The Role of Blockchain Technology in Financial Engineering

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Abstract This research work is to study and list out the processes and operational areas where Blockchain Technology (BCT) is playing a greater role as a tool in the process of financial engineering (FE) in the insurance business. We studied the use of BCT as one of the InsurTech tools in the design and development of financially engineered insurance products. Here, the development of insurance products covers the design of new and innovative insurance policy models, its attractive features as per the needs and requirements of concerned target customers. Insurance processes cover the management and administration of insurance business i.e., marketing, sales and distribution, the underwriting process and claims management, etc. Financial Engineering is a process of creating a new and innovative insurance model by merging existing policy models OR creating a new and innovative insurance model. FE uses the tools and techniques of Statistics, Financial Mathematics, Econometrics, ICTs which includes, FinTech tools, InsurTech tools like Blockchain Technology, Artificial Intelligence, etc. In this research work, we used descriptive cum explorative research methodology. We have studied the role of BCT as an effective tool in the financial engineering process of the insurance business.

Keywords Blockchain Technology · Financial Engineering · FinTech · InsurTech · Insurance business · Insurance policies

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1 Introduction

One of the fastest-growing sector and industry in the Indian Economy is the Insurance sector. This sector broadly can show in two divisions. One is Life Insurance Sector and the second one is the General Insurance Sector. Total 60 licensed insurance companies are playing a major role and serving the people in India. 24 companies are providing their insurance services in the life insurance sector and 34 companies are providing services in the general insurance sector and the balance two are in reinsurance business and serving to the above listed 58 companies. All these companies are regulating by Insurance Regulatory Development Authority of India (IRDAI) an agency of Government of India. After the Banking Sector, Insurance is the largest sector in the Indian economy which is playing a major role in terms of offering innovative financial and insurance services to the Indian insurance customers. More than 95% of these registered companies are operating as joint-ventured companies with the collaboration of various abroad banking and insurance companies. Financial Engineering is a process of creating innovative financial and insurance models or products in both the banking and insurance sectors. FE considers the competition, needs and customized requirements of the current era customers. The current era customer doesn't have time and patience to refer the multiple apps, broachers, websites or applications to avail his financial and insurance needs. In most of the occasions, the current era customers are expecting tailor-made, customized products for his both financial and insurance needs. Hence, considering these customization challenges, competition from the existing players, also threat of the advanced technologies, all most all insurance companies have started thinking to release new and innovative policies into the market. Hence, Financial Engineering is the only solution provider which can help the insurers in the creation of financially engineered products and processes. Insurance companies consider and imports various tools like Statistics, Financial Mathematics, Econometrics, ICT (Information & Communication Technology) tools like FinTech, InsurTech, etc. The backbone technology of Cryptocurrency is Blockchain Technology comes under one of the advanced tech tools of InsurTech [1–6].

2 What Is Blockchain Technology

2.1 Blockchain Technology

Blockchain is a nascent technology also known as distributed ledger technology (DLT). BCT was used as the main technology in the introduction process of the first cryptocurrency in the year 2009 [3, 4, 7].

2.2 What Is Cryptocurrency

Cryptocurrency is a digital currency which we can avail or see in the form of digital format only. It is completely a private currency and its transaction time is very less at a very cheaper cost. This digital currency uses strong cryptography, hash algorithms to secure all its financial transactions throughout. Almost nearly about 1600+ cryptocurrencies are in operation at present across the world. But only ten currencies are famous among these. All these cryptocurrencies are mostly using C++, JavaScript, Python and Solidity program languages to implement. The first cryptocurrency released in the world was Bitcoin which was released in the year of 2009 by Satoshi Nakamoto released as an open BCT software and a Peer-to-Peer Electronic Cash System. There is no any cryptocurrency without BCT in the world at present. The market capitalization value of all these currencies is more than 100$ billion dollars which are larger than 120+ countries GDP value in the world. Since this cryptocurrency uses distributed ledger technology and no one will take centralized responsibility and legality on these currencies flow and operations. That's why still in India, these cryptocurrencies are not recognized by the Govt. of India. quality plagiarism software/tool (Turnitin/iThenticate) will be used to check similarity that would not be more than 20% including reference section. In the case of exclusion of references, it should be less than 5% (Fig. 1).

But Indian companies of various sectors started using this currency technology to speed up their operations, to reduce the fraudulent practices and to minimize their operational costs. The insurance sector also started using this technology in operations. We can rate Blockchain Technology (BCT) as a trusted technology of the decade of the 21st century where we can use its services greatly in both the insurance and banking sectors. BCT can define as the fastest growing technology

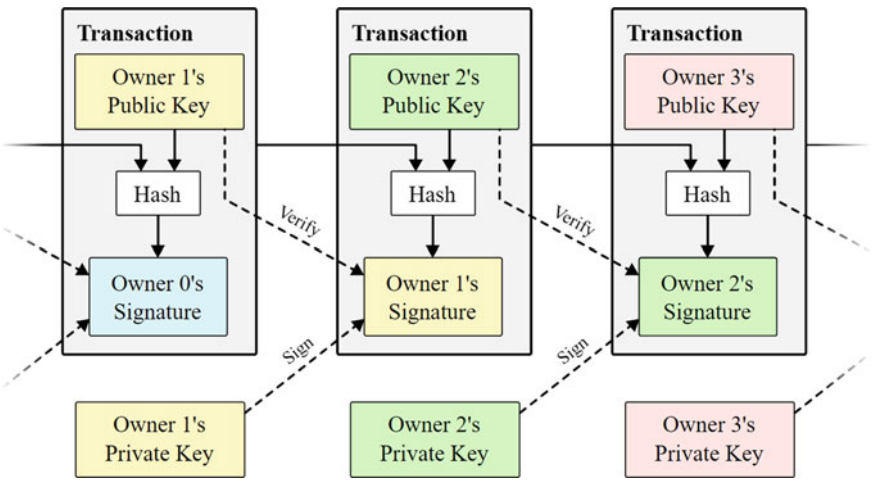

Fig. 1 A peer-to-peer electronic cash system *Source* Kassandra Jucutan*; April 2018 [2]*

which is having a distributed and decentralized digital ledger which records transactions across a global network of computers where the information is highly secure with two different kinds of passwords. The companies which are using BCTs are in the gaining process

2.3 What Is Financial Engineering

Financial Engineering is a process of using statistics, financial mathematics, econometrics, computer sciences, software technologies like ICTs, Fintech and InsurTech, etc., to create a new and innovative financial model or product. All over the world all most all companies serving in the insurance sector using FE in the process of creating new policies and in the management of insurance operations.

2.4 What Is Insurance, Brief Overview of Global and Indian Insurance Sectors

The business turnover worth of the global insurance industry is over 5$ trillion. In India, the gross premium written in the year of 2019 is Rs. 5.78 trillion. Indian insurance industry expected to grow by 2020 is 280$ billion [6].

3 Brief Overview on the Role of Technologies in Insurance Sector

In the digital world, particularly since two decades' customers' insurance needs, preferences are changing frequently in the direction of personalized and customized models, products. Use of computer and mobile apps increased and customers started referring to the policies, applying insurance policy and renewal payments and query or claims submission, etc., activities are mostly doing in online. Since a decade the following five InsurTech technologies are having a great impact on Insurance sector i.e., Artificial Intelligence (AI), Big Data (BD), Blockchain Technology (BCT), Internet of Things (IoT) and Augmented Reality (AR), etc. [5].

Table 1 Various steps in the working of Blockchain Technology

Sl. No.	Phases/Steps in BCT transaction	What exactly happens at each phase/step
1	Someone requests a transaction	From a node of Peer To Peer (P2P) Network
2	The requested transaction will be broadcasted	The broadcasted transaction will be visible at another P2P Network at all Nodes. Where this P2P consists high-speed of computers well-known as Nodes
3	Validation of the transaction	The P2P network of nodes validates the transaction and the user's status using known as hash algorithms
4	Content of the transaction	The verified transaction can involve any one of the listed cryptocurrency, or its related contracts, records or any other related information
5	Creation of new block	The verified transaction by nodes has to be combined with other transactions to create a new block of data for the ledger
6	Adding of newly created block to the existing blockchain	The newly created block after verification by the nodes will be added to the existing blockchain, in a way it is permanent, unalterable, in editable

4 How Blockchain Technology Works and What Is Its Significance

Block Chain Technology is disrupting the insurance sector worldwide. BCT is not only a currency transfer technology, but this was also used by the worldwide industries even beyond that. Though all the above said 1600+ cryptocurrencies are powered by blockchain technology, now it is transforming as a new ecosystem in the countries and world economy where one can do virtually anything. It is like a database or registry or data. The following diagram and Table 1 clearly explaining how BCT works (Fig. 2).

5 Objectives of the Study

Objective 1: To list the areas where blockchain technologies are playing a greater role in insurance operations.
Objective 2: To study the use of blockchain technology as a tool in the financially engineered insurance products.

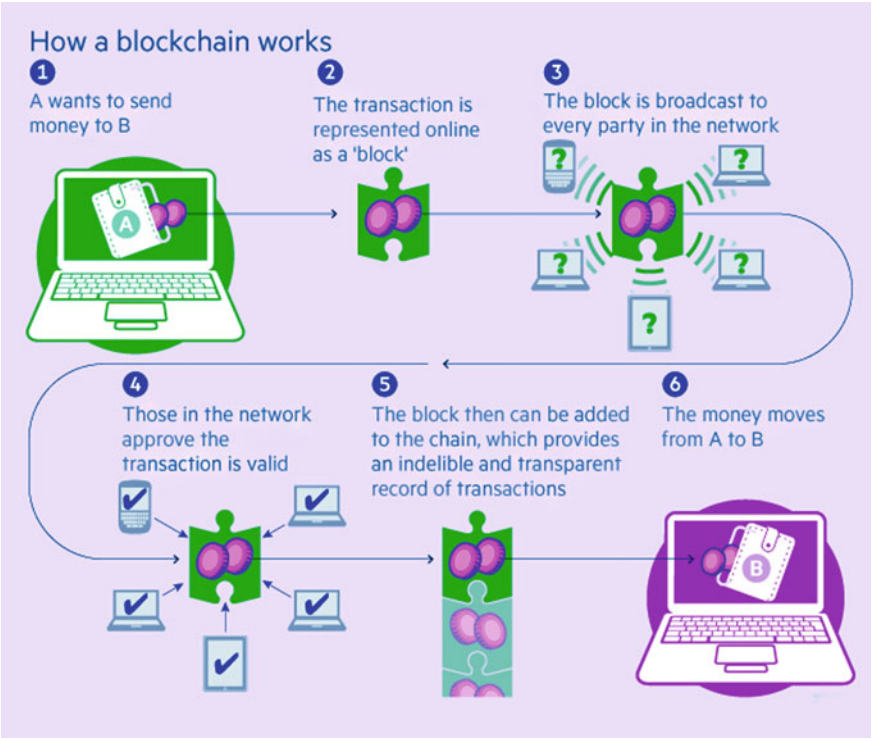

Fig. 2 Working of Blockchain Technology with *example Source* Dataflairteam 2018

5.1 Research Methodology

Both observational and case study types of descriptive research methodologies are used in the proposed research work.

5.2 BCT in Insurance

Blockchain Technology has lots of scope in the insurance sector. Not only for money or currency transfers, but BCT also plays a major role in various core and key areas in the insurance value chain. BCT network by connecting multiple devices and mobile apps, it will speed up the insurance processes, helps to achieve accuracy in the transactions, helps to minimize the cost of insurance operations and helps to remove completely the fraudulent claim application submission practices in the insurance sector. The estimated loss in the USA alone due to fraudulent practices in Insurance claims is up to 80 $ million and in the UK is up to 2.1$ million

[5]. Insurers can maintain cordial relations with their satisfied customers due to use of BCTs in their operations. No need to submit again and again repeatedly to the company once the customer submits his/her KYC, health and policy documents, etc., records. This decentralized BCTs makes is a regular course of business transactions to authenticate transactions, policies and customers. Nephila Capital and Allianz insurance companies are using BCTs to process their claims fast. BCT also playing a major role in underwriting activity in the insurance process. BCTs minimize identity fraud or theft, minimizes fraudulent practices, decentralization of data repository, a great reduction of paper works and improves the efficiency across insurance value chain [7].

There is a special initiative called B3i (The Blockchain Insurance Industry Initiative) was introduced and launched in the year 2018 by 17 insurance market participants across the world. This is a startup company established in the world to use Blockchain Technology for the benefit of the insurance industry. At present 40 companies are playing a major role in this consortium across the world. The promoting insurers of this new venture are Aegon Insurance Company, Allianz, Munich Re, Swiss Re, Zurich, etc. [5]. B3i offers better services in a short time at a cheaper cost to customers and other market participants of the insurance sector using blockchain technology [8]. Similarly, Engineering InsurTech, R, Chain, Wave, ripple and symbiont are also working as other consortium using blockchain technologies in the insurance industry [10–12].

5.3 *Blockchain Technology as a Tool in Financial Engineering*

Blockchain Technology used by the insurance companies in the financial engineering process of the insurance business. BCT is one of the effective tool in financial engineering process in the insurance business in the complete value chain of the insurance business.

Particularly in the following insurance areas BCT is playing an effective and major role and generating effective results.

- Financially Engineered Product design and development process.
- Financially Engineered effective policy features, policy risk riders, etc.
- Financially Engineered customized insurance policies.
- Financially Engineered Sales and distribution channels.
- Financially Engineered underwriting procedures in the insurance business.
- Financially Engineered insurance claim application process.
- Financially Engineered Insurance Management process.

5.4 *Potential Usage of BCT in Financial Engineering of the Insurance Business Is Happening in the Following Areas*

Claims Management: It is one of the important managerial operations in the insurance business where most companies are facing fraudulent practices. Incurring losses every year in crores. BCT effectively used as a tool in the financial engineering process of insurance claims management to stop frauds, to administer claims payouts and also to encourage and convert the existing systems to auto initiation of the claim (Fig. 3).

Product Management: To design the financially engineered insurance products and its features BCT using as a tool. Particularly to design various risk riders, attractive insurance features with fund switching options, renewal payment procedures and claim application submission process, etc.

Marketing Management: BCT used in this process to bring back the track in the target market at target customers. With huge data transactions, it is possible to track the customers easily when the BCT is using as a technological tool in the systems.

Sales and Distribution: By sharing the customer data based recorded at various online enquiry nodes to the agents or advisers also by sharing newly designed financially engineered policies and its features in the network we can easily achieve the transfer or distribution of information effectively at a cheaper cost by using BCT as a tool.

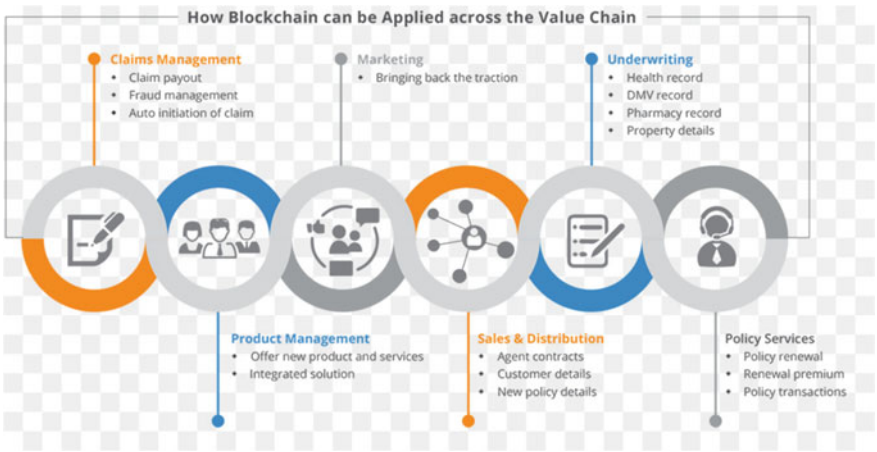

Fig. 3 How Blockchain can be applied across the value chain *Source* kisspng dated 5th Aug 2019 [9]

Underwriting: It is a process of evaluating an insurance application to determine the risk associated with the applicant by reviewing his/her submitted medical records, financial soundness and his lifestyle also taking other demographic factors of the applicant like age, gender, etc., BCT plays an effective role by authenticating the provided data or information by the customers matching with the data recorded in its Distributed Ledger when he/she was transacted on the similar purchases with other companies (Fig. 4).

Policy Services: BCT plays an effective role in after-sales services. Particularly in reminding renewals payment transfers at a cheaper cost, or sharing the related information at a cheaper cost, etc. Claims processing is a long and confusion stage for the clients. Instead of wasting time in the sourcing process of required documents, if the information is available in the blocks earlier with various insurance companies and financial companies, that can share easily to the insurer to authenticate the claim application to process the claims quickly (Fig. 5).

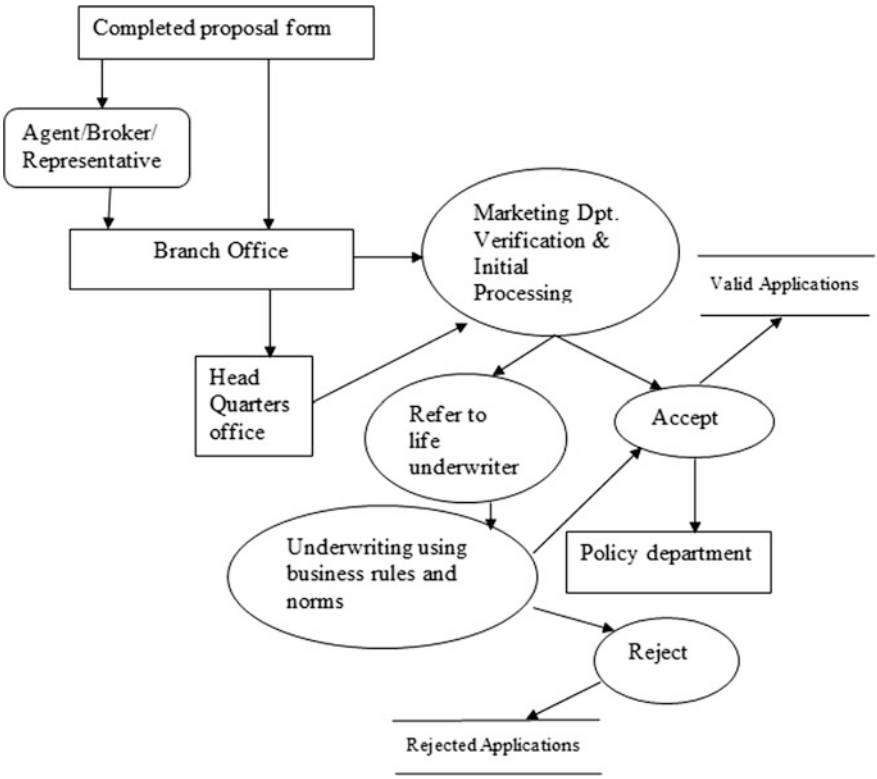

Fig. 4 The existing process of insurance underwriting [11] *Source Mutai Joram (2017)*

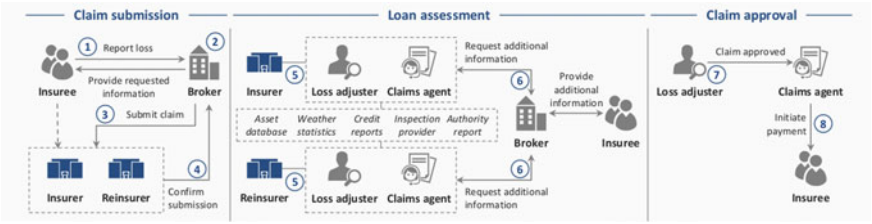

Fig. 5 Insurance claim process *Source* World Economic Forum. https://www.skcript.com/svr/insurance-industry-use-case-blockchain-hyperledger-fabric/ [10]

5.5 Scope for Further Research

Based on the above discussions and observations, there is a lot of scope and research opportunities are there in this domain. If we can get the designing part data from the companies, we will have a lot of scopes to see the usage of BCT in Financial Engineering of Insurance Business.

6 Result and Discussion

Blockchain Technology has started playing a major role in across the world crossing its main origin i.e. Cryptocurrency. By 2030, All most all insurers will migrate gradually to the BCT to adopt in their business management to minimize their operational costs and fraudulent claiming processes

References

1. https://en.wikipedia.org/wiki/list_of_cryptocurrencies
2. Kassandra jucutan (2018) Coding boot camp news, career guidance and more. https://www.codingdojo.com/blog/what-is-cryptocurrency-engineering-jobs
3. Residual (2017) How Blockchain Technology works in layman's English – infographic. https://steemit.com/blockchain/@residual/how-blockchain-technology-works
4. Dataflairteam (2018) Working of Blockchain technology with example; https://data-flair.training/blogs/working-of-blockchain/
5. Hacker Earth Blog (2018) 5 Technologies that made a major impact on the insurance industry. https://www.hackerearth.com/Blog/Talent-Assessment/5-Technologies-Insurance-Industry/
6. IBEF (2019) https://www.Ibef.org/Industry/Insurance-Presentation
7. Kumar M (2018) Dlesblockchain; the blockchain revolution in the insurance industry. https://Blockchain.oodles.Io/Blog/Blockchain-Technology-In-Insurance/
8. B3i. https://B3i.Tech/Who-We-Are.Html
9. Kiss Png (2019). https://www.Kisspng.com/Png-Life-Insurance-Blockchain-Value-Chain-Block-Chain-5001274/

10. Jain P (2018) Redefining the insurance industry with blockchain using hyper ledger fabric. https://www.Skcript.com/Svr/Insurance-Industry-Use-Case-Blockchain-Hyperledger-Fabric/
11. Joram M (2017) A knowledge-based system for life insurance underwriting. https://www.Researchgate.net/Publication/314838086_A_Knowledge-Based_System_For_Life_Insurance_Underwriting
12. Chakravaram V, Srinivas J, Ratnakaram S (2019) Use of ICTS in financial engineering applications in insurance business, November 2019, ICT Analysis And Applications, Lecture Notes In Networks And Systems 93. Springer Nature Singapore Pte Ltd. 2020. https://doi.org/10.1007/978-981-15-0630-7_27