

Blockchain technology – a new approach in business environment

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Abstract. Given the newest trends in business and the growing interest towards Internet of Things, it became natural that economic environment switched the paradigm of classical business model. Blockchain technology is a very timely topic of discussion both in academic environment and outside it. This element was proven by authors when analyzing the topic towards the number of publication releases and the search engine queries. Furthermore, the authors shaped the framework of blockchains’ development highlighting the main advantages and disadvantages for Industry 4.0.

1 Introduction

Specialists discuss that the world is at the start of a new industrial revolution, which is considered the fourth revolution and is called "Industry 4.0" [1-5]. The manner of doing business in any company changes due to several factors, such as: globalization, high level competition, information becoming a key resource or digitalization (both of work space and business environment). Connecting many products to the internet, the presence of highly sensitive sensors, the expansion of wireless communications, developing intelligent machine and real-time data analysis have the potential to turn the way the production is done. Given this, the business environment tends to adapt to this shift of paradigm. As a consequence, businesses turn to cloud or at least try embed more and more features related to Internet of things, not only in terms of marketing strategy, but also by integrating innovative elements such as cryptology or cryptography..

In 2008, Nakamoto [6] introduced the concept of blockchain without using the exact term yet explaining the technology by presenting Bitcoin as virtual currency. Bitcoin is known as the first virtual currency. Yet, in only 10 years, the number of known virtual currencies grew to more than 1590 [7], the most traded elements being the following:

Table 1. Top 5 most traded virtual currencies

Currency	Market capitalisation [\$]
Bitcoin	141,568,525,343
Ethereum	70,160,750,450
Ripple	26,661,640,812
Bitcoin Cash	20,283,402,474
EOS	11,347,212,707

Until recently there was no official definition of “blockchain”. Still, in March 2018, blockchain was defined as “a digital database containing information (such as records of financial transactions) that can be simultaneously used and shared within a large decentralized, publicly accessible network” and also as “the technology used to create such a database” [8].

Expert Aaron Montemayor Walker explains the technology in few easy steps [9]:

- One party requests a transaction
- Requested transactions are funneled into a P2P (peer-to-peer) network and broadcast to each individual computer (node)
- Individual nodes receive the request and validate the transaction using an algorithm
- Approved transactions are represented as blocks and added to a public ledger
- Once the block is added to an existing chain, transactions are complete and permanent.

A blockchain is characterized by censorship resistance, immutability and global usability, and has a global network of validators called miners, who maintain it through block rewards, named crypto tokens [10,11].

The paper presents, in great, a literature research towards the concept of “blockchain technology”. The literature research shall represent the starting point for a deeper analysis in order to help practitioners reshape their businesses, in order to become more globally competitive.

2 Research methodology

The research methodology had the following steps:

- Enquiring Web of Science database towards the number of publications that had “blockchain” as topic and assessing the categories regarding those results
- Investigating “blockchain” as “search topic” on Google Trends.

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- After the comprehensive trend analyses, a wide-ranging literature review was conducted and summarized in order to shape the advantages, disadvantages and possible applications of blockchain technology as the IT impact on the company is not only felt from the outside environment, but also from within the company

Web of Science is an online subscription-based scientific citation indexing service that provides a comprehensive citation search.

It gives access to multiple databases that reference cross-disciplinary research, which allows for in-depth exploration of specialized sub-fields within an academic or scientific discipline. [12]

Google Trends is a public web facility of Google Inc., based on Google Search, that shows how often a particular search-term is entered relative to the total search-volume across various regions of the world, and in various languages.

The horizontal axis of the main graph represents time (starting from 2004), and the vertical is how often a term is searched for relative to the total number of searches, globally. [13]

3 Results

The level of interest towards “blockchain” embedded two layers: the academic environment and the non-specialists’ environment. The authors assumed that the more attractive the topic is, the more many publications are released.

This research was conducted on the 1st of May 2018. We collected a number of 594 of publications within the selected period, namely 2013-2017.

As it can easily be observed, the evolution is positive, having an exponential increasing trend. This trend is presumed to be a consequence of the novelty of the topic.

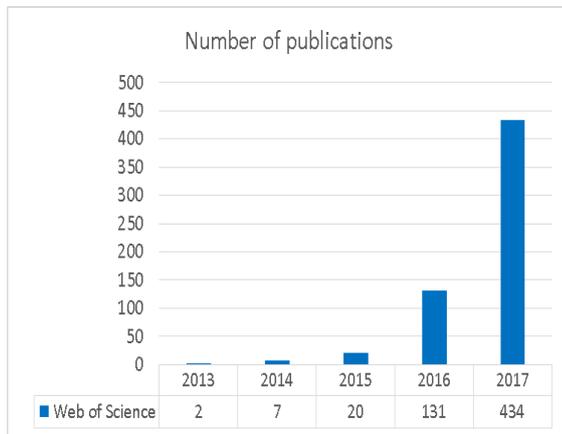


Fig. 1. Evolution of number of publications on “blockchain”

In terms of “Web of Science” domain, most papers deal more with the technology as engineering process, only recently, scientists shifting the paradigm to business features (Table 2).

Table 2. Top 10 papers categories on “blockchain”

Web of Science Categories	No. of papers
computer science information systems	180
engineering electrical electronic	165
computer science theory methods	162
telecommunications	95
computer science interdisciplinary applications	81
computer science software engineering	63
business finance	49
computer science artificial intelligence	46
computer science hardware architecture	45
business	28

As for the non-specialists’ interest towards blockchain, Google trends revealed that the interest reached a pick at the end of 2017, nowadays, the trend being negative. This is considered to be also an effect of the negative marketing campaigns conducted by the conventionall financial organizations. Furthermore, many governments try to establish an restrictive regulatory framework for “smart contracts”.

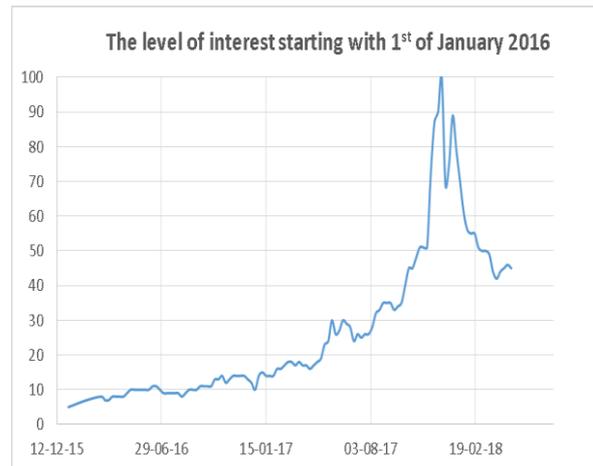


Fig. 2. People’s interest towards “blockchain”

The numbers associated in a certain period with interest (as seen in Fig. 2) represent the search interest associated with the highest point in the chart for the specified region and time. Value 100 is related with the maximum popularity of the term. We selected the period after 1st of January 2016 as, starting that date, Google trends implemented a more performant tool in collecting and analyzing these particular type of data.

One may conclude that the trend shifted to negative as Bitcoin value started to decrease. As it can be observed in following tables, the search of “blockchain technology” on Google is correlated mostly with business environment (Bitcoin, wallet, investment, ...)

Table 3. Top 5 search terms related to blockchain

Searched topic	Scoring
Blockchain	100
Bitcoin	14
Wallet	6
Ethereum	3
Blockchain.info	3

Scoring is done on a relative scale, where the most frequently searched topic has 100 points.

Table 4. Related entities.

Term of search	Results
Ethereum	massive growth
Cryptocurrency	massive growth
Technology	massive growth
Investment	massive growth
Ripple	massive growth

According to Google trends “The results marked “Massive Growth” have shown an increase almost impossible to measure, most likely because the topics are new and previously there were few searches for them (or not at all)”.

Table 5. Top 5 related queries to “blockchain”

No.	Related query
1.	blockchain bitcoin
2.	bitcoin
3.	blockchain wallet
4.	blockchain technology
5.	what is blockchain

Another layer of the analysis took into consideration the interest of academia in blockchain technology vs. the interest of business sector. It was revealed that the scientific interest is not followed by a putting in practice of the theoretical findings.

Table 6. Top 5 most productive countries

Country	No. of papers
USA	162
China	107
England	64
Germany	49
Italy	39

Despite the results retrieved from Web of Science (see Table 6), L. Lewis states that top 5 countries leading in blockchain industry is [14]:

- Switzerland
- United Kingdom
- Estonia
- Singapore
- Cyprus

Even if most people refer to “blockchain” only in terms of crypto-currencies, this technology has multiple applications: [15]

- As a system of record:
 - For digital identity
 - For authentication in certain context (tokenization)
 - For governments
 - For financial institutions
 - For audit trails
- As a platform:
 - For smart contracting
 - For automated governance
 - For markets
 - For streamlining of clearing and settlement
 - For automating regulatory compliance

There should be mentioned several blockchain platforms that embed those elements:

- Bitcoin [16] is the first and best known blockchain network, mainly oriented on crypto-currency transactions
- Ethereum [17] was launched as an open-source blockchain platform in 2015, defines smart contracts and is designed for a large variety of decentralized applications (DApps)
- Hyperledger [18] is a Linux Foundation Project and incubates and promotes a range of business blockchain technologies, including distributed ledger frameworks, smart contract engines, client libraries, graphical interfaces, utility libraries and sample applications.

The advantages of the blockchain technology are the following [10,19]:

- self-sovereignty - users identify themselves and maintain control over the storage and management of personal data;
- trust - the technical infrastructure offers secure operations (payments or issue of certificates);
- transparency and provenance - to perform transactions in knowledge that each party has the capacity to enter into that transaction;
- immutability - records are written and stored permanently, without the possibility of modification;
- disintermediation - no need for a central controlling authority to manage transactions or keep records;
- collaboration - ability of parties to transact directly with each other without the need for third-parties
- durability – the decentralized networks offer no central point of failure

One the other hand, we shall mention also the disadvantages, as for example:

- large energy consumption
- uncertain regulatory status
- the novelty of the technology
- performance – it is slower than a centralized database
- costs

4 Conclusions

As Holotescu [10] mentioned: “blockchain has surged from a technology with narrow applications related to digital currencies, to one with important applications in many domains, drawing attention to policy makers at different levels too.

In spite of the evidences that blockchain could solve some of the most pressing problems in business and society today, there is a gap in turning many use cases into reality, particularly from a strategic viewpoint.

In October 2017, Pannetta mentioned blockchain as a strategic technology trend it “holds the promise to change industries, and although the conversation often surrounds financial opportunities, blockchain has many potential applications in government, healthcare, content distribution, supply chain and more.” [20]

Furthermore, being such new technology, there are many risks that might occur as there was not enough time of testing it therefore “black swan” events are highly probable.

Nevertheless, we shall mention that specialists predict that [9, 21, 22]:

- major institutions will offer pilot programs to the public
- blockchain will reshape the future
- financial institutions will invest more and more in blockchain technology
- blockchain – IoT (Internet of Things) will boom

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