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Information Technology

DAIRY INDUSTRY? READY TO ADOPT BLOCK CHAIN TECHNOLOGY?

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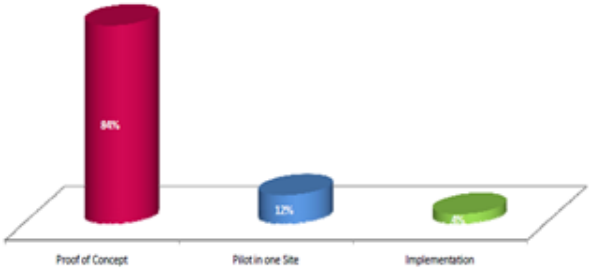
ABSTRACT Author reviewed various manuscripts of work done by authors and presenting and it is abstract in summarized fashion. In India, block chain technology is very primitive stage in adoption, however the looking the features available in the technology, it looks more interesting to take up for implementation. In today digital world, it is getting more imperative to build trusted business model which will enable all stake-holders in the supply chain trust each other and conduct business.. In health conscious world, today the customers / consumers are to be empowered brought into the trusted business model of food world, particularly the consumption of Milk and Dairy products, food products etc, the source of the material and its various nutrients are to be validated by the consumer and ensure that the consumer is purchasing the right products, which is where the BLOCK CHAIN technology is going to be very promising solution.

KEYWORDS :

INTRODUCTION

Block chain technology is the new-age, disruptive digital technology that is bringing paradigm shift in business models across sectors world over. This history-altering technology has started gaining foothold in India too. Reports say more mainstream industries (including banking, retail, healthcare, logistics, and finance) will adopt block chain technology in 2019. Gartner research and advisory firm predicts that the block chain's business value will surpass US$3 trillion by 2030.

Block chain is a decentralized database locked down by smart cryptography. Block chain acts like a "Shared ledger" to digitally store all the tracking data of a product, from its raw production stage until it lands on consumer's hand, in real-time. Each product's activity will be recorded as a "block" with a time-stamped, unique alphanumerical character set and accessible by all supply chain's parties. By design, a block chain is resistant to modification of the data. It is "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. Due to its features, the block chain is transparent and safe, since old data cannot be falsified afterwards and all events in the chain can be verified at any time. Strong information security, auditing possibility as well as the secure storing of value, authenticity and ownership are therefore built-in features of the block chain. The pace of adoption both in developed nation and INDIA seems to be on the same platform.

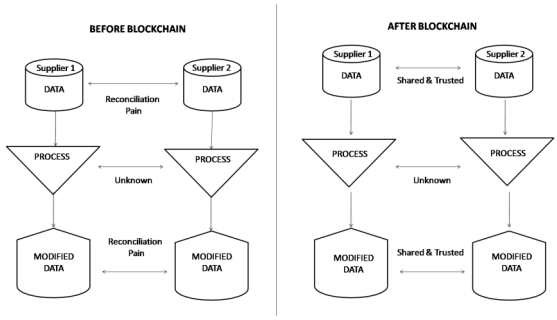


"Block Chain could automate and sequence information by time stamp to create a full record for any item,"

Drivers Of The Block Chain Market

- Increasing demand for distributed ledger technology for traceability
- Reduced total cost of ownership due to distributed storage
- Increased transaction management efficiency
- Increased efficiency in the settlements process
- Increased awareness of the quality of the products and services
- Increasing demand for simplified business processes
- Need for creating transparency
- Need for immutability

As the food supply chain is global, a network with real traceability is essential in order for people to be able to trust what they are buying. Block chain is an effective way to balance the need for confidentiality with the need for transparency.



The Three Pillars of Block chain Technology:

(a) Decentralization

The idea is very simple. You have a centralized entity which stored all the data and you'd have to interact solely with this entity to get whatever information you required. Another example of a centralized system is banks. They store all your money, and the only way that you can pay someone is by going through the bank. The traditional client-server model is a perfect example for this, When you google search for something, you send a query to the server who then gets back at you with the relevant information. That is simple client-server. Now, centralized systems have treated us well for many years, however, they have several vulnerabilities.

- Firstly, because they are centralized, all the data is stored in one spot. This makes them easy target spots for potential hackers.
- If the centralized system were to go through a software upgrade, it would halt the entire system
- What if the centralized entity somehow shut down for whatever reason? That way nobody will be able to access the information that it possesses

In a decentralized system, the information is not stored by one single entity. In fact, everyone in the network owns the information. In a decentralized network, if you wanted to interact with your friend then you can do so directly without going through a third party. That was the main ideology behind Bitcoins. You and only you alone are in charge of your money. You can send your money to anyone you want without having to go through a bank.

(b) Transparency

The level of transparency has never existed before within a financial system. It adds that extra, and much needed level of accountability which is required by some of these biggest institutions.

(C)Immutability

Immutability, in the context of the block chain, means that once something has been entered into the block chain, it cannot be tampered with, which is due cryptographic hash function.(bitcoin uses SHA-256) which gives an output of a fixed length. Let's see how the hashing process works. We are going to put in certain inputs. For this exercise, we are going to use the SHA-256 (Secure Hashing Algorithm 256).

INPUT	HASH
Bye	3639ABCDEFOGHDIDNINDOLEFEKJD29ABCKDEDRIFJFD5AJKKJJKLLA8978
Welcome to Dairy Industry	588AB98ABCDEFOGHDIDNINDOLEFEKJD29ABCKDEDRIFJFD5AJKKJJKLLA

As you can see, in the case of SHA-256, no matter how big or small your input is, the output will always have a fixed 256-bits length. This becomes critical when you are dealing with a huge amount of data and transactions. So basically, instead of remembering the input data which could be huge, you can just remember the hashing algorithm and keep track.

Block Chain for Food Traceability?

The last few years have been disruptive for India's Food Industry. The rise of cloud kitchens and app based food delivery like Zomato, Swiggy, and Uber Eats has created NEW NORMAL. The customer who is ordering food, however, has no visibility or awareness of the hygiene standards maintained or the quality of products used at the restaurant we choose. The fake medicines and adulterated food items like milk, sweets and vegetables, fruits with injected colors sneak into our food chain and no more gets any wiser. While tighter safety regulations like FASSI, ISI and more stringent self-checks have a part to play across the global and INDIA, it is increasingly clear that better traceability and transparency could help the supply chains prevent future incidents like these from disrupting business owners and consumer precious lives.

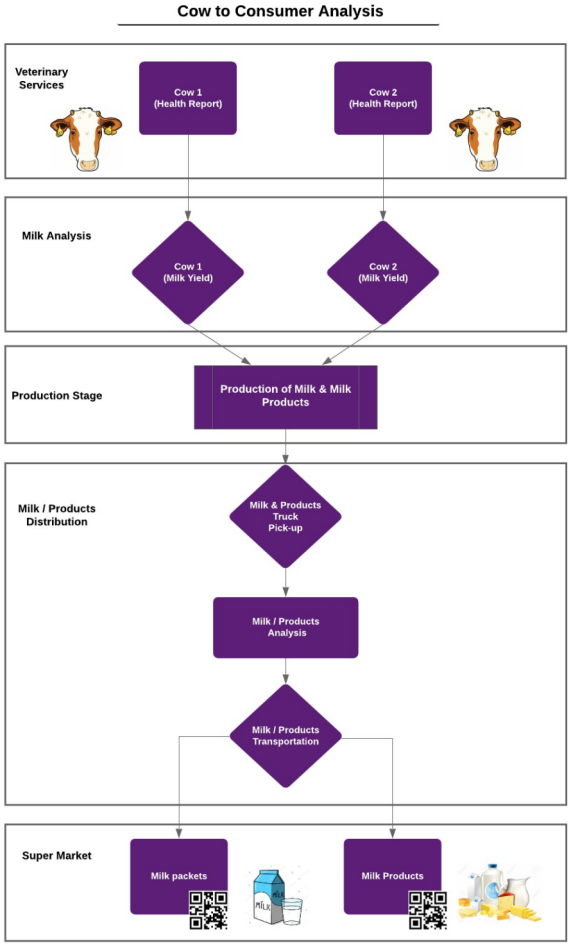
One of the key technologies for the transparency is Block chain technology. This innovative technology could give manufacturers, distributors, restaurants and retailers a single source of truth about every shipment that passes through our incredibly complex food supply chains. Producers, distributors, eateries and retailers are to trust each other when operating in the complex food supply chain. For instance, instead of conducting stringent and time consuming background checks on the authenticity of their shipped products, food retailers will often choose to trust the quality assurances processes of the suppliers. Sometimes resulting to re-call of the both good and bad food products thereby huge loss, goodwill and at times the BRAND build by the business-house has huge impact in the market. A classic example is MAGGI noodles to recall the packets from the market due to unwanted chemicals found in the food products in INDIA.

Block Chain for Dairy Industry

Block chain can revolutionize the overall value chain in the Dairy industry. It can create a digital chain starting from milk cattle's health to reaching the consumer's location. Additionally, it can allow the consumers to understand and visualize the overall value chain, hence increasing transparency in the system. RFID enabled vehicles and packing systems can overhaul the transportation value chain. Rfids will not only make the transport system traceable in each stage but will also help in tackling issues related to adulteration, mishandling, etc. Iot enabled storage-processing system in the value chain will enhance quick checks for various factors (location wise) to reduce the adverse effects of changing factors such as temperature change, other key parameters changes if it is to be under surveillance.

There's a lot of application for block chain technology, and we ultimately want to help our dairy farmers can be on the forefront if we adopt this block chain technology. Dairy is one of the ideal industry for block chain technology because of the amount of data collected at each point in the supply chain, starting at the cow level. Data can be recorded at any point in the process from when the milk was produced on the farm all the way up to the time the milk bottle is on the store shelf.

- Do you know where the milk you drink comes from?
- What do the animals eat?
- Is their feed produced in a sustainable manner?
- How much of the price you pay at the supermarket / Retail shop went to the farmer for his milk?



The Milk Producer

Dairy farmer can automatically add new blocks into the block chain indicating how healthy your cows are. You could even decide what information you are willing to share with others, and what you are not. Afterwards, your milk analyzer software could give us the milk yield for those cows, generating a full profile of your cow within the block chain. Up to this point, this is completely transparent to you. Once your milk is picked up by a truck, you can easily use an app to confirm the transaction between you and the distribution company: cryptographic technology will ensure that this is done in a way that can be easily validated by third parties.

The End-Consumer

Consumer walks into the supermarket one day and notice that some brands of milk incorporate a QR code on their packaging. Curious about it, you take out your phone to read it, and it redirects you to a webpage where you can see all the information contained within the Block Chain, as shown in the above image. Now you are able to get answers to questions that, as a conscious customer, might have a large impact on your purchasing choices:

- Where did this milk come from? Is it from a farm in the province where I live?
- Did the cows that produced my milk have any diseases or were they all?
- The purchase price I am about to pay for this milk, how much did the farmer make out of it?
- Did producers run a milk analysis? If so, did anything strange come out of them?
- Was the cold chain kept properly during transportation? How old is this milk anyway?

End user or the consumer could take their phone scan the barcode. Alternatively, if their phone has NFC, they could just scan the RFID tag and get the complete history, of the milk. History such as when the cow was milked, when it was shipped from the farm to the processing centre, how long was the milk was there in the processing centre, when it was bottled, at what temperature was it bottled, when it was shipped

to the shopping centre. What was the temperature control that happened and so on, until the time how long this milk bottle has been on this shelf in this supermarket? All that information is available for the customer. The customer can take that information, and have trust in the company because they can completely monitor and track this information and in a way, it helps build the trust between the companies and the consumer.

Sounds impossible, but possible with block chain technology!!!

At the dairy farm, data could be attached to a milk shipment, including when it was picked up and any lab work that goes with it. It's even feasible that production practices could be attached with the data, including any animal welfare activities, environmental practices, antibiotic applications and so forth. Once it leaves the dairy, each stop along the product production chain would have another set of data that could be attached with that specific load of milk. "Once that product hits the final customer, that customer could have access to the complete ledger of data for that product."

Providing this transparency throughout the production chain also allows for enhanced food quality through better traceability, especially in the event of a food recall. Using the blockchain technology companies could get to the source of the food quality issue in a matter of hours rather than days. This system could also help producers understand what happens to their milk once it leaves the farm, and allow them to make adjustments based on what the final customer demands that enhance the value of their product.

AAVIN and AMUL being co-operative sector has spread over large number of Unions and largest supply chain in INDIA and it can well adopt this block chain technology to increase supply chain transparency and better connect farmers with customers. Consumers today want to know where their food comes from and Aavin can offers it consumers with real-time data, which can really help increase trust and confidence about food production from start to finish using block chain technology.

Industry Adoption – Indian Scenario

According to CAGR research reports, the Indian block chain technology market is projected to grow at 58% between 2018 and 2024. During the forecast period, the market is projected to be driven by rising adoption of block chain in the banking, financial services, and insurance (BFSI) vertical, especially led by banking institutions.

The state government of KERALA is turning to block chain technology to organize the supply chain process of everyday groceries. The new project will specifically look to streamline the supply chain networks – including distribution of milk, vegetables and fish in the state using block chain technology. The state's think-tank will spear-head the project that will include RFID tags and the use of Internet of Things (IoT) devices to monitor transportation. It is implementation in Dairy Sector where the block chain will continuously monitor production, procurement and distribution of milk to ensure speedy delivery to millions of people on a daily basis. In addition, the transportation of milk within specific temperature in refrigerated trucks will also be monitored through RFID tags and iot equipment. Every single component of the supply chain network will have a separate ID that will be recorded on the block chain, enabling real-time monitoring of the quality of the product at its source at every step of the chain.

Traceability and its authenticity are a critical aspect of the supply chain and are difficult to achieve with the current set up. In Dairy Industry, both milk and products touches everyone in their day to day life in one or other form. Hence, the organization is seeking to eliminate or minimize costs associated with certain intermediaries, such as cost for proof of delivery to improve efficiency across the entire value chain can make use of this technology. The organization wants to look at new trust-based business models that are made possible by Block chain. In a nut shell, the benefits of block chain lie in its transparency, traceability, and immutability. In Indian context, Decentralized applications on public block chains can solve countless Indian problems, such as eliminating middlemen, providing data security, reducing corruption and tampering of financial ledgers, and improving the speed of service delivery by governments and corporations

Block chain Technology Adoption in India. Union government's policy think-tank, NITI Aayog, in association with the state governments of Telangana and Goa, hosted International Block chain Congress 2018, the biggest block chain conference in Asia. This will help in adoption of block chain technology in India. To drive block chain technology adoption across industries Mumbai-headquartered Tata Consultancy Services (TCS) has collaborated with Microsoft and R3 enterprise block chain software firm. PwC report based on a global survey said that India has the potential of becoming a leader in block chain technology adoption, provided there is right amount of industry and government participation.

Reserve Bank of India set up a unit in August 2018 to research/ supervise new emerging technologies for studying the block chain application in creating a decentralized as well as cashless banking system.

In February 2019, while placing the interim budget, Finance minister Arun Jaitley said: "The government will explore the use of block chain technology proactively for ushering in the digital economy." NITI Aayog is exploring opportunities for deploying block chain technology in drug and fertilizer industries.

While government of Karnataka has shown interest in exploring block chain technology, Telangana government has announced using this advanced and secured technology to digitize land records as well as upgrade other data. Many other Indian states such as Andhra Pradesh, Maharashtra, and Kerala have started pushing the block chain agenda aggressively. Block chain technology looks promising and there is immense scope of its adoption in India. However, some challenges persist:

- There is lack of regulation and compliance. Once the Indian government implements the clearly defined regulation on block chain and Distributed Ledger Technology, their adoption will become faster.
- Testing and adoption of block chain applications are still restricted to crypto currency only. For successful poc (Proof of Concept) execution at large scale, the banks need to hire block chain experts. Cost of hiring such experts or data scientists are much higher than software developers, making its adoption costly.
- In many public block chain-based applications, it is still not clear who incurs the cost of network maintenance as well as validation of transactions.
- Indian tax and RBI authorities don't have a favorable opinion about crypto currencies and ICOs (Initial Coin Offerings). Until and unless this hate affair of Indian authorities end with crypto currencies and ICOs, startup initiated block chain projects can't be executed.
- Lack of robust regulatory framework in India is restricting creation of enough opportunity for block chain developers. A study has found that 80% of the sample survey is likely to move abroad for better opportunities. Therefore, India is likely to face a crunch in block chain minds.
- Not many vendors in the supply chain are ready to adopt the new technology because of the trust issues and lack of awareness about the technology. Therefore, more digitization and awareness is required for accelerated adoption.

Industry Adoption – International Scenario

Carrefour: Announced intentions to launch Europe's first food block chain. A QR code scan will tell consumers where the bird was reared, the name of the farmer, what feed the bird consumed, quality labels and where the bird was slaughtered. The initial focus will be on its line of free-range Auvergne chickens, but the plan is to expand the technology to at least eight other products before year end 2018.

JD.com: Beef industry platform in China that can trace beef purchased in Beijing, Shanghai and Guangzhou to its original production location in Inner Mongolia.

Foodlogiq: Starting as a Canadian beef platform, foodlogiq is now a full farm-to-fork system, with an emphasis on supplier management, food safety compliance, quality incident management, recall management and whole chain traceability.

Ripe.io: Started by former financiers, Ripe uses algorithms to calculate sustainability scores, as well as scores for spoilage and safety levels.

Bext360: A Ugandan Great Lakes Coffee exporter and a Denver-based coffee roaster, Coda Coffee, are creating a "bean to brew" block chain. A similar platform by Moyee Coffee tracks their beans from Ethiopia to Amsterdam program will trace the coffee from Moyee Coffee in Ethiopia to Amsterdam, tracking payments to the farmers along the way. Starbucks is also investigating the technology to promote ethical sourcing and connect customers to bean growers.

DNVGL: Its application, known as My Story, verifies Italian wine growers' supply chains, from seed to bottle.

Origin Trail: In combination with tagitsmart sensors, origin trail has a pilot project designed to maintain data integrity in the beverage industry. Wine producer Plantaže will be able to track more than 15,000 bottles of wine.

Zhongan Technology (a subsidiary of an insurance company):
Its block chain system for the free-range chicken sector in China intends to alleviate both poverty among chicken farmers and consumer food safety concerns. Individual chickens are tagged, and information about each individual chicken's growth, location, food and even movement is uploaded and available for consumers to trace. Currently, the program collects data from over 200 chicken farms with plans to expand to 2,500 farms by 2020.

Coca-Cola and the U.S. State Departments are initiating a project using block chain to combat the forced labor market by creating a secure registry for workers.

CONCLUSION

International level, F & B major food companies like Tyson Foods, Unilever and Walmart and retailers have incorporated block chain technology, a digital ledger of transactions, to increase transparency and enhance food safety along their supply chain. As a distributed ledger technology, block chain guarantees enhanced security, greater transparency, increased efficiency, improved traceability, and reduced costs. It also reinforces existing solutions that are built on technologies including Artificial Intelligence and Internet of Things. Enterprises are now looking at a blend of AI, iot, and Block chain to streamline and enhance their business process but also to explore new business models and create innovative products for the next generation of consumers. It is still early days yet for block chain, yet it holds great potential for revolutionizing the supply of Food industry in our Country, particularly the world largest producer of the milk and Indian dairy industry adopt this technology and used it correctly, it could help our food supply chins, making it easier to ensure the security and safety of the food that we eat,. Our people deserve the peace of mind when buying their food, and block chain technology could prove to be worth for the humankind in the globe to eat right food for long-livelihood.

Supply chains have become increasingly complex over the years. Traceability, responsiveness, and trust issues remain barriers to more efficient supply chain networks. Block chain's ability to remove these constraints can unlock value both by reducing inefficiencies and creating new opportunities. However, despite the compelling opportunities, there have been only a few large- scale implementations of this technology. Organizations can use the analysis in this report of applications being implemented and the characteristics of pace-setting organizations to understand how feasible this technology is for them and how to go about implementing their own block chain programs. With that clear picture, they will be ready to strike as the block chain hype increasingly turns to a reality. India's youth and industry can lead a revolutionary movement using Artificial Intelligence and block chain, IoT technologies to deliver trusted business values to end-consumers both in INDIA and global market."

REFERENCE:

[1] http://www.cnbc.com/2016/10/31/one-year-after-chipotles-e-coli-crisis-chain-still-struggling.html
[2] https://www.forbes.com/sites/yanzhonghuang/2014/07/16/the-2008-milk-scandal-revisited/#199e7ac34105
[3] https://www.forbes.com/sites/kevinomarah/2017/03/09/blockchain-for -supply-chain-enormous-potential-down-the-road/2/#34aaeddc3832
[4] https://www.lucs.lu.se/wp-content/uploads/2017/01/kkeg17_littsem-1_sustainable-consumption.pdf
[5] https://blogs.wsj.com/cio/2016/12/16/wal-mart-readies-blockchain-pilot-for-tracking-u-s-produce-china-pork/
[6] http://www.cityam.com/248873/co-op-exploring-blockchain-technology