Unit - 4

Use Case 1 & 2

4.1 Use Case 1: Blockchain in Financial Software and Systems (FSS): (I) Settlements, (II) KYC, (III) Capital Markets, (IV) Insurance

Blockchain in Financial Software and Systems (FSS)

The financial software and system (FSS) is a type of ledger which is used in payments technology and transaction processing. The FSS can offer the diversified portfolio of software products.

It hosts the payment services and software services. The FSS re used to build innovative products and services. The FSS caters wholesale and retail payments initiatives such as the leading banks, financial institutions, processors, merchants, governments and regular bodies. The blockchain in financial industry work tremendously by using FSS. In blockchain it helps to reduce the need for bank branches or boost the competition by lowering barriers to entry.

The blockchain technology has various benefits over financial services which facilitates the bilateral settlement by eliminating intermediaries failures, delays, collateral costs, minimize credit risk, faster implementation of transaction, enhanced transparency in operations, amongst the other.

The blockchain is block of records of data which has three main properties such as:

a. Decentralization b. Transparency c. Immutability

The data and information is stored at multiple entities and each of the networks owns the data. The FSS technology is powerful hence ultimate consequences are impossible. The FSS service takes care of results and deployment of blockchain.

In financial services the new transaction is undertaken where it is automatically stored in block and added to the chain.

Every block is secured using electronic cryptographic algorithms to safeguard the reliability of the database.

The transparency is given by blockchain in FSS is high. The blockchain protects the personal identity by cryptography represented by their public address.

The tempering of the data is impossible in the blockchain where once the data is added into the chain the further changes in the block cannot be made unless it is approved by all the members.

Immutable records are visible to all participants in blockchain. The immutable improves the data accuracy, security and helps to reduce the risk of fraud. The blockchain is safe, secure, decentralized, transparent and relatively cheaper.

Impacts of Blockchain in Financial Sectors

The blockchain impacts on banking sector and insurance sector. The blockchain helps in bank space where bank has issues in recoverability of loans granted by bank. The use of blockchain in banking breakthrough all the transactions right from the disbursal till its end use will be recorded in block. The blockchain helps in tracing the diversion of loaned funds.

The blockchain used in administering trade finance transaction for the banks. The various documents like LCs, bill of loading, shipping bills, tax invoices can be recorded in centralized repository in blockchain where all the parties involved can access the real time data.

All the large amount of documents and transactions are recorded using blockchain distributed ledger where fraud and tempering cannot be done. The blockchain gives the security over the records by decentralization property.

Key Features of FSS

In real time processing of payments extends far beyond the payment system to incorporate core banking, fraud, reconciliation and settlement. Following are the features of FSS payments:

- ✓ It supports multiple payments instruments.
- ✓ It supports multi-currency.
- ✓ It supports standard ISO8583/87 message formats for financial transaction.
- ✓ It is flexible and easy to configure workflows.

- ✓ It is clearing settlement.
- ✓ It has better risk management.
- ✓ Better exceptions handling and dispute management
- ✓ Real time accounting, status, information, dashboard available online to view real time and historic transactions.
- ✓ It provides multi layered Security.

Applications of FSS

FSS payment works in background, underpinning in financial institution's customer facing systems for range of propositions. Following are some of the use cases where FSS is used.

- Person to person
- It used for bill sharing with friends.
- It also used in emergency fund transfer and remittance.

Business to business

The just-in-time supplier payment is used in business to business.

In this use case, an immediate bill payment with E-invoicing is used.

Person to business

E-commerce and in store POS payment is providing by person to business.

The emergency bill payments and rent payments can be done by person to business.

Business to person

Salary or wage payments for temporary workers or contract employees and instant insurance claim payouts are provided by business to person application of FSS.

Merchant to person

It initiates the collecting money requests for purchase.

Government to person

Emergency disaster payments and welfare benefits are given by government to person FSS.

Person to government

Tax payments and payments of fines are taken by person to government.

(i) Settlements

- The FSS services support the push and pull payment transactions.
- The FSS provides the report on settlement positions to the participant bank for establishing settlement finality.
- The FSS clears the transactions and provide settlement report.
- The FSS is the instant payment service.
- The fast settlement services facilitate the immediate settlement between participants obligation.
- The FSS provides the clearing and settlement flexibility to define frequency of settlement cycles.
- This settlement is nearby real time or periodic throughout the day.
- In the FSS, the payment hub supports multiple settlement windows.
- The FSS includes the ability to force settlement when a participating bank's daily exposure limit is reached.

(ii) KYC

- Each candidate is individually checked by KYC in traditional way by bank.
- KYC is a process to get information about identity and addresses of the purchaser in bank.
- Each user is checked by government structure or organization individually.
- The individual participants are responsible for collecting personal data.
- The KYC helps to check and confirm that everything is normal in network.
- The bank takes the responsibility to enter data about user into the blockchain platform where the banks get access.
- When a user wants to use the services of other bank the system validates the user identity before second bank access.
- The information exchange operation is initiated by using private key when user must log in with crypto currencies transaction.

(iii) Capital Markets

- ✓ The capital market is the pairing of issuers with demand capital and investors which are corresponding to risk and return profiles.
- ✓ The issuer can be entrepreneurs, start-up, or large organizations.
- ✓ In this, the processing of raising the capital becomes challenging.
- ✓ The firms are faces increasingly stringent regulations, longer times to get to market.
- ✓ It violates from interest rates and liquidity risk.
- ✓ The blockchain gives the multiple benefits as follows for several capital market use cases.

    - Elimination of single point of failure through decentralized utilizes
    - Digitization of processes and workflows
    - Reducing operational risk of fraud
    - Human errors
    - Facilitation of capital market

(iv) Insurance

The blockchain gives the security on data verification, claims processing and disbursement, reducing processing time.

The property and insurance claims are entities where fraud can be happened and claim assessment can extend for longer period.

The insurance allows following thing such as:

- Authentication documentation and KYC/ AML data
- Reducing the risk of fraud
- Facilitating claim assessment
- Automated claims processing with use of smart contracts
- Automated parameterized contracts
- Automated disbursement of insurance payments
- Tokenized reinsurance markets

4.2 Use Case 2: Blockchain In Trade/Supply Chain: (I) Provenance Of Goods, Visibility, Trade/Supply Chain Finance, Invoice Management Discounting, Etc.

Blockchain in Trade/Supply Chain

The trade finance system involves multiple parties in the network such as financial institutions, their corporate clients but also logistic companies, insures, electronic invoicing, procurement and compliance service, ERP provider and various technology providers.

The trade finance is optimal use case of blockchain. The blockchain helps in trade finance transformation. The blockchain impacts and gives benefits on entire eco system. The trade finance involves various technologies like blockchain which becomes the path of their success.

The members of trade finance taking the initiatives to launch the blockchain consortia to harness the value of such technology to improve trade and working capital finance solution.

Both system and technology define, challenge, develop, test and deploy new products and processes. They can design new normal for efficient trade finance transactions. The data in supply chain is not always visible, available or trusted.

The blockchain in supply chain helps partners to share trusted data through permissioned blockchain solutions. The blockchain with supply chain is used in the disruption of business.

The block chain is helpful in use of leaders to handle the disruption of business and resilience for the future. The supply chain gives the sourcing responsibly and better visibility to minimize disputes. The blockchain provides the guarantee of authenticity for business and consumers product.

The supply chain network can be limited by one up to one down visibility. The blockchain in supply chain gives the more visibility to the permissioned participants across all supply chain activities.

The smart contract which automatically trigger when predefined business conditions are met. The block chain with supply chain gives the visibility into operations and the ability to take

actions. The new supplier on boarding is time consuming for both seller and buyers in supply chain.

There is main project which focused on trade finance blockchain solution is Macro Polo Network. It the largest project and growing technology in trade and working capital finance network in the world. The blockchain is the very attractive technology provides to work towards a common goal.

Following are some of the trade financing technologies.

- We.trade – focusing on bank payments
- SMEs VAKT and KOMGO – addressing needs in commodities
- Tradelen, Cargo – for shipping
- Freight, Voltron and TradeConnect – letters of credit and e-bills of loading

Provenance of Goods, Visibility, Trade/Supply Chain Finance, Invoice Management Discounting, Etc.

Provenance of Goods

- The provenance is the production for the financial ecosystem.
- It combines the distributed, trustless and immutable characteristics of blockchain.
- The provenance is used by firms such as Jefferies, figure and caliber loans to reduce cost and improve execution.
- The company places an order for goods with supplier.
- The supplier sends the goods to the purchasing company.
- The balance to be pay is agreed by company within established time frame in between 30 to 180 days.
- The invoice is send to the supplier for goods to the financial institution.

Visibility

- The greater visibility is provided by the blockchain in supply chain into the origin and movement of goods and more accurate timely supply chain data to address inefficiencies.
- The visibility is provided in global value chains risk.

- Each organization records their own version pf truth, leading errors, high cost and reputational and financial risk.

Trade/Supply Chain Finance

- Supply chain finance is also known as reverse factoring.
- The banks help in number of ways in corporate client trade for fee.
- The supply chain is building on what business have termed as traditional trade finance.
- The supply chain trade finance is used to open account trade between buyers and sellers with established relationship.
- The supply chain includes the third party funding models and emerging platform driven system based on digital technologies.
- There are two types of supply chain are included in commercial activities such as physical supply chain and financial supply chain.
- The supply chain is also referred as buyer side finance.
- The supply chain finance is used to cover supplier financing for large buyers.
- The supply chain finance is kind of invoice factoring but basic factoring in terms of supply chain finance.
- In this the customer or the ordering selects the invoices they would like to be paid early to the supplier. The supplier also has an option to choose the invoices he would like to encash thought the factor.
- Hence, in supply chain finance all the three parties should be work in collaboration.
- Supply chain is the better option for getting easy business loan due to simplicity of contract involved.
- Trade finance required lot of negotiation because of sheer number of parties involved.
- Supply chain is straight forward collaboration between supplier, buyer and the factor.
- The business can select the critical suppliers and pay them early to ensure a smooth running of operation at either end.

Benefits Of Supply/Trade Chain Finance

The supply chain finance offers benefits to both buyers and suppliers.

Following are the advantages offers to the buyers:

- Improving working capital position
- Reducing supply chain risk
- It is strengthening supplier relationships.
- It is sued to gaining an advantage in negotiations
- It used to support business growth.

Following are the benefits for the suppliers.

- It gives the working capital benefits.
- It shows the lower cost of funding.
- It improves the cash flow forecasting.
- It is used to access to a user friendly platform.

Invoice Management Discounting

- The invoice discounting is an invoice finance facility which allows business owners to leverage the value of their sales ledger.
- When user sends any invoice then customer gets the proportion of total amount available from the lender.
- The lender provides an invaluable source of working capital throughout the month.
- The invoice financing is very similar to factoring.
- The invoice discounting is financing option which allows business to access funds by leveraging their sales ledger.
- The unpaid accounts are used by company for accessing the funds and boost their cash flow.
- The amount raised is usually a significant portion of the invoice value.
- There are two parties involved in invoice discounting.
    - Seller
    - Financier
- The invoice financier does not gain any control over to business's sales ledger.
- The customer is not aware of financier's involvement in invoice discounting.
- The business is responsible for collecting payment form customer.

How Invoice Discounting Works?

- The invoice is sent after completion of order or work.
- Once a copy of invoice has been received by lender, the pre-agreed proportion of each invoice is deposited to the customer's bank account.
- The money can be used to pay bills, repay debt or part of a long term plan for growth.
- The invoices are sent after completion of work is the key to success with invoice discounting.
- It allows for regular influx of cash throughout the month.
- The invoice can give the normal collection of payment generally upto 80% to 90% on agreed percentage on each invoice has been paid.
- Fees and charges are deducted from remaining balance and remitted to or claimed by lender in invoice discounting.
- The financier should be clear with charges and fee structure.
- This helps in budget and makes the best use of each cash input.

Advantages of Invoice Discounting

- Release locked cash
- Reduced collection period
- Improves cash flow
- No asset as collateral
- No effects on business relation
- Allows more room for credit sales
- Control confidentiality
- Win win situation for business

Disadvantages of Invoice Discounting

- Decrease in profit margins
- People's perception
- Only commercial invoices

Unit - 5

Use Case 3

5.1 Blockchain for Government

The blockchain is used for providing the security, immutability, transparency in financial sector. The blockchain for government becomes a benefit to deliver tangible profits to the government clients. The list of public sector blockchain application continues to grow in network.

Following are the benefits in blockchain for government:

- Building trust with citizen
- Protecting sensitive data
- Reducing costs and improving efficiency

The blockchain is the solution on transparency through decentralization. It allows the participant parties to see and verify data in network. The blockchain gives the services to the citizens for independent verification of government claims. The government has large amount of hackers to steal the sensitive data.

Therefore blockchain becomes the solution for protecting the sensitive data on the network. The data structure which is harden network security by reducing single point of failures risk. The government becomes serious about the blockchain in cyber security department.

The government always manages the cost of budget where blockchain becomes helper of government. The blockchain solutions could reduce the redundancy, streamline processes, decrease audit burden, increase security and ensures data integrity.

Trends of blockchain usage in Government

According to transparency and market research, the blockchain usage is expanding at a rapid pace all over the world. The blockchain is used in Dubai to put 100% of their records pertaining to land registry.

The blockchain is used to validate property related government transaction in Republic of Georgia. The blockchain is developed in some countries like Sweden, Honduras and others for enabling secured e- Governance.

In India the Andhra Pradesh becomes the first state who pilot the blockchain technology in two department and plans to deploy it across the administration.

5.2 Digital identity, land records and other kinds of record keeping between government entities

(i) Digital identity

The blockchain developed from Distributed ledger technology to track bitcoin ownership. The blockchain technologies replace the traditional system with highly trusted mechanism of managing identities. The blockchain provides greater control over their own identity.

The organization only can use with customer's consent and there is no central entity would be able to compromise a consumer's identity. The blockchain provides the facility of identity to the users called as self-sovereign.

This is inherently unalterable and more secure than traditional identity system. The self-sovereign used to verify the user's identity and to remove need for password. The identity and security are two complex issues for enterprise and government system.

The blockchain provides the solution for exceptional utility in solving issues of identity and digital system. The digital identity arises organically because of the web. The user fill the personal information on the web and the digital identity becomes automatically.

The digital identity can be pseudonymous which is linked to the device's IP address. The digital identity contains the username, password, drivers license number, online purchasing history, date of birth, online search activities and medical history, etc.

The blockchain self-sovereign identity allow user to

- Control the user's identity
- Access and update the information
- Choose the information that need to be private

- Move the data
- Delete identity if user's want

Following are the characteristics of self-sovereign identity:

- Minimalistic – it discloses least amount of data needed for a task
- Security – it provides the privacy and confidentiality
- Control – it controls the user's ID
- Consent- the ID used when user agrees
- Portability- it provides inter-operability
- Persistent- the ID of user cannot be taken away from the user
- Resilient- it provides the censorship and ID deletion operations.

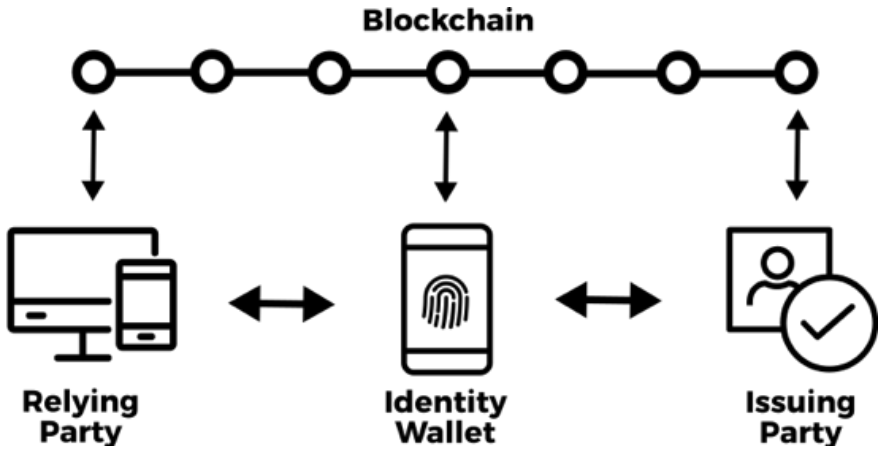

Fig. No. 1 Following figure represents the Biometric, behavioral, biographic can become the Person's identity.

(ii) Land records and other kinds of record keeping between government entities

The blockchain is the decentralized, distributed and digital network to record the information in a tamper proof with an automated way to enforce trust among different participant.

The blocks in blockchain are connected uniquely to the previous block via digital signature. The blockchain in network captures, manipulates and builds the consensus among participants. It makes a change to record without disturbing the previous records in the chain is not possible. Hence the information must be tamper proof.

There are various departments of government where the blockchain is used such as:

- Land management
- Digital identity
- Property records
- Scheme management
- Agriculture management
- Electronic health records

The land management is the registration of all the lands that are authorized by government geographical location. The government has to keep records of all the land and the local bodies of government.

The blockchain provides the trust, transparency and accuracy in maintaining the land records. It also helps to build a robust land management system. The blockchain provides the reduction in cost of storing the physical records about the land property. This will helps in time and promotes the transparency.

The seller and buyer meets at registration office in today's scenario. The physical documents in the presence of registrar and completes the land registration.

Following are some issues in land registration.

- Unclear land titles, leading to huge GDP lost
- Duplicate land records
- Land records are maintained in silos, updating and verifying the records is challenge
- Poor recording keeping, most of the dealing with inaccurate data
- Multiple land web portals and no of them provide single source of truth

5.3 Public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain

(i) Public distribution system social welfare systems Blockchain Cryptography

- The public distribution system is the system where the government create a supply chain to reach towards the public such as ration card is used by public to gain the glossary form government.

- PDS involves the process of finding the farmers till distribution to ration card beneficiaries where different entities comes into chain like central and state agencies, milers, transporters, shop owners and then finally beneficiaries.
- The entire supply chain process of finding the chain till disbursement can be the part of blockchain.
- The farmer provides the food grain to the government under minimum support prize (MSP).
- Milers identifies the collected food grain and then hull it to be returned to government.
- The food grain then moved to the godown to be distributed to various block godown. This block godown gets distributed then to the fair price shops (FPS) for beneficiary distribution.
- The farmer gets the payment under collected food grain MSP.
- The government agencies allow the registered miler to collect the food grain.
- The blockchain helps in payment and stock in PDS.
- The blockchain can remove the delay in payment from the milers to the farmers.
- As the milers are responsible for the collection and stock related transaction.

(ii) Privacy and Security on Blockchain

- The government uses the electronics government (E-government) to deliver the public services to individuals and organization.
- The blockchain is used to provide information and communication to public effectively, efficiently and transparently.
- The E government is the complex system which needs to be distributed over network.
- The e government should be secure, privacy preserved and less failure.
- The blockchain technology involves the high security and privacy preserving decentralized system to the government.
- In this the government information is decentralized where no other third party involve in sharing of data.
- The new data and existing data is stored in the sealed compartment of block in blockchain technology.
- The blockchain in e government build the trust on information high security and privacy in public sectors.