Blockchain-Driven Supply Chain Management and Open Innovation

Abstract

Advanced networking systems among consumers, goods, and value imposing major challenges for industries. Which comprises a change in consumers' outlooks and forces on producing low-cost merchandise, arrangement, and supply chain. These changes demand advancements concerning businesses to adapt to modern system by encouraging and embracing advanced and innovative solutions for the challenges. Which highlights the overall modification of industries which is described as 'industries 4.0', which enforces the need for digital technologies, networking in industries, and associated practices. The blockchain technological domain is strongly incorporated by industries over the years. The usefulness of blockchain is not only accepted for the monetary sector but at the same time proven highly effective for supply chain management as well. Blockchain is an advanced technological domain that refines overall efficacy, transparency, and unambiguity. Currently, logistics and supply change are highly persuaded by the innovativeness, latest technological aspects, change in processes, and competitively that enhance challenges, which demands change and applying technological aspects for the modern supply chain as a multilevel system.

Keywords: Blockchain, BCSCM, innovation, open innovation, supply chain

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1. Introduction

Innovativeness is continually observed as the progression which usually absorbed within the boundaries of the firm. Whereas, the approach to innovativeness in businesses has been changing widely, as the domain of innovation is altering and extending the boundaries of the company's innovativeness prospects. Therefore, businesses are moving from the traditional conception of the closed innovativeness model to open innovation prospects (Elmquist et al., 2009). In the era of change and progression of systems and approaches is the demand for industry 4.0 which shapes the need for prospective business strategies. This need for change is the forceful truth of today, which disturbing the conventional business procedures, systems, and market forces (Fragapane et al., 2020). Innovativeness is one of the classic patterns of activities that businesses plan for involving consumers and suppliers.

In recent years, the conception of open innovation is attracting the attention of experts in the innovation and management field (Costa et al., 2007). Which intensifies the innovative attitude and outlook concerning research and development management prospects, and presumes that businesses must utilize the outside conceptions and philosophies along with the internal knowledge, information, and ideology. Where at the same time businesses also look for internal and outer paths toward markets for the progression of the technological domain (Chesbrough, 2006).

Industrial 4.0 philosophy is encouraging the conception of open innovation for industrial growth and to achieve competitiveness within the market against rivals. The need for concerted innovation is gaining massive attention within academia and the industrial domain, as the worldwide competitiveness amongst businesses and the revolution in technology prospects are the key antecedent of the need for open innovation (Moreira, 2005).

The conception of the supply chain is associated with the complex dominion which is connected with a variety of initiatives and founded on the information float to understand the business concerned alliances of all the linkages among business initiatives (Leng et al., 2018). This domain of supply chain is a multilevel organization system of association intended to advance the rotation

competence, were at the same time developing a business system focusing on value-adding as a primary focus, comprising the info, logistics, and investment flow (Xue et al., 2020).

The overall industrial revolution or industrial 4.0 domain represents the transformed level of businesses and mechanism of the whole value creation in aspects of the supply chain and improved life cycle of produces (Bigliardi et al., 2010). There are numerous setups for establishing the connection between the supply chain bodies, which include the improved incorporation of basic suppliers within the domain of collectivism. Which encourages the serious assurance bond between the parties, especially in the form of a mutual competitive approach (Bigliardi et al., 2010).

This arrangement stresses the high-tech approaches and systems of industrial aspects, existence of the end-to-end value chain, and smart business interaction systems (Mubarik et al., 2021). The outdated and old system of the supply chain is not competent in meeting the innovative economic, scientific, and customer stresses. The supply chain management system is developing in terms of its extent of involvement, comprising several levels and several participants on different levels. Consequently, businesses are indulged to join in their various actions with consumers and suppliers for continuing in the market (Bigliardi et al., 2010). The supply chain system today consists of strong complications and a diversified environment.

Where the system was founded on the modification of market arrangement, environmental concerns and supply chain mandate also included intangibility (Campos et al., 2019). Though, the old-fashioned supply chain system is relatively low in terms of adaptability according to the demand of consumers and modified systems. Therefore, it has less ability to meet the necessities of modified environmental concerns (Yu et al., 2018). Whereas, to encounter the growth of competitiveness among businesses and adaptation aspects in customer's needs, old school supply chain system is facing challenges (Kshetri, 2018).

This whole developed system includes all the levels from customized consumer demands, supply chain systems, industrialized processes, and providing the products to consumers (Sendler, 2017). This transformation not only focusing the domain of manufacturing, delivery, and supply chain but at the same time also includes transparent processes and networking of manufactured items and services in a digital way (Pfohl et al., 2015). This arrangement of transparency, networking, and the digital world affects the overall business setting to develop transformed business models

and supply chain systems according to the demand of change. Which affects the partnership and communication level to provide an enriched level of trustworthiness, quickness, and efficiency (Kern & Wolff, 2019).

1.1 Open Innovation and Supply Chain Management

The dominion of innovation within the arrangement of business started in the initial human settlements and widely influenced the prospects of evolution and progression of cultures. The origination of the latest and innovatively developed tactics of production and approaches for supplying has been critical for the persistence of societies within the challenges of competitiveness (Ghouri et al., 2021; Gul & Khan, 2020). Where an insignificant number of innovators headed towards agricultural and industrial advancement, along with their huge and continuous impression on overall communal systems (Inauen & Schenker-Wicki, 2011).

In a current scenario, innovativeness is one of the priority stratagems of businesses, and view as a fundamental aspect of the success and survival ability of firms (Khazanchi et al., 2008). Innovation is inevitable for businesses to achieve competitiveness and face challenges effectively (Stock et al., 2002).

In the earlier mid-20th century, fundamental technological systems were established by giant firms' industrialized research sections, which they applied to the concerned production methods, production, and services domain (West et al., 2006; Bruland & Mowery, 2006). Vertically integrated prospects of firms were the basic practice of obtaining the latest technological upgrades to ensure the firms with a competitive edge over other competitors in the market (West et al., 2006). However, in customary and old-style business arrangements, innovative methods and products were established within the firm's limits (Bruland & Mowery, 2006), which Chesbrough (2003) called a closed innovativeness approach, where successful innovations needed regulators and businesses to be self-sufficient as they would not firm on the excellence, accessibility, and aptitude of the related parties.

The businesses would maintain all the regulations concerning research and development accomplishments and these all prospects excluded any outside knowledge or technological incorporation. However, the conception of a closed innovativeness arrangement is coming to its limits. As for businesses to be effective in innovative approaches and tactics irrespective of the

industrial focus significantly depends on interaction with outside the firm boundaries and including outside important bodies (Laursen & Salter, 2006), which contains smart interactions with consumers and supplying bodies (Song & Di Benedetto, 2008).

Combining flexibility of knowledge and skillful workforce, rapid changes in the consuming and manufacturing utilities, and smaller product life cycles are the key elements of prototype modification of industrialized research and development domain and encouraging the demand for open innovation (Afuah, 2003; West et al., 2006). Whereas, the expansion in the interchange of technological and intellectual assets backs this modification from a closed innovativeness arrangement to an open innovation arrangement.

The rise in technological markets has militarized technological and intellectual assets (Arora et al., 2001). The fundamental reason behind this shift is that useful knowledge is not limited to a small number of giant entities, the necessity for opening the research and development domain becomes critical for firms (Gassmann, 2006). Consequently, the prospects for attaining knowledge and technological basis from the external environment and beyond the limits of organizational boundaries are considerably improved. Open innovation pressurizes the prominence of capturing this outer knowledge or technological base to transform them effectively for the progression of advanced merchandise and services (Gassmann, 2006; Afuah, 2003).

For the domain of ensuring open innovation, overall activities concerned with research and development should be focused to enhance the technological support inside and mandating. Therefore organizations must utilize the inside and external available knowledge and information, while at the same time employing inside and outlying commercialization pathways because the businesses are attentive to developing their technological strength in terms of methods, tactics, and processes for developing products and services (Chesbrough, 2006). Therefore, soon the domain of open innovation becomes the central attention of practitioners, academia, and literature concerning managerial and innovation practices (Christensen et al., 2005).

Open innovation has jumped out of the growing world of “much bigger and much higher” prospects, which includes the domain of carry-outs conceptions, thoughts and philosophies around the allotment of knowledge and conceptions fundamentally executed by the info and communication technological domain (Pazaitis, 2020). The principal agenda and rationality are associated with the solution of problematic prospects, developing a previously unnoticed

capability concerning massive scale arrangement, and synchronization of various participants (Benkler, 2017). Therefore, as a phenomenon, open innovation is associated with an extensive range of activities, which are extending from a planned central base and can control the procedures similar to joint and virtually available labor platform. Various strategies are built towards the concerns like workforce, capitalization, and uncertainty level can be described (Harhoff & Lakhani, 2016).

However, the fundamental prospects stay as focused: a standard aptitude for the purpose of implying knowledge in vibrant and ambiguous procedures and activities. This overall aptitude is progressively influencing the tactics businesses to adopt innovativeness, moving towards innovative corporate models, and possibly nature. Open innovation is commonly adapt as a deliberate preference for businesses to occupy marginal inputs (Brunswicker & Chesbrough, 2018).

Innovativeness considers the initial element of businesses which is associated with many crucial concerns of businesses. Now, the systems and the demand for innovation prospects are changing covering wider prospects than before and including many areas of organization and businesses. Innovativeness process shifts from a closed system to an open system of innovation (Chesbrough, 2003). The conception of open innovativeness was primarily explained by Chesbrough (2003) which is rapidly gaining the attention of experts and businesses as an innovative way of intellectual and rationality (Elmquist et al., 2009). In the application of the conception of open innovativeness, businesses joint with all concerned parties, for example, consumers, opponents, academia, and other distinct industries in the market for establishing the ground of open innovation (West & Gallagher, 2006). The primary philosophy of open innovativeness is associated with the plan of obtaining all the knowledge and information essential for fashioning innovativeness, which was not reachable within the organizations. Therefore, the organization is required to obtain the information and improve its knowledge capacity from other origins as well (Bigliardi et al., 2010).

Open innovation is described as “the utilization of knowledge and information available via inflows and outflow channels to accelerate core innovativeness and strengthen markets for marginal use of innovation” (Chesbrough, 2006). This standard of innovation includes research and development as an open arrangement. Which presumes that valued conceptions can develop from within the organization and externally available systems (Hauser et al., 2006). While experts

asserted numerous originators of open innovation, which explain four bases of information for organizations, example, suppliers and consumers, academia, governmental institutions, and secluded research labs (Von Hippel, 1988).

For businesses, the creative way of facing competitively the challenges of the market and demand for change is to team up with other companies for the purpose of progression and to offer new products in the market (Huston & Sakkab, 2006). Predominantly, innovativeness is primarily attained by the networking system, which helps the business to acquire the knowledge and information important for fashioning innovation, by banding with the other bases like consumers, supplying channels and research bodies, etc (Aylward & Glynn, 2006).

Therefore, in these rapidly varying scenarios and demands of market and change, many businesses establish incontrollable systems of supply chain gathering with the concerned stakeholders, for example, industrialists, distributing channels, supplying chain, and consumers. The contemporary supply chain systems comprise various establishments (Thomke & Von Hipple, 2002). Accordingly, open innovation contrivances are progressively gaining attention in the domain of supply chain management concerns (Chang & Makatsoris, 2001). As innovativeness is primarily driven by consumers, the business also establishes research and development prospects within the company, which provide direction for the latest technological interpretation for the challenges in the market (Angerhofer & Angelides, 2006).

Open innovation stratagems are usually depending on the supply chain concerned parties. Which establishes a wider domain of association amongst consumers, supplying bodies, distributing channels, and research (Azadegan & Dolley, 2010). This association significantly works to identify new significant solutions to the challenges of the market. These open innovation prospects immensely affect all the associated parties concerning the supply chain in terms of better services to consumers, productivity, and sustainability (Elmquist et al., 2009).

The conception of the blockchain system is identifying attention-grabbing study areas for researchers due to its advanced characteristics which offer effective resolutions and answers for highlighted existing gaps concerning numerous industrial setups. However, the present literature on blockchain systems is limited in terms of addressing the concerns of applying blockchain systems related to the supply chain management domain (Tribis et al., 2018). Whereas, previous studies not covering the demand of blockchain in the domain of effective management of supply

chain for the industrial sector, which should also highlight the potential mapping of studies in the domain (Maestrini et al., 2017; Khan et al., 2017).

The gap also determines the areas focused on by researchers in the domain of supply chain management concerns within the perspective of blockchain. Academia and business research and development prospects are also limited to food supply chain concerns and pharmaceutical supply chain concerns (Seebacher & Schuritz, 2017). If further narrowing down the focused areas of previous studies it's highlighted mostly the security apprehensions related to data and monetary distresses within the supply chain management system. However, academia focused on the improvement of supply chain systems. Therefore, asserted various explanations and resolutions for improving the supply management issues and blockchain systems. However, addressing the prospects of substantiation and appraisal in the domain of supply chain and blockchain is limited (Yli-Huumo et al., 2016).

1.2 Blockchain

The prompt growth of "blockchain" prospects is gaining attentiveness and has been adopted in several domains, for example, the banking sector, retailing, supply chain domain, medical care, and public organizations (Kosmarski, 2020). Blockchain brings the technological support to attain the solution for a transparent system on many levels for stakeholders as a whole arrangement. This networking arrangement offers a rationalized business system to acknowledge peer-to-peer interaction in supply chain administration (Cole et al., 2019). This progressive domain encourages a decentralized environment for connections for stakeholders of firms. Blockchain systems can offer safety, timeliness, and transparent approaches for all operators with the aim of clarity in probable applications during operational activities and supply chain management systems (Ganeriwalla et al., 2018). Certainly, experts asserted that blockchain proposes resolutions to the numerous challenging domain due to composite supply chain arrangement in the era when suppleness, speediness, and transparency is critical for businesses (Pilkington, 2016).

Blockchain technological prospects are concerned with the distribution-related database arrangement which contains proceedings of transactions and other relevant material, which are protected by cryptographically ascertain domain and administered by unanimity setup. This is the systemization associated with data configuration which unites data archives, known as blocks within a chain (Swan, 2015). Where chain is the automatically dispersed record to contain a listing

of records that operators or accomplices retain through networking systems amongst the networks. Particularly, blockchain practices cryptograph technological aspects for the purpose of processing and validating the operations on record. The whole process ensures the benefit on a commercial level, which includes the participant as a collective domain including collective power. Therefore, the blockchain system provides resolution concerning revelation and liability among the participants and firms where the concern between the stakeholders holders are not certainly allied (Casey & Wong, 2017). Where at the same time this record can be beneficial for all the concerned parties and can be updated with time. This process also includes eliminating the vital for active and inaccuracy resolution procedures with the data of each participant (Kache & securing, 2017). The arrangement involves the practices that facilitate the participants networking with better and well-timed visibility of the transactions records within the network domain. This availability of big data can be advantageous for businesses and supply chain management systems, therefore gaining the attention of businesses and researchers. The records contains encrypting and encoding system in a blockchain domain to advance accuracy, proficiency, and confidence to share information and records (Misra, 2018).

The crucial characteristics of blockchain are concerned with four domains, firstly, blockchain arrangement is concerned with providing facilitation for distribution and synchronization among networks and linkages, which inspire firms for Records sharing that develops a multi-firms business networking, like supply chains or monetary corporations (Pilkington, 2016). Secondly, a blockchain system consists of smart agreements, which involve agreements among the parties before the head and put in the storage of the blockchain. These smart agreement arrangements in a computerized way are intended to have operations in a digital way and most importantly atomization of upcoming future payments among participants (Reyna et al., 2018). Where at the same time these smart agreements also outline the purposes and settings, for example, the authentication of possessions and resources within a collection of trades with non-financial foundations (Reyna et al., 2018). This atomization provides an assurance between the parties that within the network system every participant is in concert by guidelines. Thirdly, blockchain is established via P2P networking. However, the arrangement between the concerned participants is a must and also provides validation of transaction and remove the invalid or possibly deceitful transactions from the database. Fourthly, constancy of records confirm that all transactions are

listed and not changed. That delivers the origin of resources in terms of history in relevance to the transactions (Cole et al., 2019).

2. Application of Blockchain in Supply Chain Management

The supply chain is an intricate arrangement, which is gaining fast progression in today's business world. This arrangement is the amalgamation of high-tech systems and networking technological prospects. Consequently, the supply chain domain has moved from the traditional outdated methods as a distinctive chain modeling to modern nonlinear networking chain modeling system (Akhtar et al., 2022a; Khan et al., 2017). This approach to supply chain effectiveness and efficacy is not only profitable for the profit maximization of businesses but also is constructive for the overall supply chain and related stakeholders (Meijer & Carlo, 2016). Because the threat concerning the supply chain can be a possible danger in the operational activities of the supply chain. The causes of every unspecified dynamics, due to the interrelationship of the business concerned processes and revenue between the supply chain businesses, can lead to the association amongst supply chain risk (Akhtar et al., 2022b; Fu & Zhu, 2019).

There are numerous firms that considered and applied blockchain technological support. This blockchain system application to the supply chain networking domain can transform the mode in which organizations are doing business.

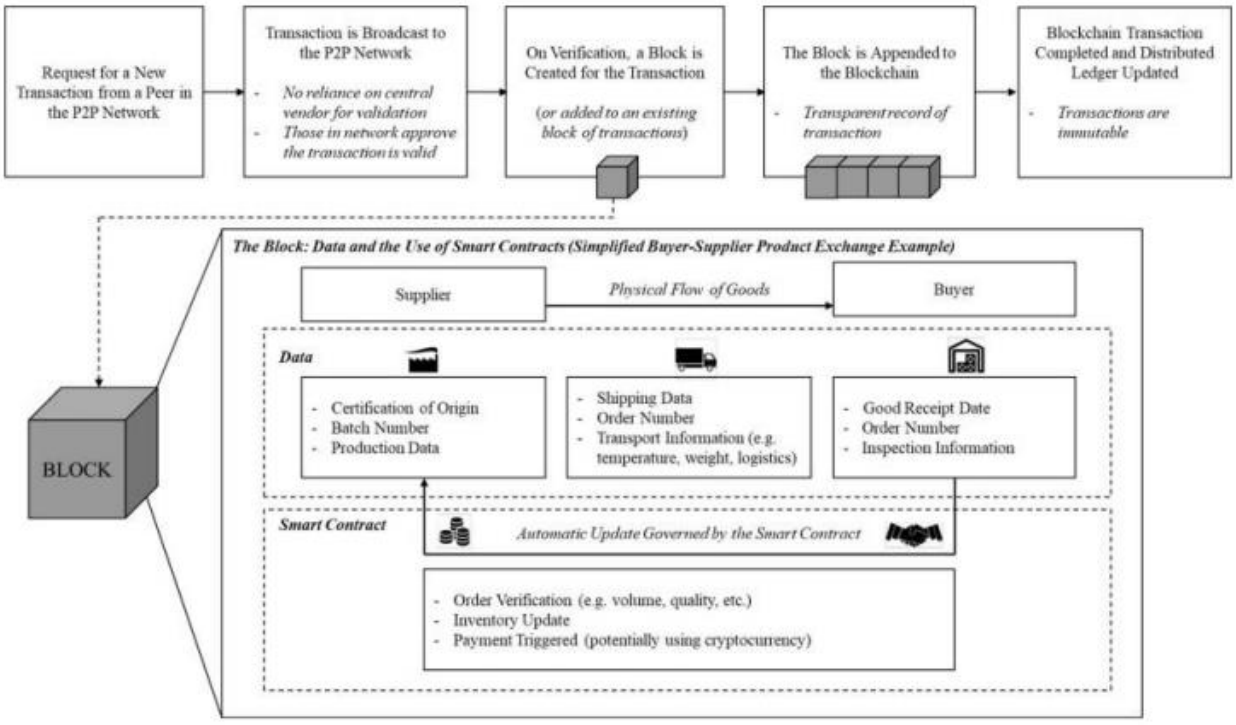

Figure 1: The application of blockchain in supply chain management (IBM, 2018)

The above figure (1) illustrates the basic example of applying blockchain in the supply management system, which includes records or prompts for a smart agreement. The system comprises a) the formation of the block from appealing a fresh transaction over the block attached to the chain. b) Further detailing is exhibited with the help of purchaser supplier patterns of which statistics might be documented within the block at every phase and also how the smart agreement can complement the practice overall (IBM, 2018). This regionalized record is more like a representation of a stock archive, which performs as a private integrated basis of information on transactions. That also includes fashioning a vibrant assessment trial based on uniformity amongst the relevant dealers. For instance, industrialized processing, assembly, supply, and protection practices (Angrish et al., 2018). Furthermore, also assists in improving product protection and genuineness, cultivating better services, and lessening the estimation of preservation aspects (Li et al., 2018).

One of the important prospects while considering blockchain in applying to the system of the supply chain is to evaluate and confirm the appropriateness and suitability of the system under consideration. The following prospects are crucial, first, to confirm the involvement of several groups in the system. The operational aspects or transactional aspects are usually managed by the

authorities (Lo et al., 2017). In this regard supply chain is a prominent example, as the supply chain is the incorporation of compound, dynamic, and multi-group engagements and activities along with governing and logistical constrictions covering multiple various jurisdictional restrictions (Carvalho & Machado, 2007). Such a multifaceted system of blockchain offers a collective and mutual structure or setup were ensuring the neutrality of power and stance which discourages the pressure of any group on dictating the projections on others. Therefore, a blockchain system provides perfect suitability in such set-ups and arrangements which includes several parties within the system, where possibly arbitrators are involved within the whole arrangement of the supply chain. Blockchain disturbs the storage of data systematized by a single group, whereas at the same time offers a better, quicker, and more economical system for all (Khan et al., 2020; Kim & Shin, 2019).

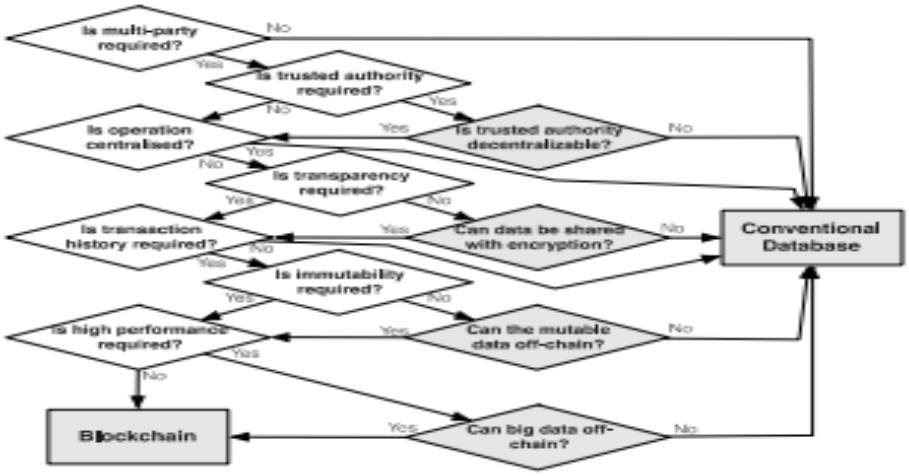

Figure 2: The aptness of blockchain in arrangement setting (Lo et al., 2017)

However, the system including a single group arrangement can select for the relatively inexpensive setup to gain the similar prospects proposed by the system of blockchain. Similarly, the arrangements which need a trustworthy authoritative body, where this authoritative body can be any system that is accredited for implementing several operational aspects or amending a plan, strategy, or structure for any operational activity within a system (Arun, 2017). Whereas, at the same time this authoritative body can also be the sole point of risk. This usually is the case when the trusted authoritative body faces complications and problems, all the users using the services from the body can be equally affected by the problems and challenges (Mesropyan, 2017). Blockchain is a system that works efficiently in all these circumstances deprived of a trusted

authoritative body within a system. However, blockchain does not eliminate the trust element within a system, because all parties are always unprotected from uncertainty (Xue et al., 2020).

Parties within a supply management system are transposing and rearranging their trust in the blockchain system instead of relying on a singly trusted central body or authorities. The blockchain system is the structure that persuades "moral conduct" of the tolerance projections, which includes trusted arbitrators to perform as directive domain for protecting data within a blockchain system (Xue et al., 2020). Blockchain facilitates the parties in a supply chain arrangement for eliminating the aspect of trusting a self-contained particular body for the purpose of maintaining the record of transactional activities, which is described as a "disseminated trust"(Wang et al., 2021).

The other crucial element of the blockchain system is associated with the domain of applying a "smart contractual system", as the system operational domain is firmer to imply for the smart contractual system than the traditional isolated structure. The domain of these contracts contains encoding which controls the interfaces amongst the conjointly untrusting groups (Omohundro, 2014). Consequently, trust is based on the projection that this encoding arrangement cannot be modified with ease. When companies apply a blockchain management system in managing the supply chain, it ensures that not a singular body will control the system in any way, but every user can be eligible for controlling their records and resources, which inherently forms challenging prospects in terms of governing the system. Managing the progression of blockchain system fashions more towards delicacy rather than outmoded risk managing or conventional product managing system (Staples et al., 2017).

Blockchain technological proposes high security and indisputable accessibility concerning supply-chain records. The basic feature of decentralization of the system is the dominant focus where legitimacy and validation can be appraised. Within the system, no individual body has the proprietorship status of the supply chain management and data included (Kim & Laskowski, 2016). Therefore, businesses shifting towards blockchain prospects as an open innovation domain which significantly provides the superiority of the rapidity of the transactions and also can be the economical option in many cases. The transactions within the Overall supply chain management system can be traced and identification is possible after encoding of record, where it cannot be simply altered by any of the parties involved (Hackius & Paterson, 2017). Any transactional record is verifiable by unanimity and consent between the parties involved. Hence, when a record is

encoded within the blockchain system, it cannot be reformed or erased by any of the individual parties. As the overall chain is encompassed by a blocking system. Therefore, amending a prevailing block would need the settlement and arrangement amongst all parties involved (Crosby et al., 2016). Similarly, within supply chain managing concerns and logistics, blockchain established singular, verifiable aspects of all activities within the arrangement, and ensures the concurrently of all the processes and activities amongst the parties and users involved within the arrangement (Xue et al., 2020; Khan & Ghouri, 2022).

There can be a significant association between the partners involved in the supply chain because trust between the parties can be established. Whereas, this trusting prospect can be the base for facilitating better attraction towards establishing objectives and tracking distresses (Sahay, 2003). Like, in the context of sustainable approaches and trust within supply chain affiliates and supportive dominance mechanisms for the purpose of forming significance (Cuevas et al., 2015). The blockchain systemization domain provides end-to-end encryption to deliver businesses assurance towards the overall supply chain (Glaser, 2017).

2.1 Application of Blockchain-Driven Supply Chain Management (BCSCM): An Inference on Open Innovation

At present, globalization and competitiveness in a local market enforced logistics to be inclined with innovativeness, the latest technological prospects, and the transformation of systems as per the demands of change defined by prioritization and objectives of the business. Where this transformational domain is also the determinant of competitiveness and density. This density continually administers the requisite for adaptation of systems, deciding on the technological support which can be beneficial on a mutual grounds for businesses and determine formatting prospects (Shcherbakov & Silkina, 2021). The phase of industry 4.0 demonstrates the need for digitalization and the supplementary aspects of combining firms and procedures as a networking domain (Lee et al., 2018). The expansion of inter-linked prospects of procurement and trade methods influences businesses, especially within industrialized segments to enlarge and advance the networking domain of communicating and elevating the supply chain practices business involved (Helo & Hao, 2019).

In the current scenario, the conception of open innovation highlights the prototypical modification in terms of tactics businesses are adapting to the innovativeness concerned actions. Open innovation is the distinction between outmoded tactics and activities within the domain of trade, supply chains, and R&D (Benkler, 2017; Khan et al., 2017). Within the context of open innovation, knowledge streams and market trails from inside and outside the origins and mix up in innovativeness-based business actions, activating greater inferences within the corresponding trade activities and arrangements. The limitations of businesses turn into lesser fixed and networking founded arrangements of businesses achieve distinction in effective stratagems (Chesbrough, 2003). The efforts of businesses related to innovation demand boundary-less practices by effectively employing inward-bound and outward-bound information for ensuring the effective implications of the innovation efforts (Chesbrough, 2006). Chesbrough (2006; 2003) asserted two alienated practices including 1) employing externally focused innovativeness within the organization, and 2) commercializing externally focused innovation efforts with internal innovativeness efforts.

Within the arrangement of open innovation businesses utilize both inside available facts and outside processed knowledge and information for the purpose of research and development progression, which has signed on the overall development of innovatively established produces processes, and services (Vanhaverbeke, 2006; West, 2006). For this purpose, the prototypical open innovation domain permits nurturing alliances with consumers, supplying bodies, and any other bases for value creation concerning the stakeholders of the company. The open innovativeness model is not only the combination of innovative mechanisms but defines universal innovativeness concerned managerial stratagems which determinedly lookout and act on a larger collection of foundations for innovativeness prospects via the variety of paths (Philips, 2009).

The primary need is concerned with the feasibility of information channels, for example, the locality and reputation of products, channels for money and reimbursement inflows and outflows, and records of manufacturing facilities and material availabilities within a supply chain arrangement. Technological support is reflected as the primary facet of these networking structures and innovativeness domain (Tijan et al., 2019).

Like these prospects are included in the supply chain to be sufficient for economic-based settings. Hence, supply chains are systematically shaped by arrangements of dealers and clients, where

every client can immediately be a dealer/supplier, and inversely, the dealer can be the client. The basic conception of the supply chain, which was asserted by Oliver and Webber (1982), has gone through major modifications over the years. The contemporary domain of the supply chain is demonstrated as a multifaceted and multiphase arrangement. Which is the alliance of various vibrant and coherent arrangements of activities and systems for users on many levels (Oliver & Webber, 2012). The overall unification of networking construction and arrangement of the supply chain is molded to include the individual users (businesses or distinct individual entities) providing the products or services to one another, and also includes an accumulation of definite consumption charges for the goods (Hahn, 2020).

The supply chain management system of firms is comprised of contracted conditions to supply resources, elements, final goods and to ensure the distribution of final goods to particular markets. Overall, the arrangement shapes the networking structural design of the logistics. However, the concern associated with this simulated incorporation is crucial. Like, the simulated incorporated arrangement provides a solution to various matters concerning the alliances but also includes creating positive exposures and weaknesses based on integration (Shcherbakov & Silkina, 2019). The following can be the main concerns associated with the simulated integration within the supply chain management system. 1) Improbability and vagueness associated with the situations of decision making (which are concerning with external setting); 2) improbability and vagueness associated with the user's activities, which are not controlled; 3) improbability and vagueness of the objectives of the users (Su et al., 2019).

However, the carefulness of the issues can increase or reduce with the transactional activities to innovative simulated integration, like the interface of users (and decisions) changes to the extent of the device-to-device collaboration and assimilation of info structures. Where also the effect of individual dynamics can be reduced but not fully vanished on many levels of the arrangement (Casino et al., 2019). When establishing shared undertakings, the major apprehension is associated with the fact that every individual user or party has their concern (s), their standards, and most importantly their stratagems for attaining the objectives planned. As the parties have their objectives to achieve, however, within the supply chain managing system these individual goals may not dispute the overall objectives and agendas of integration. This may prime to an

establishment of a multi-criterion concern associated with interconnected standards (Rozman et al., 2019).

Blockchain technological domain has enclosed the effectiveness to amending the essential arrangements and foundations which shape the prospects of contemporary civilization, which includes the reimbursement structures, marketable settlements, and numerous executive arrangements which occupy the societal domain (Casino et al., 2019). The influence of scattered records and smart contractual undertakings to ensure the elimination of confrontation and drastically decrease the cost of trades, while at the same time providing better security arrangements of trade, certainty and most importantly ensuring transparent arrangements amongst the parties (Pazaitis et al., 2017). These aspects are concerned with the domain of businesses and industrialized segments, to facilitate them, especially regarding augmentation and mechanization of industrial setups and transactional activities (Rosa et al., 2017).

Certainly, blockchain is emerged as the utmost glorified, fiercely discussed, challenging, and still favorable technological support meanwhile in the origination of the internet. The broad and vigorous potentiality of blockchain is presently well as an indication of innovation and change (Tiwari et al., 2018). Consequently, the prominence and significance of blockchain are beginning to access businesses and processes globally, receiving substantial firms which are facilitating for enhancement of the competencies of the blockchain. In accumulation, to artificial intelligence (AI), blockchain has appeared as a prominent and stimulating high-tech progression and innovativeness (Ghouri et al., 2022; Ghouri et al., 2020; Teodorescu & Korchagina, 2021).

These features are principally significant for commercial and organizational activities, which permit the growth, development, and systematization of business and trading. Similarly, in supply chain managing concerns and logistics, establishing individual, validated activities nearly concurrently amongst all parties involved in trading activities is critical (Filippi & Wright, 2018). Being the fragment of open innovation and technological prospects, blockchain establishes a larger extent of flexibility and distribution of authority which can establish favorable settings for open innovation. However, various affirmations are still assumed on expectations and activities which are disposed to the similar drawbacks of the current market systems and economic domain (Lansiti & Lakhani, 2017). The reasoning of dealings and connections exposes a faithfulness to unknowable and selective possession and controlling of capitals and supremacy domain which is

included within the arrangement. At that point, accuracy and transparency can be the utmost authoritative and dominant prominences of the arrangement to regulate and force manufacturing and hinder undermining dynamics (Hackius & Petersen, 2017).

3. Conclusion

This chapter precisely addressed the domain of blockchain-driven supply chain management concerns and the overall purview of open innovation and its need for the industrial sector. Which focused on the importance of blockchain-driven supply chain from the open innovation perspectives on the major concerns like 1) supply chain tractability, 2) supply chain data security 3) overall supply chain financial prospects, 4) and evaluating the views on the application of blockchain in the dominion of supply chain and open innovation.

Overall this chapter highlighted the advantages offered by the application of blockchain systems within the domain of supply chain and concerns of open innovation. In the context of the supply chain, blockchain benefited the industries, especially on the concerns related to tracking ability with the trustworthy data and as well as an advanced level of consistency and trustworthiness amongst the connected parties with ingenuousness, transparent processes, reliance, eliminating chances of cheating and accessibility to end-to-end encryption facilitations (Xue et al., 2020). Which at the same time benefited the businesses by providing cost-effective operations. The advantages are not limited to business only in terms of tracking facilitation, monitoring, and appraising the overall supply chain management but at the same time also provide benefits to consumers from the prospects of product excellence and safety issues (Khan et al., 2022).

However, further studies can also be done in the domain of evaluation and validation concerns by focusing on the practical examples of industries adopting blockchain-driven supply management systems. Assessing the impact of this application in the domain of open innovation for businesses and concerned stakeholders.

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