Impact of Blockchain Technology on Efficiency of Financial Transactions

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Abstract

Blockchain technology is emerging strong in many areas and is playing a major role in financial transactions, mainly in the banking domain. The study was conducted using primary data by considering the convenient sampling method. The study examined the perceptions on the usage of blockchain technology's implementation with the help of statistical method of discriminant analysis and the results revealed that the perception was higher in case of the attributes such as mitigation of transaction costs and highly secured. The SEM model indicated that smart contracts had a higher impact on the efficiency of financial transactions followed by digital currency. This paper will be useful to the various financial institution regulators, stakeholders, and academicians.

Keywords : **banks, blockchain, digital currency, financial transactions, efficiency and technology**

JEL Classification Codes : C73, D47, E5, E42

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Technically, digital payments are described as any payments made using digital tools. Both the payer and received shall use electronic means to send and receive cash in the form of digital payments. Physical money is not used. However, in some cases, it is not mandatory for the payer to participate digitally in order to complete the transaction. Blockchain technology is expected to play a significant role in the future of digital payment processing solutions. Blockchain technology provides secure real-time verification of transactions through the use of encrypted distributed ledgers and eliminates the need for mediators such as correspondent banks. Major economic industry firms are already a part of the technology.

Even for those who have taken digital wallets with a great deal of aplomb, there are plenty of usable cases for which they would not even have received a digital wallet or a mobile payment system. They would prefer to undergo transactions in the legacy banking system with the assistance of third-party intermediaries as they can provide higher security by visualizing these procedures. With the implementation of blockchain technology, this entire process can be decentralized (i.e. lack of single-authority control) and made safer. A significant proportion of the huge transactions would no longer consume intermediate and processing costs. Unlike standard digital payments, blockchain technology-enabled contact less payments would not only interrupt some of the payment ecosystem elements, but would revolutionize and enhance any imaginable use of the case. The contact less payment system enabled by block chains is one of the finest solutions for money, covering the entire transaction spectrum of payments; from high-ticket purchases to candy purchases at the corner store, blockchains are capable

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of securing assets and are more important than pocket money. Blockchain technology will certainly help accelerate the transition to digital currency, but transformation is already taking place without a blockchain, that is, individuals no longer necessarily carry money or deal with money on a regular basis, but rather use electronic payment systems such as Internet banking, square, cellular, e-wallets, etc. In fact, small businesses are already refusing to accept money. So, regardless of the status of blockchains and crypto currencies, companies are continuing to move towards cashlessness (i.e. electronic payment systems). In Sweden, for example, only 2% of the transactions are currently in cash and the amount is expected to fall to less than half a percent by 2020.

Another major innovation is blockchain convergence and the Internet of things (IoT), which also changes the way payments are handled. Payments require more than one step. There are many other elements of payments to consider where the blockchain can be of assistance. For example, it can provide a way to track the IoT device payment history and manage and issue invoices and payments automatically. In addition, other firms see ways to integrate blockchain technology into payment procedures, such as accounts payable and accounts receivable, as a way to increase these transactions for firms that often have hundreds of invoices to process. This would include applications such as insurance and health insurance premiums or large companies with countless suppliers and staff to deal with.

Review of Literature

Bhattacharjee and Kaur (2015) attempted to examine the evolution of Bitcoin as a currency, situations preceding and aftermath as well as its consequences and effects on the present economy. The paper concluded that there are new hopes for both consumers and markets seeking more freedom in terms of volume, payment methods, and anonymity.

Pilkington (2015) in the study indicated introducing a radical change in the way we deal with asset interchange in the digital economy, from the financial industry to the manufacturing and supply chain affecting sectors such as mining, petrochemical, pharmaceutical, agro food, energy, automobile, and many of the global chain industries.

Yli-Huumo, Ko, Choi, Park, and Smolander (2016) explained that blockchain is a "decentralized transaction and data management technology." The paper also explained seven technical challenges and limitations that blockchain technology has and also stated that blockchain technology is a better technology to improve the transparency.

According to Di Pierro (2017), a blockchain is a table with three columns, where each row represents a distinct transaction, the first column stores the transaction's timestamp, the second column stores the transaction's details, and the third column stores a hash of the current transaction plus its details plus the hash of the previous transaction. By providing a time stamp and the previous transaction, parties wishing to verify this data are able to look it up at any point, and since it mentions the previous transaction, it becomes possible to track the history with relative ease.

Maxwell, Speed, and Pschetz (2017) suggested the theoretical possibility of applying blockchain technologies to narratives and storytelling. They used a research through design (RTD) approach to explore blockchain as an analogy for sharing information and stories. Through a series of workshops, they explored the possibility of blockchain technologies being used to share culturally situated stories.

Objectives of the Study

(1) To study the perceptions on the usage of blockchain technology.

(2) To study the blockchain technology's impact on processing efficiency in financial transactions.

Scope of the Study

The study is focused on the implementation of blockchain technology in banking and financial transactions. The study has considered mainly three elements, namely smart contracts, digital currency, and securities and examined the improvement in efficiency with the usage of blockchain technology.

Research Methodology

The study has considered the primary data to examine the role of blockchain technology's usage in financial transactions. The study applied the convenient sampling methodology to determine the sample size. The study collected data from 85 respondents - employees who are working in the banking sector in the technology domain. I collected the sample data from the period of June – July 2019. The questionnaire was drafted with the help of fintech experts and banking employees who are working in the Central Processing Cell of State Bank of India, Telangana. The study applies the following statistical methods to study the framed objectives :

↳ **Discriminant Analysis :** The study applies the discriminant analysis to examine the perception on the usage of the blockchain technology in the banking financial domain. The Wilks's lambda is used to ascertain the model's fitness for the application of discriminant analysis.

↳ **Structural Equation Modeling :** The study applies the SEM model to know the impact of multiple independent variables (smart contracts, digital currency, and securities) on the dependent variable (efficiency of financial transactions).

Data Analysis and Results

(1) Examining the Perceptions on Blockchain Technology : The study has considered the primary data to examine the perception of blockchain technology. The study applies the Wilks's lambda test to know the model fitness.

Table 1. Model Fitness with Wilks's Lambda

Tests of Equality of Group Means					
	Wilks's Lambda	***F***	***df1***	***df2***	**Sig.**
Data confidentiality	.981	6.044	1	84	.011
Process re-engineering	.992	5.419	1	84	.020
Building technology investments	.806	13.018	1	84	.001
Current data standards	.997	8.189	1	84	.015
User-friendly	.996	7.202	1	84	.055
Peer-to-peer connectivity	1.000	6.000	1	84	.008
Mitigation of cost	.947	6.019	1	84	.038
Technology - Trustworthy	.961	6.215	1	84	.042
Near real time	.986	5.769	1	84	.024
Highly secured	.996	6.210	1	84	.048

Table 2. Discriminant Analysis for Perceptions on Blockchain

Parameters	Discriminant Score	Mean Difference	Relative Total Discriminant Score
Data confidentiality	0.632	1.27778	18.695
Process re-engineering	0.413	1.35556	8.745
Building technology investments	0.501	1.45546	9.001
Current data standards	0.406	1.52222	7.975
User-friendly	0.484	1.36667	8.978
Peer-to-peer connectivity	0.526	1.36667	9.657
Mitigation of cost	0.574	1.61111	12.624
Technology - Trustworthy	0.318	1.43333	7.384
Near real time	358	1.36667	7.698
Highly secured	0.518	1.45556	9.243
			100

Table 1 reveals the value of *F*-statistics and Wilks's Lambda test with respect to perception on blockchain technology's financial transaction parameters. The analysis results show that the *F*-statistics calculated value is greater than the critical values (i.e. > 4.0012) and Wilks's Lambda coefficient values are observed to be near to 1, which indicates that the model is fit for the discriminant analysis.

Table 2 illustrates the respondents' perception with respect to blockchain activities in a financial transaction. Data confidentiality seems to be highly discriminant (0.632) followed by mitigation by cost (0.574), peer to peer connectivity (0.526), and highly secured (0.518), which means perception of these activities is high regarding the blockchain activities. Remaining activities such as building technology scores 0.501, user-friendly has a value of 0.484, and current data standards has a discriminant value of 0.406 ; whereas, the lowest discriminant score is given to the activity : trustworthy.

(2) Examining the Impact of Blockchain Technology on Processing Efficiency in Financial Transactions : Structural equation modeling (hereafter, SEM) model is employed to determine the highly loaded factors derived from various factors.

Table 3 indicates that the chi-square of default model seems to be smaller than the independent model's chi-square value (172 is less than 188), which indicates acceptance of the model value (as the value is less than 0.05, this shows the significance of the model). The various common models' overall goodness of fit is depicted in Table 4.

Table 3. Model Evaluation Criteria : Goodness of Fit

Model	NPAR	CMIN	*DF*	*P*	CMIN/*DF*
Default Model	7	172.733	83	.031	.929
Saturated Model	60	.000	0		
Independence Model	19	188.743	83	.018	.904

Note. Here NPAR represents number of parameters, CMIN as chi - square minimum discrepancy, *Df* (degree of Freedom), and *p* as probability value.

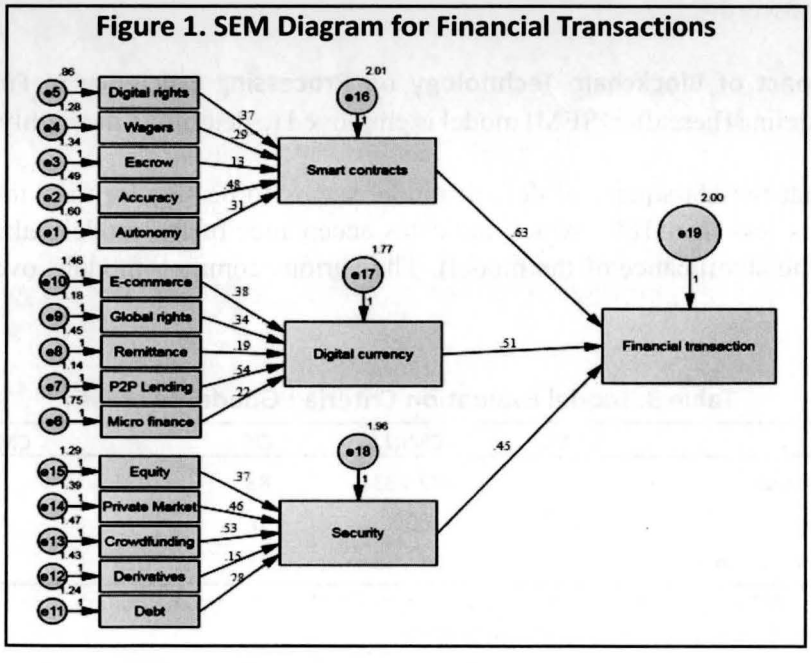
Table 4. Goodness of Fit for Financial Transactions

Fit Statistic	Recommended	Obtained
Chi square		172.733
Df		153
Chi - square significance	$p <= 0.05$	0.011
Goodness of fit index	>0.90	0.846
Adj. goodness of fit index	>0.90	0.809
Normed fit index	>0.90	0.914
Relative fit index	>0.90	0.912
Comparative fit index	>0.90	0.734
Tucker – Lewis Index	>0.90	0.874
RMSEA	<0.05	0.038

Table 4 depicts that goodness of fit index (0.846) is below the recommended value of 0.90, and adjusted goodness of fit index also seems to be less than the recommended value (0.846 < 0.90), but at an acceptable level. Normed fit index and relative fit index values seem to be satisfying the recommended level, that is, 0.914 and 0.912. The comparative fit index value obtained (0.734) and Tucker – Lewis index value (0.874) are at an accepted level and the root mean square residual is 0.038, that is, less than 0.05. Therefore, the proposed model is moderately fit.

The study designed the path (Figure 1) in the AMOS software. The study considers the impact of three independent variables (smart contracts, digital currency, and securities) on the dependent variable (financial transactions using blockchain technology). Each independent variable has five sub-components. The path diagram shows that the value of the smart contracts estimate is shown to be the highest followed by digital currency.

Figure 1. SEM Diagram for Financial Transactions



The study also examines the impact of smart contracts on the financial transactions with the usage of blockchain technology. Hence, the study has framed the following hypotheses :

- H_{01} : There is no impact of smart contracts on financial transactions.
- H_{a1} : There is an impact of smart contracts on the financial transactions.

All the hypothesized paths seem to be significant at the 5 % level (p-value <0.05) and the standardized regression weights are depicted in Table 5.

Table 5 depicts the impact of blockchain technology on process efficiency in financial transactions. The results depicted in Table 5 reveal that smart contracts have a significant influence on process efficiency with respect to the financial transactions. The results indicate that accuracy (0.484) shows a significantly high influence on the efficiency of financial transactions, which means accuracy will improve once the blockchain is associated with financial transaction activities, while digital rights and autonomy positively influence the process efficiency with their respective regression weights of 0.371 and 0.314. The lowest influential activity is escrow (0.132). Hence, the null hypothesis is rejected (H_{01}). Therefore, smart contracts have a significant impact on the financial transactions with the usage of blockchain technology.

Next, the study examines the impact of digital currency on financial transactions with the usage of blockchain technology. The study has framed the following hypotheses :

- H_{02} : There is no impact of digital currency on financial transactions.
- H_{a2} : There is an impact of digital currency on financial transactions.

Table 6 illustrates that digital currency has a significant influence on process efficiency with respect to the

Table 5. Regression Weights Regarding Smart Contracts

			Estimate	S.E.	C.R.	P	Significant/ Non-significant
Smart Contracts	<---	Digital Rights	0.371	0.133	3.079	0.027	Significant
Smart Contracts	<---	Wagers	0.297	0.13	2.745	0.016	Significant
Smart Contracts	<---	Escrow	0.132	0.123	3.263	0.003	Significant
Smart Contracts	<---	Accuracy	0.484	0.119	2.505	0.014	Significant
Smart Contracts	<---	Autonomy	0.314	0.117	2.72	0.031	Significant

Table 6. Regression Weights Regarding Digital Currency

			Estimate	S.E.	C.R.	P	Significant/ Non-significant
Digital Currency	<---	E-Commerce	0.385	0.13	2.426	0.004	Significant
Digital Currency	<---	Global Rights	0.349	0.117	2.276	0.002	Significant
Digital Currency	<---	Remittance	0.198	0.132	3.832	0.005	Significant
Digital Currency	<---	Peer to Peer Lending	0.547	0.107	2.445	0.017	Significant
Digital Currency	<---	Micro Finance	0.224	0.131	2.481	0.039	Significant

financial transactions. The results indicate that peer to peer lending activities are influenced significantly followed by e-commerce activities (0.385) and global rights (0.349). The activity which has the lowest influence is remittance (0.198). Hence, the null hypothesis (H_{02}) has been rejected. Therefore, digital currency is found to have a significant impact on the financial transactions with the usage of blockchain technology.

Next, the study examines the impact of securities on financial transactions with the usage of blockchain technology. The study has framed the following hypotheses :

- **H_{03} :** There is no impact of securities on financial transactions.
- **H_{a3}:** There is an impact of securities on financial transactions.

Table 7 depicts the influence of blockchain activities : Securities on a trading platform, which are found to significantly influence the process efficiency with respect to financial transactions. The results indicate that crowd funding and private markets show a significantly positive and high influence. Securities such as equity funding (0.374) and debt (0.285) have an influence, while derivative funding shows a significant positive but low influence as compared with other securities. Hence, the null hypothesis (H_{03}) has been rejected. Therefore, securities have a significant impact on the financial transactions with the usage of blockchain technology.

Table 8 outlines the impact of financial transaction activities with respect to blockchain technology on process efficiency in the banking system. The results reveal that smart contracts (0.639) have the maximum impact followed by digital currency (0.518) and securities (0.456). Hence, it is concluded that adoption of blockchain technology in the banking system will improve the usage of technology adequately.

Table 7. Regression Weights Regarding Securities

			Estimate	S.E.	C.R.	*P*	Significant/ Non-significant
Securities	<---	Equity	0.374	0.126	2.667	0.015	Significant
Securities	<---	Private Markets	0.468	0.122	4.371	0.021	Significant
Securities	<---	Crowd Funding	0.531	0.124	2.856	0.064	Significant
Securities	<---	Derivatives	0.154	0.133	2.408	0.033	Significant
Securities	<---	Debt	0.285	0.162	3.523	0.001	Significant

Table 8. Regression Weights Regarding Financial Transactions

			Estimate	S.E.	C.R.	*P*	Significant/ Non-significant
Financial Transactions	<---	Smart Contracts	0.639	0.105	2.37	0.000	Significant
Financial Transactions	<---	Digital Currency	0.518	0.11	2.641	0.001	Significant
Financial Transactions	<---	Security	0.456	0.102	2.038	0.009	Significant

Findings

(1) The study examines the perception level of the usage of blockchain technology in financial transactions with the help of statistical method of discriminant analysis and the results reveal that data confidentiality (0.632) has a higher perception level among the bankers.

(2) The study also reveals that the bankers had higher perception levels for the parameters : Mitigation of cost (0.574), peer to peer connectivity (0.526), and highly secured (0.518).

(3) The study examines the blockchain technology's impact on processing efficiency in financial transactions with the help of SEM and the results reveal that smart contracts have the highest (0.639) influence on the efficiency of financial transactions. Digital contracts (0.518) are found to be having a moderate influence on the efficiency of financial transactions. Securities (0.456) have the lowest influence on the efficiency of financial transactions by the adoption of blockchain technology.

Conclusion

The study emphasizes on the usage of the latest technology (blockchain) to improve the efficiency of the financial transactions in the banking sector. Global banks have started using the blockchain technology in their business operations. The study examines the perception on the usage of the blockchain technology with the help of discriminant analysis and the results state that processing cost of the transactions will be reduced with secure and peer to peer transactions. The study applies SEM and the results reveal that smart contracts influence the transaction efficiency the most followed by digital currency.

Limitations of the Study

(1) The present study has emphasized on three elements only, that is, smart contracts, digital currency, and securities. The study has not considered other segments in financial markets.

(2) The study is confined to the usage of blockchain technology in ascertaining the efficiency of financial transactions. The study has not considered crypto currency, which is an integral part of blockchain technology.

Scope for Future Research

(1) The present study has focused on the blockchain technology's usage in the financial sector (i.e., B2B) for process efficiency. The study suggests focusing on the impact of blockchain technology in the B2C segment of banking.

(2) The study proposes that research can be conducted on the usage of blockchain technology in the e- government segment so that the transparency will be enhanced.

(3) The study suggests the implementation of blockchain's impact on the capital market operations for the reduction of corruption.

Author's Contribution

A. Kotishwar contributed to the design and implementation of research, to the analysis of the results, and the writing of the manuscript.

Conflict of Interest

The author certifies that he has no affiliations with or involvement in any organization or entity with any financial

interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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