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# **Innovation and Emergent themes in Finances: a Bibliometric Study on FinTechs**

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## **Abstract**

The present article seeks to scientifically study the FinTechs and the Theories of Administration associated with the topic. To this end, a bibliometric study is developed based on the research conducted in 1,749 publications. FinTechs are examined using three approaches: type of editions (gray literature or peer-reviewed); concentration by type of journal and; focus on the treatment of the subject. In the first approach, 45% of academic publications are identified in relation to gray literature; the second approach points to the fact that there is no concentration of publications in the same edition; the third approach demonstrates the concentration of works to categorize the theme and the relationship with Disruptive Innovation theory, Management Theories, and regulatory/legislative aspects. The conclusions identified the emergence of new research strands, precedence of studies of "gray" literature to explain the phenomenon, distribution of studies in different fields of knowledge and lack of consensus in theories of Administration to explain the subject.

## **Keywords:**

FinTechs; Financial Technologies; Innovation; Bibliometrics; Gray Literature.

## **1 Introduction**

FinTechs are examples of technological innovations competing with the traditional system of services, in this case, the provision of financial services. The different software and applications developed require study, not only about the use of new technologies to offer traditional services, but also about the competition and complementarity of these with the agents of the traditional financial system.

The article aims to scientifically study the FinTech topic and the theories of Administration currently associated with it. The works on current issues related to the topic present additional difficulties for the researcher. Because these works involve new technologies, the academic literature is still incipient and not widely disseminated in peer-reviewed editions, and is competing with non-academic literature, called "gray" literature.

FinTechs, financial technology companies, fall into this category. According to the bibliometric study of Wu (2017), the research carried out concerning the topic began in 2014 which means that it is still in its exploratory stage.

The present article develops a bibliometric study on the FinTechs topic, an emerging concept. Therefore, we explored not only the traditional databases, but also the works of the "gray" literature. Examples are surveys of consultancies, and editions of government agencies, not subject to peer review.

The justification for this article is the need to deepen the study of FinTechs, to identify how the theories of Administration try to explain the phenomenon. Among 1,749 publications identified in six databases (Emerald, ProQuest, Science Direct, Scopus, Web of Science and Google Scholar), we highlight three review papers (Cai, 2018; Martínez-Climent, Zorio-Grima & Ribeiro-Soriano, 2018; Wu, 2017). These papers do not answer the question which management theories are most widely used to clarify the nature of this type of companies. This gap allows us to consider the subject as lacking in surveys and understanding by established theories.

The article begins by presenting a review of the FinTechs literature. Next, we describe the methodology and explain in detail the steps used in the bibliometric research. The fourth chapter is divided into three parts related to the topics introduced and discusses the different approaches selected for the treatment of the subject. The last section contains the final considerations and the suggestions for future research related to the subject.

## **2 Literature Review**

The study of the publications related to the FinTechs demands the conceptualization of innovation, Theory of Disruptive Innovations and FinTechs.

### **2.1 Innovation**

Because it is a broad field of research (Damanpour, 1991), innovation must be studied from different perspectives and in an interdisciplinary way (J Fagerberg, Mowery, & Nelson, 2004). This is also because there is an overlap between the various definitions of innovation, a situation in which there is no authorial definition of the theme (Baregheh, Rowley, & Sambrook, 2009). The difficulty in defining the concept was also addressed by Rowley, Baregheh, and Sambrook (2011).

A classic example of a definition of the concept is proposed by Schumpeter (1983). He defines it as introducing new products, introducing new production methods, opening new markets, developing new sources of raw materials/inputs and creating new market structures in the industry. The author also distinguishes innovation from invention. Innovation involves a commercial and practical application, whereas inventions become economically irrelevant.

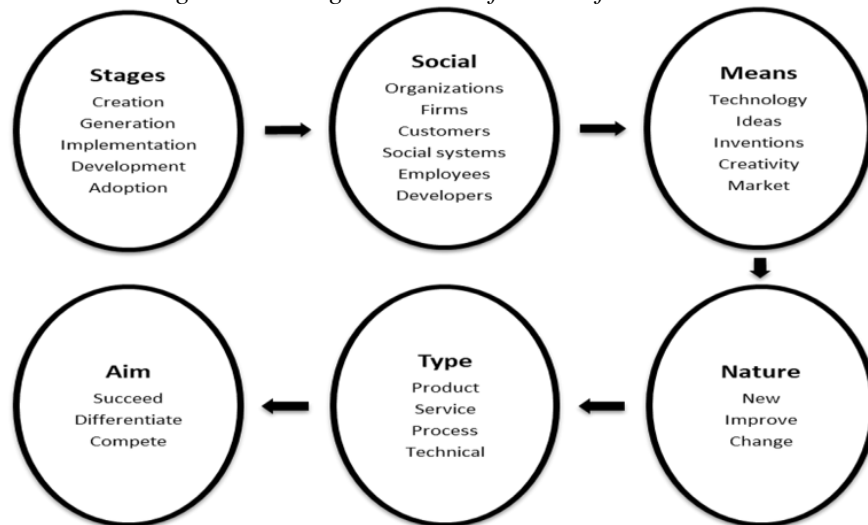
The works of Organization for Economic Co-operation and Development [OECD], (2005) and Francis and Bessant (2005) are cited as examples of this definition. Dosi (1988) defines technological innovation as the solution of problems using information withdrawn from previous experiences and formal knowledge.

A more uniform and institutional definition is provided by the OECD (2005): the implementation of a new or significantly improved product (good or service), or a process, or a new marketing method, or a new organizational method in business practices, workplace organization, or external relations.

To try to capture the essence of the concept and make a comprehensive and interdisciplinary definition, Baregheh et al. (2009) carried out a literature review and content analysis of 60 definitions offered in seven fields of study. The definition uses multiple stages to

transform ideas into products, services or processes to compete and differentiate successfully in the market, according to Figure 1:

Figure 1. A diagrammatic definition of innovation



Source: (Baregheh et al., 2009).

Another definition is proposed by Damanpour (1996), who defines innovation as the means of changing an organization as a response to changes in the external environment or as a preventive action to influence the environment.

The literature also differentiates innovations as radicals, defined as unique and significant, or incremental, when they consist of a series of small changes that can also constitute a significant change (Damanpour, 1996; Jan Fagerberg & Mowery, 2004; Rowley et al., 2011). Radical innovations are also called disruptive innovations when they transform the process so as not to allow the continuity of the previous product or process.

## 2.2 FinTechs

The concept “FinTechs” is derived from the term Financial Technologies and is used to describe the variety of innovative business models and emerging technologies with the potential to transform the financial services industry (International Organization of Securities Commissions [IOSCO], 2017).

### *FinTechs and Financial Innovation*

The Financial Stability Board (FSB) defines FinTechs as financial innovations derived from the technology that may result in new business models, applications, processes or products, with material effects on financial markets and established institutions (FSB, 2017).

Puschmann (2017) defines FinTechs as an umbrella term, which encompasses innovative financial solutions made possible by IT. Also, the concept is used by startups

companies that provide these solutions, although they also include traditional providers of financial services such as banks and insurance companies.

Schueffel (2016) seeks a common understanding of the theme by researchers and users of the concept. He defined FinTech as a new financial industry that applies technology to improve financial activities.

The Central Bank of Brazil (BACEN) presents the concept as a correction of imbalances. For the institution, FinTech means identifying obsolescence and omissions in the financial market and developing innovative solutions in response (offer) (BACEN, 2018).

IOSCO (2017) divides the FinTechs into several categories such as payments, insurance, planning, loans, blockchain, investments, data analysis and security. Alt, Beck, and Smits (2018) presents the three levels of transformation to demonstrate the main differences between these two categories of organization in terms of External Organization, Organization of Work Networks and Internal Organization, as presented in Table 1:

*Table 1. Comparative of Fintechs in three transformation levels*

<b>Transformation level</b>	<b>IT user banks (until 2008)</b>	<b>FinTech (after 2008)</b>
<b><i>External Organization</i></b>		
- Regulation	Little need for equity capital,	More severe rules, less
- Business model innovation	Businesses in agencies and off-line	<i>online</i> and <i>mobile services</i>
- Infrastructure governance	Institution centralized as a focal firm	Task distribution
- Payment Style	Most of the clients use cash	Cash payment reduction
<b><i>Networks organization</i></b>		
- Networking	A little number of networks	Many specialized partners
- Costs: Margins and Structure	High margins in the main business	Reduced margins, more
- Competitors	other providers of traditional financial	<i>startups</i> , side incoming
- Culture	Hierarchy	Cooperative, agile
- Customer retention	High customer fidelity	Low changing costs
<b><i>Internal organization</i></b>		
- Business focus	Oriented to processes	Centered on the customer
- Interaction with customers	initially <i>off-line</i>	initially <i>online</i> , <i>multiple</i>
- Essential competences	Distribution, products, transactions	<i>Online distribution</i> ,
- Vertical integration	high integration	Low integration
- Services portfolio	banks as providers of general services	Small diversified providers
- Automation	Processes require manual steps	Completely automatized
- IT Architecture	Monolithic systems, internal	Modular systems, <i>APIs</i>

**Source:** (Alt et al., 2018).

### *Categorization of FinTechs*

Besides the need to conceptualize the theme, different authors categorize and describe the subject and its subdivisions into different fields of research. The categorization is made about types of services offered, types of innovation, target audience and specific taxonomies.

Puschmann (2017) demonstrates the five phases of the evolution of the term based on three focal categories each (strategy, organization, and systems). He also proposes a framework with three dimensions that cover the type of innovation (disruptive or incremental), the scope of



innovation (intra or inter-organizational) and object of innovation (business models, product/service, organization, process or system).

Eickhoff, Muntermann, and Weinrich (2018) have created a taxonomy for the division of business models based on six dimensions (Dominant Technology, Value Proposition, Delivery Channel, Consumers, Revenue Flow and Offer of Products / Services).

Drasch, Schweizer, and Urbach (2018) proposed another taxonomy divided into six different dimensions: type of cooperation; type of innovation; innovation maturity; location of the value chain; business ecosystem and; innovation holder.

Another taxonomy is developed by Gimpel, Rau, and Röglinger (2017), with 15 dimensions related to the perspectives of interactions, data and monetization. Ashta and Biot-Paquerot (2018), Alt et al. (2018), Zavolokina, Dolata and Schwabe (2017) and Dorfleitner, Hornuf, Schmitt and Weber (2017) performed other useful classifications and segmentations.

### *State of the Art of the Research on FinTechs*

From the research in the Emerald, ProQuest, Science Direct, Scopus, Web of Science and Google Scholar databases, two previous literature review articles were identified (Kim, Choi, & Lee, 2016; Wu, 2017) and a bibliometric survey (Cai, 2018) on the current state of research on the subject.

The bibliometric article of Wu (2017) carries out researches in the ISI - Web of Science database and identifies 80 keywords used in the publications on the concept. He claims that the publications on the topic began in the year 2014 and the main areas covered are Payments (25.65%); Deposits and Loans (25.54%); Insurance (17.29%); Capital Increase (14.35%); Investments (13.67%).

The paper of Cai (2018) contains a bibliographical review of the terms "crowdfunding" and "blockchain", while that of Kim et al. (2016) carries out the application of topic modeling in the study of the theme. The latter presents greater adherence to the studies in the area of Computer Science.

Because it is a matter related to the development, implementation, and execution of information systems, part of the published literature has a closer relationship with the Information Technology (IT) and related areas. An example of this are the articles by Eickhoff et al. (2018) and Gai, Qiu, and Sun (2018).

## **3 Methodology**

The article presents exploratory qualitative-quantitative research. This approach is used because of the initial ignorance of the essential variables to be examined (Creswell, 2010). This lack of knowledge does not stem from a reduced scope of research, but from the fact that it is a new subject, without relation with established theories and still little explored by the academic literature.

The topic is also chosen because of the mixed treatment of the concept. Since it is an emerging concept, this approach can help in the gaining of insights that would not be possible to

be obtained only by one type of method alone, besides being a methodologically highly desirable approach (Bhattacharjee, 2012).

The bibliometric approach, as a type of research, can be considered as the grouping and interpretation of statistics related to books and journals (Pritchard, 1969). In the area of new technologies, this technique is not only used to quantify academic production on specific topics but can also be applied in predicting new technologies. Examples of articles in this line of study are those of (Daim, Rueda, Martin, & Gerdri, 2006; Li, Zhou, Xue, & Huang, 2015; Morris, DeYong, Wu, Salman, & Yemenu, 2002).

A strict quantitative treatment using bibliometrics and the exclusive use of peer-reviewed articles could disregard recent and relevant publications in the area, a justification also used by Schueffel (2016).

The gray literature is classified as those publicly disclosed material not subject to the traditional peer review process, and can be used as a way to broaden the scope of researches, to widen the perspective on the concept with up-to-date materials and to enable further discussions on the research theme/topic (Adams, Smart, & Huff, 2017). This literature encompasses business reports, discussion papers and procedural guides, each of which is a broad source of information (Lawrence, Houghton, Thomas, & Weldon, 2014).

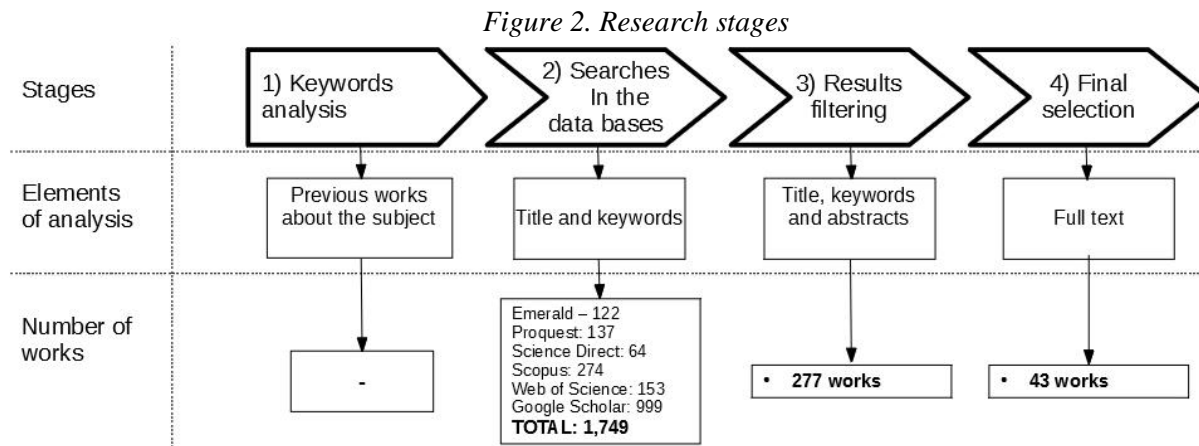
### 3.1 Stages of Research

The present study begins with the formulation of the research problem, followed by the construction of the hypotheses regarding the problem found, as described by Creswell (2010).

The article focuses on the problem of how to research the phenomenon of FinTechs academically and what are the main theoretical approaches that the publications in the field of theories of Administration use to analyze the subject.

The first hypothesis is about the existence of an initial literature not strictly academic to divulge and analyze the phenomenon. The second concerns the initial production of publications with a preponderance in IT because FinTechs present the technological base as one of its principles. The third and last hypothesis contemplates on the existence of preliminary research and preliminary studies on this type of companies, such as theoretical publications and categorizations of FinTechs.

The bibliographic survey consists of four stages for a final selection of the works to be made, which resulted in 43 publications, described in Figure 2.



**Source.** The authors (2019).

The preparation and analysis of the bibliographical references are made with the help of the software Publish or Perish (PoP) version 6.35.

## 4 Development

This chapter presents three analytical approaches (divided into topics), as a result of the analysis made of the 43 publications included in the final selection, based on the bibliometric data identified in the fourth step. These approaches are related to the following: type of publications, the concentration of publications and lines of interest of the works and the treatment of the subject.

### 4.1 Type of Editions

The keyword search of the bibliographic references resulted in 1,749 records. The analysis presented below is performed after reading the 20 most cited works.

Moreover, the analysis shows that 55% (11) of the publications are not published in peer-reviewed academic journals, with only nine works published in such journals. Of the 11 works included in the gray literature, seven are working papers from public and private institutions, and four are books published by electronic and digital media.

Taking into consideration the emerging technologies associated with the topic, it can be considered, as shown in the publications by Dietz, Moon and Radnai (2016), Dombret (2016), Gomber, Koch and Siering (2017) and Drasch et al. (2018), that the FinTechs studies present the opportunities and concerns of the agents involved regarding the future of the banking industry.

### 4.2 The concentration of Publications and Lines of Interest of Editions

The second approach divides the 43 publications selected in the fourth step, according to the title and subject of the editions. Of the 39 different editions, and books found, the maximum concentration identified is three publications per edition.

The first edition, Journal of Economics and Business (three articles), focuses on finance and economics studies. Its focus is on related topics (industrial and financial structure of companies, insurance, and financial markets).

As for the Electronic Markets journal (two articles), it covers several aspects of the digital economy and shows interest in IT-enabled business networks (scanning). Finally, the



Financial Innovation journal (two articles) carries out innovative studies on finance. The main topics covered are derivatives, asset pricing, and disruptive models.

The analysis of the objectives, vision, and focus of the remaining 27 works reveals four broad lines of research interests: Business (13); IT (10) and; Legislation (2). It is necessary to clarify the allocation of the two publications in the area of Legislation, which demonstrates the concern of the works with the regulation and elaboration of norms to enable the stable development of the sector. By region, the countries with the highest number of publications were the United States (17), the United Kingdom (8), Germany (5) and the Netherlands (4).

The distribution of the articles in different editions can be explained by the fact that Fintech is an emerging concept not yet academically explored (Puschmann, 2017; Schueffel, 2016; Wu, 2017) or by the lack of a broad definition of the concept (Anagnostopoulos, 2018; Bogusz, 2018; Gimpel et al., 2017; Zavolokina et al., 2017).

#### 4.3 How the Selected Works Treat the Issue

As far as the third approach is concerned, after careful reading and analysis of the contents of the publications, different treatments of the subject are identified, with an emphasis on the four categories described in Table 2:

*Table 2. How the Fintechs topic is treated in the analyzed publications*

Publications focus	Year				Total
	2015	2016	2017	2018	
Categorization of FinTechs	1	3	5	5	14
Disruptive Innovation Theory	-	3	4	5	12
Relation with the Management/Economics	1	2	5	2	10
Regulation/Legislation	1	2	1	2	6
<b>Total</b>	<b>3</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>42</b>

**Source:** The authors (2019).

The following four topics are used to analyze the works about the FinTechs categorization, about the Disruptive Innovation Theory, the application of Management Theories to clarify the topic and analyze the subject from a regulatory and legislative perspective.

#### *Categorization of FinTechs*

The 14 publications classified as "Categorization of FinTechs" seek to divide into specific categories the activities carried out, the tools used and the environment in which these companies operate. To this end, they compare the services and products offered by them with those provided by established banks.

In these categorizations, the four most cited types of products/services are loans/financing, investments, securities transfers and insurance (Arner, Barberis, & Buckley, 2017; Ernst & Young, 2016; Wu, 2017).

Divisions and classifications other than those discussed above have also been described. These descriptions involve, for example, tools and the environment in which companies operate, such as those presented in the articles by Eickhoff et al. (2018); Gomber et al. (2017).

### *Theory of Disruptive Innovation*

The references relating the FinTechs to the Theory of Disruptive Innovation (and its versions) appeared in 12 out of the 43 publications selected. Examples of publications with this analysis are Bogusz (2018); Chiu (2016); Dorfleitner et al. (2017); Gomber, Kauffman, Parker, and Weber (2018); Zalan & Toufaily (2017).

A concern about the use of Disruptive Innovation Theory in such companies, raised by Anagnostopoulos (2018), is related to the additional data needed to understand the phenomenon in more depth and also to offer regulatory solutions for this category of business.

### *Relationship with Administration / Economics Theories*

Of the 10 articles that reveal the relationship between the FinTechs and the theoretical approaches of Administration and related fields, four stand out: FinTechs and the Theories of Innovation Diffusion (Wonglimpiyarat, 2017), FinTechs and Institutionalism (Larsson, Teigland, Shahryar, Moreno, & Bogusz, 2018), FinTechs and the Two-Sided Markets (Jun & Yeo, 2016) and FinTechs and Banking Microeconomics (FSB, 2017).

Among the 43 publications selected, only 10 (23%), explains the theoretical approaches used. This is because of the emergence of the theme, that is still in the development phase about the concepts and categorization. Moreover, there is a lack of consensus among the supporters of the most appropriate theories and methodologies applied to study the phenomenon.

### *Regulation and Legislation*

Anagnostopoulos (2018); Arner, Barberis, and Buckley (2015); Chiu (2016); Dombret (2016); FSB (2017) and Lagarde (2018) deal with the regulation of FinTechs and show concern for the dynamics inherent to these companies. Three of these studies are published by regulatory bodies or government financial institutions, which can be given as evidence.

The emergence of the concept and the use of the topic into the financial market context raise concerns about the legislation to be adopted. This can be proved by the existence of publications that address the regulatory aspects of FinTechs also in the publications in the area of Law and Regulation.

Because they operate in a segment that is subject to systemic crises and presents fewer barriers to entry than conventional banks, as described by FSB (2017), these types of companies present several types of risks to the financial system, mainly related to IT, which demands agility from the regulators.

## **5 Conclusions**

Academic research on FinTechs, as shown in Table 2 started in 2014 and, like its object of study, can be considered relatively recent. Research in non-peer-reviewed journals (gray literature), present 55% of the 20 most cited publications in the analyzed databases, which is due to the emergence of the topic and the concern not to disregard recent and relevant works in the area, as justified by Schueffel (2016).

The initial emergence of survey research, of a non-academic nature preceding academic studies, is natural. Articles published in scientific journals undergo peer review and are the result

of complex research, supported by theories and methodological basis, but are unable to provide rapid responses to the market on emerging issues.

The 39 editions where the 43 works are published have a multidisciplinary scope, for example, ten publications are in the area of IT / Computer Science, and two are in the area of Law / Regulation.

Thus, the analysis shows that there is no consensus within the theories of the Administration for the treatment of the subject because the existent works are categorizations, conceptual/empirical tests and analyses of possible regulatory solutions for understanding the phenomenon. The analysis of the gray literature is also useful to find new research strands capable of contributing to this understanding.

The selected books, for example, present an in-depth treatment of the concepts associated with the subject and expand the range of the analyzes beyond the restricted views of academic editions. In this way, they are presented as essential manuals for the diffusion, comprehension, and categorization of the concepts associated with FinTechs.

The categorization of the FinTechs, a subject of 14 out of the 43 publications analyzed, seeks to contextualize the phenomenon, compare the activities of these companies with those of the existing banks and classify the main differences between them, which may serve as a basis for further research. The increase in the number of works published for this purpose, from one in 2015 to five in 2018 (Table 2), shows an increasing effort by the authors to provide means for the study of the subject.

As for the use of theories to explain the phenomenon, some applications and concepts to guide the research are verified. The Theory of Disruptive Innovation, cited in 12 out of the 43 publications analyzed, is the most widely used theory in the treatment of the phenomenon, which allows a comparison to be made with the emergence of other industries previously nonexistent or not theoretically conceived.

Other theoretical approaches in the areas of Administration and related fields, such as the Institutional Theory, are used in 10 out of the 43 publications analyzed. This fact reveals the strive for more theoretical definitions of the phenomenon as an opportunity for the researchers.

Starting from the first publications, about the conceptualization of the subject, and reaching the most recent publications, there are new research areas, such as small and medium-sized companies, regulatory aspects, technology acceptance and study of specific sectors (e.g. payments and transfers) of this new industry. This change of perspective can be explained by the evolution of research on the subject. Even at an early stage, the research goes beyond conceptual aspects to experiment with more elaborate forms of inquiry.

In short, FinTechs can be characterized as incremental innovations because they improve and diversify financial services, but can also be characterized as radical innovations in that they eliminate some traditional financial services. The technology used by FinTechs tends to be disruptive because it threatens the traditional structure of financial agents. The most evident categorization is that of FinTechs as providers of services similar to traditional financial agents (e.g. credit, collection, and investments), but using new technologies and differentiated means of interaction with the target audience.

The suggestions for future research, focus on the revisions of works on the categorization and identification of companies such as FinTechs, the establishment of a

relationship between the concept and the Theory of Disruptive Innovations and the identification of possible associations of the subject with theories in the field of Administration to reinforce the legitimacy of the concept.

In order to provoke discussions in the field of the emergence of new technologies, it is possible to approach the works from gray literature editions as antecedents of these new technologies. Besides, an analysis can also be made of how the transition of the knowledge of this type of publications occurs for the peer-reviewed academic editions and how this may reveal evidence for the maturation of the new technologies studied.

Another line of research may deepen the impact of FinTechs on the traditional financial system or otherwise explore how traditional financial agents are incorporating FinTechs into their business models.

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