Blockchain for Businesses: A Systematic Literature Review

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Abstract. This study tries to address the literature gap of what blockchain can offer to businesses in relation to consumers (B2C), businesses (B2B) and governments (B2G) through systematic literature review on blockchain. The review covers 40 articles from business, management and accounting peer review journals recognized by Scopus database. The review highlights how blockchain will facilitate instant payments, trusted interfaces and traceability of goods for the consumers. Businesses can use blockchain for snapshot sharing, machine-to-machine transactions, accounting, business process management and provenance traceability. Blockchain technology creating new business opportunities in government sector such as digital storage, authentication and maintenance of records; smart trust codification; new market for digital payment services and global commerce.

Keywords: Blockchain; Literature review; Technology usage; Emerging technology.

1   Introduction

Blockchain is a disruptive innovation [19][26][35] which can revolutionized organizations and offers various applications. Initially blockchain had emerged for the financial sector [22][28]; but now researchers, academicians and industries are exploring blockchain for other applications in different sectors. Bitcoin was the first application built on blockchain which had facilitated money transfers and e-commerce activities [12].

Blockchain is a decentralized, permanent, transparent, immutable, trusted, peer-to-peer transaction ledger systems [14][18][38] supported by algorithmic trust and distributed consensus mechanism which enables (a) secure information sharing; (b) long term preservation of digital records; and (c)verification and validation of digital transactions.

Blockchain projects had been initiated in multiple industries such as banking, insurance, supply chain, renewable energy, real estate, healthcare and many more [5]. Decentralization and disintermediation of blockchain is leading to ubiquitous commerce [38]. Blockchain is an attractive technological solutions for: (a) proof of ownership; (b) trade ability; (c) trust among peers for real time transactions; (d) increased reliability; and (e) resilience to external threats [38].

Literature highlights technology features leading blockchain to technological commonwealth [19]: (a) disintermediation; (b) trustless exchange; (c) increased user control of information; (d) durable, secure decentralized networks; (e) transparency and immutability; and (f) maintenance of high-quality and accurate data; and also highlights technology features leading blockchain away from a technological commonwealth: (a) unresolved technical challenges; (b) unsettled regulatory environment; (c) cyber security and privacy concerns; (d) challenges to widespread adoption; (e) job loss due to automation; and (f) decreased corporate accountability. Literature indicates there is lot of complexity is involved in implementing and owning blockchain application [32] such as: (a) legal implications; (b) blockchain ownership; (c) operation of blockchain; (d) location of the ledger; and (e) control over the ledgers.

Rapid development of blockchain as an economic platform in different industries and huge demand of its characteristics and technological solutions had raised the need for the broad view of the use-case offered by the technology in context of the businesses. However this is missing in the existing literature. Therefore this study tries to address this literature gap and tries to investigate the answer for the question: What blockchain can offer to businesses in relation to consumers (B2C), businesses (B2B) and governments (B2G)?

The literature review helps us in identifying use-cases that had been offered by the blockchain in the past [10]. Through systematic literature review of the academic literature surrounding the blockchain in peer reviewed journal on subject area of business, management and accounting tries to highlight the various use-cases of the blockchain for B2C, B2B and B2G. The rest of the paper has been structured as follows: Section 2 discusses the methodology adopted for systematic literature review along with brief overview of the metadata of selected articles, section 3 discusses use-cases of blockchain in B2C, B2B and B2G context. Section 4 discusses and concludes the study followed by discussing the limitation of the study along with future research directions.

2 Methodology for Systematic Literature Review

This section illustrates the procedure adopted for selecting the studies (section 2.1) for systematic literature review for investigating blockchain offers to businesses in relation to consumers (B2C), businesses (B2B) and governments (B2G). The brief overview of metadata information of the studies is presented in section 2.2.

2.1 Literature – Systematic Selection Protocol

For the current study, evidence based systematic literature review process suggested by Brereton and others (2007) [42] had been followed. The process model consists of the 10-stages, which can be grouped into three main phases outlined in fig. 1. According to Elsevier, Scopus is the largest abstract database for journals, books and conference proceedings. Scopus provides rich interface to the user for selecting the studies on the basis of year, document type, subject area, keywords, source title, source type and lan-

guage. Therefore to study what blockchain can offer to businesses in relation to consumers (B2C), businesses (B2B) and governments (B2G), Scopus was considered as the electronic database and subject area had been limited to "Business, Management and Accounting". For developing the review protocol previous studies in literature had been considered [39][40][41][42][45]. The review protocol minimizes the bias in the study [42]. The review protocol had been formally reviewed by Prof. Arpan Kumar Kar and the results of it were considered by the review team as well.

The search term "blockchain" in title, abstract and keywords field had been searched in Scopus database on 20th April 2018. The stage 5 (in fig. 1), select primary studies is a two-step process. In first step irrelevant studies on basis of the title and abstract were rejected. In the second step inclusion/exclusion criteria was applied on the studies. The studies which provides the answers to the research questions were considered further in the review process. The studies not providing any information related to research question had been excluded. The studies selected for the current review had been restricted to journal publication only because of the following reasons [42]: (a) journals are well established and offers adequate indexing; (b) to make assure study had been written by expert; and (c) study had been reviewed by other experts in the field before publication. The metadata information for the selected studies had been extracted and analyzed. Results of it are presented in section 2.2. Section 3 presents the offers of the blockchain technology to businesses in context to consumers (B2C), businesses (B2B) and governments (B2G). The review had been validated internally.
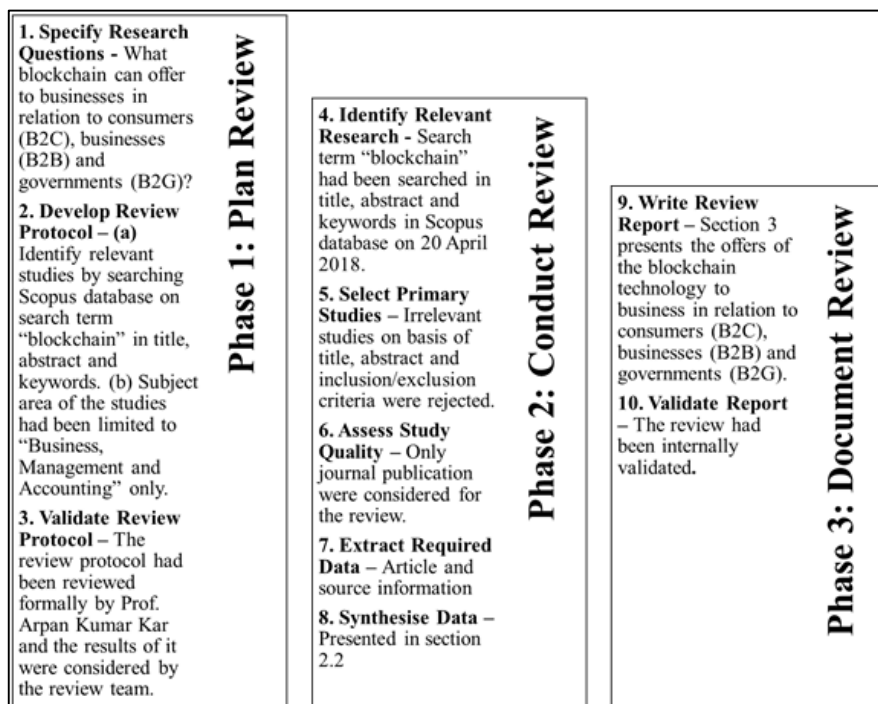

Fig. 1. Systematic literature review process followed

2.2 Brief overview of metadata of selected articles

This section tries to presents the brief overview of the metadata of the selected articles in terms of year of publication, journal, article titles and keywords. The fig. 2 presents the journal and year wise count of the selected studies. In the selected studies two studies were published in 2016, 27 studies were published in 2017 and 11 studies were published in 2018. Journal wise highest number of the studies was published in journal "Strategic Change" in a special issue "The Future of Money and Further Applications of the Blockchain".

The figure 3(a) tries to give the overview of the keywords of the selected articles followed by the figure 3(b) tries to give the overview of the titles of the selected articles. Figure 3 depicts the blockchain had been associated with subject areas such as finance, accounting, fintech, corporations, management, manufacturing and marketing. Figure 3 illustrates blockchain had been associated with information and management in which processes, provenance and protection plays a role.

Fig. 2. Journal and year wise count of the selected studies

Fig. 3. (a) Word cloud on selected studies keywords; (b) Word cloud on selected studies article title

Fig. 4 presents the association among keywords of the selected studies for the systematic literature review using paired words analysis. The paired word analysis had been applied over the keywords to better understand which keywords are being used together mostly. The analysis depicts the following words had been used often: (a) supply and traceability; (b) distributed ledger and entrepreneurship; (c) bitcoin and block;

(d) provenance and smart; (e) distributed architectures; and many others. These all words highlighted above are strongly connected along with other words such as technology, disruptive, disintermediation, crowd, disruptor, managed, framework and contract. Thus these indicates the blockchain can be used for unbiased, trustworthy, distributed interface.

Fig. 4. Association among keywords of selected studies for systematic literature review

3 Blockchain for Businesses in context to consumers, businesses and governments

This sections had been divided into three section. The first section, highlights offers of blockchain for businesses to consumers. The second section list the blockchain offers for B2B followed by the third section which lists the blockchain offers in context of businesses to governments sector.

3.1 Business to Consumer offers

Blockchain infrastructure has the ability to provide trusted user interfaces for consumers [34]. Literature indicates using blockchain infrastructure an individual can control their own personal data like identity proofs, citizenships, financial and educational records [14][34]. Crypto currencies such as Bitcoins facilitates instant payment without a

central bank or financial intermediaries [2][12]. The instant payments provides consumers with the following benefits such as (a) low transaction cost; (b) faster transaction completion time; and (c) lessening coordination issues. Literature suggests blockchain can be used for giving incentives to researchers for doing peer review of scholarly papers [31]. The table 1 lists the use-cases offered by blockchain for consumers along with the literature evidences and impacts. Popular offers that businesses can offer to their consumers are: (a) trusted user interfaces; (b) facility of instant payment for goods; (c) incentive receiving system; and (d) web interfaces for traceability of goods.

Table 1. Use-cases offered by blockchain for consumers

Applications	Literature Evidences	Impacts
Trusted user interfaces	[7][9] [14][29] [27][34] [43]	• Virtual direct one to one connections • Instant social sharing • Instant exchange of information • Protecting consumer privacy
Instant payments facilities (specially micro)	[2][23] [29]	• Low transaction cost • Faster transaction completion time • Transferring money across the global without intermediaries, i.e. banks • Lessening coordinating issues
Incentive receiving system	[31]	• Receiving incentives virtually in secure way through blockchain infrastructure
Traceability of goods	[7][15]	• Authenticity of luxury goods • Customer centricity • Improves informedness

3.2   Business to Business Offers

Literature indicates businesses is actively investigating in blockchain technology for commercial products and services [6]. Table 2 tries to list down the blockchain use-cases for businesses in selected articles along with literature evidences and their impacts. The company data can be warehouse on blockchain [34]. The blockchain will protect the data from security breaches. Using blockchain snapshot sharing can be done in one go which leads to transparency and removing layers of management within an organizations.

Kewell and other [13] had pointed out Everledger and Provenace are the companies working in supply chain operation. Blockchain streamlines the entire supply chain [38] and facilitates ownership, tracking and traceability of the assets [14]. Blockchain automates supply chain operations and makes it both responsive and cost-efficient [38]. Using blockchain machine-to-machine transactions is possible which can lead to market disintermediation [38] through autonomous economic agents, which send and re-

ceive money over IP. Autonomous economic agents may take the form of (a) autonomous vehicles; (b) independent certification agents for academic degrees or national identities; (c) for car parking ticket collection.

Literature suggests blockchain within and cross organizations can be used for (a) a real time, verifiable and transparent accounting system can be built [3][16]; (b) container load optimization for international trading [33]; (c) legal and procedural standards for knowing your customer and suspicious transaction reporting requirements [32]. There is a need for business managers to understand potential benefit and threat of blockchain applications [35].

Table 2. Use-cases offered by blockchain for businesses

Applications	Literature Evidences	Impacts
Storing of the records	[3][16] [22][34]	• Data availability across the organization increases. • Reliability for the preservation of company record increases.
Snapshot sharing in one go	[13][14] [33][34] [38][44]	• Sharing at the enterprise level • Horizon-scanning. • Improves transparency within organisations. • Flattens the hierarchy within firms.
Autonomous execution / Machine-to-Machine transactions	[38][30]	• Autonomous economic agents, who send and receive money over IP. • Increased commercial efficiency
Accounting	[3][4] [24][16]	• Helps in verifying and auditing records • Brings transparency into the systems
Market disintermediation	[1][22] [38]	• More efficient operations • Faster transactions • Direct linkages
Business process management	[21][35]	• Builds mutual trust within a firm • Automation and monitoring
Provenance tracking	[8][15] [23][27] [20]	• Better supply chain operations • Authenticated ownership for digital assets • Increases transparency in the transactions • Sources of the products can be identified
Rapid internationalization	[37]	• Decentralized autonomous organization

3.3 Business to Government offers

Blockchain as a technology is creating new opportunities for business in government sector. Some of popular are listed in table 3, these are: (a) digital storage, authentication and maintenance; (b) smart trust codification; (c) new market for digital payment services; and (d) global commerce. Government facilitates transaction and provides necessary institutional infrastructure [38]. There is a need in the government for keeping the trustworthy records [18] for the following use cases: (a) identity identification; (b) property titles; (c) election and voting [14]. Using blockchain these use cases can be recorded on immutable, transparent, and verifiably distributed ledger. Blockchain technology for these use cases can be divided into four transactional activities: (1) recording; (2) validating; (3) updating; and (4) authenticating [18]. Thus from these evidences it can be concluded blockchain is creating new opportunities for businesses in government sector.

Estonian government is offering e-residency to every world citizen [32]. In this offer government issues digital identity to the citizens. These digital identities proof enables citizens to run an online company for commercial activities with both public and private sectors. E-residency is a commercial initiative of the Estonian government for borderless trade. E-residency leads to creation of new and false identities of the citizens which can be used for: (a) hiding real identity; (b) money laundering; and (c) organized crime [32].

Blockchain will eliminate fraud and corruption within government ecosystem [14]. Usage of blockchain in government ecosystem will offer speed, efficiency and trust to the people lying at the bottom of the pyramid. Kewell and other [14] had pointed out the government are working on blockchain initiatives along with startups. These countries are Ghana, Honduras, Sweden and Georgia. Under-socialized use cases of blockchain will foster the visions for the technology [13]. The table 3 highlights some of the blockchain use-cases for government ecosystem.

Table 3. Use-cases offered on blockchain by businesses to governments

New Businesses opportunities	Applications	Literature Evidences	Impacts
Digital storage, authentication and maintenance	Land registries / Property rights	[11][18]	• To stop illegal acquiring of properties
	Identity management and authentication	[14] [18] [32] [19]	• For country's immigration policies • For national security • For election and voting • Identification of identity frauds
Smart trust codification	Law and legal enforceability	[6][11]	• Jurisprudence • Smart trusts through written code

New market for digital payment services	Financial inclusion	[14][17] [38]	• For unbanked citizens at bottom of the pyramid leads to financial inclusion • Removes payment barriers
Global commerce	Cross border activities / Borderless commerce	[7][28] [30][32] [37][38]	• A free global market • Commercial initiatives • Offers better services and products to the citizens. • Leads to global competitions among firms
	E-Residency	[32]	• Enables commercial activities

4   Discussion and Conclusion

Internet took two decades for development and next decade for commercial purposes whereas blockchain is developing more rapidly as an economic platform [34], therefore there was a need for investigating the various use-cases offered by blockchain technology for businesses in relation to different stakeholders such as consumers and governments.

This study signifies blockchain will transform as well as revolutionized the way businesses are organized and managed in coming future which is in line with literature [34] and will affect daily operations of business activities and processes [30]. The table 1, table 2 and table 3 highlights the various blockchain use-cases for businesses in relation to consumers, businesses and governments along with their literature evidences and impacts. The summary of table 1, table 2 and table 3 had been presented in table 4. The study points out using blockchain infrastructure, businesses can provide trusted user interfaces for consumers along with facilities of instant payments and better traceability of goods.

Blockchain technology can replace the supply chain labor intensive and time-consuming operations with a software, can automate and make it more responsive, consistence and real time reporting [22]. Blockchain infrastructure make feasible for businesses for snapshot sharing in one go along all the stakeholders leads to transparency within an organizations. The study points out blockchain can be used among organizations for various purposes such as accounting, international trading and knowledge sharing [3][16][32][33]. Through blockchain government can offer a free global market [32]. Reduction in the cost of financial transactions through blockchain will result in widening financial inclusion [14]. Blockchain is more suited for multi-stakeholder governance model as it involves the participation of various participants [36]. Literature

suggests the steps for organizations to understand and implement blockchain technology [34]. This study suggests researchers to pay attention to blockchain research opportunities for rapid internationalization of organizations.

Table 4. Blockchain offers for businesses in context to B2C, B2B, B2G

Consumers	Businesses	Governments
➢ Trusted user interfaces ➢ Instant payment facilities ➢ New incentive receiving system ➢ Traceability of goods	➢ Storing of the records, Snapshot sharing ➢ Autonomous execution ➢ Accounting ➢ Market disintermediation ➢ Business process management ➢ Provenance tracking	➢ Digital storage, authentication and maintenance ➢ Smart trust codification ➢ New market of digital payment services ➢ Global commerce

5 Limitation and Future Work

For articles search for systematic literature review, only electronic database, Scopus had been considered for this study. Future studies can explore other databases as well. Only journal publication had been considered for high quality publication, future research can consider secondary resources as well for the literature review [42]. Only keyword "blockchain" had been used for searching the articles future studies can use other term such as "distributed ledger", "crypto currency", "smart contract" and many more terms which had been strongly related to blockchain in fig. 4. This study had been restricted to subject area "Business, Management and Accounting" only, because of the research question had been explored in the study. Therefore future studies can explore the blockchain use-cases in the other subject area, by expanding the subject area to other areas such as decision sciences, computer science, social science and many more.

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