

A Study on the Effectiveness of Blockchain Integrated Supply Chain in the Retail Market

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Abstract

Industry 4.0 comprises of some disruptive technologies which are creating a significant impact in every fields. Recent development in these technologies has created a huge impact in the conventional supply chain model which forces the companies to evolve new models to face the upcoming challenges. One such promising technology which will disrupt and change the entire view of supply chain transparency is Blockchain. Blockchain is basically a chain of blocks that contain information that is nearly impossible to tamper. Blockchain is defined as stack of information linked with each other in blocks and highly resistant to changes. It is a distributed ledger completely open to everyone. Once we enter data in Blockchain it becomes nearly impossible to change it which will give us the authenticity of the data. Based on the literature study, we found that integrating Blockchain in the supply chain will improve the efficiency of the supply chain exponentially. Every transaction that happens in a supply chain can be integrated and recorded in the blocks of a decentralized Blockchain (Distributed ledger) which will be shared will many computers thus increasing the transparency. As each block is connected with each other it becomes nearly impossible to change the entered record as tampering a single block may result in complete loss of data. This will improve the transparency of the supply chain in every stage and improve the supply chain security and efficiency.

Keywords: Blockchain, Retail Market.

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INTRODUCTION

Recently there has been exponential development of disruptive technology particularly in the development of industry 4.0. The development of these technologies has eventually led to evolution of new supply chain models. Due to the rapid growth in these technologies like AI, ML, and Blockchain almost all the conventional or traditional methods related to supply chain industry are forced to evolve and adapt to new technology. In order to keep up to the competition all the industries are forced to update themselves and are forced to adapt to these disruptive technologies which makes the life of the people much better. Block chain t is used in management of land records, crypto currencies e-notary services, Nduity payments as well in supply chain management.

OBJECTIVES OF STUDY

- To study weather retailers are aware of the rapid transformation in the supply chain model due to various technologies

- To study various barriers and drivers for the retailer in adopting Blockchain based supply chain model
- To study the impact of supply chain transparency on retailers and customers and to see how much influence this factor has on consumer buying behavior.
- To study the advantages and disadvantages in adopting the technology and to see whether the adaptation will have a considerable impact or not.

LITERATURE REVIEW

- Verma 2018 study assesses how Blockchain could impact retail by conducting survey among retailers. Many responders were happy to adopt but only few adopted in within next year as others were sceptical about its viability. It concluded that once retail implements Blockchain it is definitely going to stand out from its competitors in terms of transparency, delivery tracking, loyalty tracking, and efficient Supply chain Management
- Wamba et al., 2020 study aims to identify the influence of Blockchain in supply chain management

by inventing a model and testing it in US and India. Data is collected from supply chain professionals working in US and India by means of survey. The result found that constructs Knowledge Sharing and Trading Partner Pressure impacts adoption of Blockchain in supply chain in both countries and concludes that strong empirical relationship exists between Blockchain and supply chain management's performance.

RESEARCH METHODOLOGY

RESEARCH DESIGN

This is a descriptive study in the influence of Blockchain technology in enhancing the retail supply chain performance done during the period of 2021-2022. This study comprises of quantitative research design which involves in collecting data both primary and secondary by survey, questionnaires and focus groups in order understand the view of the supply chain from a retailer's perspective and to understand the challenges faced by the retailer in the supply chain management due to pandemic situation.

SAMPLING TECHNIQUES

The target population for the study includes various retail shops like pharmacy, electronics, supplements, grocery etc. In order to study about the common challenges faced by the retailers in the field of supply chain various formats are included in the study. Structured questionnaire was shared with 130 respondents and around 100 responses were received and taken for further analysis process.

STATISTICAL TOOLS USED

SPSS is used for the entire analysis of this research. SPSS (Statistical Package for the Social Science) is one of the widely used software package for data analysis and visualization.

HYPOTHESIS

H1: There is no significant difference between retailers view on blockchain technology adoption in their supply chain and awareness about the blockchain technology.

H2: There is no significant difference between retailers view on blockchain technology adoption in their supply chain and supply chain visibility issues.

H3: There is no significant difference between retailers view on blockchain technology adoption in their supply chain and receiving damaged goods, delayed delivery and receiving counterfeit products.

H4: There is no significant difference between retailers view on blockchain technology adoption in their supply chain and their view on supply chain efficiency and performance.

H5: There is no significant difference between retailers view on blockchain technology adoption in their supply chain and experiencing payment trouble.

ANALYSIS AND INTERPRETATION

DEMOGRAPHIC ANALYSIS:

TYPE OF INDUSTRY:

Table 1: Type of industry

Type of Retail based on Industry					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Apparel	18	17.8	17.8	17.8
	Automobile spares	1	1.0	1.0	18.8
	Cosmetics	11	10.9	10.9	29.7
	Electronics	22	21.8	21.8	51.5
	FMCG	23	22.8	22.8	74.3
	Hardware	1	1.0	1.0	75.2
	Optical	1	1.0	1.0	76.2
	Pharmaceutical	24	23.8	23.8	100.0
	Total	101	100.0	100.0	

The above frequency table shows the distribution of the response of various retailers based on the industry. It was found that about 24% of the respondents were representing the pharmaceutical industry. 23% of the respondents were contributing towards FMCG sector and 22% of the respondents are from electronics industry. About 18 percent of the respondents are from apparel industry.

Type of Retail (based on Industry)

101 responses

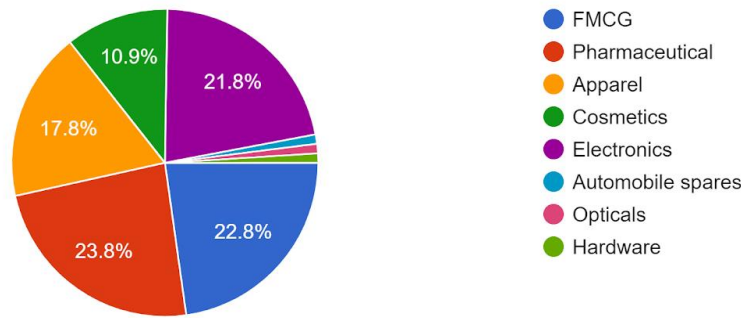


Figure 1: Industry chart

The above chart shows the visual representation of distribution of the response of retailers based on various

The above table shows the Kruskal-wallis test between views on troubles faced during payment and how likely are the user to adopt the blockchain technology. The above table shows that the value 3 has the highest mean rank which depicts the problem faced during transaction.

SIGNIFICANCE TEST

PAYMENT TROUBLE VS BLOCKCHAIN ADOPTION

Ranks			
	How far would you like to adopt to this technology	N	Mean Rank
How often do you face trouble during payment and transactions	3	34	73.91
	4	52	39.52
	5	15	38.87
	Total	101	

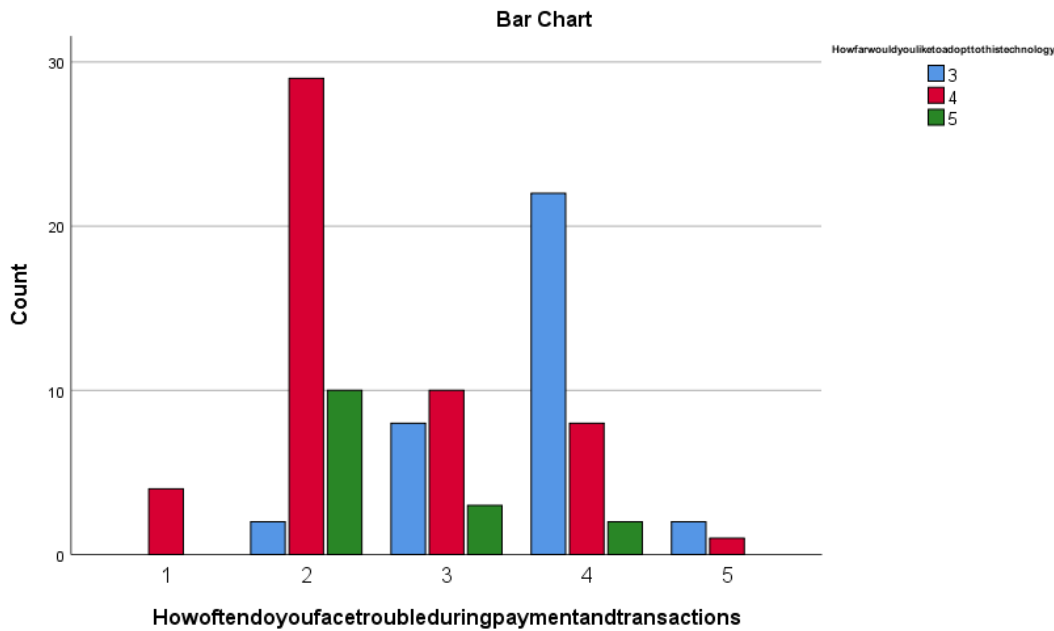
Payment trouble and adoption

Test Statistics ^{a,b}			
	How often do you face trouble during payment and transactions		
Kruskal-Wallis H	35.129		
df	2		
Asymp. Sig.	.000		
a. Kruskal Wallis Test			
b. Grouping Variable: How far would you like to adopt to this technology			
Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	38.775 ^a	8	.000
Likelihood Ratio	44.373	8	.000
Linear-by-Linear Association	25.603	1	.000
N of Valid Cases	101		
a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .45.			

Payment trouble and adoption

From the above test, It is inferred that there is significant difference between willingness to adopt and trouble faced during transactions. So null hypothesis is rejected (H5) and alternate hypothesis is accepted. This shows that people who

face trouble during payment transactions have preferred to adapt to blockchain technology in order to eliminate the discrepancy during transactions.



Payment trouble views

The above graph shows that most of the people who had trouble during payment transactions are most likely to adapt to this technology. People who face trouble during transaction are willing to adapt to blockchain technology as they feel this technology might reduce the transaction problems by eliminating the middlemen. As the system is decentralized the trouble during the transaction can be eliminated. The retailers who did not face trouble during transaction do not show much interest in adopting the technology.

FINDINGS

The main aim of the study was focused on three areas. Awareness among retailers about the blockchain technology, how far their conventional supply chain model is reliable and how likely they are to adopt the technology and what are the drivers which help to adopt this technology.

From the study we can tell that most of the retailers do have clear idea about how the blockchain technology can disrupt their entire supply chain model. Even though the industry 4.0 and its associated technology are creating serious impact worldwide, still it has not reached every corner of the retail industry. Lack of awareness is one of the main factors which directly influence in the retailers view about adopting this technology. On the other hand those who have idea about this technology are opting for implementing.

Based on the survey we found that almost 72% percent of the retailers have online presence and their major concern is about the trouble faced during the transactions. From the analysis we came to know that most of the retailers' face trouble during payment transactions and those who face trouble during payment transactions are willing to adopt blockchain technology to overcome this problem (H1, P-.00). As this is completely decentralized the problems caused during transaction can be eliminated with the help of smart contracts (Alexandre A. Boschi, 2018).

Supply chain visibility also has a direct impact on the views

How often do you face trouble during payment and transactions * How far would you like to adopt to this technology Cross tabulation					
Count					
		How far would you like to adopt to this technology			Total
		3	4	5	
How often do you face trouble during payment and transactions	1	0	4	0	4
	2	2	29	10	41
	3	8	10	3	21
	4	22	8	2	32
	5	2	1	0	3
Total		34	52	15	101

Payment trouble and adoption

of retailer about the adoption of blockchain technology. From the study it was found that retailers who do not have complete transparency in the supply chain has opted to adopt (H2, P-.003) and implement blockchain technology to overcome this problem associated with supply chain visibility.

Delayed delivery (H3, P-.00) and receiving damaged goods (H3, P-.004) also have direct impact on retailers view on blockchain adoption. Retailers who often receive delayed delivery of goods and receive damaged goods have option to integrate blockchain technology in their supply chain in order to eliminate this problem. In blockchain based supply chain the retailers do not have to rely on the supply chain partners to get the information about the status of the project (Alexandre A. Boschi, 2018). A tracking device like RFID or a barcode will be attached to the product through which the retailer will get to know all the information about the product throughout the entire supply chain process (Ying Yu, 2016).

Retailers who have the fear of receiving tampered goods have opted for adopting blockchain technology in order to eliminate counterfeit products (H3, P-.00). Due to lack of supply chain visibility counterfeit products and duplicates can easily be injected into the supply chain without any proof. This blockchain technology will track the product till it reaches the end user to the chain cannot be easily broken and the problem of counterfeit goods can be eliminated. Retailers who often get complaints from the customer about the product also are most likely to adopt blockchain technology in their supply chain in order to improve customer satisfaction.

The overall supply chain efficiency can be improved from implementing the blockchain technology (H4, P-.003). From the study it was found that retailers feel that implementing blockchain in their supply chain model can significantly increase the efficiency of the supply chain. It was also found that retailer feel that this technology may eliminate the paperwork and improve the speed of the operations.

It was found that most of the retailers are unsure about implementing the blockchain technology in their supply chain because they feel that it might incur more cost for the organization and as it is considered as one of the high end technology they feel that the market solutions for the technology is not yet ready and it might be tough for them to adopt to this technology. Lack of knowledge in this area and cost acts as a major barrier for implementing this technology.

CONCLUSION

Blockchain is one of the technologies which are completely going to transform the conventional supply chain model. It takes the supply chain visibility to a whole new level where complete transparency of the supply chain prevails and the supply chain partners no longer have to depend on other

partners to get the information. The decentralized system completely regulates the flow of information as the whole chain is distributed so that the supply chain stakeholders can share a database which is interactive and also eliminates a third party which may improve the security. At the same many challenges are the in implementing block chain such as scalability, interoperability and Data localization. These issues need to be addressed. Then only the adoption level will increase to a certain extent. This technology can create a serious impact in the field of food supply chain, Pharmaceutical, food supplement industry, electronics industry and so on.

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