

Can FinTech Progress the Real Estate Sector? The Disruptive Role of Crowdfunding & Blockchain: A Systematic Literature Review

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Abstract— The aim of this article is to examine the literature on the role of two dominant players within the FinTech world in recent years: on the one hand, crowdfunding and on the other, blockchain. Our focus will be on the traditionally static and non-innovative real estate sector, trying to analyse how the latter can benefit from the use and interaction between these two new actors. Through a systematic literature review (SLR), 143 scientific articles based on current literature have been identified to better understand the topic. The information collected from the selected articles is presented and summarised in specific tables and graphs for a more immediate understanding. The qualitative research software Nvivo was also used. This research found 43 out of 143 articles analyse the phenomenon of crowdfunding based on blockchain technology from an economic point of view. After the descriptive results through qualitative analysis, the evidence that emerged is that none of the articles analysed deals with the issue in terms of real estate to understand possible practical implications and further theoretical contributions. This research work suggests to investors who intend to invest in real estate, how new investment methodologies could bring enormous benefits to a sector that is less prone to innovation and traditionally static, considering how the use of new technologies applied to alternative financing instruments would make real estate investments much more attractive and accessible. This study contributes to advancing knowledge of the FinTech world, specifically of new alternative financing instruments such as crowdfunding and new emerging technologies such as blockchain, from a theoretical point of view. As far as the authors are aware, this is the first study that systematises the international literature on the subject, highlighting the main contributions written on the subject, always keeping a focus on real estate.

Keywords: *FinTech, Crowdfunding, Blockchain, Real Estate, Systematic Literature Review*

I. INTRODUCTION

The term FinTech, composed of the words financial and technology, is a term to describe the use of technology applied to finance and everything that revolves around it. As highlighted in the literature (Hochstein, 2015), the term was coined in the early 1990s but has only recently come to the fore with its main subsets that at present appear to be crowdfunding

and blockchain. Another definition of FinTech is that given by PricewaterhouseCoopers (PwC) in its 2019 Global FinTech Report:

FinTech is a combination of technology and financial services that's transforming the way financial businesses operate, collaborate, and transact with their customers, their regulators, and others in the industry. All types of companies, from start-ups to tech companies to established firms, are using FinTech (PwC, 2019, p.3).

Specifically, we can say that Fintech concerns the digitisation of the financial system, in particular the banking system, to make it more effective and efficient (e.g., Freedman, 2006; Ferrari, 2017). Not only do we hear about crowdfunding and blockchain but often also about peer-to-peer lending, payment systems and crypto currencies. 2018 was a record year for FinTech investments, with figures approaching \$40 billion. The results showed an exponential increase in investment compared to the previous year of 120% worldwide. Among the countries that have distinguished themselves for innovation and Artificial Intelligence (AI) technologies in the financial field, the United States has played a key role, but it is above all the new emerging giants, such as China and the Asia Pacific, that have gained significant market shares. In this context, Europe, albeit slowly compared to other countries, is continuing its run of allocating from 10% to 15% of investments to the international market. The new players born in this evolutionary context can be grouped into two macro-areas: financial pure, which includes all the companies involved in payment, money management, lending, wealth and asset management, capital market and trading, and crowdfunding; and other companies that operate outside the strict banking value chain but enter the market with an innovative offer and which are of great interest to the financial world, such as InsurTech, RegTech, Tech Enabler and Cybersecurity (Cb Insights, 2019).

The interaction between crowdfunding and blockchain is a relatively young topic in terms of scientific discussion. There have been several contributions regarding the application of crowdfunding to the real estate sector (e.g., Brzeski, 2014; Montgomery et al., 2018; Garcia-Teruel, 2019; Politecnico di Milan, 2019). Multiple contributions have existed for some

years now in the literature regarding blockchain (e.g., Fanning and Centers, 2016; Guo and Liang, 2016; Cai, 2018), but to our knowledge, there are no contributions in literature dealing with the application of blockchain-based crowdfunding in the real estate sector. Our review is therefore based on the following research questions:

RQ1: Could crowdfunding, through interaction with and the help of blockchain technology, be a valid alternative in real estate, a traditionally cyclical, static and non-innovative sector, to make this sector more attractive and innovative?

RQ2: What direction is being taken with regard to the development and use of blockchain as applied to crowdfunding? Can it be applied to the real estate sector and, if so, how? Can the use of tokens be a valid opportunity?

RQ3: Can blockchain applied to crowdfunding play a key role in the real estate sector in the future?

The purpose of this paper is twofold: 1) to highlight whether there are any contributions in the literature dealing with blockchain-based crowdfunding and whether they specifically concern the real estate sector; and 2) to understand the direction in which the studies on crowdfunding are going and if there are more connections with new technologies, in particular blockchain. From a methodological point of view, a systematic review of the scientific literature has considered crowdfunding and blockchain as a subset of FinTech in real estate. SLR is a method that allows the collection of a sample of publications to be systematically examined (Petticrew and Roberts, 2006) in different areas of research (e.g., Pittaway et al., 2004; Gligor and Holcomb, 2012; Kumar and Goyal, 2015; Tian et al., 2018). The use of the SLR method can be beneficial for locating, evaluating and synthesising most of the information and recent contributions on blockchain-based crowdfunding. Using the Scopus database, 143 papers were identified and analysed to better understand the approaches and methodologies adopted in recent studies in the FinTech field. More specifically, 42 out of 143 of the analysed articles were in the economic, financial or business and management areas.

The rest of the article is structured as follows. In the next section, the theoretical frameworks for crowdfunding, blockchain and an overview of real estate, with a focus on Italy, are summarised. Section 3 examines the methodology adopted to collect the relevant documents for the review, while section 4 provides the descriptive results and section 5 addresses the gaps in the literature and the direction to be taken for future research lines.

II. THEORETICAL BACKGROUND

A. Crowdfunding concept and definition

The concept of crowdfunding is in an evolutionary state that arbitrarily limits definitions (e.g., De Buysere et al., 2012; Pais et al., 2014; Quaranta, 2016; Tencalla, 2017; European Commission, 2018). De Buysere et al. (2012, p.9) defined crowdfunding as ‘a collective effort of many individuals who network and pool their resources to support efforts initiated by other people or organizations’. Pais et al. (2014, p.10) defined it as ‘a form of participation (financial, but not only) of the (social) network and through the network (Internet) to a project that is characterized by: forward planning; freedom of choice

of the project and of the designer, conveyed through reputational mechanisms; transparency of the funds collected’.

Quaranta circumscribed the term crowdfunding as:

a particular type of collective funding that, exploiting the potential of the Internet, allows those who have ideas or needs, but—respectively—not all the funds to realize or satisfy them, to try to access third-party financial resources, starting from those of relatives and friends (family and friends) in the hope of attracting those—much larger—of the crowd (crowd) that populates the online world, which, trusting the feedback mechanisms which are generated among users is willing to finance an increasing number of ideas (needs), as the tendency is to sell more and more units of products and/or services specific to small niches. In this way, anyone can potentially access a real ‘crowd funding’ (Quaranta 2016, p.241).

For Tencalla (2017) crowdfunding can be defined as ‘the process by which more people give money to finance a project using websites and sometimes receive a reward in return’. Finally, the European Commission (2018) highlighted that ‘the basic function of Crowdfunding can be described as an open call via the Internet for the provision of small fundraisers. In order to compensate for the financial risk (tangible reward)’.

Crowdfunding can therefore be seen as a subset of FinTech, which in the literature (Belleflamme et al., 2015) is divided into 2 distinct groups:

- Investment-based crowdfunding
- Reward- and donation-based crowdfunding

There are currently five standard crowdfunding models: donation-based crowdfunding, equity-based crowdfunding, reward-based crowdfunding, royalty-based crowdfunding and lending-based crowdfunding. Equity involves the purchase of an investor's stake in the company; lending consists of a loan from private individuals or institutional intermediaries that will be repaid with consideration of an interest over a set period of time; reward involves a non-monetary reward, a product or service based on what is invested in the financial campaign; royalty involves a monetary reward in terms of shares of the future income of the project for which financing is requested; and donation involves a donation to finance projects with social implications (Belleflamme et al., 2014).

B. Blockchain origin and definition

Everything started in the literature in 2008 with Satoshi Nakamoto's famous white paper which proposed his concept of decentralised digital payment:

An electronic payment system based on cryptographic evidence [...] that allows any two counterparts to negotiate directly with each other without the need for a trusted third party [...] using a distributed peer-to-peer time stamp server to generate computational evidence of the chronological order of transactions (Satoshi, 2008, p.1).

As a result of this paper, the first block, called Genesis Block, was created in January 2009, within which the first Bitcoins were mined. It is interesting to note that the word blockchain never appears in the white paper; in fact, the potential of the underlying technology for the Bitcoin protocol only began to be taken into account a few years later.

It is important to pay attention to how the word ‘blockchain’ is written; with a capital letter, we refer to the technology underlying the Bitcoin protocol, while with the lowercase letter, we refer to the underlying technology that has other cryptoassets and not necessarily bitcoin (Garavaglia, 2018). Literally, the term means a chain of blocks; it is a large, decentralised digital register in which entries are grouped in concatenated blocks in chronological order. We can think of blockchain as a huge shared database in which every 10 minutes, more or less, a new block is undermined whose security is guaranteed by asymmetric encryption. Nakamoto's revolutionary idea included a type of data storage in which everyone can see what is inside and make sure it is real. Not a single bit can be changed, and once something is on the network, it stays there forever (Collins, 2016).

Blockchain technology is based on a few basic principles:

- Decentralisation and distribution because every single node that makes up the network has access to the whole blockchain and the whole history since the genesis block.
- Peer-to-peer communication, that is, communication passes through individual nodes without passing through a centralised server.
- Transparency because each transaction has an identifier and is visible by anyone; and pseudo-anonymity because each user has its own alphanumeric ‘address’ between which transactions occur, and each user can decide whether or not to show proof of identity.
- Irreversibility because once transactions are entered in a block and validated, that particular block is linked to the previous block without the possibility of modifying the history of the whole blockchain.
- Computational logic because the transactions within the blockchain are linked to computational power derived from the entire network. Users themselves can set the rules and the algorithm that will automatically undermine the next bloc with the transactions between nodes inside (Boucher et al., 2017; Iansiti and Lakhani, 2017; Zheng et al., 2018).

At the present time, there is no real regulation. However, we can say that some countries, such as the United Arab Emirates with its ‘UAE Strategy for Artificial Intelligence (AI) 2031’, have defined a new model of ‘smart government’ based on blockchain technology (<http://www.uaesai.ae>). In the United States, some states, such as Illinois, have approved the ‘Blockchain Technology Act’ within which smart contracts on blockchain are protected by law and given a clear definition as ‘a contract filed as an electronic record which is verified through the use of a blockchain’ (www.ilga.gov). At the Italian level, on the other hand, an initial definition of blockchain has begun to be given with article 8ter of Decree Law 135/18, which establishes:

technologies based on distributed registers as the IT technologies and protocols that use a shared, distributed, replicable, simultaneously accessible, architecturally decentralised register on cryptographic bases, such as to allow the recording, validation, updating and archiving of data both in clear text and further protected by encryption that each participant can verify, cannot be altered or modified (Official Gazette of Italian Republic, 2019).

Smart contract, on the other hand, means ‘a computer program that operates on technologies based on distributed registers and whose execution automatically binds two or more parts on the basis of predefined effects by the same’ (Official Gazette of Italian Republic, 2019).

C. Overview of the Real Estate in Italy

Real estate showed significant growth until the first years of the 21st century thanks to the new opportunities related to the possible achievement of a good yield and the high expectations related to achieving capital gains by developing new financial tools. Nevertheless, starting in 2008, the conditions that supported real estate development have come to a screeching halt due to a negative economic situation that has strongly influenced market events of the past few years (Tardivo et al., 2015). However, the real estate sector in Italy is constantly recovering, and 2017 was an important first year of relaunch for Italian real estate. The total amount invested was over 11 billion Euros, 23% more than in the previous year. The technological change that has been taking place means that the real estate sectors in which investments occur are changing: the office sector remains unchanged (36% of total volume), retail is falling (21% of total volume), while the logistics sector is growing (11% of total volume) as is hotels (12% of total volume). This trend was confirmed in 2018, even assuming an increase in volume due to macroeconomic growth, new investors' appearance, and new investment methods (Cbre Research, 2018). International capital continued to be the main component of investments (around 65%), but domestic investor activity (35%) was up compared to 2017; the compression of prime yields continued, with office transactions closed below 3.5%, a sign of a healthy market in which interest continued to be strong; and, finally, the confirmation of attention to real estate development, whether it be for large urban regeneration projects or the enhancement of individual properties (Business People, 2018). In Italy, the real estate market continues to express a rather low potential in reference to its size, which is only 4% of European volume compared to an economy worth 12% of the total GDP (Cbre Research, 2018).

III. REVIEW METHOD

The literature review in this paper is based on the methodology of systematic literature review (e.g., Tranfield et al., 2003; Petticrew and Roberts, 2006; Macpherson and Holt, 2007; Littell et al., 2008). In general term, a literature review can be seen as a ‘mapping of knowledge’ of a given topic, intended to investigate and explore everything that has been written and summarise it all (Frank and Hatak, 2014).

A SLR can be divided into phases, which typically are:

1. Definition of search and selection keywords in the database;
2. Search for articles (papers) in the database;
3. Reading and selection of titles and abstracts;

4. Reading and selection of articles (papers);
5. Analysis of articles (papers) for the purpose of research (Thorpe et al., 2005).

To build the sample to be analysed, the Scopus database was used. Through the Boolean operators, AND and OR, it was decided to use the following terms as a search field in the title, abstracts and keywords: ‘FinTech*’ with the asterisk in order not to overlook variations of the term since it is a new and compound term, ‘Real Estate’, ‘Crowdfunding’ and ‘Blockchain’. With the addition of the Boolean operators AND and OR as the final search string, the following was used:

‘FinTech*’ AND ‘Real Estate’ OR ‘Crowdfunding’ OR ‘Blockchain’

It was decided to use this research string after appropriate evaluation because changing the Boolean operator from OR to AND between the terms ‘Real Estate’ and ‘Crowdfunding’ produced a sample with only one result, which was not reliable to give rise to our literature review.

The search string gave 143 results, which were then filtered so that only those belonging to the area Business/Management/Accounting and Economic/Econometrics/Finance were taken into account.

We chose to consider as a type of document only those articles that were already published and were in English. It was decided not to apply a time horizon because the topic in question is new; in fact, as shown by the research, there are no contributions before 2016. After applying these appropriate filters, the end result for the sample is 42. Of these 42 articles, at the time of our review, it was impossible to locate three; thus, the total of those available is 39. The articles not available and for which no trace could be found are: Kasthuri (2018), Katyayani and Varalakshmi (2019) and Kursh and Schnure (2016).

Following Dada (2018) and Endres and Weibler (2017), we then manually searched the reference lists of all selected studies. This added step resulted in the retrieval of four more papers, thus increasing the selected studies to 43. The papers added are the following: Schweizer and Zhou (2017), Montgomery et al. (2018), Mochkabadi and Volkmann (2018) and Garcia-Teruel (2019).

The objective of this review is limited to two subsets of FinTech—crowdfunding and blockchain in the real estate sector. For this reason, only papers that could make an in-depth contribution to the analysis of the chosen topic were selected. From the final sample obtained, we can say with certainty that there are no contributions in the literature that interface in the real estate sector with both these innovative tools. Most of the articles deal with these two new tools that can be used together, but none are in the field of real estate. This was determined by following the SLR principles proposed by Tranfield et al. (2003) and Littell et al. (2008). SLR can be considered an analytical review scheme necessary to effectively evaluate the contributions of a given subject in the literature as it involves the adoption of a set of clear and reproducible steps that allow scholars to improve the overall quality of the review process

(Tranfield et al., 2003). Table 1 shows in detail the various phases used to arrive at the final sample.

Table 1 - SLR process of this research

Research Phase	Details
Selection of databases	Scopus
Selection of document types	Scholarly peer-reviewed journals
Terms used with Boolean operator	‘FinTech*’ AND ‘Real Estate’ OR ‘Crowdfunding’ OR ‘Blockchain’
Elements	Subject Area: Business/Management/Accounting Economics/Econometrics/Finance Document type: Article Publication stage: Final Language: English
Outcomes	Selection of 143 papers; after the application of the filters, it dropped to 42 papers. Three of these are not available. The sample then drops to 39. Another 4 papers were added manually to the final sample. The final sample is then composed of 43 papers

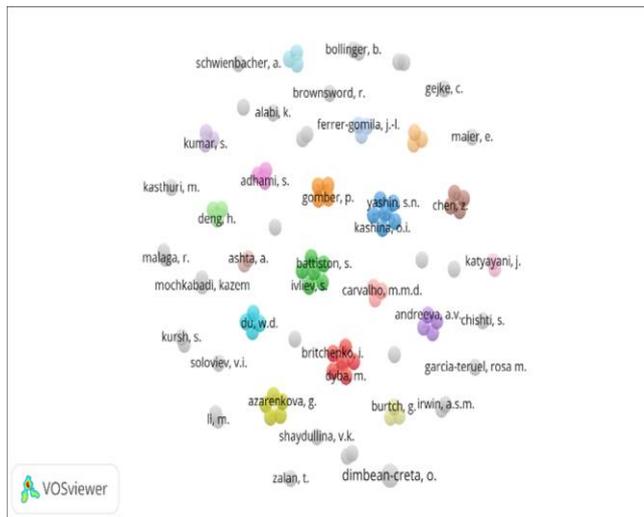
IV. ANALYSIS OF RESULTS

A. Bibliographic Map

VOSviewer software was used to analyse and display in bibliographic map mode the final sample that was used. By entering the sample of papers we exported from Scopus, we obtained 103 items that corresponded to the authors of the papers in the sample. Of these 103 items, many have no connection to each other, as can be seen in Figure 1 below, but the largest cluster of items obtained as a result of the bibliographic map is six. In our opinion, this means that it is undoubtedly a new topic which many scholars have approached in recent years, but there is not yet a sufficient

number of interactions between the various actors to create a dense network of co-citations.

Figure 1 - VOSviewer process of bibliographic map



B. Final Dataset

Table 2 below shows the articles that are part of the final sample used for our research, sorted by year of publication. The first thing that stands out is that there are no documents prior to 2016. This is because the interaction between crowdfunding and blockchain is a topical issue that has developed in recent years.

Table 2 - List of articles used as samples

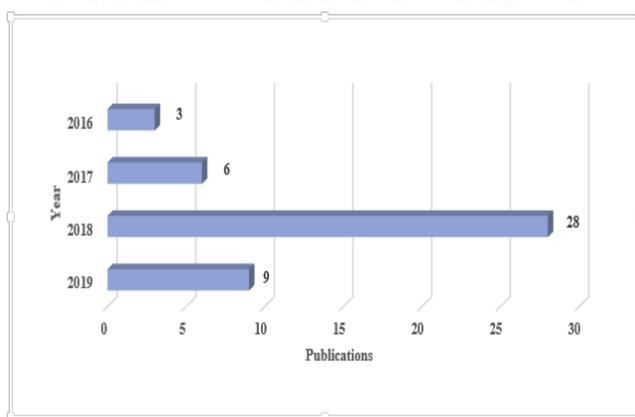
No ³	Publication Year	Author	Title	Type of Article	Journal Title
1	2019	Ferrer-Gomila, J.-L., Francisca Hinarejos, M., Isma-Deya, A.-P.	A fair contract-signing protocol with blockchain support	Empirical	Electronic Commerce Research and Applications
2	2019	Chen, K.	Information asymmetry in initial coin offerings (ICOs): Investigating the effects of multiple channel signals	Empirical	Electronic Commerce Research and Applications
3	2019	Brownsword, R.	Regulatory fitness: FinTech, funny money, and smart contracts	Theoretical	European Business Organization Law Review
4	2019	Du, W.D., Pan, S.L., Leidner, D.E., Ying, W.	Affordances, experimentation and actualization of FinTech: A blockchain implementation study	Empirical	Journal of Strategic Information Systems
5	2019	Miljan, E.Z., Spivola, M.D.M., Curvalho, M.M.D.	FinTechs: A literature review and research agenda	Review	Electronic Commerce Research and Applications
6	2019	Schwiebacher, A.	Equity crowdfunding: anything to celebrate?	Theoretical	Venture Capital
7	2019	Semenyuta, O.G., Andreeva, A.V., Sichev, R.A., Filipov, Yu, M.	Digital technologies in lending small and medium-size enterprises in Russia	Theoretical	International Journal of Economics and Business Administration
8	2019	Garcia-Teruel, R.M.	A legal approach to real estate crowdfunding platforms	Theoretical	Computer Law & Security Review
9	2018	Cai, C.W.	Disruption of financial intermediation by FinTech: a review on crowdfunding and blockchain	Review	Accounting and Finance
10	2018	Yang, D., Li, M.	Evolutionary approaches and the construction of technology-driven regulations	Theoretical	Emerging Markets Finance and Trade
11	2018	Adhami, S., Giudici, G., Marinazzi, S.	Why do businesses go crypto? An empirical analysis of initial coin offerings	Empirical	Journal of Economics and Business
12	2018	Kumar, S., Mookerjee, V., Shubham, A.	Research in operations management and information systems interface	Theoretical	Production and Operations Management
13	2018	Dimbean-Creta, O.	FinTech in corporations: Transforming the finance function	Theoretical	Quality - Access to Success
14	2018	Marines-Clement, C., Zorio-Grima, A., Ribeiro-Soriano, D.	Financial return crowdfunding: literature review and bibliometric analysis	Review	International Entrepreneurship and Management Journal
15	2018	Deng, H., Huang, R.H., Wu, Q.	The regulation of initial coin offerings in china: problems, prognosis and prospects	Theoretical	European Business Organization Law Review
16	2018	Bollinger, B., Yao, S.	Risk transfer versus cost reduction on two-sided microfinance platforms	Empirical	Quantitative Marketing and Economics
17	2018	Irwin, A.S.M., Turner, A.B.	Illicit Bitcoin transactions: challenges in getting to the who, what, when and where	Theoretical	Journal of Money Laundering Control
18	2018	Adna, A., Biot-Paqueot, G.	FinTech evolution: Strategic value management issues in a fast-changing industry	Theoretical	Strategic Change
19	2018	Zetsche, D., Preiner, C.	Cross-Border Crowdfunding: Towards a single crowdfunding and crowdinvesting market for Europe	Theoretical	European Business Organization Law Review
20	2018	Marsal-Llacuna, M.-L.	Future living frameworks: Is blockchain the next enabling network?	Theoretical	Technological Forecasting and Social Change
21	2018	Gejke, C.	A new season in the risk landscape: Connecting the advancement in technology with changes in customer behaviour to enhance the way risk is measured and managed	Theoretical	Journal of Risk Management in Financial Institutions
22	2018	Macchiavello, E.	Financial-return crowdfunding and regulatory approaches in the shadow banking, FinTech and collaborative finance era	Theoretical	European Company and Financial Law Review
23	2018	Burtsch, G., Hong, Y., Liu, D.	The role of provision points in online crowdfunding	Empirical	Journal of Management Information Systems
24	2018	Gomber, P., Kauffman, R.J., Parker, C., Weber, B.W.	On the FinTech revolution: interpreting the forces of innovation, disruption, and transformation in financial services	Theoretical	Journal of Management Information Systems
25	2018	Mamonov, S., Malaga, R.	Success factors in Title III equity crowdfunding in the United States	Empirical	Electronic Commerce Research and Applications
26	2018	Soloviev, V.I.	FinTech ecosystem and landscape in Russia	Theoretical	Journal of Reviews on Global Economics
27	2018	Zalan, T.	Born global on blockchain	Theoretical	Review of International Business and Strategy

28	2018	Olsen, R., Battiston, S., Caldarelli, G., Golub, A., Nilsulin, M., Ivlev, S.	Case study of Lykke exchange: architecture and outlook	Theoretical	Journal of Risk Finance
29	2018	Saayidullina, V.K.	Review of institutional and legal issues for the development of the FinTech industry	Review	European Research Studies Journal
30	2018	Karakas, C., Stanevna, C.	Defining A Fin-framework for financial technology (FinTech): Economic perspectives and regulatory challenges	Theoretical	Law and Economics Yearly Review
31	2018	Azarekova, G., Shkodina, I., Samirov, B., Babenko, M., Onishchenko, I.	The influence of financial technologies on the global financial system stability	Theoretical	Investment Management and Financial Innovations
32	2018	Yashin, S.N., Yashina, N.I., Poyushcheva, E.V., Malysheva, E.S., Pronchikova-Rubsova, N.N., Kashina, O.I.	Evaluating the effectiveness of public health financing based on financial and non-financial indicators in terms of the knowledge economy	Empirical	European Research Studies Journal
33	2018	Sybirianska, Y., Dyba, M., Britchenko, I., Ivashchenko, A., Vasylyshen, Y., Polischuk, Y.	FinTech platforms in SME's financing: EU experience and ways of their application in Ukraine	Theoretical	Investment Management and Financial Innovations
34	2018	Montgomery, N., Squires, G., Syed, I.	Disruptive potential of real estate crowdfunding in the real estate project finance industry: A literature review	Review	Property Management
35	2018	Mochkabadi, K., Vollmann, C.K.	Equity crowdfunding: a systematic review of the literature	Review	Small Business Economics
36	2017	Wonglimpiyarat, J.	FinTech crowdfunding of Thailand 4.0 Policy	Theoretical	Journal of Private Equity
37	2017	Chen, Z., Li, Y., Wu, Y., Luo, J.	The transition from traditional banking to mobile internet finance: an organizational innovation perspective - a comparative study of Citibank and ICBC	Theoretical	Financial Innovation
38	2017	Larios-Hernández, G.J.	Blockchain entrepreneurship opportunity in the practices of the unbanked	Theoretical	Business Horizons
39	2017	Alabi, K.	Digital blockchain networks appear to be following Metcalfe's Law	Empirical	Electronic Commerce Research and Applications
40	2017	Dimbean-Creta, O.	FinTech - Already new fashion in finance, but what about the future?	Theoretical	Quality - Access to Success
41	2017	Schweizer, D., Zhou, T.	Do principles pay in real estate crowdfunding?	Empirical	The Journal of Portfolio Management
42	2016	Maier, E.	Supply and demand on crowdfunding platforms: connecting small and medium-sized enterprise borrowers and consumer investors	Empirical	Journal of Retailing and Consumer Services
43	2016	Chishini, S.	How peer-to-peer lending and crowdfunding drive the FinTech revolution in the UK	Theoretical	New Economic Windows

C. Overview of Publications by Year and ABS Ranking

By subdividing the number of publications by year, it can be seen that there are three in 2016, six in 2017, twenty-eight in 2018, which is the year with the highest number of publications of this type, and nine in 2019. This can be observed in more detail in Figure 2.

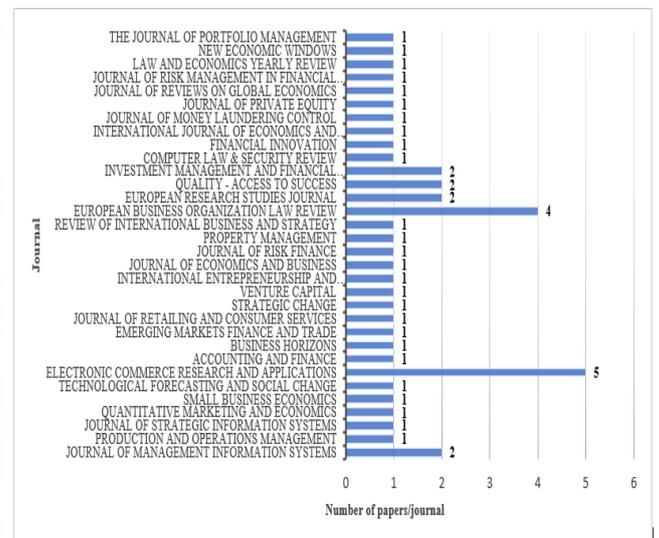
Figure 2 – Publications about interaction crowdfunding and blockchain broken down by year



In Figure 3 below, we can see the sample of analysed articles separated by the journal in detail. It emerges that the most represented journal is *Electronic Commerce Research and Applications* with five papers, followed by the *European Business Organization Law Review* with four published papers. With two published papers each, we find *Cutter Business*

Technology Journal, European Research Studies Journal, Journal of Management Information Systems, Quality – Access to Success and Investment Management and Financial Innovations, while twenty-seven journals have published only one paper.

Figure 3 - Breakdown of journals by number of publications



As shown in Table 3, it is interesting to see the subdivision of these journals, taking into account the ranking for the top ABS journals. Although it is now a very topical subject, only three articles have been published since 2016 in journals classified 4 in the ABS list. The following two articles have been published in the *Journal of Management Information System*: ‘The role of provision points in online crowdfunding’ by Burtch et al. (2018) and ‘On the FinTech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services’ by Gomber et al. (2018). *Production and Operations Management* has published ‘Research in operations management and information systems interface’ by Kumar et al. (2018). The reasons for only three contributions in journals classified 4 in the ABS list are that the topic is new and current, is undergoing great expansion and there are no contributions related to the interaction between crowdfunding and blockchain prior to 2016. Table 3 also shows that our topic has been dealt with not only by newspapers that deal purely with computer science and technology but also by a wide variety of disciplines, such as management, marketing and finance.

Table 3 - Journals included in the sample

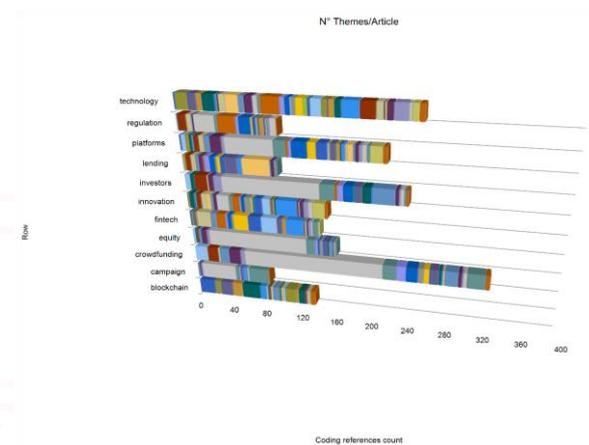
Name of Journal	ABS Ranking	No. of paper	Weight
Journal of Management Information Systems	4	2	5%
Production and Operations Management	4	1	2%
Journal of Strategic Information Systems	3	1	2%
Quantitative Marketing and Economics	3	1	2%
Small Business Economics	3	1	2%
Technological Forecasting and Social Change	3	1	2%
Electronic Commerce Research and Applications	2	5	12%
Accounting and Finance	2	1	2%
Business Horizons	2	1	2%
Emerging Markets Finance and Trade	2	1	2%
Journal of Retailing and Consumer Services	2	1	2%
Strategic Change	2	1	2%
Venture Capital	2	1	2%
International Entrepreneurship and Management Journal	1	1	2%
Journal of Economics and Business	1	1	2%
Journal of Risk Finance	1	1	2%
Property Management	1	1	2%

Review of International Business and Strategy	1	1	2%
European Business Organization Law Review	No Rank	4	9%
European Research Studies Journal	No Rank	2	5%
Quality - Access to Success	No Rank	2	5%
Investment Management and Financial Innovations	No Rank	2	5%
Computer Law & Security Review	No Rank	1	2%
Financial Innovation	No Rank	1	2%
International Journal of Economics and Business Administration	No Rank	1	2%
Journal of Money Laundering Control	No Rank	1	2%
Journal of Private Equity	No Rank	1	2%
Journal of Reviews on Global Economics	No Rank	1	2%
Journal of Risk Management in Financial Institutions	No Rank	1	2%
Law and Economics Yearly Review	No Rank	1	2%
New Economic Windows	No Rank	1	2%
The Journal of Portfolio Management	No Rank	1	2%
		43	100%

Table 4 – Autocoding Results

Sample	A blockchain	B campaign	C crowdfunding	D equity	E fintech	F innovation	G investors	H lending	I platforms	J regulation	K technology	M
1 A fair contract signing protocol with blockchain support	10	0	0	0	1	0	0	0	2	0	0	2
2 A legal approach to real estate crowdfunding platforms	0	0	15	3	0	0	6	2	5	1	0	0
3 A new season in the risk landscape Connecting the advancements in technology with changes in customer behaviour to enhance the way risk is measured and managed	7	0	0	0	2	0	0	1	3	0	0	13
4 e-Banking, experimentation and actualization of FinTech A blockchain implementation study	15	0	0	0	4	1	0	0	0	0	0	10
5 Blockchain entrepreneurship opportunity in the practices of the unbanked	12	0	0	0	1	1	0	1	1	0	0	6
6 Born global on blockchain	22	0	0	2	0	6	5	0	3	0	0	14
7 Case study of Lykke exchange architecture and outlook	8	0	0	0	0	2	0	0	2	0	0	3
8 Cross-Border Crowdfunding Towards a Single Crowdfunding and Crowdfunding Market for Europe	0	0	13	2	0	6	15	6	6	10	1	1
9 Drafting A EU-Framework for financial technology (FinTech) Economic perspectives and regulatory challenges	1	0	2	0	15	6	1	3	3	6	7	7
10 Digital blockchain networks appear to be following Maslow's Law	4	0	0	0	0	0	0	0	0	0	0	0
11 Digital Technologies in Lending Small and Medium-Sized Enterprises in Russia	2	0	0	0	1	5	0	2	2	0	0	14
12 Disruption of financial intermediation by FinTech: a review on crowdfunding and blockchain	6	3	11	3	7	3	0	4	7	1	6	6
13 Disruptive potential of real estate crowdfunding in the real estate project finance industry: A literature review	0	1	14	7	0	4	6	5	13	1	9	9
14 Do Principles Pay in Real Estate Crowdfunding	0	2	5	3	0	0	9	0	3	0	0	0
15 Equity crowdfunding: a systematic review of the literature	0	41	157	113	0	14	108	0	53	23	5	5
16 Equity crowdfunding: anything to celebrate?	3	5	15	10	0	4	16	0	13	3	3	3
17 Evaluating the Effectiveness of Public Health Financing Based on Financial and Non-Financial Indicators in Terms of the Knowledge Economy	0	0	0	0	0	0	0	0	0	0	0	0
18 Evolutionary Approaches and the Construction of Technology-Driven Regulations	0	1	10	3	2	1	6	6	3	3	5	5
19 Financial return crowdfunding literature review and bibliometric analysis	1	0	13	2	5	4	11	7	17	13	6	6
20 Financial-returns Crowdfunding and Regulatory Approaches in the Shadow Banking, FinTech and Collaborative Finance Era	0	0	0	0	0	0	0	0	0	0	1	1
21 FinTech - Already new fashion in finance, but what about the future	0	0	0	0	0	0	0	0	0	0	0	1
22 FinTech Crowdfunding of Thailand 4.0 Policy	0	0	6	4	2	7	0	1	0	0	0	4
23 FinTech ecosystem and landscape in Russia	2	0	6	0	17	2	0	4	9	2	8	8
24 FinTech evolution Strategic value management issues in a fast changing industry	0	0	0	0	0	2	1	0	0	0	0	0
25 FinTech in corporations: Transforming the finance function	0	0	0	0	0	0	0	0	0	0	0	4
26 FinTech platforms in SMEs financing: an experience and ways of their application in Ukraine	0	0	1	1	15	9	0	6	12	4	3	3
27 FinTech: A literature review and research agenda	3	0	0	0	18	9	0	0	2	1	11	11
28 Future living framework I: blockchain the next enable network	13	0	0	0	0	1	0	0	1	1	6	6
29 How peer-to-peer lending and crowdfunding drive the fintech revolution in the UK	0	3	9	4	6	2	8	13	6	1	1	1
30 Illnet Bitcoin transactions: challenges in getting to the who, what, when and where	3	0	0	0	4	2	0	0	4	5	6	6
31 Information asymmetry in initial coin offerings (ICOs): Investigating the effects of multiple channel stimuli	8	0	3	1	0	1	10	0	1	0	7	7
32 On the FinTech Revolution Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services	0	3	1	0	20	24	1	5	4	1	18	18
33 Regulatory FinTech: FinTech, Money, and Smart Contracts	1	0	0	0	0	1	0	0	0	1	16	16
34 Research in Operations: Management and Information Systems Interface	0	0	0	0	0	0	0	0	2	1	7	7
35 Review of institutional and legal issues for the development of the FinTech industry	0	0	0	0	2	0	0	0	0	0	2	2
36 Risk transfer versus cost reduction on two-sided microfinance platforms	0	0	2	0	1	0	0	31	6	0	1	1
37 Success factors in Title III equity crowdfunding in the United States	0	3	14	5	1	2	23	1	2	1	0	0
38 Supply and demand on crowdfunding platforms: connecting small and medium-sized enterprise borrowers and consumer investors	0	0	4	1	1	4	4	4	4	0	7	7
39 The influence of financial technologies on the global financial system stability	2	0	1	0	3	5	1	1	3	2	14	14
40 The Regulation of Initial Coin Offerings in China: Problems, Processes and Prospects	1	1	4	1	2	5	4	0	5	7	3	3
41 The Role of Provision Points in Online Crowdfunding	0	24	19	2	6	0	2	2	3	0	0	0
42 The transition from traditional banking to mobile internet finance: an organisational innovation perspective - a comparative study of Citibank and ICBC	2	0	0	0	2	15	0	0	13	0	7	7
43 Why do businesses go crypto? An empirical analysis of initial coin offerings	6	1	5	0	0	3	3	0	5	1	6	6

Figure 6 – Number themes/article



F. A Possible Integrative Practical-Conceptual Framework

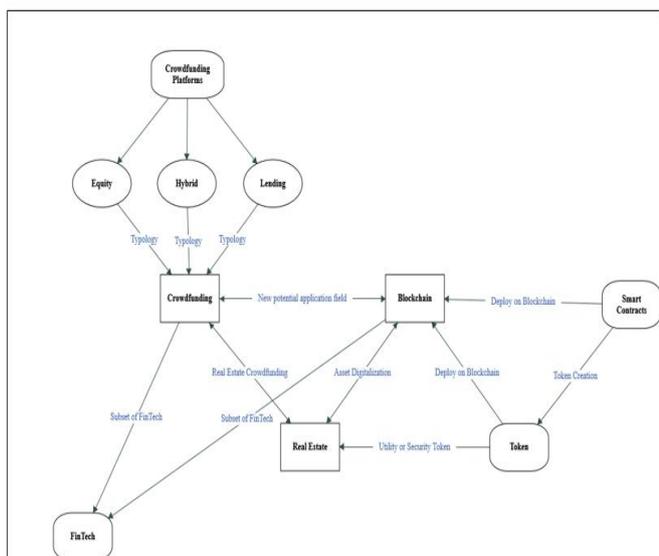
The grounded theory that underlies the qualitative research software Nvivo, develops around the concept that theory is discovered through data analysis; it starts from data to build the theory and not the opposite, that is, starting from a theory already known to confirm research data (Strass and Corbin, 1990). Grounded theory can be defined as a theory that is able to represent the reality to which it refers; it is applicable to various contexts inherent in the research that is being conducted, using both concepts and relationships between concepts (Strass and Corbin, 1990), as the software Nvivo precisely does through the creation of what we previously called 'nodes'.

In our systematic literature review, we aimed to define, through the results obtained from the qualitative analysis of data, a possible future integrative conceptual framework because, in our opinion, there is no link in the literature that contains the three macro categories of crowdfunding, blockchain and real estate. The practical-conceptual framework proposed is the result of the analyzes previously carried out with the NVivo software. The analyzes provide a concrete indication of which topics can be cited individually within the observed sample. The data show an overview of the macro-categories described above, whose interaction can create benefits for the real estate sector.

As shown in Figure 7, an integrative framework can help to better understand the different parts of the existing literature and address future lines of research. Above all, it can provide a new input of practical implications that has been missing until now.

We then proceeded to analyse these 'nodes' found through cluster analysis to determine how many times the single nodes or main themes were mentioned within each journal within our sample as shown in Figure 6 below.

Figure 7 - Practical-conceptual framework



Source: Own processing

V. DISCUSSION AND CONCLUSION

This review of the literature aims to advance the knowledge of the possible interaction between crowdfunding and blockchain and highlights that there are currently no studies in the literature concerning their possible joint use in the field of real estate. As far as we know, this is the first article that systematises the international literature on this subject, giving an overview on the use of blockchain technology applied to the alternative method for finance of crowdfunding. In particular, the world of real estate crowdfunding is a subset of crowdfunding that allows widespread investors to participate in financing a real estate project in a residential or commercial environment in exchange for a return on capital. The project typically relates to the purchase of a property, so that it is put to income, rather than the restructuring of a real estate property (which will also be put to income or sold by earning a capital gain) or the development of a greenfield project (Politecnico of Milan, 2019).

From this point of view, we have used an SLR and are able to answer the three main research questions proposed in the introduction.

RQ1: Could crowdfunding, through interaction with and the help of blockchain technology, be a valid alternative in real estate, a traditionally cyclical, static and non-innovative sector, to make this sector more attractive and innovative?

Blockchain methodology has many advantages over existing methods of transaction exchange and validation: there is no need for a centralised body to store and maintain transaction data and apply a commission; blockchain data is extremely difficult to create or modify inappropriately as all transactions need to be approved by consensus rather than unilaterally from a single source; there is a high degree of redundancy as common data is stored on multiple network computers and, therefore, a catastrophic loss of information is unlikely; as there is no central third party in a blockchain

network, it is not possible to charge taxes or transaction costs on individual blockchain transactions.

RQ2: What direction is being taken with regard to the development and use of blockchain as applied to crowdfunding? Can it be applied to the real estate sector and, if so, how? Can the use of tokens be a valid opportunity?

In crowdfunding, particularly in real estate crowdfunding, one of the dominant trends will certainly be the opportunity to use new blockchain technologies in the service of data collection; the use of blockchain technology not only optimises sale transactions because it effectively records the financial history of a property but also ensures greater stability to the market and effectively eliminates intermediaries. Thanks to the collection of valuable information related to everything on buildings affected by real estate trading actions, which comes from the application of the system of big data, it will be possible to create increasingly intelligent structures (Savina, 2019). The use of blockchain as a tokenisation of assets gives creators and entrepreneurs more freedom; they can raise more funds by issuing more fractional shares of their companies and then use these funds to expand.

RQ3: Can blockchain applied to crowdfunding play a key role in the real estate sector in the future?

The implications of using blockchain technology within the real estate industry through crowdfunding could be multiple and include: eliminating the need for centralised registries which would be replaced by a distributed registry of real estate holdings using digital property titles; timely and secure transfer of funds using blockchain technology; reduction or removal of unnecessary fees due to the peer-to-peer nature of blockchain transactions; and reduced fraud potential arising from the blockchain 'consent' verification and approval methodology.

Our literature review, conducted via a systematic approach, aims to provide a starting point for further advanced research on crowdfunding based on blockchain technology, especially in the real estate sector, which has always tended to be a sector where real estate investments have been accessible only to a limited part of the population. This is because investments in real estate require immobilising substantial capital resources and, at a later stage, an active management of the property because an investment property is characterised by low liquidity and a limited possibility for diversification. As so, the results presented underline the fact, that the study on the *FinTech and Real Estate* is just starting and this work can be a pioneer in guiding scholars on which future research directions can be taken further.

Practical implications consist in the birth of the first platforms operating in real estate crowdfunding based on blockchain technology, to certify data relating to investments in performing non-loans (NPLs). It is a sector typically not accessible to retail investors. National and international regulators (e.g. the European Commission) should consider that the use of digital tokens in the crowdfunding sector, and more specifically in real estate crowdfunding, could provide the impulse for the creation of a secondary market, making the whole sector liquid. To the best of our knowledge, this is the first systematic literature review on the interaction between crowdfunding and blockchain within a specific sector such as real estate. Scholars could support regulators and industry

because FinTech, new support technologies and alternative finance tools will be among the most investigated topics.

With regard to future avenues the focus can be on the organizations that manage real estate crowdfunding platforms. Qualitative and quantitative studies can afford to analyze individual crowdfunding campaigns with the aim of observing how blockchain technology is used or how digital tokens are created to accompany each project.

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