents. The above table shows the block chain and smart contracts do not have significant relationship with real estate sector in Karachi. The values are less than that are significant. The block chains also show the relationship between the variable at 0.494 which is not significant. Smart contracts also do not have a significant impact at 0.369.

Multiple Regression Model

The regression analysis predicts and explains the relationship between the independent and dependent variable. In this research, two independent variables and one dependent variable were selected to predict the relationship of the block chain and smart contracts towards the real estate sector as a dependent variable. The multiple regression model research reports the r square value as model determination and F- Statistic for model accuracy and determination.

Table 3: Regression Model Summary

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	2.696	.278		9.697	.000
	Block Chain	.041	.075	.047	.551	.583
	Smart Contracts	.065	.081	.069	.802	.424

a. Dependent Variable: Real Estate

Table 4: Regression Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.60	.520	.60	.47289

Predictors: (Constant), Smart Contracts, Block Chain

The R square shows .60 that shows the model is significant and can predict the 60% change in the dependent variable with change in independent variable. The standard error of an estimate as .47 shows the variability in the unexplained part shows significance change with market factors regarding real estate and behavior of the people used in the sample.

The responses show that people in the real estate sector as well as people using block chain would like the system to be transparent so that all users can see what the volume is as well as the process of these properties so that buyers, so they may get accurate prices of their property holdings in DHA. They also agree that the government should also be able to view the prices of these properties so that they can allocate taxes and duties accordingly.

However, the real estate agents did not agree on block chain being implemented as they do not prefer so much visibility of the prices and values of these properties, which included plots, apartments and completed houses would cause their profit margins to go down and eventually they would have to go out of business as buyers and sellers would be able to transacts without any intervention from them but instead only digitally.

Whereas, investors and people who would potentially buy property as well as people using the block chain agreed that it would be a better idea to implement the block chain of this real estate sector as it would become a much better investment as well product if they knew what the prevailing rates in the market was instead of being deceived by a broker or a middle man as well the historical prices and rates could become a better indicator to forecast prices in the future of these assets so that chances of a loss would be much less than it is now.

CONCLUSION

The aim of this study was to determine the impact of applying the block chain technology to the real estate sector in the area of DHA in Karachi, Pakistan. For this, different models were explored, and a questionnaire was also filled by subjects who are either working in the real estate sector in DHA or are investors as well subjects who are using the block chain technology in their daily life. The conclusion that was derived was that although most of the respondents wanted technology to be implemented in this profitable sector of business, the people earning the most from the trading of these assets, the real estate brokers would rather not have this technology implemented in DHA as it would enable any new or old buyer or seller to see the prices at which these properties are being traded, which would cut into their profits as well as eventually make them redundant.

This study recommends that the government of Pakistan should take serious note and should apply the block chain technology to the real estate sector so that it is transparent in nature for the general population of the country as well as departments who are stakeholders in the real estate sector for the government so that these transactions can be taxed accurately, unlike the current system which is in place in DHA, Karachi.

This study was conducted in six months and due to the limitation of time, data on the real estate sector and resources, this study could only be conducted within an area in Karachi called Defense Housing Authority or DHA which has 8 phases with residential and commercial properties.

REFERENCES

- Eyal, I., Gencer, A. E., Sirer, E. G., & Renesse, R. v. (2016). Bitcoin-NG: A Scalable Blockchain Protocol. Santa Clara: Cornell University.
- Friedlmaier, M., Tumasjan, A., & Welp, I. (2017). Disrupting Industries with Blockchain. Munich: Technische Universität München (TUM) – TUM School of Management.
- Hillbom, E., & Tillstrom, T. (2016). Applications of smart-contracts and smart property using Blockchain. Gothenburg: University of Gothenburg.
- Amadeo, K. (2017, June 10). Real Estate: What It Is and How It Works. Retrieved from The Balance: <https://www.thebalance.com/real-estate-what-it-is-and-how-it-works-3305882>
- Atzori, M. (2015). Blockchain Technology and Decentralized Governance. University College of London.
- Bal, M. (2017). Securing Property Rights in India Through Distributed Ledger Technology. New Delhi: Observer Research Foundation.
- Blockgeeks. (2015, May 1). Smart Contracts: The Blockchain Technology That Will Replace Lawyers. Retrieved from Blockgeeks: <https://blockgeeks.com/guides/smart-contracts>.
- Christidis, K., & Devetsikiotis, M. (2016). Blockchains and Smart Contracts for the Internet of Things. North Carolina: IEEE.
- Crosby, M., Nachiappan, Pattanayak, P., Verma, S., & Kalyanaraman, V. (2016). Blockchain Technology: Beyond Bitcoin. Berkeley: Berkely University.
- CSIRO. (2017). Risks and Opportunities for Systems Using Blockchain and Smart Contracts. Sydney: CSIRO.
- Dictionary.com. (n.d.). Record keeping. Retrieved from Dictionary.com: <http://www.dictionary.com/browse/recordkeeping>.
- Harker, P. T. (2017). Fintech: Revolution or Evolution? Pennsylvania: University of Pennsylvania School of Engineering.
- Investopedia. (2015, January 1). Block chain. Retrieved July 29, 2017, from Investopedia: <http://www.investopedia.com/terms/b/blockchain.asp>.
- Kevin Delmolino, M. A. (2015). Step by Step Towards Creating a Safe Smart Contract. Maryland: University of Maryland.
- Malviya, H. (2015). Blockchain for Real Estate. itsblockchain.com.

Maximilian Friedlmaier, A. T. (2016). *Disrupting Industries with Block Chain: The Industry, Venture Capital Funding, and Regional Distribution of Block Chain Ventures*. Munich: Technische Universität München (TUM) – TUM School of Management.

Nakamoto, S. (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*. Tokyo: Bitcoin Organization.

Sadouskaya, K. (2017). *Adoption of Blockchain Technology in Supply Chain*. University of Kouvola.

Speilman, A. (2016). *Blockchain: Digitally Rebuilding the Real Estate Industry*. Massachusetts: Massachusetts Institute of Technology.

Webster, M. (2016). Definition of cryptography. Retrieved July 29, 2017, from Merriam Webster: <https://www.merriam-webster.com/dictionary/cryptography>.

Wikipedia. (2017, July 1). Disruptive innovation. Retrieved July 29, 2017, from Wikipedia: https://en.wikipedia.org/wiki/Disruptive_innovation.