Use of Blockchain Technology in Enterprise Management

Ankur Arora, Manka Sharma, Suku Bhaskaran

Abstract: The Blockchain is an emerging technology and is gaining the popularity over worldwide. This technology is not owned by anyone but used by everyone. The Blockchain technology can be applied in the fields for the ease of operations in business, finance, networking, law etc. This paper aims to make offerings to theory, practical and practice in blockchain technology. A framework focusses on the use of blockchain technology from entry to exit of any process in the system. This is represented in terms of use case discussions and evaluation. This gives an opportunity to use the by Blockchain and to increase trust, mitigate the risk while doing the transaction (Markovitch & Willmott, 2014).

This paper presents the detailed understanding and identification of flow of any enterprise. It also covers the identification of important areas where the technology as Blockchain can be applied and implemented. Finally, the blueprint was discussed keeping the view of important areas of implementation of Blockchain technology. This aims to help the enterprise to automate and digitalize their current processes used by an organisation.

Keywords : Block chain, Enterprise management, supply chain management

I. INTRODUCTION

The enterprise word can be defined as the engagements of a person in investing in, taking risk and running a business (Beck et al., 2017; Nofer, 2017; Zhang & Wen, 2017). Every enterprise management can be better understood better in terms of supply chain management. Any enterprise defines supply chain management as a cross-functional integration of marketing with other departments (Apte & Petrovsky, 2016; Sikorski, 2017). The challenge is to determine the process/Method and also its integration with all the departments. The innovation in the field of technology is emerging these days. It has given a backbone to all the businesses and drives them in entirely in a different dimension all together. The Blockchain in an emerging technology to help and streamline the business processes. Blockchain Technology has been applied in the areas of Digital Manufacturing, Digital Supply Chain Management, Innovative Sales, Innovative marketing, Smart Contracts and many more (Lambert & Cooper, 2000).

Blockchain is defined as a chain of blocks that contain information; it was originally described by a group of scientists and researchers in 1991 in the use of time stamped documents so as to not backdate them or temper with them. Satoshi Nakamoto applied the concept of blockchain in the implementation of Bitcoin in 2009, which is a secured digital crypto-currency used globally. Blockchain is based on 'Distributed Ledger' which is considered as a database or file completely open and accessible to all the members of the network (Crosby et. al, 2016). Each block in the block chain has the following components:
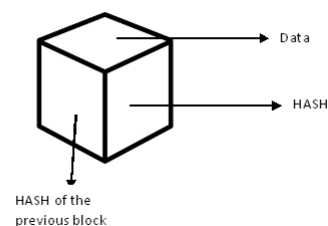

Figure 1: Block Components

Data is the type of data to be stored in Blockchain. This may include e.g such as details of the transaction including the sender details, receiver details, amount of coins used in the transaction etc. Hash is comparable to a fingerprint; it identifies the block and all of its contents and is always unique just as a fingerprint. Once a block is created, its hash is being calculated and changing something inside the block will cause hash to change (Swan, 2016). Hash is very useful when changes need to be detected in the block. If this fingerprint changes, it is no longer the same block. As a result, the hash of all the subsequent blocks need to be changed too and making it a secured system. Hash of the previous block is used to create a chain of blocks and this makes the entire system very secured. All in all, the block chain looks as the following figure:
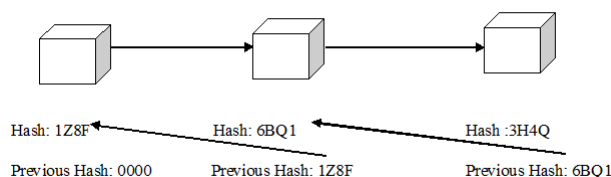

Figure 2: Chaining values in Blocks

The first block is also called as the Genesis block and it doesn't contain the hash of the previous block.

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In case, there is any change done on the second block, this will cause the hash of the block to change and will in turn make all the following blocks invalid. Blockchain Technology operates on something called as Proof-of-Work.

It is a mechanism that slows down the creation of a new block. Thus, in Bitcoin the security is implied on the basis of Hashing and Proof of Work.

Blockchain is shorthand for a whole suite of distributed ledger technologies that can be programmed to record and track anything that value from financial transactions to medical records or even land tiles (Swan, 2015; Nguyen, 2016).

For instance, the issues with the current banking systems include double spending, centralized power, private ledgers and hacking. The leading public blockchain is Ethereum. With the use of Blockchain in Banking System, the ledger can be made distributed and public giving each user access to it (Mainelli & Smith, 2015). As a result, double spending can be avoided as it takes some time to complete the proof of work and the chances for both the transactions to occur at the same time are very less. Thus, the secured systems are immutable to hacks.

The details of the department networking has discussed in a case of a supply chain management.

A. Problem Statement

The present study of an enterprise will help to understand the present scenario of working which will lead to the design of an improved system by introducing the benefit of the block chain technology. The main aim is to have a smooth conduct of all the operations in the enterprise such as planning the material, Goods receiving and reconciling, Receiving the material, Product and production plan and dispatch and finish goods for inspection etc.

The main objectives covered in this paper are listed below:
- Understanding and identification of flow of process of any enterprise
- Identifying the challenges of an enterprise.
- Finding the important areas where the blockchain may be introduced.
- Modifying the process flow diagram by introducing the model blockchain methodology.

B. Structure of Paper

In this paper, Section-II gives introduction about blockchain technology. Section -II, includes the literature review and the application areas of blockchain technology. Section -III highlights the discussion of the case based study of an enterprise. Section-IV, discusses the modified framework proposed after the implementation of blockchain technology. It also includes the limitations of the use of blockchain technology. In Secton-V includes conclusion and the further scope of the study have been drawn.

II. REVIEW OF LITERATURE

The big giants are looking into the implementation of block chain technology to ease the process of delivery and make the supply chain more efficient and traceable. This transforming technology is a useful tool for tamper-proof, product tracing for any supply i.e from tomatoes to diamonds.

Blockchain technology is equally useful in areas of healthcare, education and logistics. Giant players such as Walmart, British airways, Maersk, FedEx, Visa etc (Angraal, 2016) are keen to get on the band wagon of the blockchain. In the traditional system, the information flow in current trade is highly complicated, involves many parties, and involves heavy documentation for payments, invoice settlements, etc. Keeping track of each and every transactions and documents is a cumbersome job and sometimes important documents get lost or forged, which creates chaos in the system, leading to huge loss.

The Blockchain principle uses cryptographic techniques that allow each participant in the network to interact without pre-existing trust between parties, in regards to storing, exchanging and viewing of information. The interaction between parties involved with blockchain requires verification by the network before the information is added, enabling trustless collaboration between network participants while recording an immutable audit trail of all interactions. The use of blockchain has brought the security, privacy and decentralization for the users at both ends (Swan, 2017; Wright & Filippi,2015).

The requirements for implementation of blockchain offer advantages in the following areas-Identification of customers, Forecast and Scheduling, purchase plan Production, Inventory control, Warehousing, Distribution, Logistics, healthcare, automatic object tracking and testing of the supply chain. The roles and responsibility can be arranged in a way towards the implementation of blockchain technology in industry (Mettler, 2016).

In traditional financial transactions of real estate enterprise system, there is a "trusted" centralized third party who is responsible for verifying the transaction (Lemieux, 2016). For example, if you send money to someone else it will be verified by a bank and the bank will charge a fee for doing this. However, blockchain is open-source technology that removes the need for an intermediary or "middleman" when making transactions. Instead, data on every transaction is stored in "blocks" which are time-stamped and linked together to form a "chain". The main benefits of blockchain in this industry is speed, trust and removing a central authority can all apply to the real estate market (Jennifer, 2016).

III. A CASE STUDY ON ENTERPRISE MANAGEMENT SYSTEMS

This section aims to study the supply chain management of a Noida, India based company. The organization deals with the manufacturing of parts of car products. The average number of orders received is equal to ten per day.

An Enterprise Management System enables the organisation to work in an efficient manner. Figure -3 illustrates the process flow Enterprise Management System. The process flow starts when the customer, when places an order to the company sending a purchase order to marketing team of the organisation.
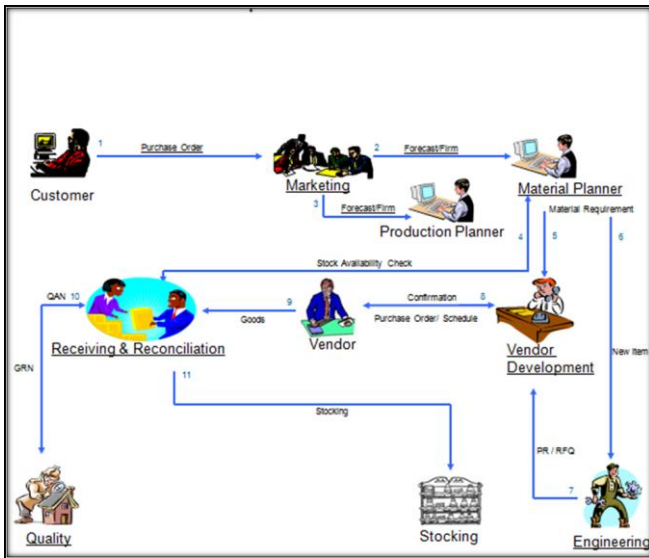
Figure-3 Process Flow of Enterprise Management -1

Based in the Enterprise Management System, the pre-conditions and post-conditions are identified. Pre-conditions are the things that must be true before a method/process is called and post-conditions are the things that must be true after the method is complete. The departments can be identified for the implementation of the block chain technology.

The marketing team looks for the purchase order and for further forecasting, it sends to production planner and the material planner department. The production planner checks the material in the stock and does the shop plan for production. The material planner department has a stock availbity check with the receiving and reconciling department. The material planner department sends the list of the material required to the vendor development department in the organisation. In case of the requirement of a new item, material planner department send the request to the engineering department directly which then send the material requirement to vendor development department and then send for further update on purchase requisition and Request/Request for quotation.

Further, the vendor development department sends the purchase order and schedule to vendor and vendor confirms back to it. Vendor sends the goods to the receiving and reconciling department. The receiving and reconciling department generates the Goods Receipt Note to the quality department. The receiving and reconciling department sends the goods to the stock and update as per the quantity of s goods received by the department.

Then further production planner do the job work to the job worker and shop floor plan to the production and finally goods to the job worker refer to Figure -4. Then job worker finally send the finished goods (FG) to Receiving and Reconciliation Department. Further, the department sends the finished goods to FG Inspection. In inspection if the finished good is rejected then go to scrap, else rework is done with consultancy with the production department. Marketing updated with the production planner in terms of business forecast. FG Inspection also sends the production report to marketing department and FG slip to FG stores and then stock is updated in bonding.

The production department sends the request/issue note to the receipt material store and it return back to the production

department. Receipt material store creates an Good Receipt Note(GRN) and Account Payable (AP) receipt for the accounts department. The accounts department is responsible for the accounts receivable payments. For any outstanding Account payable payments is outstanding then it returns back to the accounts department.
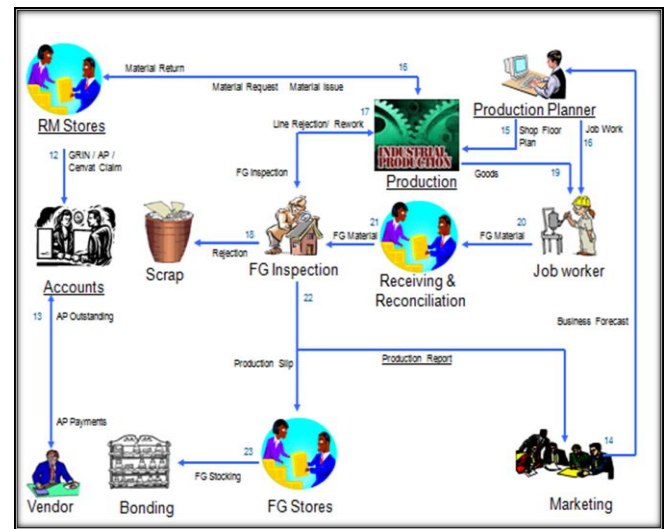

Figure -4 Process Flow of Enterprise Management -2
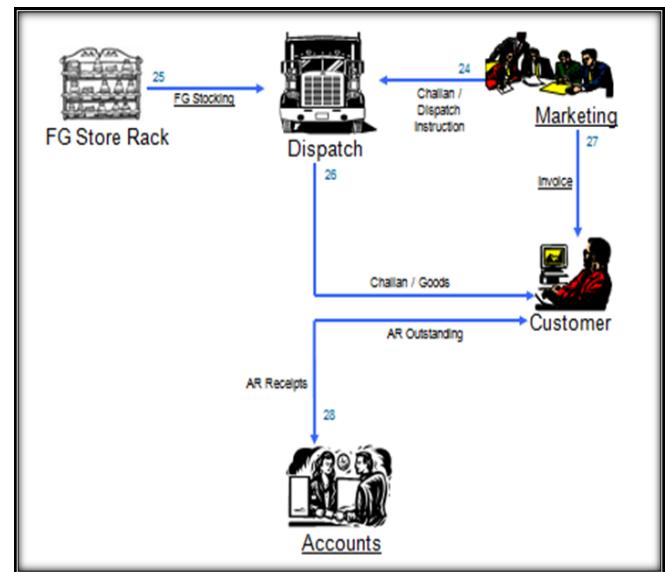

Figure -5 Process Flow of Enterprise Management -3

The dispatch department receives the stock and challan prepared along with the dispatch instruction by marketing department. Marketing department send the invoice to the customer. The dispatch with goods is dispatched to customer. If there is any outstanding account receivable the customer will be in touch with the accounts department for the same.

Based on any enterprise management system as discussed, the pre condition and post condition are identified. The details of all the steps for the important department are considered for the future study are as follows:

Marketing

Precondition	Marketing department receives customer requirements in terms of purchase order
Description	In customer requirements customer specifies the requirement
Post Condition	Marketing team gives the requirement to production and material planner for Material planning. This can be digitalized by using the techniques such as Block chain , RFID and IOT systems

Material Planner

Precondition	Material Planner gives the exact requirements of the material based on purchase order and also check the stock availability and update the stock accordingly
Description	Material planning
Post Condition	1. Material Planner checks the stock availability and gives the material requirement to the vendor. 2. Also, if there is a requirement of new item then it sends it to engineering team 3. Then, engineering team send the purchase requisition/ request for quotation to vendor development department The material check can be automated by different machines etc

Vendor Development

Precondition	Receives the Purchase Requisition/ Request for Quotation from engineering team and generate Purchase Request for new item Also receive the material requirement for the material planner from Production department
Description	Vender Identification (New or existing)
Post Condition	Vendor sends the confirmation and goods to the receiving department and follows the schedule. Block chain can be used for the same. This will verify and checks the requirement and schedule the purchases over the span.

Receiving and Reconciliation department

Precondition	Study the exact requirement of goods based on Customer's order Checks the quality of stock and details and move the stock to the from stocking location Quality Send the quality Acceptance note back to the Receiving and Reconciliation department
Description	Receive the maintain the stock as per requirement
Post Condition	Sends the Goods Receipt Note to the

	quality department If it is ok, then forward the material to stock. If quality is found to be not ok then it send it back the goods, to the receiving and reconciliation department This will automate the process which intervenes the of quality department to check the quality of items

Receipt Material Stores

Precondition	Once the Quality Inspection is complete then send the claim to Accounts department. Send a request for the material if required by a supplier.
Description	Stocking
Post Condition	Accounts department does the payment to the vendor. Material return the left out material to the production department If the material is rejected, sent back to RM Stores. This will take careon on stock details update them time to time and also update them into databases

Production / Production Planning

Precondition	Receive the forecasting and confirm the schedule Take the shop floor plan/work order from production planner/job worker
Description	Do the production of the items in enterprise
Post Condition	Sends the goods to the job worker Sends the finished goods for inspection. The finished goods are verified and updated into the system, Block chain technology helps in maintaining the transparency all the departments

Dispatch/Finished Goods Inspection

Precondition	Receive the material from production Inspect the final finished goods Take the material from FG store , challan and dispatch instructions from Marketing team
Description	Take care of all the dispatches related to final goods
Post Condition	If rejected, then scrap. Send production report to marketing. Sending final goods for dispatch to customer Marketing team will give final bill to customer and take the acknowledgement receipt from the customer using automated system in place.

Accounts

Precondition	Sending bills to customer
Description	Maintained all the accounts
Post Condition	Payment received to customer. This can be automated by taking care of all the transactions and updated timely.

All the departments are well connected by using the ERP systems in any enterprise. The aim of this paper is to look ahead for implementation of Blockchain technology. This technology not only identifies the departments for the implementation but also save time and increases the transparency over the network. The use of Block chain technology in enterprise management keeps the data in decentralized form and save the data from the trap of getting hacked or stolen. The requirements for implementation of Blockchain offer advantages in the following areas-Identification of customers, Forecast and Scheduling, Purchase plan Production, Inventory control, Warehousing, Distribution, Logistics, Automatic object tracking and testing of the supply chain. The roles and responsibility can be arranged in a way towards the implementation of Blockchain technology in industry (Sun et al, 2016).

III. PROPOSED FRAMEWORK

Based on the important processes and departments, blockchain technology can be used in the proposed refined framework. Now, the study will be based on important processes, departments linked with user/customer. The flow cannot be complete without customer or users.
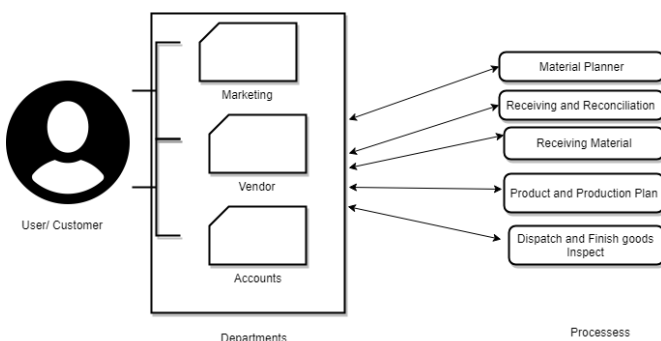

Figure 6: Proposed Framework

These processes and departments can be further used for development of the framework using Blockchain technology for any enterprise. The departments such marketing, vendor and accounts are the departments that are involve in most of the processes in any entreprise management systems. Based on the use and involvement with most of the processes, these departments are considered to be important one. The pre-condition and post condition activities can be can be managed in the use of technology and development of the framework. The implementation of this technology will automatically take care of many transactions by itself.

The Blockchain makes it possible to carry out plausibility checks (Seebacher & Schüritz, 2017). For example, you can check whether the company actually has a plant in a specific location, for example, if the product could plausibly be at the specified location (when, for example, each transport step has been saved). The appearance of the same product at the same time on opposite ends of the earth would be an indication of a

counterfeit. For retailers and buyers, the history of a good tracked in the supply chain is equivalent to a certificate. For retail customers, this means a further increase in value.

The importance of Blockchain in enterprise management can be used as it established a transparency between all the nodes connected to it. The data in the network is shared among all parties and cannot be lost. It can be used as an automated technology whenever triggers the instructions automatically fire the instruction. All the shared members in the enterprise have the copy of all the documents. It saves time and redundancy is removed and most of the things are automatic and take care for all the network transactions in an enterprise (Pilkington, 2016). Although it has many advantages but the limitations cannot be ignored while working with an enterprise. The limitations of the current enterprise system are identified in the study of blockchain technology. The Blockchain is its central attributes where security of flow and proof of authenticity can be studied in enterprise. This uses the communication of proofs of block chain and has been recorded for an enterprise. The risk will mitigate in the network of an enterprise that uses the block chain technology. The anonymity and data integrity without any third party organization in control of the transactions in an enterprise will take care the participating members in the network (Zheng et al, 2017; Tapscott & Tapscott, 2017).

IV. CONCLUSION AND RECOMMENDATIONS

The salient features of Blockchain technology; it can be implemented in any enterprise. The features such as transparency, sharing, distributed network, security. It also saves time and redundancy is removed in most of the processes to make them automatic (Yli-Huumo et al, 2016). It take care for all the network transactions of any entreprises. This paper attempts to identify the flow of the processes. Identify the important processes and finally, attempts to design of framework based on the important process used in any enterprise.

The use of RFID can be integrated with Blockchain technology as a future to facilitate the processes of an enterprise. This will make the things simpler and facilitate in case of updation of data and creation of many process with in the enterprise (Tian, 2016). The location and transfer of documents and goods can be tracked easily if it has the chip available in it. Blockchain makes it to carry out the checks in terms of location and time of the transaction that take place in any enterprise.

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