Blockchain to monetize retail operations

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ABSTRACT

Data monetization strategy can be defined as a re-engineering of business data to create a measurable and positive impact on business revenue by making efficient use of data. There are mainly two forms to transform data into money. Firstly, provide access to organizational data and get benefit of supplemental revenue stream which is also called as direct data monetization. Secondly, client data can be used to get insights and enhance customer services and operations which is called as indirect data monetization. As this monetization has become crucial for industries, data creators such as healthcare, retailors etc. are pursuing for new and significant ways to monetize their data. At the same time, consumers who are actual contributors of data demands for access control over their public data to get knowledge about usage of their data in market. A solution is constituted known as Blockchain technology. Even though blockchain is under execution for some business applications, it holds promising transformations in various businesses, retail market is one of them where data flow is continues and sensitive to day to day operations. This paper focuses on the optimization of customer data in retail management by using manually taken customer transactions and applying data analytical techniques along with blockchain. It emphasizes the significant usage of customer data in retail operations.

*Keywords***:** Data, Data monetization, Blockchain, Retail

1. INTRODUCTION

The digital market has changed the perspective of not only customers but also of business owners. In day-to-day environment, bunch of data is being generated and transferred from one business area to another at an unpredictable manner.

Data is considered as a crucial business asset. In the world of digital data, consumers leave a remarkable review on data such as likes, dislikes, demands, preferences etc. Challenge is to use this reviews to enhance existing business services which will retain customers. Unlike traditional direct data monetization approach of selling data to third party,

organization can access the selected data segments to get analytical insights from it [1].

Key benefits of data monetization:

- New revenue stream:

Organizations use their own transactional data and apply analytics on it. It discovers the future demands, existing loopholes in current business operations which organization can try to overcome in future customer services [3].

Customer demand can take as an input to improve efficiency and customer satisfaction

- Hypersonic implementation:

It's not a big deal for website owners to get customer data from site which we be used for process improvement. Publishers of website need to put few lines of code to extract customer information which save time and manual efforts.

- Universal usage:

Data provided by customers has a global reach, which means that thousands of users can take an advantage of data contributed by customer.

Data get supplied to wide global markets for further transactions and can be used by thousands of marketer worldwide.

- Reliable partnership:

As direct data monetization, organizations sell their raw data to vendors to get direct monetary benefits.

At such time, organization shows trust on Partner Company to deal with complexities of data privacy policies. In such kind of exchange, data privacy plays an important role as privacy preach can ruin organization's reputation.

To receive these benefits from data, it's crucial to have good combination of data from which insights could be derived to monetize data. Blockchain technology helps in providing ethical structural data which can be further analyzed.

2. BLOCKCHAIN

Blockchain is a digitalized, distributed and decentralized database, also be called as public ledger of records containing digital transactions which initiated and successfully shared between participating parties across a large network system of untrusted parties. Even though the usage of blockchain seems to be only associated with bitcoin

and other crypto currency applications, the blockchain is capable to do lots of other things.

It's a secured way of data transfer for digital users which indicates a secure and safe data transfer over internet channel where transaction is guaranteed to be shielded from external digital hacks. Each and every user participating in a transaction agrees that transaction has been taken place and no one can deny or challenge it or its legitimacy as record for each transaction is stored in distributed ledger for future reference. Blockchain is considered as a newly emerging technology but in literature sense it has been proven to be the combination of technologies applied in a different way. The blockchain is a digital technology, which is a combination of mainly orchestration of three techniques: The Internet, Private Key cryptography and the protocol governing incentives. This technologies where the basis for Santosh Nakamoto's bitcoin concepts which is one of the application of blockchain. Distributed data base is one of the fundamental feature of blockchain. Distributed database system which is introduced by blockchain has a powerful different reliable digital backbone.

In the blockchain technology, each data node in the network is coming to the same conclusion, each updating its record independently of each other, with the most popular record becoming the de-facto official record in lieu of there being a master copy of complete chain.

Transactions are broadcasted, and each node in chain creates their own updated version of transactions.

For example, an excel spreadsheet which is updated or duplicated thousands of times across the network of computers. In this case, the blockchain network is smart enough to automatically update this spreadsheet at any time someone makes any change to one of the versions of the spreadsheet. This latest version is added to blockchain and its record is stored. Transactions held on a blockchain exists as a shared and continually reconciled database system which preserves details of transactions.

Blockchain has the following big data effects:
- As data is stored in distributed database, all parties in the transaction can have common access to the same data. This further accelerates sharing, data acquisition, data quality, data governance and fundamentally, data analytics.
- Blockchain provides a thorough ledger of all events or engagements which are kept in a single directory which provides a complete view of the entire transaction, from even/transaction start to even/transaction finish. Using this system, there's no need to integrate different chunks of data from multiple storage systems in order to create a single view of the entire engagement or transaction history.
- Blockchain also provides the ability to control and manage one's own personal data without the need for a third-party involvement or centralized repository.

We have used the different features identified in these works along with considering the frequency of review for a user for a similar product as well fake reviews are created, to be used as a training model for classification.

3. RETAIL-MANAGEMENT
Retail management includes the activities involving selling goods or services to end consumers for personal, non-business use. Retailing holds a very important place in the county economics of any country. It is the final stage of distribution of services or products. The basic principle of retail industry is to give your customers what they want and customers want everything: a wide assortment of good quality merchandise, lowest possible prices, guaranteed satisfaction with what they buy, friendly knowledgeable service, convenient hours, free parking, and a pleasant shopping experience.

Data value and its connectivity with retailer and their customers has been created influential change in the control and power of customers' behavior. Analytics and network technologies with their latest generation has the potential to initiate a new correspondence between customers, retailers and the retail supply chain.

Functions of a Retailor
Retailors plan to maintain customer engagement by providing the essential goods that customer needs, in a desired quality from, at a required place and time. A retailor does not sell raw material for product, instead he merchandises the well finished goods or services in the form that customer wants.

A retailer performs both functions-buying and selling. He buys a wide range of raw material and products from various wholesalers and put these products on the market under the one roof for selling.

Location plays an important role for retail market as any retailor tries to keep the products or services within easy reach of the customer by making them available at appropriate location. Retailor also maintains the details of wholesalers from which imports goods and services which are used for future reference.

4. BLOCKCHAIN TO MONETIZE RETAIL DATA
Like most merchants providing customer services, even the world's largest retailers struggle to determine and discard food that's been recalled and replace it with fresh arrival. When customers reports sickness due to services or goods offered by retailer, usually it takes days to identify the product which cause illness, shipment and vendor from whom product was imported. With the blockchain technology, supply chain like Wal-Mart would be able to identify and extract crucial data from a single receipt, including information of suppliers of goods, details on how and where food was grown and who inspected it for its quality measure. The database combines details from different sections to the individual package [6].

As blockchain socializes data, here comes a time to imagine how the individual customer would manage and control who has access to their data through use of blockchain.

E.g.: Providing consumer a survey with preferences as to sharing policies of data, which automatically gives them control and a sense of authenticity, trust about the retailer/product.

This could give consumers authority to negotiate with manufacturers and distributors about pricing and discounts in the exchange for their personal consumption data. With this approach consumers get their discounts on current/future products and retailers get a chance to have a look at consumers' behavioral patterns towards purchasing products.

Offers are integrated in surveying. E.g.: Fill the XYZ survey and get 25 points XYZ balance. Which indirectly gives consumer a discount on a product. In return, retailer gets an

information which is of great market value to him and which could not have got by paying random people.

By this survey integrated offer approach, retailer could make sure that he is getting information from someone who is actually purchasing and using the product. And he could easily bait the customer for providing more and more of information by providing discounts. This gives retailer a constant peep into customer preferences which in turn could help to deliver preferred products to make more profit.

Principal attraction of blockchain in retailing is reducing record keeping as retailers struggle enough to maintaining more or less margin in a margin-squeezed environment. It would also reduce the operational cost. If record keeping is a struggle, why retailers have not stopped doing it yet? Because has proven to be useful? Then why call it a struggle? As data is huge? Why data is huge? Because data is redundant. Also some of the data is based on educated guesses rather than being facts from actual consumer. Now why not all of the data present is consumer fact-based? Since there are no effective ways to extract data from consumer. This also include reasons such as there are no effective ways to make consumer interested in providing vital information about their usage patterns and analyze it. A blockchain based surveying- Data analysis application/ method which could play with graphs and numbers to draw results could be very much useful to attract consumers to provide data- Maintain it efficiently- Reducing the struggle of whole process by having to maintain less data. As the data acquired would be actually, direct, fact-based data rather than being hypothetical analysis.

With the aggregate information of blockchain technology and product-based data could concur goods and services manufacturer to identify detailed consumer usage and utilization insights which could include following knowledge about customer:
E.g. Ms. Jenifer is an honest customer of Retail store on floor, retailer can get information about her purchasing pattern towards a product 'ABC' at their store in below points:
a) How often does Jenifer use the product ABC?
b) Is there any specific duration and/or season when Jenifer is using the product?
c) How much does Jenifer use the product per load (quantity acquired)?
d) How frequently Jenifer purchases a product?
e) How much product does customer have left in store?
f) When do you think Jenifer will have a need to refill or reorder?
g) Is there a variation in usage of ABC product describing how much Jenifer uses it?

Access to the detailed information of consumption data and consumer product usage would blow up the potential of big data terminology to optimize and enhance key business processes, minimize managerial and security risks, uncover new areas for monetization approaches and opportunities, and create a more compelling consumer experience to retain customers and increase consumer involvement in products.
In retail management, the blockchain technology can support and contribute a lot to lend a hand to the retailers in improving their customer retention rate and business growth.
Some of the business services empowering processes are explained here:

Supply Chain: Shipment tracking plays an important role in supply chain. Blockchain can be used to store data about the shipment at every stage of tracking including location, date and time, shipment handling person details, temperature, condition of the package/product, etc. This will help one check in real-time if the shipment has been handled properly and it has arrived on time at any given location. It will also assist the retailers in finding the lost or damaged products in the shipments. In addition, blockchain-based exchanges will allow the retailers to buy or sell from each other as well as distributors through the blockchain-shared ledger [2].

Customer Profiling: Blockchain can be used to accumulate data related to customer buying pattern, order placement trend, etc. This data can be used to forecast the location-specific demands, suggested stock on hand to enhance their just-in-time inventory facility. Again, advanced data warehousing systems can be developed for the retailers using blockchain technology since the records are immutable and a number of analytical tools can run on it.

Transparency: The information stored in blockchain will be visible to customers, retailers, suppliers and they will be able see the product source, whether the products are made through child labor or if any dangerous or hidden components are present; all these helping the retailers/customers decide about the products. This blockchain improved transparency will indicate customer behavior patterns more accurately.

Authenticity and anti-counterfeiting: One can use blockchain to validate the product authenticity so that customers can walk through the records on the products and avoid counterfeiting, thus increasing the customer confidence about the product quality.

Loyalty: Blockchain can revamp the loyalty system by storing the encrypted customer data, coupons and discounts and making the data available to all the stores providing deeper analytics on customer records [4]. A loyalty warranty on blockchain will also let customers view all their loyalty information in one place across the retailers.

The above-mentioned blockchain enabled processes will lead to higher customer satisfaction, improved customer buying habits, more secured transactions and higher profit margins for the retailers.

5. CHALLENGES
Even though blockchain has numerous benefits in business operations, this technology is still in emerging level and is in the proof of concept stage of development and not many blockchain based systems got deployed at industrial scale, so real threats with blockchain may not be apparent for next few years till it becomes mainstream more. [2] As this technology going to contain real-life data, technology needs to be carefully analyzed and verified before being adopted on real applications and its adoption should not be rushed to use. A failure in implementation may lead to major consequences, and even systemic risks for organizations as well as for consumers. Being a shared ledger systems, blockchain is supposed to host sensitive data as well. Hence, it must ensure that its cryptography and cyber-protections are robust and external attach resistance. It should be in line with the industry's best practices. Data protection and segregation should be taken care of for cloud-based retail solutions as well. Its way important to test the blockchain

transactions in retail industry as all selling and buying transactions would be crucial to maintain for retailers.

6. EXPERIMENTATION AND RESULTS

Customer data for a superstore is taken. Each time a transaction happens in the stored it's recorded in a blockchain. For each customer, as per their orders a block is created associated with an individual order item. Data is stored in a buffer for analytical purpose which furnishes data and get insights out of it.

As retail management deals with the products the blockchain will contain the information of each product which is transacted to the customer along with it unique item number and description.

The data buffer contains data including customer segment, country, city, state, and region, and product id, the category of item, product name, Sales, Quantity, discount, and profit.
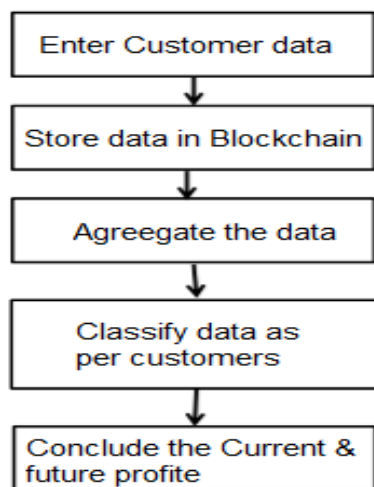
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Enter Customer data
        ↓
Store data in Blockchain
        ↓
Agreegate the data
        ↓
Classify data as
per customers
        ↓
Conclude the Current &
future profite
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Figure 1: Steps for Retail Operational Data Analysis

Every time a transaction is processed, block is added on the network which has a unique hash key representing a respective block. Implementation is in its initial phase as data is loaded in a repository. It will be shown how blocks are appended one after another once new transaction is initiated.
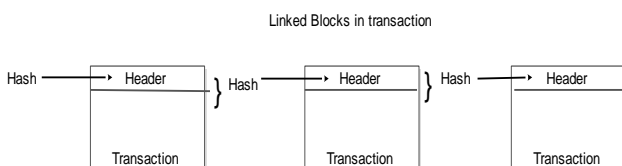
Linked Blocks in transaction

```
Hash → Header  } Hash → Header  } Hash → Header
       Transaction       Transaction       Transaction
```

Figure 2: Blockchain structure for single product

6.1 Results and Evaluation

From the data collected from Blockchain, data has categorized as per different criteria. As the data sale was done across the countries, regions wise product sales are calculated as per the season.

Segment	Customer Name	Category	Central	East	South	West	Grand Total
Consumer	Aaron Bergman	Furniture	1			1	2
		Office Supplies	1			2	3
		Technology	1				1
	Aaron Bergman Total		3			3	6
	Adam Shilling	Furniture	1	4			5
		Office Supplies	10	6	1	1	18
		Technology		2			2
	Adam Shillingsburg Total		11	12	1	1	25

Figure 3(I): segment based sale

Figure 3(II): segment based sale

	Central	West
Central	1	
West	1	

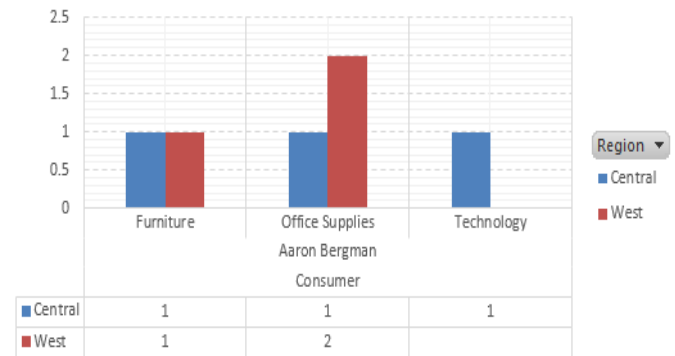|	Furniture	Office Supplies	Technology
Central	1	1	1
West	1	2	

With the aggregated information of customer order data, factors such as product category sales, regional sales re calculated for every customer.

From the analysis, it is concluded that one customer can order a product from different locations, for different categories of product. This information could help a chained base retailer to decide whether to open a new store chain to get extra profit or not.

Also, the number of sales derived when the discount is given on individual item could be calculated which can provide a decision making capability regarding discount policies as per seasons. Customers buying pattern can let retailer maintain reorder point of stocks.

Discount	Quantity	Product Name	Total
0	1	#10 Self-Seal White Envelopes	1
	1 Total		1
	2	"While you Were Out" Message Book, One Form per Page	1
		#10 Self-Seal White Envelopes	1
	2 Total		2
	4	#10-4 1/8" x 9 1/2" Premium Diagonal Seam Envelopes	1
	4 Total		1
	5	#10 White Business Envelopes,4 1/8 x 9 1/2	2
	5 Total		2
0 Total			6
0.2	1	#10 Self-Seal White Envelopes	1
		#10 White Business Envelopes,4 1/8 x 9 1/2	1

Figure 4: Sales on discount scheme

Demand for different items changes dramatically across different geographical areas and regions, even though even retailers are aware of this, actual figure of requirement need to be generated. Using business analytical tools information such as customers past purchase habits can let retail system allow to suggest similar items to customer. Using predictive analytics to set prices allows retailers to take all possible factors into account regarding the product prices which would be fluctuating as per time. Instead of forecasting revenue based on historical data from shoppers who may not even be customers anymore in the fickle world of retail, predictive analytics allows for more accurate forecasts based on the predicted buying habits of brand new customers.

7. CONCLUSION AND FUTURE WORKS

Although blockchain is the technology behind Bitcoin which used in financial transactions, its use is not limited to financial domain only. Retail operators will start adopting the benefits of blockchain technology through improved transparency of products, more efficient supply chain

management, better loyalty management system, improved customer profiling, fight against counterfeiting etc. which will lead to increased customer satisfaction and higher profit margin for retailers.

In the future scope, we can work on how customers trust on blockchain and its efficiency to perform transactions and how it will work.

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