
Understanding FinTech ecosystem evolution through service innovation and socio-technical system perspective

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Biographic note

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Resumo

No âmbito dos estudos sobre FinTech objetiva-se, nesta investigação empírica, compreender a evolução do ecossistema das FinTechs e reforçar a sua caracterização através das perspetivas da teoria sociotécnica e da inovação de serviço.

Para esta análise, foi utilizada a metodologia de estudo de caso, na qual foram consideradas 11 FinTechs startups que fazem parte do contexto Português e Brasileiro. A recolha dos dados primários fez-se através de entrevistas semiestruturadas com os diretores e funcionários das startups, enquanto os dados secundários foram obtidos por meio de relatórios de grandes empresas de consultoria e materiais de relações públicas das FinTechs startups.

Os resultados obtidos mostram a evolução do ecossistema das FinTechs sob a ótica da teoria sócio-técnica e de inovação de serviços. Sobre o ponto de vista da teoria sócio-técnica foi possível compreender a evolução deste ecossistema a partir dos papéis dos atores sociais, tecnológicos e organizacionais. Assim, pode-se entender como cada stakeholder influencia no desenvolvimento dos negócios das FinTechs, na criação de novos produtos e serviços. Sobre a perspetiva da inovação de serviços foi possível compreender a dinâmica da evolução do ecossistema das FinTechs e os seus resultados.

O contributo académico para a inovação de serviço se faz presente durante o processo inovação das FinTechs estudadas, onde foram identificados como os stakeholders que fazem parte do ecossistema, impactam nas inovações incrementais, radicais, de melhoria e recombinação das startups. O contributo para a teoria sócio-técnica se faz presente durante a utilização da estrutura que permite compreender o desenvolvimento do ecossistema e dos atores sociais, tecnológicos e organizacionais. Por fim, a contribuição para a gestão, pode ser definida como a caracterização do ecossistema das FinTechs para os empreendedores que atuam com essas startups compreendam melhor o ambiente em que estão inseridos.

Keywords

FinTech, FinTech Ecosystem, Service Innovation, Process Innovation, Social-Technical Theory

Abstract

In the context of the studies on FinTech, this empirical research aims to understand the evolution of the FinTechs ecosystem and to strengthen its characterization through the perspectives of socio-technical system theory and service innovation.

For this analysis, the case study research methodology was used, in which 11 FinTechs startups that are part of the Portuguese and Brazilian context were considered. Primary data were collected through semi-structured interviews with C-level and startups employees, while secondary data were obtained through reports from large consulting firms and public relations materials from FinTechs startups.

The results show the evolution of the FinTechs ecosystem from the perspective of socio-technical system theory and service innovation. For socio-technical system perspective, it was possible to understand the evolution of this ecosystem from the roles of social, technological and organizational actors. Thus, it can be understood how each stakeholder influences the development of FinTechs business, in the creation of new products and services. For service innovation perspective, it was possible to understand the dynamics of the evolution of the FinTechs ecosystem and its results.

The academic contribution to service innovation is present during the innovation process of the studied FinTechs, where they were identified as the stakeholders who are part of the ecosystem, impact on the incremental, radical, improvement and recombinative innovations of startups. The contribution to the socio-technical system theory is present during the use of the structure that allows understanding the development of the ecosystem and social, technological and organizational actors. Finally, the contribution to management can be defined as the characterization of the FinTechs ecosystem for the entrepreneurs who work with these startups to better understand the environment in which they are inserted.

Keywords

FinTech, FinTech Ecosystem, Service Innovation, Process Innovation, Social-Technical Theory

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1. Introduction

Technology evolution, particularly the evolution of information technology (IT), is driving a propagation of services provided by innovators, which is changing the way customers go through the purchasing process (Ostrom, Parasuraman, Bowen, Patricio, & Voss, 2015). According to Snyder, Witell, Gustafsson, Fombelle, and Kristensson (2016), several companies have redefined their business, including several new services, in order to create a new experience for the customer. Service innovation involves value creation for clients, organizations or other actors, through the development of new processes or services offers (Patricio, Gustafsson, & Fisk, 2018)

The word FinTech is a combination of the terms "financial" and "technology", and is intended to denote the use of technology to deliver a financial solution (Puschmann, 2017). Interest in FinTech business has been growing. According to Gagliardi, Dickerson, and Skan (2016) the value of global investment in FinTech grew 75% in 2015, and is now equivalent to US\$ 22.3 billion. Despite the considerable growth, academic research about FinTechs is still scarce (Gimpel, Rau, & Roglinger, 2018), which motivates this work. This study has the purpose of understanding the dynamics of creating a FinTech startup and its evolution. Moreover, it is intended to emphasize the interaction between FinTechs evolution, and the development of the services offered by these startups.

In order to understand FinTechs evolution dynamics, it is necessary to analyze their ecosystem (Lee & Shin, 2018). According to Lee and Shin (2018), the FinTech ecosystem is composed by five elements: FinTech Startup, Government, Financial Customer, Technology Developers, and Traditional Financial Institutions.

Lee and Shin (2018) define FinTech Startups as innovative companies operating in the areas of payments, insurance, financial management, loans and capital markets, which have low operating costs and provide services that are more personalized than those offered by traditional financial companies. They argue that technology developers allow specific digital platforms to add value and facilitate the delivery of FinTechs services and that financial customers refer to all the potential users of the service provided. Finally, according to these authors, the government has a very important role in the development of a FinTech since it is the regulator of the sectors where FinTech startup acts.

For the purpose of better understanding the relation between the aforementioned elements of the ecosystem and their roles in such ecosystem and on the FinTech

development, socio-technical system theory was found to be appropriate. The socio-technical theory proposes a structure to analyze the interactions between social dimensions and the technical dimension of organizations (Durkin, Mulholland, & McCartan, 2015). According to Markard, Suter, and Ingold (2016), a socio-technical transition is understood as a fundamental transformation of a socio-technical system (STS). The STS consists of two subsystems: the social subsystem, which comprises workers and structures, and the technical subsystem that encompasses technologies, processes, procedures, and the physical environment (Durkin et al., 2015). Such a transition encompasses both technological, organizational, institutional and sociocultural changes. In the course of change, new products, services, practices, business models, organizations, or regulations emerge, in part complementing, but more often, replacing the existing ones (Markard et al., 2016).

A search in the Web of Science using FinTech, Service Innovation and Socio-technical theory as keywords shows the growing interest of these research topics. It is important to emphasize this research was conducted in 2019, from February until July, which is why the number of papers in some combinations of the keywords decline in the last year.

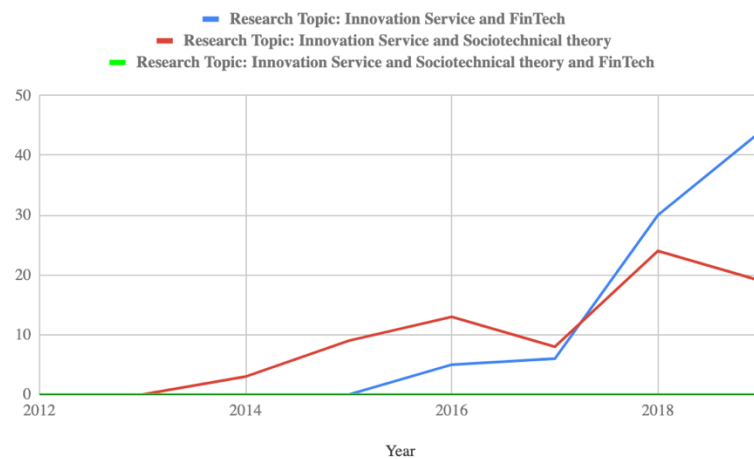


Figure 1: Historic of Research Topic Approach in Web of Science

However, to the best of our knowledge, a service innovation perspective has yet to be combine with socio-technical theory to understand Fintechs and their ecosystem.

Applying the Service Innovation perspective, it is possible to understand the dynamics of FinTech's ecosystem evolution and its results, since from this perspective it is possible to understand the co-creation of value between the startup and the client. Whereas, applying the socio-technical perspective, it is possible to recognize the structure of the FinTech ecosystem and identify new stakeholders that are part of the ecosystem.

As such, this study has the following research goal: Understand the FinTechs ecosystem, and its characterization, namely by understanding

- How are the various actors for the FinTechs ecosystem characterized?
- How do these actors influence the evolution of the FinTechs ecosystem?
- How does the perspective of service innovation and socio-technical system theory support the understanding of the FinTechs ecosystem?

To achieve this goal, an empirical study was developed following case research methodology (Yin, 2003). The Data was collected through semi-structured interviews with C-levels managers and employees of Portuguese and Brazilian FinTechs. In order to validate data, other sources of evidence were also used, such as reports from large consultancy companies, archives of the FinTech, among others.

This study consists of three main sections: literature review, empirical study and analysis of results and conclusions.

The first section describes the literature review, the relevant literature on the key topics of the study, named service innovation, FinTech, FinTechs ecosystem, and socio-technical system theory was reviewed. The second section explains the methods used and how the data collection was analyzed and categorized during the study, following the interview guide, sample definition and data collection process. The third section comprises the analysis of data obtained throughout the research and the discussion of the results.

At the conclusion, along with results, contributions and limitations of this research, suggestions are presented for future research.

2. Literature Review

This chapter presents the most relevant literature for this work. It is divided in three sections, corresponding to the three streams of research that are the focus of this research. In the first section service innovation will be examined in order to understand how innovation can be identified in the service industry and to clarify what do service innovation perspective refer to. The second section defines and characterizes FinTech businesses. It also analyses the FinTech ecosystem, as well as the main FinTech stakeholders that are part of such ecosystem. The last section describes socio-technical system theory, which establishes a basis for understanding the relation between the social dimensions and the technical dimension.

2.1 Service Innovation

Socioeconomic sectors are increasingly focusing on services, while, at the same time, there is a significant evolution in information and communication technologies (ICTs), and thus the development and fast dissemination of innovative services based on ICT (Barrett, Davidson, Prabhu, & Vargo, 2015; Ostrom et al., 2015).

According to Barras (1990), ICTs have an impact on the efficiency and effectiveness of service-based companies, and this can lead to the development of new markets or products. For Snyder et al. (2016) service innovation is responsible for the development of service sectors and is also an engine of society renewal. Service innovation involves value creation for clients, organizations or other actors, through the development of new processes or services offers (Patricio et al., 2018).

The way service innovation is characterized has been evolving, and according to Gallouj and Savona (2009) it is possible to define service innovation from three approaches; 1) assimilation or technologist approach, 2) service-based or differentiation approach, and 3) synthesis approach.

The assimilation or technologist approach reduces service innovation to the use and adoption of technologies, such as ICTs (Gallouj & Savona, 2009). This approach founds its analysis of the service sector in the structure of manufacturing sectors since it was developed in a period when the economy was dominated by manufacturing (Gallouj & Savona, 2009). For Snyder et al. (2016), service innovation has to be considered from broader perspective,

rather than just considering that service innovation occurs only when there is technological innovation.

The service-based or differentiation-oriented approach identifies characteristics in the nature and organization of innovation in services, while trying to highlight all the particularities in the services and the production processes of products and services (Gallouj & Savona, 2009). According to the authors, this approach searches for a structure of service innovation that is able to emphasize every detail of the production processes of products and services.

Finally, the synthesizing approach identifies the trend towards convergence between services and products (manufactured goods), and seeks to define a common structure that can combine a perspective of innovation applicable to products and services, whether tangible or not (Gallouj & Savona, 2009).

In addition to the types of service innovation approach, Gallouj and Weinstein (1997) present the different modes of service innovation such as radical, incremental, improvement and recombinative innovations. The authors emphasize that radical innovation involves the creation of an entirely new offer of service, while incremental innovation aggregates new characteristics to the offer without changing the general service offer (Gallouj & Weinstein, 1997; Snyder et al., 2016).

Improvement innovations consist of a limited improvement in the certain characteristics of a service, without changing its structure (Gallouj & Weinstein, 1997). On the other hand, recombinative (or architectural) innovations can be defined as changes in characteristic of a service that combine other attributes from other services, preserving the components of the pre-existing services, but reconfiguring the way such components are structured to compose the new service (Gallouj & Savona, 2009).

Service innovation has made customers change the way they perceive the purchasing process, and therefore, companies realized the need to redesign their businesses to improve the customer experience (Ostrom et al., 2015; Snyder et al., 2016). Recalling service innovation definition, it involves value creation for customers, organizations or other actors, through the development of new processes or service offers (Patricio et al., 2018). According to Snyder et al. (2016), service innovation focuses on co-creating value from service actors' experiences since the central focuses for service innovation are value creation and customer experience. Service actors are clients, organizations or other individuals that may be related to the process or offer of services, and who participate in the process of value creation (Patricio et al., 2018). A service innovation perspective has yet to be applied to a Fintech

ecosystem and can bring a service and customer-orientation to the understanding of this ecosystem.

2.2 FinTech

The word FinTech is a combination of the terms "Financial" and "Technology", and is intended to denote the use of technology to deliver a financial solution (Puschmann, 2017). According to Leong, Tan, Xiao, Tan, and Sun (2017), a FinTech provides a financial solution developing a technology-based product and/or service

Regarded as the most significant innovation in the financial sector, FinTechs promise to reshape the industry by cutting costs and growing quality of service delivery (Lee & Shin, 2018). FinTech business models are developed to be affordable and cost-effective, and, therefore, stand out from traditional financial service providers (Gagliardi et al., 2016). As argued by Alt, Beck, and Smits (2018), FinTechs are searching for innovative solutions and have new business models that are only possible using digital technologies. FinTech definitions include financial processes, such as investment, payment, insurance and regulatory issues.

FinTechs offer financial solutions such as payment services (payment through cryptocurrency, blockchain technology), financing and loans (crowdsourcing and crowdfunding), insurance (usage-based insurance), and interaction with customers (personal finance management) (Alt et al., 2018).

According to Puschmann (2017), the term FinTech was probably mentioned for the first time by the Citicorp CEO, John Reed at a convention in the 1990s. However, the sector only started to emerge and became popular in 2008 due to the technological development for mobile devices, changes in financial customer behavior, e-finance development, and the global financial crisis (Alt & Puschmann, 2012; Lee & Shin, 2018). The spread of mobile devices and digital financial services have enabled customers to gain access to their financial information anytime and anywhere (Alt et al., 2018).

Alt and Puschmann (2012) argue that customer behavior has changed due to the emergence of the native digital generation, who have a closer relationship with the technologies and seek more transparency in the provision of financial services.

The global financial crisis had a significant negative impact on the confidence in the banking system (Dietz, 2016). The financial sector experienced a series of ruptures in its operations and processes (Alt & Puschmann, 2012). Therefore, after the crisis, new

regulatory issues emerged and focused on greater transparency from financial agents and greater protection for consumers (Alt et al., 2018). Although the financial sector regulations became stricter after the crisis, some initiatives in some countries reduced FinTech entry levels for new companies (Puschmann, 2017).

Since then, the sector has been gaining prominence among investors, according to Gagliardi et al. (2016), the value of global investments in FinTech grew 75% in 2015, which is equivalent to US\$ 22.3 billion. Gagliardi et al. (2016), emphasize that the highlight of FinTech startups is due to low bureaucratic boundaries, great knowledge about customer needs and highly qualified dynamic teams. However, even with an investment growth, there are few theoretical developments about FinTechs (Gimpel et al., 2018). Although there is several research about the digitalization of the financial services industry, the literature about FinTech has begun to develop recently and is still scarce (Puschmann, 2017).

As argued by Gimpel et al. (2018), although there are some definitions, both academic and commercial for the term FinTech, it is necessary to distinguish FinTech and FinTech startups. For the author, FinTech represents the use of digital technology, such as Internet, mobile computing, and data analyses, to enable innovate or disrupted financial services. FinTech startups are new technology-based companies that offer financial services based on FinTech. For Zavolokina (2016), FinTech can be defined as a phenomenon in broad expansion, which has been adjusted according to the social needs, and where there are increasingly more entrepreneurs. The term FinTech can also be used to refer to startup companies within financial services (Zavolokina, 2016).

Functional perspectives of a FinTech can be represented by interactions with customers, payment services, insurances, financing and loans, while for an institutional perspective a FinTech is a startup company (Alt et al., 2018).

According to Alt et al. (2018), functional perspectives cover three sub-areas of FinTech, such as InsurTech, which are companies that associate insurance business with technology, RegTech, i.e., companies that link regulatory issues of the financial sector with technology, and BankTech, i.e., companies that combine banking with technology. Among these three subareas, only BankTech did not receive extensive academic attention (Alt et al., 2018).

2.2.1 - FinTech Ecosystem

FinTech services can influence financial institutions, regulators, customers and retailers in a wide range of industries (Leong et al., 2017). The new trends and needs related to the financial services delivery have been driving the development of an entirely new ecosystem, affecting both startups (FinTechs) and non-financial firms (Puschmann, 2017). This ecosystem is of paramount importance to ensure that the necessary technological innovations to make the financial services sector more efficient and to improve customer experience emerge (Diemers, 2015).

According to Lee and Shin (2018), the ecosystem of a FinTech comprises five elements: FinTech startups; government; traditional financial institutions; financial customers; and, technology developers. A well-developed ecosystem can stimulate the local economy and generate opportunities for growth in many industries (Diemers, 2015). In order to understand the dynamic of a FinTech and how it develops, it is necessary to analyze its ecosystem (Lee & Shin, 2018).

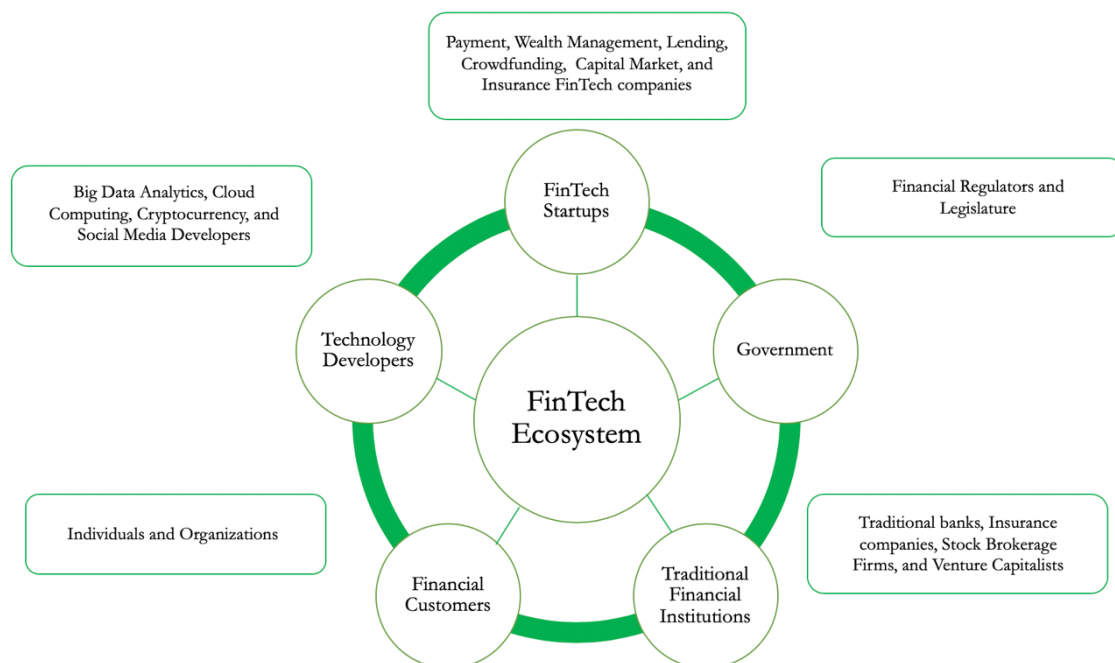


Figure 2 - The five elements of a FinTech ecosystem based on Lee and Shin (2018)

- **FinTech Startups**

FinTech startups are new technology-based companies that offer innovative solutions in the financial industry (Gimpel et al., 2018). These companies are responsible for

the innovation leaps in the areas of payment, wealth management, loans, crowdfunding, insurance, and capital markets, so they are should be considered the central piece of the ecosystem (Lee & Shin, 2018). Fintech startups' businesses have many elements that directly impact the consumer in the financial value chain (Gimpel et al., 2018). FinTech startups use digital channels as a point of contact and each of them vary the forms of payment, settlement, quality of service, security and rights (Gimpel et al., 2018). Besides focusing on low-cost operations, FinTech startups also prioritize meeting niche market needs by offering more customized services to their clients in comparison to traditional financial institutions (Lee & Shin, 2018). However, although FinTech startups adopt a customer-centered strategy, such strategy does not remove uncertainties about long-term profits and success rates (Gimpel et al., 2018).

As stated by Gimpel et al. (2018), the major categories of financial services that can be provided by FinTech startups are asset management, account management, investments and saving, crowdfunding, crowdinvesting, financial planning, insurance, P2P (peer to peer) loans, financing and money transfer. Alt et al. (2018) defined the possible financial solutions offered by a FinTech startup more generically, dividing them into payment services, insurance, customer interaction, financing, and loans.

- **Government**

The global financial sector has experienced significant changes in regulations due to digital technologies and their disruptive effect (Leong et al., 2017). Governments and regulation agencies can positively impact different dimensions of the ecosystem, e.g., by simplifying of trade regulations or by reducing taxes and duties. However, according to the authors, governments and regulation agencies can also have a negative impact, namely by creating more rigid and bureaucratic regulations (Diemers, 2015). After the global economic crisis of 2008, governments and regulation agencies further developed regulations, prioritizing transparency in an attempt to reduce fraudulent behavior and protect consumers (Alt et al., 2018). Although there is this trend for more stringent regulations, some countries started initiatives that promote the emergence of new FinTech companies (Puschmann, 2017).

In order to encourage technology-based innovations, entrepreneurial activity and guarantee greater competitiveness in the financial sector, some countries developed national economic development plans and designed economic policies more flexible, creating a more

favorable regulatory environment for FinTech emergence (Diemers, 2015; Lee & Shin, 2018).

It is worth mentioning that governments' and regulation agencies' relationship with FinTech ecosystems may change from country to country. Some countries, such as the USA and the United Kingdom, have more mature ecosystems, and, therefore, the private sector is largely responsible for the role of the service provider (Diemers, 2015). As argued by Diemers (2015), in the countries where the FinTech ecosystem is more developed, the government and regulation agencies only fulfil the function of defining regulation, policies and property development. On the other hand, in the countries where the FinTech ecosystem is less-mature, as Saudi Arabia and Jordan, the government and regulation agencies must be connected across the whole ecosystem (Diemers, 2015).

Gomber, Koch, and Siering (2017) emphasize the importance of understanding regulatory issues in the market in which a FinTech startup is operating and its level of flexibility, in case a startup business model is unprecedented and requires customized regulations.

- **Traditional Financial Institutions**

Traditional financial institutions (TFIs) are essential for FinTech ecosystems (Diemers, 2015). After the first impact of FinTechs emergence in the financial sector, TFIs have been reviewing their business models and developing new strategies to approach the reality of TFIs in terms of innovation in financial technology (Lee & Shin, 2018). Nevertheless, TFIs still focus on the provision of aggregated, complete and comprehensive services to consumers (Lee & Shin, 2018). However, the main public is no longer interested in such kind of services and loyalty to large financial institutions is decreasing, since clients tend to prefer to build relationships with various financial service companies (Alt et al., 2018).

Although at the beginning TFIs faced FinTech startups as a threat, recently they have started to work in collaboration with those new companies (Lee & Shin, 2018). Some corporative banks have started to develop and invest in FinTech startups through acquisitions and the creation of in-house incubators seeking to launch new services with lower operational costs and more competitive prices (Dany, 2016).

According to Diemers (2015), the relationship of TFIs with FinTech startups may stimulate the innovation within the former and further strengthen their competitive position.

- **Financial Clients**

One of the FinTech startups key feature is the ability to identify customer needs (Gimpel et al., 2018). Furthermore, FinTech startups focus on offering services that meet the needs of market niches by delivering high quality and personalized services through personalized services (Lee & Shin, 2018). This approach is extremely relevant in the acquisition of new clients, since customers consider the benefits and risks of using the services of a FinTech beforehand (Ryu, 2018). Customer satisfaction is of paramount importance to FinTech startups because word-of-mouth recommendations can be crucial for business success in such a highly competitive industry (Lee & Shin, 2018).

For Ryu (2018), FinTechs need to comprehend the characteristics of their users in order to be able to provide an efficient service, and meet the expectations and demands of customers. For companies that have the X and Y generations as customers, it is necessary to offer accessibility, convenience, and tailor-made services (Lee & Shin, 2018). The high standard and value-added services attract customers who have been served by well-established financial institutions since those institutions did not offer products or services that would meet the specific and individual customers' needs (Gomber et al., 2017).

According to Lee and Shin (2018), FinTech startups must use integrated management of customer services to ensure the appropriate use of the several channels through which they interact with their users, since customers are already used to have ubiquitous access to their financial information (Alt et al., 2018).

- **Technology Developers**

With the advance of information technology, technology developers deliver digital technologies, such as big data, cloud computing, social media, and artificial intelligence (AI), that are one of the factors responsible for FinTech startups success (Alt et al., 2018; Lee & Shin, 2018). New technologies provide new features for electronic tools that previously were exclusive for banking agents (Alt et al., 2018). The internet of things (IoT), cloud computing, big data, social computing, among other technologies, enable startup companies to automatize their business processes and offer unparalleled services and products within the financial sector (Puschmann, 2017).

The relationship between technology developers and the FinTech ecosystem is crucial, since they are one of the responsible for developing a favorable environment that enables FinTech startups to launch innovative services, that guarantee sources of revenue for the developers (Lee & Shin, 2018).

2.3 Socio-technical System Theory

Socio-technical theory (STT) analyses the relationship between social and technology dimensions and identifies whatever may emerge from this interaction (Durkin et al., 2015). As argued by Zhang, Tang, and Jayakar (2018), STT is built on the premise that the social context of an organization and the new technologies and technical requirements that emerge and are used in such organization are successively adapted to align with each other. The STT is, therefore, considered appropriate for the analysis of emerging technology-based areas, as in the case of financial services, since the industry seeks a model that is able to explain the social and technological changes in the sector (Durkin et al., 2015). In order to understand the complex relationship between technology and workers within an organization, it is essential to analyze the organization and its context as a socio-technical system (STS) (Durkin et al., 2015; O'Hara, Watson, & Kavan, 1999). The STS consists of two subsystems: the social subsystem, which comprises people (workers) and structures, and the technical subsystem that encompasses technologies, processes, procedures, and the physical environment (Durkin et al., 2015).

Furthermore, according to Fuenfschilling and Truffer (2016), the socio-technical transition (change) can be conceptualized by an interrelationship between three pillars: actors, institutions and technologies. Socio-technical systems only work due to the interactions between human actors (companies, consumers, industries, citizens, public authority, social groups), technologies (radical innovations and incremental improvements), and institutions (legislation and formal rules) (Fuenfschilling & Truffer, 2016; Geels, 2004; Zhang et al., 2018). In this context, technologies define the organizational environment in which human agents act (Zhang et al., 2018). A socio-technical transition means a change from one socio-technical regime to another, with the interaction between actors, institutions (organizations), and technologies (Fuenfschilling & Truffer, 2016). There is a tendency for an equilibrium between social and technical systems since they reinforce each other until there is an external or internal disturbance in which one of them changes the system to a new equilibrium (Zhang et al., 2018). This transition is a moment when new products,

services, organizations, business models, or regulations that may complement or replace the previous offer emerge (Markard et al., 2016; Zhang et al., 2018). It is important to emphasize the complexity of these interactions, since technical systems are developed to reach an expected level of performance, while social systems are composed of people, whose reactions are not always predictable, and are typically resistance to change (Zhang et al., 2018).

The importance of associating service innovation with FinTechs is supported by the argument of Snyder et al. (2016), who consider that service innovation is partly responsible for the development of the service sector and that it is a way to remodel society (including the financial services). The socio-technical theory (STT) on its hand, analyses the relationship between social and technology dimensions of a socio-technical system and identifies possible issues that may occur from this interaction (Durkin et al., 2015), which has been shown to be a good setting to analyze the evolution of FinTechs. As such, service innovation perspective brings a service focus (instead of a product one), while STT integrates the technology focus of Fintech, in a broader socio-technical system.

The relevance of this study to the scientific and practical emerges from fact that up to date no research explores the relation of the topics service innovation, FinTechs and socio-technical theory.

3. Method

The method used during this research was case study research.

Case study research design is appropriate to understand complex social phenomena, such as organizational processes and management, and the maturation process of industries (Yin, 2003). Yin (2003) further defines the case study as particular situations that have great empirical detail, and which are based on several data sources. Multiple case studies may increase the external validity and help prevent researcher bias (Eisenhardt & Graebner, 2007; Voss, Tsikriktsis, & Frohlich, 2002). Case studies may be characterized as exploratory and descriptive (Yin, 2003). The construction of a theory from the analysis of a case study is considered one of the best ways to connect qualitative evidence with deductive research (Eisenhardt & Graebner, 2007). The process of theory building occurs through repetitive iterations between case data analysis, theory building, and framing in the literature (Eisenhardt & Graebner, 2007).

This method was chosen because it is appropriate to the exploratory scope of the objectives of this study. Besides, it allows in-depth analysis of one or more cases of FinTech ecosystems, which enable the development of a theory or medium-range propositions (Eisenhardt & Graebner, 2007).

3.1 Data Collection

Interviews are the main source of data used in case research (Voss et al., 2002). In this research, semi-structured interviews were used as a main source of data.

According to Voss et al. (2002), an issue that is implicit in data collection is known as triangulation, which can be defined as the combination of different sources and methods to study the same phenomenon. Eisenhardt and Graebner (2007); Yin (2003), refer that secondary data, such as surveys, reports, archives and direct observation, is also an important source of data for case studies allowing triangulation of data. In this study, secondary data used included reports of major consulting firms, such as Accenture, PWC, KPMG, and Ernst & Young. In addition, materials of relations public, such as press release, newspaper articles, and others, were also used.

Between March and April of 2019, a total of 11 FinTech startups have accepted to be part of this study. The selected startups to be included in this study were companies which

have been categorized as FinTech by consulting reports such as Portugal FinTech Report 2018 and Finnovista FinTech Radar Brazil 2018. In each startup one interview was conducted with one top level manager, working in the company since its establishment (in some cases one of the founders of the company). The FinTech startups are presented in Table 1.

| FinTech Start-up | Business Type | FinTech Size (employees) | Year of Foundation | Meeting Type | Country | Interviewee |
|-------------------------|----------------------|---------------------------------|---------------------------|---------------------|------------------------|------------------------------|
| FinTech BR 1 | Wealth management | 51-200 | 2014 | Web Call | Brazil | Co-Founder |
| FinTech BR 2 | Payment | 11 - 50 | 2014 | Web Call | Brazil | Head of Business Development |
| FinTech BR 3 | Payment | 201 - 500 | 2016 | Web Call | Brazil | Public Relationship |
| FinTech BR 4 | Capital Market | 201 - 500 | 2010 | Web Call | Brazil | Founder |
| FinTech BR 5 | Capital Market | 11 - 50 | 2017 | Web Call | Brazil | Marketing Manager |
| FinTech BR 6 | Crowdfunding | 11 - 50 | 2010 | Web Call | Brazil | CEO |
| FinTech PT 1 | Payment | 11 - 50 | 2014 | In person | Portugal | Co-Founder |
| FinTech PT 2 | Crowdfunding | 2 - 10 | 2011 | Web Call | Portugal | Co-Founder |
| FinTech PT 3 | Financing | 2 - 10 | 2018 | In person | Portugal | CEO |
| FinTech PT 4 | RegTech | 11 - 50 | 2017 | Web Call | Portugal / Switzerland | Product Owner |
| FinTech PT 5 | InsurTech | 11 - 50 | 2015 | In person | Portugal | CEO |

Table 1: Summary of the interviewed FinTechs Startups

Most of the interviews have been conducted online using videoconference, and three of the interviews have been carried out in person in the startup office. Every interview has been recorded. The average duration of the interviews was 35 minutes, the longest lasted for 53 minutes, and the shortest for 16 minutes.

An interview script was prepared beforehand and used during the interviews, organized in 3 blocks. The first was focused on the FinTech history and development, the second targeted the FinTech ecosystem characterization (Lee & Shin, 2018), and the third addressed the FinTech's innovation process. The script is presented in the Appendix B.

3.2 Data analysis

After data collection, interviews were transcribed and added to NVivo software. Using NVivo it was possible classify the interviews and was split them into two groups:

Portuguese FinTechs and Brazilian FinTechs. Interviews were also coded, using descriptive and simultaneous coding. Coding is one of the methods to analyze qualitative data (Saldaña, 2013). Codes were then analyzed with the purpose of finding patterns among the cases that would enable a theoretical framing of the knowledge retrieved from the cases, based on the theoretical foundations collected from the literature review. This theory building process occurred iteratively back and forth from empirical data and literature.

4. Results

Considering coding as an analysis method used to interpret the interviews, it was possible to identify five main categories, and several other subcategories. The main codes created to reflect the data collected were “Business Type”, “FinTech Startup”, “FinTech Stakeholders”, “FinTech Ecosystem” and “Innovation Process” (Table 2). The complete tree code is presented in the Appendix C.

| Category | Subcategory | Sources |
|-----------------------------|--|-----------|
| Business Type | | 11 |
| | <u>Payment</u> | 3 |
| | <u>Capital Market</u> | 2 |
| | <u>Crowdfunding</u> | 2 |
| | <u>Financing</u> | 1 |
| | <u>InsurTech</u> | 1 |
| | <u>RegTech</u> | 1 |
| | <u>Wealth Management</u> | 1 |
| FinTech Startup | | 11 |
| | <u>Foundation</u> | 11 |
| | <u>Investment Capital</u> | 11 |
| | <u>Value Proposition</u> | 11 |
| | <u>Work Team</u> | 5 |
| | <u>Headquarters</u> | 3 |
| FinTech Stakeholders | | 11 |
| | <u>Financial Customer</u> | 11 |
| | <u>FinTech Startup</u> | 11 |
| | <u>Government</u> | 11 |
| | <u>Investor</u> | 11 |
| | <u>Technology Developers</u> | 11 |
| | <u>Traditional Financial Institution</u> | 11 |
| | <u>Partner</u> | 4 |
| FinTech Ecosystem | | 11 |
| | <u>Financial Customer</u> | 11 |
| | <u>FinTech Startup</u> | 11 |
| | <u>Government</u> | 11 |
| | <u>Investor</u> | 11 |
| | <u>Technology Developers</u> | 11 |
| | <u>Traditional Financial Institution</u> | 10 |
| Innovation Process | | 11 |
| | <u>Idea Generation</u> | 11 |
| | <u>Development</u> | 11 |
| | <u>Business Definition</u> | 6 |

Table 2 Coding Tree - Categories and Subcategories

The first code, “Business Type”, describes the type of business of the FinTech startups that participated in the study. Among various types of businesses in a FinTech

startup mentioned in the literature and reports, the following were identified in the cases: Capital Market, Crowdfunding, Financing, InsurTech, Payment, RegTech, and Wealth Management. "Business Type" was also considered a sub code and was included in the main code "FinTech startup" since the type of business is one of the inherent characteristics of a FinTech startup. It is worth emphasizing these categories were mentioned separately during the analysis of the codes in order to facilitate their understanding.

The second code, "FinTech Startup", describes the characteristics of the companies studied, such as details of their founders, year of foundation, investments, and value proposition. This code was also framed as a sub-code of the "FinTech Stakeholders" and "FinTech Ecosystem" categories.

The third code, "FinTech Stakeholders", characterizes which actors have a key role and impact in the creation and development of startups. In the "FinTech Stakeholder" code, all stakeholders who have some relationship with the startups studied were identified. In all cases analyzed, the identified stakeholders are aligned with the FinTech ecosystem developed by Lee and Shin (2018); and they are: Traditional Financial Institutions, Customers, Technology Developers, Government, FinTech Startup. However, in addition to stakeholders mentioned by Lee and Shin (2018), this research uncovered other groups of stakeholders, such as the partners and investors. Despite not being represented in the structure of the FinTechs ecosystem of Lee and Shin (2018), this research found that these actors, partners and investors, have an important role in this ecosystem.

Partners can be characterized as sellers, content partners (who are partner agents as influencers and bloggers), and the community in which this startup operates. Although partners were cited as stakeholders, their importance in the Fintech ecosystem is still developing, as only few startups mentioned these stakeholders. Therefore, this study will not deepen the relationship between partners and FinTech startups.

Investors are defined as companies that invest some capital in startups, through Venture Capital Firms, accelerators and incubators, angels' groups. The relationship of this stakeholder with startups was identified in all cases studied. Although the types of interaction between investors and startups vary, there is a pattern that shows an important relationship between these stakeholders and the FinTechs startups. Therefore, unlike previous research, investors were considered relevant to the FinTechs ecosystem.

The fourth code, "FinTech Ecosystem", characterizes the relationship between the stakeholders of the companies under study and their respective business models. This analysis was performed based on the diagram of the FinTech ecosystem developed by Lee

and Shin (2018). In addition to the stakeholders identified by Lee and Shin (2018), in this code, the investors were also characterized as stakeholders.

The fifth code, “Innovation Process”, describes the stages of the startups' innovation processes according to service innovation literature, from idea generation, idea selection, development and dissemination to product and service delivery (Salerno, Gomes, da Silva, Bagno, & Freitas, 2015).

From these codes and the analyses performed during the coding, it was possible to make a combination between them, and thus identified seven main elements for achieving the main objective defined in this study: Understanding the evolution of the FinTechs ecosystem and reinforcing its characterization based on the combination of two theoretical frameworks of reference (Service Innovation and Socio-technical system theory). The seven elements are FinTech startup, Government, Traditional Financial Institutions, Customer, Technology Developers, Investors and Innovation Processes. Each of those elements will be addressed in the following sections.

In order to understand better, the FinTech ecosystem diagram and how the seven elements impact on FinTech startup' development, it was necessary to analyze each element separately. The analysis of these seven elements was made from the crossing of the perspectives of socio-technical theory and service innovation. From the perspective of socio-technical theory it is possible to understand the structure of the FinTechs ecosystem, and thus understand the roles that each social, organizational and technological actor has in the structure. Whereas, service innovation perspective is relevant to understand the dynamics in which the evolution of the ecosystem happens besides allowing the understanding of the value co-creation between startups and customers.

4.1 FinTech Startups

FinTech startups can be categorized by the type of segment in which they provide services. According to Quandt (2019), the business types of FinTech can be separated into 14 categories. In this study, 11 categories have been considered (those identified in the data collected from the cases). As seen in Table 1, the following business categories were identified: capital market, crowdfunding, financing, InsurTech, investment, payment, RegTech and wealth management.

| Subcategory | Number of FinTechs | Quotes |
|--------------------|--------------------|---|
| Foundation | 11 | “In March 2017, we opened the doors and released the queue for all users to register and use the platform. At the end, there were already more than 30 thousand people waiting to use the service”. |
| Investment Capital | 11 | “At first, we looked [for investment], but it turns out we didn’t have to. It was internal capital.” |
| Value Proposition | 11 | “So, we combine freedom with simplicity, because normally, you find several products to invest, but all [products] with a certain complexity.” |

Table 3: Coding Tree – Category: FinTech Startup

In addition to the types of FinTechs, during the interviews, some characteristics of the startups were identified. These characteristics are related to the founders, capital investments and value proposal, as shown in Table 3. In general, the founding year of the startups studied is quite recent. The oldest companies were founded in 2010, and the newest company was created in 2018. Some startups involve new businesses, such as cryptocurrency exchange and RegTech, justifying such recent foundation which, in both cases, was in 2017.

Among the subcategories identified, it is worth mentioning the founders of startups. Two groups of integration were found among the founding partners. The first group was characterized by founders who have a similar professional background and work in the same area. The second group was characterized by founders who have different professional backgrounds, and there is an integration between their areas of expertise. From the cases studied, most of the founders have a similar professional background.

Another pattern identified is related to the form of capital investment made during the foundation of the companies. In most cases, the initial investment was internal came from partners’ capital. In only two of the cases studied the initial investment was external capital.

The subcategory, “Value Proposition”, was divided between products and services offered by FinTechs. Portuguese and Brazilian startups were analyzed, and the products identified involve the ideas developed and unsuccessful products. The services offered present the extra services that the startups offer to the customers.

4.2 Government

According to reports from major consulting companies, regulators and governments in countries such as Portugal and Brazil are developing regulation and political actions to promote the development of FinTech startups (Pollari, 2018; Taïar, 2018).

| Subcategory | Number of FinTechs | Quotes |
|-----------------------|--------------------|--|
| Closer Relationship | 7 | “Regulators we constantly talk about is the Anbima (Brazilian Financial and Capital Markets Association), they are on top, which is the private regulator [and] it is much more rigorous in some aspects such as auditing, [and] knowing how the data is doing.” |
| Nonexistence | 4 | “On our side, we haven’t had much trouble with the government and regulators yet, thank God! Because we try to keep our focus more [on] [the]technological [layer], and not in the part of fund and finance management which is heavier from the point of view of regulation.” |
| Loophole | 3 | “And it has a kind of veiled relationship, it exists, but at the same time it doesn’t exist, which is with the government. Today in Brazil, Bitcoin is in a limbo that is not prohibited, but it is not regulated.” |
| Proactive | 3 | “Yes, for sure, it has an influence on the business, and we are always very attentive to it. I, for example, keep following laws that have something to do with crowdfunding.” |
| Indirect Relationship | 2 | “Since 2015 there has been a regulation, a law on crowdfunding. After the emergence of this regulation, no substantial change was made to the business, only a few details were changed.” |

Table 4: Coding Tree – Category: Government

As seen in Table 4, among the companies studied, several behaviors regarding the relationship with the government have been identified. No single pattern emerged from the data concerning the relationship between Financial Regulators and FinTech startups. Instead, five types of different behaviors were uncovered: a closer relationship to Financial regulators, the nonexistent relationship, the loophole relation between the company and the government, the proactive relationship, and an indirect relationship to Financial regulators.

The first subcategory identified were FinTechs with a closer relationship understand the importance of the government in their business and work with a regulation defined by the state and regulatory agencies. From the studied startups, all Brazilian startups have a close relationship with regulatory agents and the government. The types of startups businesses that have a close relationship with the government are: payment, wealth management, capital market and crowdfunding. In this group, there are small startups with up to 50 employees and larger startups with up to 500 employees. However, it is important to highlight that among the startups that have this behavior close to the government, some are not considered proactive, in other words, they are following the actions of the government and the regulatory agencies, because they know that this directly affects their business, but they are not involved in the suggestion of new laws and rules.

The second subcategory refers to companies that have no relation with the government. In some cases, these companies have such innovative business models that regulatory agencies have failed to identify and create specific regulations to that reality. Other examples are FinTechs that develop a technology solution together with traditional financial institutions and are not affected by regulatory issues since they only provide technology. In this subcategory, there are Brazilian and Portuguese startups, which have the following types of business: payment, capital market and crowdfunding. In this subcategory, there are FinTechs considered micro-companies, with up to 10 employees, small companies with up to 50 employees.

The third subcategory identified were FinTechs that have a loophole relationship. A loophole relation happens when a FinTech does not have a business recognized, understood and regulated by the government. In this context, FinTechs startups consciously take advantage of this loophole in the legislation to build its business. The startups that are part of this group are of Brazilian and Portuguese origin, and the types of business are: payment, financing and capital market. These startups are considered micro-companies, with up to 10 employees, and small companies that have up to 50 employees. Nevertheless, these companies' businesses are framed within the regulation of other types of business. This is

the case of the payment and capital market startups interviewed. In some situations, the Financial Regulators keep these conditions due to help the FinTechs startups, i.e., there are interactions between regulators and FinTechs to create an effort to adapt the regulatory conditions to these new types of businesses.

The fourth subcategory identified were FinTechs that have a proactive relationship with the government. Most startups that fall into this category have a business that does not yet have a clear definition of regulatory issues, and therefore require companies to position themselves proactively on regulatory and legal issues. Within this category there are also businesses that have some defined legislation that applies to their activity, but there are still regulatory issues still need to evolve. The startups that are part of this subcategory are Brazilian. They are characterized as small companies with up to 50 employees and large companies with up to 500 employees. The types of business of these FinTechs are: capital market and crowdfunding. These startups are closely monitoring all the regulatory issues that may relate to their type of business. And they show themselves available to help the government in the best way to update or create new regulation.

The fifth subcategory identified were FinTechs that have an indirect relationship with regulatory agencies and the government. The startups that are part of this group are of Portuguese origin. The types of startups businesses that have an indirect relationship with the government are: Crowdfunding, InsurTech and RegTech. In this subcategory, there are FinTechs considered microenterprises with up to 10 employees, or small companies with up to 50 employees. The relationship of these FinTechs was considered indirect with the regulatory agencies and the government, once they know the importance of these issues for the environment in which the startups is inserted, but the way these businesses were developed do not suffer direct changes due to alterations in the laws.

4.3 Traditional Financial Institutions

Technology enables FinTechs to offer services that provide consumers with more decision-making power and reduced number of intermediaries in the financial services chain. For this reason, FinTechs are considered to be a decentralizing force in the market, since they have the power to end the offer highly concentrated in traditional financial institutions (Taiar, 2018)

| Subcategory | Number of FinTechs | Quotes |
|-------------------------|--------------------|--|
| Dependence Relationship | 6 | “So, we have a relationship with the bank, which is kind of a love-hate relationship. (...) Today the bank is still a necessary evil because I still need people to bring the money via bank, to transform it into Bitcoin.” |
| Neutral Relationship | 2 | “We have no official relationship with any kind of bank or financial institution.” |
| Partner Relationship | 1 | “What we need is more how we make our operational turn, it is much more an operational issue than a relationship with the bank (...)” |

Table 5: Coding Tree – Category: Traditional Financial Institutions

The FinTech startup relationship with traditional financial institutions is directly related to the startup business type. As seen in Table 5, three types of relations were identified between these institutions and the startups interviewed. In most of the interviews, banks were considered the most important financial institution for the business. However, in the case of Financing and InsurTech startups, the insurers and credit brokers were considered key institutions.

The first subcategory identified the FinTech which have a crucial relation with traditional financial institutions for company operations. In these cases, a relationship of dependency occurred between the startup and the financial institutions. This relationship can be observed in Brazilian and Portuguese FinTechs with the business type of payment, capital markets, and wealth management. These types of startups need to have appropriate banking infrastructure to ensure delivery of the service provided. In this subcategory, there are FinTechs considered micro-company, with up to 10 employees, a small company with up to 50 employees, and a large company with up to 500 employees.

The second and third subcategories identified that have a neutral and partner relationship with traditional financial institutions, such as banks. These FinTechs use banks as one of the operational tools and do not depend on banking infrastructure to deliver their services. There are Portuguese and Brazilian FinTechs that have a neutral relationship with banks. These FinTechs business types are: capital market and crowdfunding. The only

startup that has a partnership relationship with the banks is Brazilian, and its type of business is crowdfunding.

4.4 Financial Customers

According to Lee and Shin (2018), financial customers can be divided into individuals and organizations. As analyzed by “Pulse of FinTech”, global KPMG’s report of 2018, there is an increase in the emphasis of FinTechs focused on Business-to-business (B2B) (Pollari, 2018).

| Subcategory | Number of FinTechs | Quotes |
|-------------|--------------------|---|
| B2B | 5 | “Concerning our customer, we are talking about giant customers, who invoice around 50 to 100 million euros a year, and who are also the type of customer who sees value in our platform.” “We focus a lot on micro-entrepreneurs and small and medium enterprises. But our base today is micro-entrepreneur and small company.” |
| B2C | 4 | “Our main customer are users, I will not say only low income, but are users who do not have access to financial services (...)” |
| B2B and B2C | 3 | “Most of our clients are companies, we have non-profit associations, social organizations, cultural associations, theater companies, or private users who want to make a book or volunteer, release a record.” |

Table 6: Coding Tree – Category: Financial Customers

As seen in Table 6, key customers of the startups under study were categorized as other companies and individuals. All Portuguese FinTechs studied have other companies as the target, being characterized as B2B (business to business). These were then subdivided in different types of companies they target: large companies, small and medium-sized enterprises (SMEs) and social organizations. These FinTech business types are: payment,

crowdfunding, InsurTech, RegTech and financing. These FinTechs are characterized as micro-enterprises, with up to 10 employees, and small businesses with up to 50 employees.

Other FinTechs included in this study target individuals and are defined as B2C (business to consumer). These FinTechs are Brazilian, and their business type are: Capital market, payment and wealth management. Two specific targets of those FinTechs were identified: millennials and small investors. Some of these startups have defined the final customer as the most important stakeholder. These FinTechs are classified as micro-companies, with up to 10 employees, and medium companies with up to 250 employees, and large company with up to 500 employees.

Among the companies interviewed, there is a small group of Brazilian and Portuguese FinTechs that act for both targets, which were classified as B2B and B2C. These startups have services that meet the needs of both types of target in their portfolio. These FinTech business types are: payment and crowdfunding. A common characteristic of these FinTechs concerning their target B2B, is that the companies to which they provide services are micro-companies or SMEs. These FinTechs are characterized as micro-companies, with up to 10 employees, and small companies with up to 50 employees.

4.5 Technology Developers

For some time, technologies such as data analytics, cloud computing, mobile services, have been considered the main technologies for a FinTech (Leitão, 2018). In Brazil, for example, a study performed by Taiar (2018), indicates that these are the types of technology that are used by most of FinTechs.

| Subcategory | Number of FinTechs | Quotes |
|-------------|--------------------|---|
| In-house | 8 | “The technology we do in-house. That’s very important, it’s a very important intellectual property.” |
| Outsource | 4 | “We have made a partnership with a scientific and technological research institution that is INESTEC, a non-profit organization that promotes scientific research (...)”. |

Table 7: Coding Tree – Category: Technology Developers

Due to the importance of the technology for a FinTech, in every interview, this element was identified as essential for the business. Furthermore, the relationship between technology developers and startups were divided in two groups, as seen on Table 7: companies working with either outsourced or in-house team of technology developers.

In the case of most of the Brazilian and Portuguese startups interviewed, technology is developed by an in-house team due to the importance of intellectual property for strategic advantage. These FinTech business type are: payment, capital market, wealth management, crowdfunding and RegTech. These FinTechs are classified as micro-companies, with up to 10 employees, small companies with up to 50 employees, a medium company with up to 250 employees and large company with up to 500 employees.

Outsourced teams working with FinTechs were divided into two types of outsource (subcategories): Partner Companies and Research Institutes. Partner companies have a fundamental role in the startups' operations and processes, while research institutes have the function of promoting scientific research in order to create some elements in the platform that allow the use of technologies, such as Blockchain, in new ways. These FinTechs are from Brazil and Portugal and their business types are: crowdfunding, financing, RegTech and InsurTech. Those FinTechs are defined as micro-companies, with up to 10 employees, small companies with up to 50 employees.

4.6 Investors

Even though several sources of funding, such as private equity, debt financing, IPO and acquisitions, have been increasing as important sources for FinTechs, venture capitals are still generally the main source of funding for such kind of startups (Piscini, 2017). The evolution in FinTechs investment, from venture capital to other sources of funding, can be characterized as an indicator of market maturity.

| Subcategory 1° Level | Subcategory 2° Level | Number of FinTechs | Quotes |
|-------------------------|--------------------------------|-----------------------|--|
| Pivotal | Key for the startup creation | 2 | “We as a startup we live off the on investor (...)” |
| | Key for the startup growth | 5 | “We have the funds, our sponsors, who show that the business is solid.” |
| Neutral | There’s interest in both parts | 2 | We’ve already had investment rounds. We are preparing for another one. We are looking for investors who may or may not be investment funds. |
| | Seeking the ideal investor | 1 | “The profile of the investor that we seek is a very rare profile, it is a less aggressive profile in terms of growth, which respects more the purpose of the company, of growing at its own rhythm. (...)” |
| Irrelevant | Fintech has no interest so far | 2 | “So far it has never received capital. There are some funds that approach the FinTech for a possible investment, showing interest in funding it, but without any commitment so far” |
| | FinTech couldn’t find | 1 | In the beginning, we looked for, but it turns out we didn’t have to. So, we used internal capital. |

Table 8: Coding Tree – Category: Investors

As seen in Table 8, investors can be pivotal for a Fintech development due to their responsibility for financing an idea and project. The type of typical investors are Venture Capital Firms, accelerators and incubators, business angels’ groups, and banks.

Different relationships between FinTech startups and investors were identified. The first category, Pivotal, refers to FinTechs that consider their relationship with investors essential for the business. In most cases, investors have been considered key to the startup’s growth for Brazilian and Portuguese FinTechs. These FinTechs business types are: wealth management, payment, capital market and RegTech.

There are also Brazilian and Portuguese FinTechs that do not provide the same importance of investors for their growth but define their relationship with investors as the basis for the creation of the startup. These FinTechs business types are: payment and financing.

The second category refers to Brazilian FinTechs with a neutral relationship with investors, given that they only needed the third-party capital when the startup was already at a more mature stage, and its operations were more structured. The FinTech business types identified in this subcategory were crowdfunding and capital market. These startups are defined as small companies. For this reason, startups which fit in this category are constantly seeking the ideal investors for their reality and are not able to comply with much restrictions imposed by the possible investors.

The third category identified are Brazilian and Portuguese FinTechs that define the relationship with investors as irrelevant, since these startups had no connection with investors. These companies fit in two subcategories: those working with internal capital since the establishment of the startup, which have not had to seek investors; and, those which have tried to find investor at the begin but couldn't find and proceeded with their own funding. In these subcategories, were identified capital market, InsurTech and crowdfunding as FinTechs business types.

4.7 Innovation Process

Although not being a linear process, the process of innovation may be represented by four sequential stages: idea generation, idea selection, development and dissemination, and product and service delivery (Salerno et al., 2015). Each stage has its own characteristics, which are fundamental to the development of innovation within the company.

| Category | Subcategory | Number of FinTechs | Quotes |
|-----------------|----------------------|--------------------|---|
| Idea Generation | Market opportunity | 9 | “At the time, there was no crowdfunding platform in Portugal. So, we decided to replicate what existed, for example, in the USA, the Kickstarter, adapting it to the Portuguese context.” |
| | Solving own problems | 2 | “The company was created out of the founder dissatisfaction with the bank he used.” |

Table 9: Coding Tree – Process Innovation: Idea Generation

As seen on Table 9, the first category was the Idea Generation, where the real reasons for the emergence of the idea that generated the FinTech were collected. Two main reasons were identified: a market opportunity and the solution to a personal problem. Most of the FinTechs indicated that the idea of their business arose due to an opportunity the founders identified in the market. The second subcategory of FinTechs identified were those that generated the business idea from a personal problem that its founders had with a specific area of the financial sector. The types of business of the companies that are in the latter category are: payments and crowdfunding.

| Category | Subcategory | Number of FinTechs | Quotes |
|---------------------|------------------------|--------------------|---|
| Business Definition | Organization Process | 2 | “So, we had to open up a wealth manager and go through the whole process. And since everything was 100% digital, very different from everything that already existed in the market, we were fight with the Real Estate Commission, which is the regulator of the financial market.” |
| | Headquarter definition | 2 | “We decided to go to Porto Alegre, because Rio de Janeiro and São Paulo were very expensive (...)” |
| | Teambuilding | 2 | “One of the fundamental factors and 100% vital for this business to get off the ground, in my opinion, is that the 3 founders have completely different backgrounds.” |

Table 10: Coding Tree – Process Innovation: Business Definition

The second stage of the innovation process was the Definition of the Fintech business. At this stage it was possible to understand some decisions that the startups needed to make in order to build the business. Some decisions were considered particularly important by most of the startups, such as: definition of organizational processes and teambuilding with different backgrounds.

| Category | Subcategory | Number of FinTechs | Quotes |
|-------------|------------------------|--------------------|---|
| Development | Product Processes | 11 | “Product development for sure. We have a very strong focus on UX, and the further we go in this direction, the more updated, the more innovative, the better it will be.” |
| | Improvement Driver | 8 | “We do a lot of usability testing with the customer.” |
| | Radical Evolution | 6 | “We created a simple investment course and started delivering education online. In 2010 there wasn’t much talk of FinTech, and this combination of technology and education is very powerful, it grew very fast. In 2017 we became an investment broker.” |
| | Incremental Adaptation | 5 | “At the beginning, we had to adapt our reality, the means of payment are not the same as those of the USA, [(used as a reference for the business creation)]so we had to have local means of payment such as ATM, Mbway”. |

Table 11: Coding Tree – Process Innovation: Business Development

The third stage of the innovation process was the Development of startups. In this phase, as seen on table 11, it was observed subcategories that show the development of the business in several areas of the startup, from the processes of validation of the service or product offered, to issues related with the evolution and improvement of the startup and the product or service it provides.

A crucial element identified in every case study was the product development processes. During the interviews, it was possible to identify some characteristics of the main products that changed and some practical use cases that induced change. Improvements and radical evolutions of the products and services were implemented in order to adapt them to the needs of the market or the target customers. During the business development stage, adjustments and improvements to the products and services provided were classified as Radical Evolution and Incremental Adaptation. Radical evolution refers to the changes that

involved the creation of an entirely new offer of service or product, while incremental adaptation aggregates new characteristics to the offer without requiring such a deep change in the product or service.

| Subcategory | Number of FinTechs | Quotes |
|-------------|--------------------|--|
| Customer | 5 | “And based on surveys we try to understand what the priority and the types is of needs to adapt the product, the payment, the way to support.” |
| Regulation | 3 | “So, we never had to postpone or change, but for sure we are always guided by the restrictions that are imposed by these regulators.” |
| Benchmark | 3 | “We look outwards, we’ve been following what happens in the Chinese market, AliPay, WeChat, and so on.” |

Table 12: Coding Tree – Improvement Drivers

Among these radical changes or improvements that startups have been through, the drivers responsible for those changes were identified. In most cases, the consumer was considered the main reason for these adaptations, which can be related to user experience design (UX) or the mode of providing the service. Regulatory agents are the second driver identified. In some cases, these are considered responsible for changes in FinTech startups. The last driver identified were companies that the startups consider as benchmarks.

5. Discussion and Conclusion

After analyzing the literature review, as well as primary and secondary data on FinTech Ecosystem, it is possible to understand the main objective of this study, and the sub-objectives. The main objective of this investigation is:

Understanding the evolution of FinTechs ecosystem and its particularities, from the combination of service innovation and socio-technical theory perspectives.

To be able to understand the development of the FinTechs ecosystem, it is necessary to conceptualize the startup as the central point of this evolution, although there are also other actors (stakeholders) that have a significant influence on changes in the ecosystem. However, some of these actors (namely investors and partners) do not have a defined characterization in the framework developed by Lee and Shin (2018), so it is necessary to represent them in the structure of evolution of FinTechs ecosystem.

From the perspective of socio-technical theory, it is possible to identify a structure which enables the understanding of the evolution of this ecosystem. This structure allows to identify the social, technological and organizational part of the FinTechs ecosystem, which represented in the diagram developed by Lee and Shin (2018). On the other hand, from the perspective of service innovation, it is possible to understand the dynamic of evolution of the FinTechs Ecosystem and the main outputs.

5.1 FinTech Ecosystem Evolution - Socio-Technical System Perspective

From the socio-technical system perspective, it is possible to propose a new configuration for Lee and Shin (2018) diagram and include a new element identified, the investors. The FinTech ecosystem diagram review illustrates the relationship between a FinTech startup and each of the stakeholders that influence its evolution. This new diagram is an adaptation of Lee and Shin (2018) diagram since it was developed through an empirical study with the purpose to understand the evolution of the FinTech and its ecosystem, while the Lee and Shin (2018) diagram was based on a conceptual study with the purpose of characterizing such ecosystem.

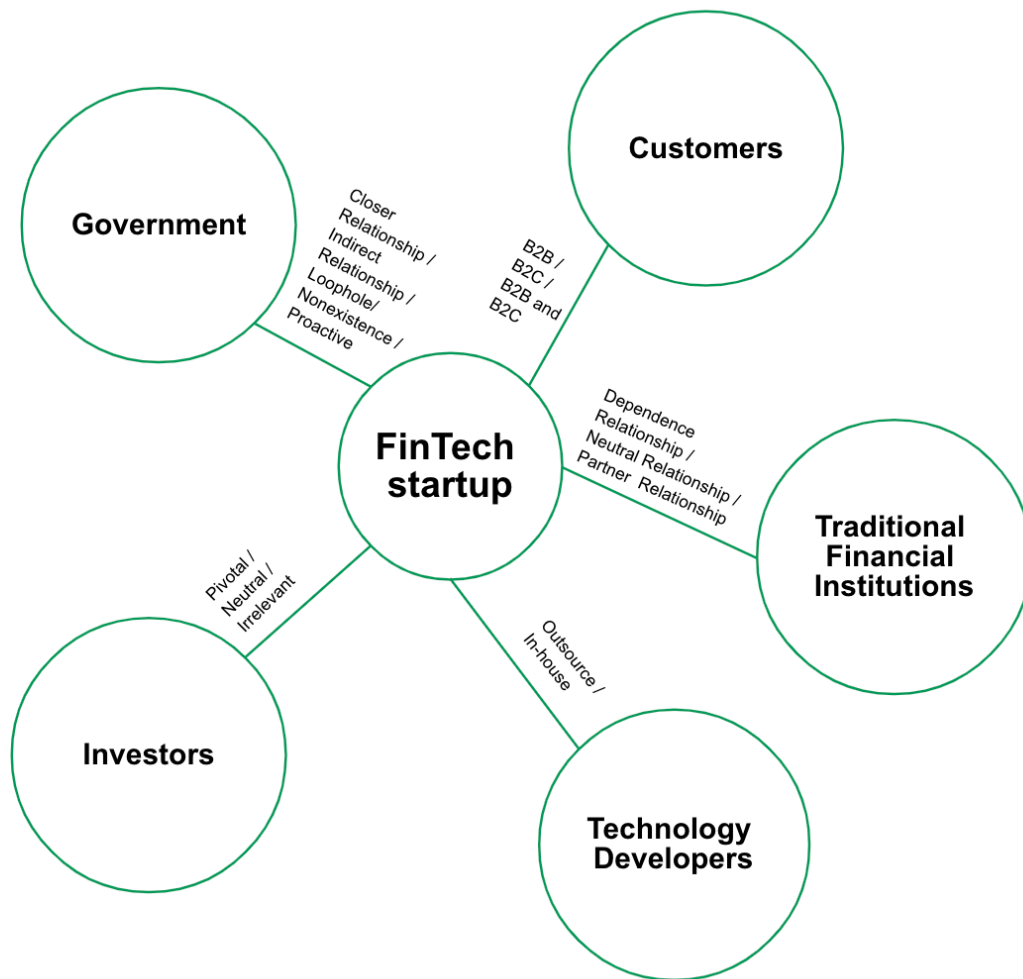


Figure 3 - Framework for FinTech Ecosystem Evolution

According to this adaptation of the diagram proposed by Lee and Shin (2018) and to what has been identified in the case studies, relationships between startups and their stakeholders occur on a two-way direction. In this adaptation of the diagram, FinTechs startup are considered as the central element of the structure, as the focus of this research is the evolution of the FinTech.

By adapting the Lee and Shin framework, it is possible to answer three questions, which are the sub-objectives:

- How are the various actors for the FinTechs ecosystem characterized?
- How do these actors influence the evolution of the FinTechs ecosystem?

- How does the perspective of service innovation and socio-technical theory support the understanding of the FinTechs ecosystem?

- **FinTech Startups**

The FinTech startup was considered the key and central element in the diagram since it interacts with every other stakeholder of the ecosystem. During this study, it was found that FinTechs are responsible for significant structural and cultural changes in both Brazil and Portugal.

The structural changes are evident when it comes to technology, regulatory issues, and the relationship with major traditional financial institutions. There are new technologies being explored for the evolution of services provided, there is implementation of new regulation within the context of financial services that affects and is affected by the FinTechs, and there is an increasingly closer relationship between big financial institutions and FinTechs startups.

On the other hand, cultural changes are related to the new form of consumer behavior, since customers are already used to have omnipresent access to their financial data (Alt et al., 2018). If these consumers are part of the X and Y generations, it is necessary to offer accessibility, convenience and customized products (Lee & Shin, 2018).

- **Government**

Government and regulatory agencies are some of the main actors that realize the relevance of the development of FinTechs, and for this reason, they are increasingly searching for solutions to facilitate the development of these startups. According to reports from PWC and KPMG, the governments of both countries, Brazil and Portugal, are open to these new business models and have been working on actions and new legislation to promote the development of FinTech startups in their countries.

Brazil, for example, is changing its legislation to decrease entry barriers for these new companies. In April 2018, there has been a change implemented in resolution 4,656 that allows Fintech startups to provide credit to their clients, without having the need of a financial institution, such as a bank, as an intermediary. This new resolution allowed several startups to register as a limited financial institution (Sagoenie, 2019). In May 2018, the Brazilian government presented another initiative to facilitate the operations of FinTechs, the creation of a Financial and Technological Innovation Laboratory (LIFT), developed by the Central Bank of Brazil (BCB) in partnership with technology companies and the National

Federation of Employee Associations of the Central Bank (FENASBAC). LIFT's function is to develop an environment in which market and academic representatives can exchange knowledge and develop innovation (Tair, 2018).

The relationship of Fintechs startups with the government can be characterized as close, indirect, loophole, non-existent and proactive.

According to the data collected in this study, it emerged that in the Brazilian context there is a close relationship between government and Fintechs, since there is a strong demand for new regulatory issues that strongly influence the new business models of Fintechs startups. In Portuguese context, there is an indirect relationship between government and FinTechs, since startups recognize the relevance of regulatory issues for the environment FinTechs are inserted. However, changes in laws do not impact directly the way in which startup businesses have been developed.

- **Traditional financial institutions**

Traditional financial institutions have been changing their perception about FinTech startups. Initially, these startups were seen with no interest by a significant part of traditional financial institutions, until FinTech startups could come to represent a possible competition. Simultaneously, major financial market players were doubtful about whether these startups would be able to survive and generate profits over time, and therefore prove that they did have a profitable and scalable business model.

Over the years, FinTech startups started to prove the potential of their business, which led traditional financial institutions to start showing interest in such startups. Some corporate banks have started to develop and invest in partnerships with FinTech startups through acquisitions and the creation of in-house incubators, looking for launch new services with lower operational costs and more competitive prices (Dany, 2016). Despite that rapprochement and according to the results of this case research, the relationship between the Brazilian and Portuguese Fintech startups and traditional financial institutions, especially banks, is still difficult, because the processes involving banks are still perceived as bureaucratic and time-consuming.

The relationship of Fintechs startups with traditional financial institutions can be characterized as a relationship of dependence, Neutral or Partnership.

- **Technology developers**

The relationship between technology developers and FinTechs is of paramount importance since they are some of those responsible for developing a favorable environment that allows startups to launch innovative services (Lee & Shin, 2018).

The relationship of Fintechs startups with technology developers can be defined as outsource and in-house. Most of the companies studied have internalized the processes related to technology (intellectual property) since these can be considered an important element for their competitive advantage. Despite being essential for the structure and development of companies, currently used technologies, such as cloud computing and mobile services, have become commodities among the Fintechs. Therefore, technology developers also need to be aware of trending and promising technological innovations, such as AI, automation of robotic processes (RPA), blockchain, and IoT (Pollari, 2018).

- **Customers**

Fintechs' customers directly influence the structure and development of the startups, since one of the main features of FinTech startups is the ability to recognize and identify consumer needs, and provide the appropriate product or service that meets those needs (Gimpel et al., 2018). This is evident within the startups studied because most businesses emerged from a market opportunity. In most cases, the role of customers in the FinTechs ecosystem is of high relevance to the business, being considered a key stakeholder to guide the development of new products and services. In addition to be the actor responsible for guiding the development of new offers and products, customers also have a role in the adaptation and improvements in existing services. Those improvements can be an incremental adaptation, or sometimes can result in the radical evolution of a product or service.

Customers of Fintech startups can be categorized as companies and consumers (Lee & Shin, 2018). The relationship of Fintechs startups with consumers can be defined as B2B, B2C and B2B and B2C. In a global analysis, there is an increase in FinTechs focused on offering services and products to other companies, being categorized as B2B (Pollari, 2018). FinTechs that act directly focused on consumers (B2C) found in the Millennium generation an interesting target since these consumers search for a better and more innovative experience using the possibilities of the new digital channels, when it comes to financial services (Tairar, 2018).

- **Investors**

Although investors are not part of the FinTech ecosystem proposed by Lee and Shin (2018), from the case research conducted the importance of this stakeholder for the FinTech startups was very significant. The importance of investors for FinTech startups goes beyond the impressive numbers (the value of global investments in FinTech startups increased by 75% in 2015 (Gagliardi et al., 2016)), the interviewees considered these stakeholders as key for the creation or growth of their businesses.

The relationship between investors and startups can begin during the development of the business, through venture capital and business angel capital, or in a more mature and structured phase of the startup, through other sources of funding, such as investment funds, private equity, debt financing, IPO and acquisitions. The presence of the latter forms of investment can be identified as an indicator of the maturity of FinTechs in the market (Piscini, 2017).

The relationship of Fintechs startups with investors can be characterized as pivotal, neutral or irrelevant.

5.2 - FinTech Ecosystem as Service Innovation Perspective

In order to understand how the FinTechs ecosystem develops, primary and secondary data were analyzed and confronted with the literature review, focusing on a service innovation perspective. Based on the information collected, it was possible to identify which stakeholders are present at each stage of the innovation process and their respective roles in those stages.

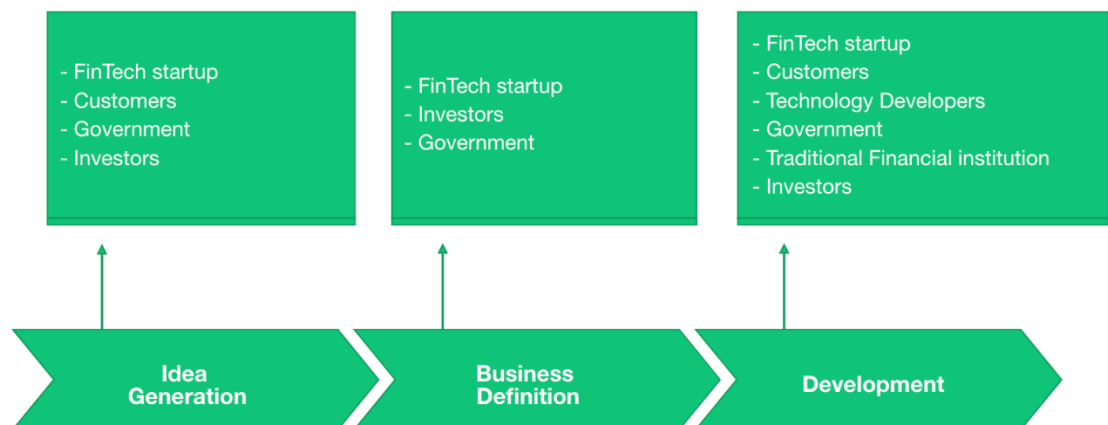


Figure 4 - FinTech Ecosystem as Innovation Process self-elaboration

Stakeholders of the FinTechs ecosystem influence every stages of the innovation process of creating a new FinTech startup, and consequently, directly influence in the innovation of the services provided by FinTechs startups. The analysis of the FinTechs ecosystem from the perspective of service innovation has a dynamic approach to the evolution of these startups and their ecosystem.

The first stage of the innovation process is the generation of ideas, where there are the first records and incentives to generate the origin of the business (Salerno et al., 2015). As identified in the interviews, the stakeholders that are part of this stage are FinTechs startups itself (which is being established), the customers (which drive the creation of the FinTech through their needs), the government that influence the context in which the FinTech is created, namely the regulation that applies to the business, and the investor, when the startup needs external capital to get created. In most cases, the origin of business idea is a combination of customer needs, regulatory issues and market opportunities existing at the time.

The second stage of the innovation process is the business definition, where the selection of ideas, portfolio management and valuation take place (Salerno et al., 2015). At this stage, the key stakeholders are FinTech startups, investors and the government. The government is crucial once again due to regulatory issues since it is necessary to frame and validate the service provided within the existing regulation. The startups are fundamental at this stage since at this stage the organizational processes are defined, and teams are structured.

The third stage of the innovation process is the business development, focused on project management and product development (Salerno et al., 2015). At this stage, there is the participation of FinTech startup, customers, technology developers, government, traditional financial institutions and investors, with Fintechs startups being at the heart of the business development. These stakeholders are directly or indirectly related to the radical evolutions and incremental adaptations that FinTech startups go through and implement in the products or services they offer. Customers are one of the main stakeholders that guide the development of new offers and products. In most cases, FinTech businesses have a relationship of dependency with technology developers, considering that these are responsible for the development of a favorable environment that allows startups to launch innovative services (Lee & Shin, 2018). This relationship makes technology developers responsible for both radical evolutions and incremental adaptations.

As mentioned above, government and regulatory agencies have a significant influence on most of the cases studied. However, regulatory issues contribute specifically for incremental adaptations of FinTech startups, since, after the validation of the business, it is only necessary to adjust it to be operate within the regulation established. On the other hand, traditional financial institutions influence some incremental adaptations of the startups, especially when there is an interdependence between them and the FinTech startup. Investors also have an influence on incremental adaptations and radical evolutions, as they are identified as a key element for startup growth.

5.3 - Contributions to Theory and Management

In this study, it is expected to provide a deeper understanding of how the evolution of the FinTechs ecosystem works from the perspective of service innovation and socio-technical theory. In order to facilitate the identification of contributions for each area studied, this section will be divided between the contributions to the service innovation and socio-technical change in the literature, and the practical contributions that will be made to management.

- **Contribution from Service Innovation Theory**

The services approach was evidenced throughout this study, by the search for FinTechs startups for business models that could validate their types of business, and thus provide the appropriate structure for the provision of services.

During the innovation process, it was observed how stakeholders, as part of the FinTechs ecosystem, impact on the innovation developed by startups in their products and services portfolio. The innovations observed were characterized as radical, which involves the creation of an entirely new offer of service, and also incremental, which aggregates new characteristics to the offer without changing the general service offer. (Gallouj & Weinstein, 1997; Snyder et al., 2016). Customers and regulatory issues are an example of how actors in the ecosystem can drive a change that would initially be an incremental innovation, but eventually becoming a radical innovation.

In addition to radical and incremental innovations, the actors of the ecosystem can also guide changes characterized as Improvement innovations and Recombinative (or architectural) innovations. Improvement innovations consist of a limited improvement in certain characteristics of a service, without changing its structure. Recombinative (or

architectural) innovations can be defined as changes in characteristic of a service that combine other attributes from other services, preserving the components of the pre-existing services, but reconfiguring the way such components are structured to compose the new service (Gallowj & Savona, 2009; Gallowj & Weinstein, 1997)

Through the perspective of service innovation, the co-creation of value between startups and customers is identified, which is perceptible through the different types of innovation that occur in startups. These changes happen based on the needs of both the customers and the company. This scenario is different from the traditional approaches which focus on the push of technologies to supply the needs of customers or market demand.

All efforts that FinTechs startups make for the development of its business, through the evolution of the products and services offered, aiming to guarantee a better customer experience during the use those services. It is important to emphasize FinTech startups adopt a customer-centered strategy (Gimpel et al., 2018).

Finally, it was evidenced a relationship of co-creation when the FinTech startup business comes from the experience and professional background of the startup founders.

- **Contribution from Socio-technical Change Theory**

The FinTechs ecosystem framework developed by Lee and Shin (2018) fits into the socio-technical system theory, and thus presents a structure that allows understanding the evolution and changes that exist together with the social, technological and organizational actors. Therefore, it was possible to identify that just as FinTechs startups go through changes, the other agents of this ecosystem also develop and adapt to the new reality developed by the change of FinTechs. This movement has been perceived along with regulatory issues, which have changed due to FinTechs as new businesses; traditional financial institutions have also changed their perceptions of FinTech business models along with the maturing of these startups; other consumer profiles, besides Millennials, have also come to perceive FinTechs with confidence over time. These are some verifications that socio-technical systems adapt at various levels among all the actors that are part of the FinTechs ecosystem.

- **Contribution to Management**

The practical contributions to business management can be defined by the characterization of the FinTechs ecosystem and the role of their respective stakeholders. In

this way, entrepreneurs and managers who act in Fintech startups will be able to better understand the ecosystem in which they operate, systematize the changes, and improve their knowledge on the evolution of the FinTechs ecosystem.

The practical contribution that also should be highlighted the relationship between the FinTech startup and the government and its regulatory agency as well as the particular relationship between this stakeholder and each type of startup business.

Another contribution to business management that is worth mentioning is the relationship between the startup innovation process and the stakeholders that are part of the FinTechs ecosystem. In each phase of the innovation process, there is a different relationship with each type of stakeholder, which means that FinTechs startups do not need to focus their efforts on all stakeholders at the same time.

5.4 - Research limitations and suggestions

As with any research, this study has some limitations, which are listed below, in addition to some suggestions for future research. The first limitation of the study is related to the sample of FinTechs studied, which was considered a convenience sample, due to the limited time for the completion of this study.

Future investigations may consider a more extensive sample of FinTechs both in Portugal and Brazil. In this context, it would be interesting to determine the same types of business in the Brazilian and Portuguese FinTechs in order to draw a comparative scenario between the evolution of the FinTechs ecosystem in both countries.

The second limitation of this study was that part of the interviews were conducted in person and the other part was conducted remotely by videoconference. The difference between the environments may generate a change in the result of the interviews. During the interviews made via videoconference, there was the risk of connection instability and audio failure, and this may discourage the interviewee to speak since he would have to repeat the same thing a few times.

As a future investigation, it is also suggested that a quantitative study is carried out in order to validate these findings on a larger sample and measure which of the stakeholders that are part of the FinTechs ecosystem has greater importance for the evolution of the business.

Another topic for future research is the relationship between partners and FinTechs. As observed during this study, the partners were mentioned by some startups during the

interviews. Due to FinTechs positioning in their industry and their business development stage, partners were not included as stakeholders in the adaptation of the FinTech ecosystem framework, although the importance of those partners is noticeable in the FinTechs ecosystem.

However, given the novelty of scarcity of research on Fintechs, this study contributes to better understand their ecosystem

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7. Appendix

APPENDIX A: Informed Consent



Consentimento Informado

Esta é uma solicitação para a vossa participação em um estudo conduzido por mim, Paola Castro no âmbito da sua dissertação do Mestrado de Gestão de Serviços da Faculdade de Economia da Universidade do Porto. Este trabalho é realizado a partir da orientação dos professores José Coelho Rodrigues (FEP/ FEUP) e Jorge Grenha Teixeira (FEUP).

Esse estudo tem como foco analisar como os aspectos sociais, regulatórios e tecnológicos influenciam no desenvolvimento do negócio de uma FinTech startup. Para isso, serão realizadas entrevistas com colaboradores dessas startups. A sua participação será de grande relevância, uma vez que fornecerá as informações necessárias para o desenvolvimento de uma compreensão acerca deste fenómeno.

A entrevista deverá ser gravada a fim de facilitar a sua transcrição e análise e para que possa ser referenciada no processo científico. Apenas após a sua autorização é que a mesma será gravada.

Todas as informações e dados recolhido através das entrevistas serão confidenciais e, só poderão ser utilizadas no âmbito deste estudo. Durante a execução deste trabalho os nomes da startup e do entrevistado serão preservados e confidenciais.

A sua colaboração nesse estudo é voluntária, e poderá ser interrompida a qualquer momento. Caso seja necessário a interrupção, os dados obtidos durante a entrevista não serão utilizados.

Investigador:

Nome: _____

Assinatura: _____ Data ___/___/___

Participante:

Declaro ter total compreensão sobre esse documento, incluindo as informações verbais disponibilizadas, e aceito participar desta investigação. Permito a utilização das informações e dados que irei fornecer, voluntariamente, para o fim desta investigação científica.

Autorizo a gravação desta entrevista

Nome: _____

Assinatura: _____ Data ___/___/___

APPENDIX B: Interview Guide

Interview Guideline

FinTech Startup name:

Name:

Gender:

Age:

Job Title:

Understanding of the interviewee's role in startup

- How long have you worked/founded this company?
- What is your job within the company?
- What do you do? What are your goals?

Company History

- Could you tell me the story of the startup?
- Could you explain to me who are the clients of the company and what is the value proposition that you deliver to them?
- In addition to these customers, who are the other stakeholders that the company interacts with?
- Could you explain to me in more depth, who are these stakeholders and how they interact with the company?
- Among the stakeholders that were mentioned, could you explain to me what is the importance of this relationship for the company's business?
- How do you identify and define the degree of importance of these stakeholders for business development?

Innovation Processes

- How was the company's development over the years and its innovation processes?
- What are the areas in which the company searches for more innovation? How did you get to this innovation?
- How do you describe the company's business model?
- How was the portfolio of products/services offered by the company developed?
- During this portfolio development process, what do you think was successful? And unsuccessful, was there a product that was not launched in the market?
- What is the role of technology in the development of the company's product/service portfolio?

- Could you tell me how the company seeks investment capital?

Future Plans

- What are the company's next steps?
- Is there a business expansion forecast? (geographical/new products and services)
- For academic purposes, would you have any indication, news, or report that highlights part of what we have talked about so far? The aim is to bring evidence and triangulate the data.
- In addition to the questions that were mentioned above, do you consider any other relevant topic on the subject?
- Could you refer to any other employees of the company to talk about this issue?
- Could you recommend another FinTech to talk to me about these topics?

APPENDIX C: Code Tree

| Category | Subcategory 1° Level | Subcategory 2° Level | Subcategory 3° Level | Sources |
|---------------------------|----------------------|-------------------------|-------------------------------|-----------|
| Innovation Process | | | | 11 |
| | Idea Generation | | | 11 |
| | | Market Opportunity | | 9 |
| | | Solving My Problemas | | 2 |
| | Business Definition | | | 6 |
| | | Company | | 2 |
| | | Headquarters definition | | 2 |
| | | Organization Process | | 2 |
| | | Team | | 2 |
| | | Seeking Investors | | 1 |
| | Development | | | 11 |
| | | Product Process | | 11 |
| | | | Core Product | 11 |
| | | | Product - Service Development | 8 |
| | | | Conference Participation | 3 |
| | | Improvement Driver | | 8 |
| | | | Customer | 5 |
| | | | Benchmark | 3 |
| | | | Regulation | 3 |
| | | Radical Evolution | | 6 |
| | | Incremental adaptation | | 5 |
| | | Process Development | | 3 |
| Business Type | | | | 11 |
| | Payment | | | 3 |
| | Capital Market | | | 2 |
| | Crowdfunding | | | 2 |
| | Financing | | | 1 |
| | InsurTech | | | 1 |
| | RegTech | | | 1 |
| | Wealth Management | | | 1 |
| FinTech Ecosystem | | | | 11 |
| | Financial Customer | | | 11 |
| | | B2B | | 5 |
| | | B2C | | 4 |
| | | B2B and B2C | | 3 |
| | FinTech Startup | | | 11 |
| | | Payment | | 3 |
| | | Capital Market | | 2 |
| | | Crowdfunding | | 2 |
| | | Financing | | 1 |
| | | InsurTech | | 1 |
| | | RegTech | | 1 |
| | | Wealth Management | | 1 |

| Category | Subcategory 1° Level | Subcategory 2° Level | Subcategory 3° Level | Sources |
|------------------------|--|--------------------------------------|--------------------------------|-----------|
| | <u>Government</u> | | | 11 |
| | | Financial Regulators and Legislature | | 11 |
| | | | Closer Relationship | 7 |
| | | | Nonexistence | 4 |
| | | | Loophole | 3 |
| | | | Proactive | 3 |
| | | | Indirect Relationship | 2 |
| | | | Stringent | 2 |
| | | Unregulated | | 3 |
| | | Market Association | | 2 |
| | <u>Investor</u> | | | 11 |
| | | Pivotal | | 7 |
| | | | key for the startup growth | 5 |
| | | | key for the startup creation | 2 |
| | | Irrelevant | | 3 |
| | | | FinTech couldn't find | 1 |
| | | | Fintech has no interest so far | 2 |
| | | Neutral | | 3 |
| | | | there's interest in both parts | 2 |
| | | | seeking the ideal investor | 1 |
| | <u>Technology Developers</u> | | | 11 |
| | | In-house | | 8 |
| | | Outsource | | 4 |
| | | | Partner Companies | 2 |
| | | | Research Institute | 1 |
| | <u>Traditional Financial Institution</u> | | | 10 |
| | | Banks | | 9 |
| | | | Dependence Relationship | 6 |
| | | | Neutral Relationship | 2 |
| | | | Partner Relationship | 1 |
| | | Credit Brokers | | 2 |
| | | Insurance Companies | | 2 |
| | <u>Competition</u> | | | 6 |
| FinTech Startup | | | | 11 |
| | <u>Benchmark</u> | | | 6 |
| | | Reference | | 4 |
| | | Imitation | | 2 |
| | <u>Business Innovation</u> | | | 11 |

| Category | Subcategory 1° Level | Subcategory 2° Level | Subcategory 3° Level | Sources |
|-----------------------------|----------------------------|----------------------|-----------------------|-----------|
| | | Technology | | 4 |
| | | Client | | 2 |
| | | Decentralised | | 2 |
| | | Product | | 2 |
| | | Team | | 1 |
| | Foundation | | | 11 |
| | | Founders | | 8 |
| | | year of foundation | | 7 |
| | | Start operations | | 4 |
| | | New Partner | | 1 |
| | Investment Capital | | | 11 |
| | | Founders Capital | | 8 |
| | | External Capital | | 7 |
| | | | Investors | 4 |
| | | | Financial Companies | 3 |
| | | | Ventures Capital | 1 |
| | Next step | | | 11 |
| | | New Products | | 7 |
| | | Geographic Expansion | | 5 |
| | | New customer | | 4 |
| | | New market | | 2 |
| | | Seeking Investors | | 1 |
| | Value Proposition | | | 11 |
| | | Products | | 8 |
| | | | Products Ideas | 1 |
| | | | Unsuccessful Products | 18 |
| | | Services | | 7 |
| | Competition | | | 6 |
| | Revenue | | | 5 |
| | | Fee | | 2 |
| | | Sales | | 2 |
| | | Consulting | | 1 |
| | Work Team | | | 5 |
| | Headquarters | | | 3 |
| | Company Positioning | | | 2 |
| FinTech Stakeholders | | | | 11 |
| | Financial Customer | | | 11 |
| | | B2B | | 5 |
| | | B2C | | 4 |
| | | B2B and B2C | | 3 |
| | FinTech Startup | | | 11 |
| | | Payment | | 3 |
| | | Capital Market | | 2 |

| Category | Subcategory 1° Level | Subcategory 2° Level | Subcategory 3° Level | Sources |
|----------|--|--------------------------------------|--------------------------------|-----------|
| | | Crowdfunding | | 2 |
| | | Financing | | 1 |
| | | InsurTech | | 1 |
| | | RegTech | | 1 |
| | | Wealth Management | | 1 |
| | Government | | | 11 |
| | | Financial Regulators and Legislature | | 11 |
| | | | Closer Relationship | 7 |
| | | | Nonexistence | 4 |
| | | | Loophole | 3 |
| | | | Proactive | 3 |
| | | | Indirect Relationship | 2 |
| | | | Stringent | 2 |
| | | Market Association | | 2 |
| | | Unregulated | | 3 |
| | Investor | | | 11 |
| | | Pivotal | | 7 |
| | | | key for the startup creation | 2 |
| | | | key for the startup growth | 5 |
| | | Irrelevant | | 3 |
| | | | FinTech couldn't find | 1 |
| | | | Fintech has no interest so far | 2 |
| | | Neutral | | 3 |
| | | | seeking the ideal investor | 1 |
| | | | there's interest in both parts | 2 |
| | Technology Developers | | | 11 |
| | | In-house | | 8 |
| | | Outsource | | 4 |
| | | | Partner Companies | 2 |
| | | | Research Institute | 1 |
| | Traditional Financial Institution | | | 11 |
| | | Banks | | 9 |
| | | | Dependence Relationship | 6 |
| | | | Neutral Relationship | 2 |
| | | | Partner Relationship | 1 |
| | | Credit Brokers | | 2 |
| | | Insurance Companies | | 2 |
| | Main Stakeholders | | | 8 |

| Category | Subcategory 1° Level | Subcategory 2° Level | Subcategory 3° Level | Sources |
|----------|-------------------------|-------------------------|-------------------------|---------|
| | | Banks | | 4 |
| | | Clients | | 2 |
| | | Agencies | | 1 |
| | | Insurance Companies | | 1 |
| | | Investors | | 1 |
| | | Regulation | | 1 |
| | | Retails | | 1 |
| | <u>Partner</u> | | | 4 |
| | | Providers | | 2 |
| | | Community | | 1 |
| | | Content Partners | | 1 |
| | | Retails | | 1 |