INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 4, Issue 5)
Available online at: www.ijariit.com

Application of hybrid blockchain and cryptocurrency in aviation

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ABSTRACT

It is well known that travel industry accumulates enormous data and stores in a central repository of each facility provider such as airlines. If we refer to one flight operation then this alone accrues a lot of data related to aircraft, flight, Passengers, Baggage & logistics, Inflight Food & Crew. A single flight is a perishable item and it cannot be consumed again so in order to protect and secure the information, industry should be banking on a high level of methods to protect the data. Instead of that, airlines are still working on Central repositories which work on DBMS logics. Aviation industry needs to be transparent and cautious about its data after seeing the kind of growth we are experiencing in the travel industry. In today's era, Public blockchain is being used by many digital currencies such as Bitcoin but same cannot be applied in the aviation industry since it is a matter of security and it works in a closed network. Whereas, private blockchain restricts public users to interfere which itself has got many challenges. However, hybrid blockchain can be a solution to be transparent and at the same information is also secured if we keep the network private and provide access to the public to verify the information without amending it. Moreover, cryptocurrency can be extremely useful for any transaction such as ticket booking, in-flight sales and other related purchases from airlines. An ecosystem of hybrid blockchain can be built to facilitate the operations of airlines & airports which, in turn, will resolve multiple data management issues along with security. This paper suggests methods to support each department of flight operation via blockchain & cryptocurrency.

Keywords— *Blockchain, Flight operation, Aviation, Cryptocurrency*

1. INTRODUCTION

Airlines and Airports have numerous departments which are loaded with data and requires a special and autonomous mechanism to store & segregate that data. We will dive into each process of a flight operation that is operation done by a single flight. Let's look at the picture which is shown below:

Fig. 1: Airline major process

Fig. 2: Passenger major process

Above picture has all the major activities which take place while during a single flight. There are other departments also which support the flight operation, but we are presently looking at the major factors which contribute to making a flight successful and quite well known to everyone.

This is to be noted that a flight can have multiple legs or sectors (A sector is comprised of one departure and one arrival i.e. BOM-LHR) so in order to maintain the details of a particular sector, it is important to have a time stamp of all the transaction against that flight.

We will now witness the application of blockchain technology and cryptocurrency at every major step of a flight operation.

1.1. Flight, aircraft and crew assignment

It is a part of the planning of any airline where a flight number gets designated against each sector with aircraft type and Crew names. This process goes through enormous changes which are highly required to be tracked for future purposes especially the aircraft type and crew names.

Blockchain will enable the transaction's time stamp along with the verification on a private network and creates a series of the block which will help an airline to extract data at any point of time without investing too much of time and setting up multiple logics.

We need to understand that aviation or travel industry is also a data-driven industry like many others and to secure information is the primary objective of any airline or airport. Blockchain will not only help the airline to secure its information but it will also support airlines to create multiple applications for their internal business such as crew loyalty program. Well, it happens at various instances that a crew has reported sick and some other crew has been pulled out for that particular flight which actually was not his responsibility but any which he or she does the flight. This is also can be taken as that crew has saved the flight from cancellation and saved the money as well for the airline so he or she should be awarded in such a way that they can utilize this credibility in future. A lot of airlines has got crew loyalty program which ensures that these favors should be rewarded by either giving brownie point which can be compensated against wishful flights or sector OR by monetary compensation.

Fig. 3: Benefits of blockchain and cryptocurrency in flight, crew, and aircraft operations

1.2. Ticket booking

We are experiencing huge growth pertaining to a number of passenger day by day. Usually, ticket booking takes place via digital banking or credit card/debit card. We all know that credit/debit cards have become the easiest medium for any transaction in the world, but we also know that the downside of using plastic money.

a. **Theft and security–** Plastic money is one of the best mediums to buy anything across the globe, however, the chances of theft also increase with the usage and there have been cases before and are still happening. Cryptocurrency, on the other hand, is much easier than using credit or debit card and a more secure way for doing any transaction. Distributed ledger provides a decentralized mechanism to cryptocurrency and multiple verifications of the transaction provide security which is far better than credit or debit card.
b. **Transaction fee–** Transaction & conversion fee are the extra cost to our transaction which we bear all the time while booking the tickets through plastic money. Cryptocurrency solves the issue and provides us the lowest transaction fee than any other medium. There is no conversion charge levied if it is being used for the transaction anywhere apart from your domicile country since it is worldwide accepted with the same value. Also, there is no impact of inflation which usually gets resulted by the impact of government regulation and actions.

We discussed crew loyalty program and the usage of blockchain to implement the same. It is interesting to know that blockchain can be applied for customer loyalty program as well. Whenever there is a booking done by any customer, their booking will be recorded against their unique ID with a time stamp and the customer can be awarded for being loyal based on the policy of an airline.

This will reduce the effort of coding tedious logics in DBMS and will provide ease to MIS (Management Information System) for extracting any data or to accumulate the values.

In addition to that, Blockchain Ethereum or Blockchain 2.0 is being used by many industries and having said that, insurance companies are also looking forward to inducing it. Now, airlines can use **Smart Contracts** between customer and insurance company by incorporating Ethereum which will enhance the customer experience. Usually, in case of any mishaps or ambiguity, insurance companies take a lot of time to settle the funds with the customer but Ethereum can bring a smart and quick solution to settle the case immediately after the incident without any issue.

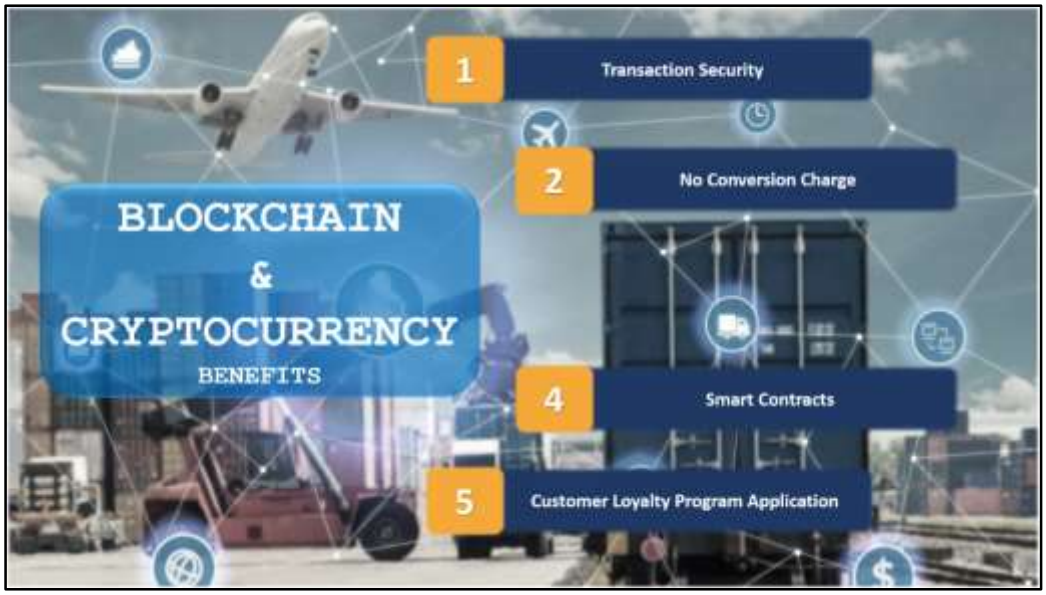

Fig. 4: Benefits of blockchain and cryptocurrency in ticket booking

1.3. MRO (Maintenance, Repair and Overhaul)

Airline operations are highly dependent on MRO and the level of transactions which take place are huge in numbers and require precision in data. This is important to note that if there is any flaw in any transaction of MRO or data then it can lead to unforeseen circumstances.

MRO operations can be segregated under various classifications by using Blockchain. There are multiple checks which are necessary for any aircraft after a flight or a certain number of hours and this requires a precise amount of data & execution. Blockchain technology will log these transactions under different categories which can be referred either minor check procedures or major checks. Moreover, it is also useful to know the history of a part which is going to be replaced from or attached to any aircraft. This will simplify the transactions in such a way that we would be able to see the transaction against any part since its inception till date. Having said that, it is also useful while leasing the aircraft since we would come to know about the leasing history of an aircraft along with the transactions pertaining to the parts.

Also, it will provide transparency to the customer since the information will be there on a public network. Hence, anyone can see the aircraft information from its first flight to date and it will also prevent from duplicating the records which generally happens in MRO.

Fig. 5: Benefits of Blockchain and Cryptocurrency in MRO

1.4. Departure Control System (DCS) and Security

A lot of airports, presently, moving toward digitizing the process of Departure control. From paperless entry to face recognition for security purposes a lot of tools are being implemented at the airports to avoid long ques and to provide a seamless experience to the customers.

Easy Yatra is one of the initiatives taken by the Airport Authority of India where passengers do not have to carry any identification card or boarding pass. Airports will scan their faces and log biometric details for the verification which will reduce the long ques and ensure the comfortable boarding of a passenger.

Private network Blockchain technology will be useful to support the initiative since information readiness is one of its traits. When airports would have all the information of a passenger just by scanning the face and biometric, it will become more convenient for airports and customer to get the initial verification done.

Also, security systems can use blockchain technology to view any anomaly with any passenger happened in the past so that it can ensure the security of the airport and flight.

Fig. 6: Benefits of Blockchain and Cryptocurrency in DCS and Security

1.5. Baggage Management System

IATA's resolution 753 for baggage tracking is becoming famous among the majority of the airlines of the world. Airlines like Qatar Airways have already implemented few solutions to track baggage of the passenger and provide continuous notification regarding the baggage info to the passenger. Singapore and Hong Kong are looking forward to engaging Artificial intelligence to provide better services to the customer in terms of baggage management.

Blockchain technology can become the foundation of such tools which would be driven by artificial intelligence. A private network deployed at the airport would simplify the process of baggage check-in and pick up from the premises. The ecosystem will be formed in such a way that Blockchain will the store the data of the check-in luggage and Machine Learning will perform the iterations to extract the precise information of the baggage status which will be provided to the passengers as well. This will indeed optimize the process of baggage management along with the support to the customer in case of mishandling, lost or pilferage.

Use of RFIDs and digital tags will easily detect the baggage and blockchain will be extremely useful in order to control the information and provide the related information immediately, as per **SITA Baggage Solution White Paper**. In case of baggage lost, this technology will ease the look-in feature as airports would be storing the data of the baggage at each step with a time stamp and without much manual intervention, they will be able to locate or track the baggage. Blockchain will supposedly contribute a lot to resolution 753 of IATA to make it a successful one for the airlines and airports.

Fig. 7: Benefits of blockchain and cryptocurrency in baggage management system

1.6. In-Flight Sales

We often experience that in-flight sales are highly dependent on credit card machines which sync the data once aircraft lands at the airport. A lot of airlines report that their data did not get stored or related issues. However, the use of cryptocurrency will definitely minimize the issues of in-flight sales and multiple verification processes will authenticate the transaction and therefore, airlines would never have to rely on the banks or credit card machines. At present, a lot of airlines are providing Wi-fi which will help cryptocurrency users to do the transaction without thinking twice about the transaction charge and conversion fee.

Also, this will help airlines to track all the records of their sales by using blockchain and it will eliminate the risk of syncing the transaction which sometimes results in missing out on data.

Fig. 8: Benefits of blockchain and cryptocurrency in in-flight sales

2. CONCLUSION

The way we are progressing in aviation, airlines & airports would definitely require these technologies to help and support us for better customer experience. Therefore, blockchain can be that pillar which will support the whole ecosystem in order to facilitate both airlines and customers as it involves much-advanced technology to manage and transact data at multiple levels. At last, a theory needs to be introduced which defines the attributes of Blockchain technology in aviation and it is called **SSIT Theory**; explained in the figure shown below:

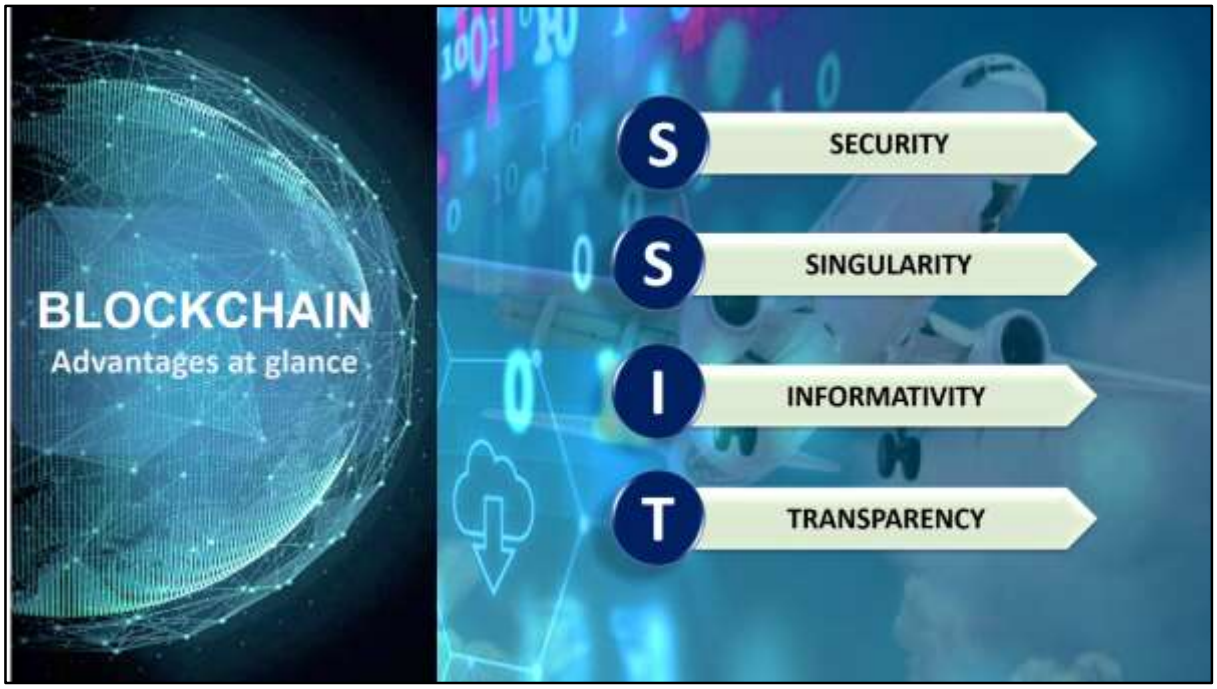

Fig. 9: SSIT Theory of Blockchain

3. REFERENCES

[1] SITA - https://www.sita.aero/resources/type/white-papers/rfid-for-baggage-tracking
[2] Udemy - https://www.udemy.com/blockchain-for-business-the-new-industrial-revolution/
[3] IATA R753 - https://www.iata.org/whatwedo/ops-infra/baggage/Pages/baggage-tracking.aspx

BIOGRAPHY

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