Master Thesis

M.Sc. Finance & Strategic Management

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How did the FinTech Industry emerge in China?

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Abstract

This thesis has investigated how the FinTech industry in China has emerged and contributes to the academic - theoretical field of the industry emergence literature. In order to explain the phenomenon at hand the researcher has conducted an extensive literature review, while applying Schumpeter's model of innovation and entrepreneurship. In line with Schumpeter, the study has found that technology and innovation are key drivers of the competitiveness and economic dynamics of China's FinTech evolution. Especially the internet company Alibaba - after its success with Alipay in 1995 – is the key entrepreneur who initiated – triggered the overall development and inspired multiple other firms – entrepreneurs to enter the emerging FinTech industry. Following that, the study has found that the FinTech Industry in China at the beginning was mainly influenced by e-commerce giants. The initial and co-evolutionary stage were trigged by Alibaba's online payment system Alipay, unmet financial needs of the Chinese consumers and an exponential growth in digital connectivity. The subsequent growth stage was highly influenced by China's FinTech ready generation, the government and investors. Last but not least, it was China's transition from a planned economy to a market economy that has been crucial for the development of the FinTech industry in China.

Key words: Industry emergence, Industry life-cycle, Schumpeter, Entrepreneurship, Innovation, FinTech, China, Alibaba, E-commerce.

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1. Introduction

"Three years ago cash was still king in China – until Alipay and WeChat Pay shook up the entire ecosystem". - South China Morning Post (2017)

In the past decade China's financial services industry has experienced rapid development, in which the digital revolution has transformed the way customers access and use financial products and services (PwC, Global Fintech Report, 2016). However, the constant *"penetration of technology-driven applications in nearly every segment of financial services is something new"* (PwC, Global Fintech Report, 2016) and considerably driving the overall FinTech industry in China. Especially emerging technologies, such as Artificial Intelligence, Block Chain, Cloud Market and Big Data, combined with *"ever-changing customer expectations and preferences, are redefining how financial institutions deliver services"* (Kpmg, 2017). In this constantly changing environment remaining competitive is challenging and *"banks, insurers and asset management companies are undertaking major transformation efforts – transitioning from complex legacy technology environments to more agile operations"* (Kpmg, 2017).

While traditional Financial Institutions have seen FinTech start-ups as major competitors at the beginning of the FinTech industry emergence, they see startup financial technology firms as a major part of the digital future now. According to academics this comes however at no surprise, as *"stimulating new industries from emerging technologies is central to successful economic growth, employment, competition and sustainability"* (Hung & Chu, 2006). However, the transition from emerging technologies to new industries is a complex process and has recently attracted considerable research interest, ultimately because of the impact new industries have on economic development.

This thesis investigates the overall FinTech industry in China and discusses specifically how the FinTech industry in China has emerged. While the first part discusses main theoretical concepts of the industry emergence literature, the second part focuses on the evolution itself, while discussing the main players who were responsible for China's overall modernization of the financial system, ultimately contributing to the raise of the FinTech industry in China. The last part provides insights into the main opportunities and challenges the industry has brought.

2. Research Question

Worldwide China is considered as the country with the largest investment into the FinTech industry and has adopted technologies faster than anywhere else. Between July 2015 and June 2016 the overall FinTech investment increased to US$8.8 billion, also equivalent to an increase of 252% since 2010 (E&Y and DBS, 2016). Hung & Chu (2006) argue that "*speeding up the transition process from emerging technologies to new industries is central to successful economic growth, employment and sustainability in economies".* However, the transition process from emerging technologies to new industries is a complex process and *"emerging industries are difficult to study because it is often hard to identify emerging industries until after they have matured"* (Forbes & Kirsch, 2010).

Nevertheless, the emergence of new industries is a *"phenomenon that has attracted considerable research interest recently"* (Forbes & Kirsch, 2010) and also inspired the researcher to investigate the FinTech industry emergence in China, while at the same time being able to contribute to an ongoing and important research field. Furthermore, it was also the researcher's personal interest in the FinTech industry and strong interest in China, and especially in the Chinese rapid economic development in the last years, which gave rise to the idea to research more about the FinTech industry in China and how it emerged.

However, in order to fully understand the emergence of this industry, many different factors need to be taken into account as the topic is very complex and has been studied both by industry experts and academics at leading educational institutions. The Master thesis seemed to be suitable for this investigation so that the researcher decided upon the following research question:

RQ: How did the FinTech Industry emerge in China?

The next section explains the overall methodology of this thesis and how the research has been conducted in order to answer the topic under investigation.

3. Methodology

Generally speaking scientific research *"pursues a step - by - step, logical, organized and rigorous method (a scientific method) to find a solution to a problem"* (Sekaran & Bougie, 2013). The hypothetico-method, developed by Karl Popper is a typical version of the scientific method which involves seven steps: "*Identifying a broad problem area, defining the problem statement, hypothesizing, determining measures, data collection, data analysis and the interpretation of the results"* (Sekaran & Bougie, 2013). Hereby, deductive reasoning is a key element which starts with a general theory and then applies this theory to a specific case. However, within the field of scientific research also inductive reasoning, the process where a specific phenomenon is observed and on this basis arrives at a general conclusion is used and applied in this thesis.

Academics also differentiate between a theoretical and empirical approach in the industry emergence literature. While the theoretical approach reviews main theoretical frameworks that have been developed to understand the emergence of new industries, empirical research addresses the question of industry emergence through case studies (Gustafsson, 2016). Hereby a great majority of studies focuses on a single industry, typically in on single county, as the researcher can *"pay more attention to identifying and defining the boundaries of the focal industry"* (Gustafsson, 2016). This thesis takes a theoretical approach, however contains some elements of an empirical research, as it focuses on a single industry in a single country.

The purpose of a study in scientific research is either exploratory, descriptive or causal. While an exploratory study is "*undertaken when not much is known about the situation at hand, or no information is available on how similar problems or research issues have been solved in the past"* (Sekaran & Bougie, 2013), a descriptive study is designed to "*collect data that describe the characteristics of persons, events and situations"* (Sekaran & Bougie, 2013). Causal studies are used in order to test whether or not one variable causes another to change. Since the thesis follows an inductive reasoning process, the purpose of the study is rather exploratory and is "*an objective, thorough summary and critical analysis of the relevant available academic and non – academic literature"* (Hart, 1998) on the emergence of the FinTech industry in China.

Data in general can be obtained from primary and/or secondary sources. Whereas primary sources refer to *"information obtained first- hand by the researcher on the variables of interest for the specific purpose of the study*" (Sekaran & Bougie, 2013), secondary data refers to *"information gathered from sources that already exist"* (Sekaran & Bougie, 2013). For the thesis the researcher relies only on secondary data. While books, academic and professional

journals are used for the first part – theoretical part -, studies, reports, articles from the most reliable newspapers, press releases and websites are applied in the second part in order to explain how the FinTech industry has emerged in China.

The next section explains the overall structure of the thesis and provides the reader with a general understanding, which elements have been taken into account, and why and also explain, how they are related to each other in order to provide an answer to the topic under investigation.

3.1 Thesis Framework

In order to answer the Research Question, the thesis follows a framework outlined in Figure 1. The framework illustrates the chronology of the thesis and how the different elements are related to each other. The first element of the framework is the Research Question - starting point of the overall thesis. In this section the researcher's motivation towards the overall topic is explained and how the topic relates to an ongoing research field.

Thereafter the methodology is explained which contributes to the overall understanding of how the research has been conducted. Theories and models however are not mentioned in the methodology, as the researcher has decided to explain the relevant models and theories in the sections where they actually belong to.

After the methodology, an extensive literature review on how industries emerge in general is conducted. As industry emergence is often discussed among experts and academics, a great variety of theories and models exist. However, in order to answer the specific Research Question of this Thesis, only selected models and theories that seemed to be most relevant and appropriate are applied. This section is fundamental to the overall thesis as it provides the reader with the general understanding of how industries emerge.

The next section discusses the evolution of the FinTech industry globally, while highlighting key historical achievements that have been shaping the overall industry worldwide but also the FinTech industry emergence in China. The section after discusses the current and prominent business models offered by FinTech's and traditional financial institutions nowadays.

The thesis then dives into the FinTech world in China. The section explains in detail the two different stages of the FinTech industry emergence in China, and its core drivers and players that contributed to the overall transformation. The overall analysis rounds up by assessing the opportunities and challenges FinTech has brought and explains how FinTechs and traditional financial institutions have to positon themselves in the ongoing transformation of the financial services industry.

The section after discusses the FinTech industry emergence in China from an academic perspective, whereby the theories and models of the industry emergence literature introduced at the beginning of the thesis are applied and critically assessed to the case at hand.

After this, the most relevant and significant findings of the study are presented, followed by a discussion of potential future research.

The last part of the thesis is the Conclusion, providing insights into the future of FinTech in China.

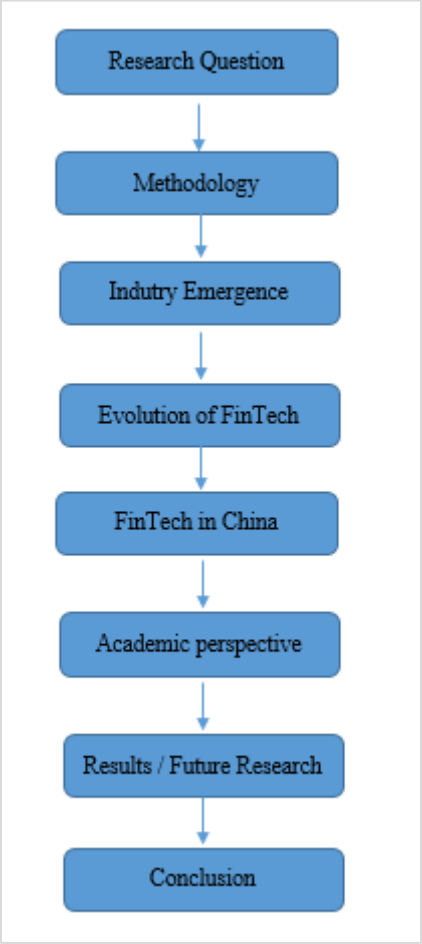

Figure 1: Thesis Framework

3.2 Limitations

As the thesis follows an inductive research process, no primary data was collected. Even though this would have been exceptionally interesting given that FinTech in China is currently a "hot topic" among experts and researchers, it is difficult to collect primary data because FinTech firms in China face fierce competition and are not willing to disclose any proprietary data. Therefore, only secondary data was collected.

The researcher has also made sure that all published academic research articles used are peer-reviewed and are therefore assumed to possess a certain quality in regards to research and analysis and therefore cited with confidence. When using online sources, the credibility and reliability of the source has always been carefully examined prior to usage. Only the sources found to be non-biased and of high quality have been used in regards to the validity and credibility of the thesis.

Furthermore, reports from leading and well known consulting firms might have been customized to a very specific topic and some information that could have been extremely relevant for the case at hand might not have been disclosed and shared with third parties due to confidentiality. This leads to incomplete information and might also have impacted the overall significance of the results.

Also due to the extensive and complex topic and the limited scope of the thesis, not all the available information was taken into consideration and critically analyzed. Only the most relevant sources which seemed to be contributing to an accurate answer of the Research Question were selected and used.

Last but not least, due to the application of only a few academic theories and models on the industry emergence literature, the overall results found in this thesis cannot necessarily be generalized.

4. Industry Emergence

The emergence of new industries is increasingly studied by researchers from all around the world. This is especially due to the increased impact which new industries can have on economic development. Furthermore, science and innovative technology play an increasing role in delivering value and competitive advantage to organizations, industrial networks, regions and nations across industries worldwide while stimulating at the same time, *"the emergence of new applications, business models and industries"* (Phaal et all, 2011).

Therefore, the industrial landscape has become *"increasingly complex and dynamic"* (Phaal et all, 2011), challenging researchers to understand the phenomenon of industry emergence. However, a difficulty in studying emerging industries occurs because it is *"hard to identify emerging industries until after they have matured"* (Mac Millan & Katz, 1992). While *"the consequent lack of research attention to emerging industries has contributed to the persistence of major gaps in our understanding of the organizational world"*, Forbes and Kirsch (2010), also argue that the increase in complexity of this phenomenon nowadays requires the attention and cooperation from not only scholars, but also from organizational sociologists and business historians.

The research on industry emergence has also been challenged due to a lack of consensus regarding the term 'industry' and its definition. Several authors and academics *"acknowledged this difficulty and explain that the definition is linked to perception of cognitive frames and that the nature of an industry evolves over time"* (Phaal et all, 2011).

Following that, the next section starts with a review of the most relevant models, theories and definitions that seem to be relevant and crucial in order to understand how the FinTech industry has emerged in China.

4.1 Schumpeter Model

Joseph Alois Schumpeter is considered as one of the most influential political economists and sociologists of the 20th century. He served as the Finance Minister of Austria in 1919, and later became a professor at Harvard University. One of his most important contributions to economic development is his "theory of business and economic development" from 1911. According to experts, his concepts of *"innovation and entrepreneurship are Schumpeter's most distinctive contributions to economics"* (Sledzik, 2013).

Schumpeter's model of Economic development was built up on several assumptions, which are explained in the following section. Schumpeter assumes a perfectly competitive economy, which is in a stationary equilibrium. This equilibrium is also characterized as the "circular flow", where economic activity produces itself continuously at a constant rate through time, while implying no destruction. This is a fundamental assumption of the model and implies that the economy is in a steady state and builds the starting point of Schumpeter's model.

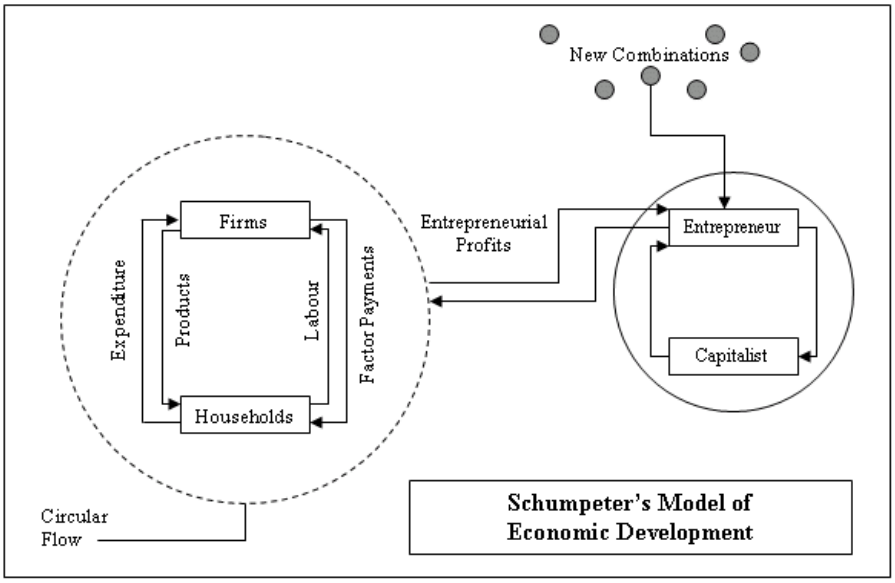

Figure 2: Schumpeter's Model of Economic Development

In order to understand the dynamics of economic growth this circular flow is first disrupted. According to Schumpeter, this disruption is the fundamental phenomenon that underlies economic growth, which occurs through technology and innovation (Schumpeter, 1912). Innovation, according to Schumpeter is defined as, *"process of industrial mutation, that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one"*. He further argues that *"innovations are not evenly distributed over time, but appear if at all discontinuously in groups, swarms or clusters"* (Schumpeter 1939, p. 223). This innovation is also closely linked to the Schumpeterian concept of development, which he defines as the *"distinct phenomenon entirely foreign to what may be observed in the circular flow or in the tendency towards equilibrium. It is spontaneous and discontinuous change in the channels of the flow, disturbance of equilibrium which forever alters and displaces the equilibrium previously existing"* (Schumpeter, 1934). He *"conceptualizes long waves as disturbances in the equilibrium and a return to a new equilibrium point which gives the process its cyclical character"* (Elliot, 1993). In Schumpeter's view *"technological innovation is at the cause of both cyclical instability and economic growth"* (Rosenberg, 2004).

The overall development process begins, when changes take place and disrupt the circular flow. Schumpeter thinks of the disruption of the circular flow that arises from technology and innovation as being the new combinations of existing resources. These resources are: (1) the production of new goods and services that consumers are not familiar with or have never seen before, (2) the creation of new methods or techniques of production, (3) the discovery or exploitation of new markets by combining and bringing new products, new production methods into new markets, (4) finding a new source of raw materials, and (5) new methods of organization/new industrial organization.

This disruption of the circular flow that arises from technology and innovation and considered as an essential driver of competitiveness and economic dynamics comes from the activities of an entrepreneur, who initiates one of the five new combinations of existing resources which ultimately lead to economic growth. Schumpeter sees entrepreneurship as the *"expression of the human impulse to be creative and the role of the entrepreneur in a developing and growing economy is to destroy the status quo in order to create a new cycle and a new flow, in an inter-temporal context"* (Schumpeter, 1934). Schumpeter argues further, that *"entrepreneurial rewards are obtained from the temporary monopoly scenario that arises as the entrepreneur successfully develops his business through new combinations of ideas and resources"*

(Schumpeter, 1934). From that it can be seen that the entrepreneur is the key role in Schumpeter's model and also considered as the "disruptive innovator", causing economic growth.

Underlying Schumpeter's Model of Economic Development is the innovation process which consists of four phases: Invention, innovation, diffusion and imitation. While the invention phase or the basic innovation phase have less impact, the diffusion and imitation process have a much greater influence on the state of an economy. This is especially, since according to Schumpeter, invention is not the cause. Discovery and execution are *"two entirely different things, and the pure new idea is not adequate by itself to lead to implementation"* (Schumpeter, 1934) but must be rather initiated by a strong character, the entrepreneur, and implemented through his influence. Schumpeter argues further, *that "it is not the power of ideas but the power that get things done"* (Schumpeter, 1934).

However, in the late thirties Schumpeter moves away from this perspective and the entrepreneur is not the only one anymore carrying out new combinations. In his second "Entrepreneurship Theory", Schumpeter puts a much greater emphasis on innovation and argues that the *"entrepreneur does not have to be one person, but can also be the country itself, or its agenda"* (Sledzik, 2013). Therefore, the *"generation of innovation does no longer depend on an individual personality, but rather involves the cooperation and interaction of multiple different actors that have the cognitive capabilities to increase the diffusion and thus the understanding of innovation leading to entrepreneurship"* (Sledzik, 2013).

The next section combines Schumpeter's model of innovation and entrepreneurship with literature on industry emergence and explains how these two research fields are related to each other and why both are extremely relevant to explain the FinTech industry emergence in China.

4.2 Schumpeter's Model and Industry Emergence

Schumpeter's model is very crucial particularly if we are trying to understand innovation and technological change in the 21st century. While Schumpeter's model was developed in the 20th century and built upon assumptions of a perfectly competitive economy, that highlighted "entrepreneurship" as the engine for the dynamic theory on economic development, the basic model is still used and considered extremely relevant for academics and professionals when trying to understand the theory of business cycles and development. However, as the world has become increasingly complex and dynamic, factors besides entrepreneurship and innovation also have to be taken into account.

Among other well-known academics, Michael Porter contributed to the ongoing research field of industry emergence and has defined emerging industries as *"newly formed or re-formed industries that have been created by technological innovations, shifts in relative cost relationships, emergence of new consumer needs, or other economic and sociological changes that elevate a new product or service to the level of a potentially viable business opportunity*". The industry itself he defines as a *"group of firms producing products that are close substitutes for one another"* (Porter, 1980).

According to academics, this industry can *"take as few as two years and as many as 50 years or more to achieve stability"* (Forbes & Kirsch, 2010), while it is especially difficult to define exactly when an industry begins, and what stage an industry is currently in, as *"all firms within an industry need not be in the same stage of the industry lifecycle"* (Phaal et all, 2011).

According to Gustafsson, the industry lifecycle can be explained in a three-stage process: "*an initial stage, in which the stage for the industry emergence process is set; a co-evolutionary stage in which the different elements of the emerging industry co-evolve and converge to form a new industry; and a growth-stage in which the sales of the newly formed industry take off" (*Gustafsson et all, 2016). All of the three stages are explained in detail in the next section.

4.3 The Emerging Industry Life-Cycle

The first stage of the emerging industry life-cycle is the 'initial stage'. This stage is also considered as the *"pre-firm- take off stage or the pre-founding stage"* (Gustafsson et all, 2016). According to Van de Ven and Garud (1989), this is the stage in which *"the existing industrial order, market or technological system is initially challenged, but in which the forthcoming industrial change or development of novel industry structure has not yet significantly progressed".* This stage may be triggered by many directions, the most prominent being scientific and technologic development (Gustafsson et all, 2016), *"resulting in inventions, innovations and technologies that challenge an existing technology, product or service"*. Nevertheless, the initial stage can also be initiated by a *"change in culture values, regulatory changes or a demand shock that challenges existing industries"* (Gustafsson et all, 2016). Also according to Gustafsson et all (2016), *"the pressures for change are often transmitted by non-market actors, such as social movements or customer interest groups".* While there are challenges which all player have to overcome in the initial stage, there are also opportunities. As there are no boundaries yet for the new industry *"user needs and viable business models are unclear at this stage"* (Granovetter and McGuire 1998; Santos and Eisenhardt 2009). Furthermore, in industries which are strongly regulated by the government, uncertainties are high, *"with respect to what direction regulation and potential subsidies to support the emergence of the new industry will take"* (Walker et al. 2014). Therefore, it is extremely difficult for the players in the initial stage to develop viable business models and to communicate them to potential investors (von Burg and Kenney, 2000). Firms in the initial stage also often lack "*skills, resources and practices to develop new product or commercialize them"* (Gustafsson et all, 2016). Especially "*technological, organizational, and financial resources are scattered and asymmetrically distributed"* (Gustafsson et all, 2016), forcing organizations to collaborate. More and more, *"early investments by venture capitalists are important resources in fueling the initial stage"* (Gustafsson et all, 2016) and have become also crucial in *"legitimating a new market category, a novel industry identity and/or a product category*" (Petkova et al. 2014; Pontikes and Barnett 2014).

Nevertheless, the initial stage provides also opportunities for *"new entrants to enter markets that are dominated by incumbents"* (Gustafsson et all, 2016). Often the initial stage is also characterized by an "*increasing number of entrepreneurial opportunities, an increase in nascent entrepreneurial activities and an increase in the number of new firms that are established"* (Mezias and Kuperman 2001; Sine and Lee 2009).

The second stage of the industry lifecycle is the 'co-evolutionary stage'. According to Mezias & Kuperman (2001), this stage is *"characterized as a stage in which the co-evolutionary emergence of organizational, technical, product and service innovations take place and during which rapid contagion and imitation accelerates the emergence of an industry".* During the stage *"technology and service development takes place, while industry structure, business models are actively developed along the value chains"* (Mezias & Kuperman, 2001). Key in the co-evolutionary stage is *"competition between different technologies, technological designs, value chains and platforms"* (Gustafsson et all, 2016).

Nevertheless, throughout the stage many companies collaborate with each other, in order develop product categories, innovation activities and engaging with consumers (Burr 2006; Van de Ven and Garud 1994). The overall transition from the initial phase to the co-evolutionary stage can be recognized from the *"emergence of a 'dominant category' that fulfils 'the need of stakeholders to communicate meaningfully with other stakeholders regarding their activities in the emerging industry*" (Suarez et al. 2014). Overall, the stage offers high growth potential for each player and an equal stage for collective strategic actions in order for firms to position themselves among others (Gustafsson et all, 2016).

The last stage of the industry lifecycle is the growth stage. Crucial for this stage is, that *"the disruption and reshaping of the industrial order represented by the initial and co-evolutionary stages have led to a permanent shift in the industry landscape"* (Gustafsson et all, 2016). The improvement in product quality lets the sales increase substantially. However, with increasing sales and production and the entrance of more and more players in the industry, competition increases. Following that, strategic alliances between firms become common and *"central in the future development of the industry"* (Gustafsson et all, 2016). Often these alliances are exploitive, meaning that firms try to acquire various skills and resources, such as intellectual property rights from other competitors in order to become industry leaders and ensure their positioning within the market.

Overall, *"research has shown that the co-evolutionary process can lead to a new industry in the growth stage, where a sub-market or technological niche of an existing industry develops and becomes distinct from the originating industry or its product domain"* (Geels 2002; Jacobides 2005). Furthermore, a new industry may also form largely unrelated to existing industries, *"through scientific discoveries and innovations"* (Malerba et al. 1999) or parallel developments in various technologies that, combined serve a new purpose or need (Rosenkopf and Tushman 1998).

Overall, the emerging industry life-cycle has shown, *"how the disruption to the existing industrial order in the initial stage, triggers co-evolutionary sub-processes in technology, activity, market and industry identity development that form the subsequent co-evolutionary stage. The co-evolution and convergence of these sub-processes lead to the growth phase and the birth of a new industry"* (Gustafsson et all, 2016).

While the emerging industry life-cycle provides a basic understanding of how emerging industries move from an initial stage to a co-evolutionary stage into a growth stage, it does not explain the process overall and how the transition between one stage and the other takes place.

Therefore, the next section explains four identifiable sub-processes of industry emergence, as they contribute to a more detailed understanding how industries emerge (Gustafsson et all, 2016).

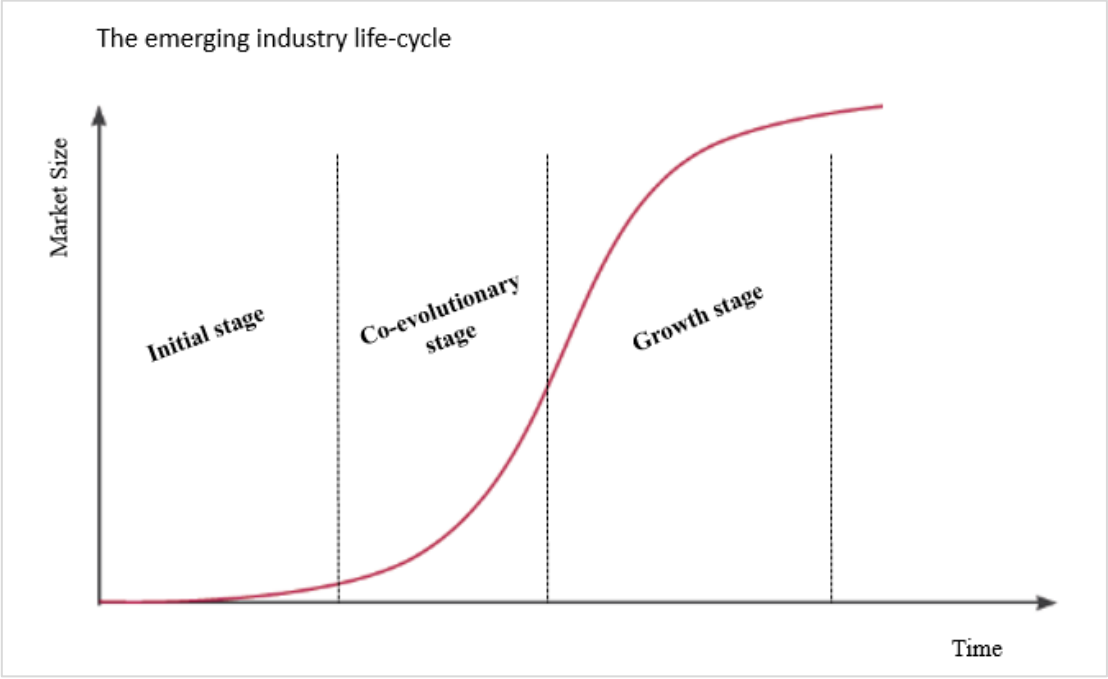

Figure 3: The emerging Industry Life-Cycle

4.4 Emerging Industry Life-Cycle and Sub-Processes

The four identifiable sub-processes of industry emergence are: (1) Establishment of technological basis, (2) market emergence, (3) emergence of activity networks and (4) formation of industry identity. All four sub-processes are explained in the next section.

4.4.1 Establishment of a Technological Basis

According to Phaal et all (2011), "*the establishment of a viable technological basis for the new industry can be considered to be a vital sub-process in the emergence of a new industry".* However, within the literature on industry emergence a novel *"technology or a technological discontinuity"* (Hargadon & Douglas 2001; Munir & Phillips 2002) is often referred as the starting point for an industry to emerge. Nevertheless, *"the technological basis around which the new industry is ultimately founded is typically quite different from the initial technological innovations that trigger the industry emergence process"* (Gustafsson et all, 2016).

Researchers have found that the establishment of technological basis often *"addresses processes occurring during the co-evolutionary stage, such as the development of standards, technological alliances, complementary and enabling technologies"* (Gustafsson et all, 2016). According to Rice and Galvin (2006), "*coalitions, such as standard-based alliances"* and *"cooperative technical organizations"* (Rosenkopf &Tushman 1998) are often *"central to the establishment of the technological bases for a new industry"*. Especially for large firms *"collaborating with smaller counterparts with technological expertise, has been shown to be strategically valuable during industry emergence"* (Zucker & Darby, 1997).

4.4.2 Market Emergence

While on the one hand market emergence is defined as the *"interplay of new technology and unsatisfied demand"* (Horii, 2012), on the other hand it is seen as the *"process of negotiating an economically viable-position for the emerging industry in the wider socio-economic and institutional environment*" (Burr,2006; Leblebici et al, 1991). It is a *"self-reinforcing process that having achieved critical mass, culminates in a sales take off"* (Agarwal & Bayus, 2002; Klepper, 1997). However till that stage (growth stage), organizations have to not only constantly communicate and *"demonstrate the viability of the new technology*" (Phaal et al, 2011), but also *"establish and institutionalize new patterns of transactions to facilitate market generation"* (Leblebici et al. 1991). This requires companies to interact with other firms within the industry while at the same time reaching out to consumers trying to commercialize the emerging technologies (Hung & Chu, 2006; Russo, 2003; Spencer et al, 2005). However, this

can be challenging in the beginning, as companies in the emerging industry do not have all the resources in place yet, or only limited access to resources that are necessary to establish the legitimacy of new products and market categories (Kennedy, 2008; Munir & Phillips, 2005; Schultz et al, 2013).

4.4.3 Emergence of Activity Networks

Activity networks are found as *"coalitions of actors around technology, design and/or standards"* during the initial and co-evolutionary stages of industry emergence (Mezias & Kuperman 2001). Mezias & Kuperman (2001) argue further that these coalitions are *"elemental to the development of an emerging industry"*, as they are responsible for the creation of the *"organizational forms and institutions in the new industry"*. The formation of the activity networks depends on the "*productive meaning-making and theorizing"* (Munir & Phillips, 2005) and the *"capacity of actors to generate interest, identities and appropriate practices that challenge prevailing institutions"* (Lounsbury et al. 2003).

Especially within the initial and co-evolutionary stage the activity networks are crucial, as they attract not only *"VC investors to mobilize financial commitments, large incumbent firms and start-ups seeking to generate marketable products"* but also *"national governmental and political institutions so as to influence the resource and activity patterns in an emerging activity network"* (Spencer et al, 2005; Vasudeva, 2009).

4.4.4 Formation of Industry Identity

The last sub-process of the industry emergence is the formation of the industry identity and the *"convergence of perceptual boundaries for industries"* (Gioia et al, 2010; Kennedy, 2008; Rao, 2004). According to Pontikes (2012) these boundaries are *"not drawn solely based on the intrinsic characteristics of the firms within an industry, but rather in conjunction with the perceptions of the audiences for these groups of firms and their activities".* Companies themselves are able to influence the identity by constantly *"identifying, acquiring and cooperating with firms they perceive as their competitors or peers"* (Kennedy, 2005, 2008; Santos & Eisenhardt, 2009). Especially in the co-evolutionary stage firms actively *"construct the cognitive and socio-political legitimacy of their activities and the technology they are conferring"* (Van de Ven & Garud, 1994) and *"establish the identity of the emergent industry in order to attract resources, partners and customers*" (Aldrich & Fiol, 1994; Hsu & Hannan, 2005).

Along the process, also "n*ew categories arise because organizations that do not conform to existing industry categories become more visible* (McKendrick & Carroll, 2001). This is also further enhanced by *"media coverage" (Kennedy, 2008)* and the *"engagement of industry associations and regulators that create and promote identities for industries*" (McKendrick & Carroll 2001). In order to prevent upcoming concerns regarding the industry identity, firms engage in *"legitimation strategies that bridge existing and emergent industries, thus drawing on existing identities and categories in legitimating the new industry"* (Hargadon and Douglas, 2001; Lamberti & Lettieri, 2011; Leblebici et al, 1991). As the industry identity matures and the industry emergence process moves from the co-evolutionary stage to the growth stage, *"the entrepreneurial firms shift their attention from constructing the collective identity of the industry to establishing distinctive organizational identities" (Navis & Glynn 2010).*

From the Industry life-cycle and its sub processes it can be seen that industry emergence is a very complex phenomenon, led and influenced by various factors. However, technology seems to be especially relevant in the emergence of new industries and is therefore considered in more detail in the next section.

4.5 Stimulating new Industries from "emerging" Technologies

According to Hung and Chu (2006), "*stimulating new industries from emerging technologies is central to successful high-tech based economic growth, employment, competition and sustainability in modern market economies".* However, the overall transition "*from emerging technologies to new industries is a complex process, by which new firms enter into industrial markets, either grow and survive or exit from the industry" (Audretsch, 1995).* Three mechanisms are considerably critical when it comes to stimulate technology based industries: (1) Encouraging partnership in the commercialization process, (2) Fostering entrepreneurship and venture initiatives in the innovation system, (3) Sustaining the commercialization and the creation of new firms.

The first mechanism emphasizes *"partnership in the commercialization process which links the technological discovery/acquisition to worthwhile and dynamic market opportunities" (*Hung & Chu, 2006). While the commercialization process involves "*the overall organization in building the value of a new technology and mobilizing actors/stakeholders in the innovation chain, it is also particularly complex, highly risky, costly and prone to failures" (*Hung & Chu, 2006). Governments and other public institutions can support with *"basic research to building infrastructures and establishing regulations, while defining industries and affect the fortunes of individual firms" (*Hung & Chu, 2006). Nevertheless, there are also disadvantages of these

partnerships, *"particularly the negative potential to block competition and to create various kinds of monopolies" (*Hung & Chu, 2006). This is especially, as an *"effective competition policy in a dynamic market encourages innovation" (*Hung & Chu, 2006). Therefore, governments are specifically encouraged to constantly adjust and modify regulations in order to consider *"newly emerging technologies that have the potential to create new competitive industries"* (Hung & Chu, 2006).

The second mechanism is fostering entrepreneurship and venture initiatives in the innovation system. Crucial is that *"entrepreneurial behaviors include both economic innovation and organization creation, engaging both innovative and imitative activities; occurring in both new and existing organizations"* (Hung & Chu, 2006). Also during the emergence of a new industry, "*entrepreneurial behaviors in one population of the community may create opportunities elsewhere in the community"* (Hung & Chu, 2006). Nevertheless, also technology entrepreneurs face difficulties and challenges. While the 'Globalization' of the overall economy provides new organizations with unique opportunities and also encourages to *"leverage their resources and skills by expanding into international operations, alliances and joint ventures, success in the international activities requires resourcefulness and entrepreneurial risk taking"* (Hung & Chu, 2006).

Therefore, technology entrepreneurs are not only forced to *"keep pace with the changing technology-based product offerings, but also simultaneously keep abreast of competitors and industrial trends in other countries"* (Hung & Chu, 2006). Furthermore, *"for these early-stage technology firms to become globally diverse, there is a great dependency on the availability of resources as well as accumulated experience, so that there is a need for collaboration and government support"* (Hung & Chu, 2006).

The last mechanism is sustaining the commercialization and the creation of new firms. In order to do so, according to Hung and Chu (2006), *"it is important to understand the post entry performance of the technology-based firms, and the process by which these new firms become established in an industry as well as the influence they exert on that industry*". Furthermore, it seems that a "*highly innovative environment promotes the survival and growth of those entrants who are able to adjust successfully in the market, but at the same time serves as a mechanism of excluding those who are unable to adjust" (*Hung & Chu, 2006). For entrepreneurs in order to *"stimulate further diffusion of technological innovation and the growth of entrepreneurial firms"* (Hung & Chu, 2006), they need to *"successfully match resources and opportunities, mobilize and promote the innovation"* (Hung & Chu, 2006). This can especially be supported

by regulators and policy makers. Entrepreneurial firms will then be able to *"serve as the incubator and carrier of that innovation and attract other followers to further develop the infrastructure for widespread diffusion of the innovation"* (Hung & Chu, 2006).

After having discussed how emerging technologies can stimulate new industries, the next section looks at the FinTech industry from a global perspective and how it has evolved over time.

5. Evolution of FinTech

Industry experts define FinTech as "a *dynamic segment at the intersection of the financial services and technology sectors where technology-focused start-ups and new market entrants innovate the products and services currently provided by the traditional financial services industry"*(PwC, Global FinTech Report, 2016). However, FinTech is a "very *broad sector with a long history and technology has always played a key role in the financial sector" (Forbes, 2015).*

The following section gives an overview over the key milestones of the FinTech industry worldwide. According to Arner et all (2015) it is important to distinguish between three main eras of FinTech evolution.

The first era, **Fintech 1.0,** describes the period from around 1866 to 1967 where the *"financial services industry remained largely analogue, despite being heavily interlinked with technology*" (Arner et all, 2015). **Finance 2.0** refers to the second era from around 1967 to 2008, where "*finance was increasingly digitalized due to the development of digital technology for communications and transactions"* (Arner et all, 2015). **Finance 3.0** is the last era from 2008 onwards where *"new start-ups and established technology companies have begun to deliver financial products and services directly to businesses and the public"* (Arner et all, 2015).

FinTech 1.0 (1866-1967)

The laying of the first successful trans-Atlantic cable that *"provided the infrastructure for financial globalization in 1866"* (Arner et all, 2015), is widely considered as the starting point of the FinTech industry. Later in the century, *"consumers and merchants started to exchange goods using credit for the first time, in the form of charge plates and credit coins"* (Arner et all, 2015). In the beginning of the 19th century, the *"Fedwire Funds Service was established by the Federal Reserve Banks to transfer funds and connect all 12 Reserve Banks by telegraph using a Morse code system"* (Arner et all, 2015). Within the 1950s electronic computers were developed that were fundamental to the evolution of the internet. Following that, *"modern -day credit cards were introduced starting with Diners Club, founded by Frank X. McNamara"* (Arner et all, 2015). The 1960s became well known for introducing *"the Quotron, the first electronic system to provide selected stock market quotations to brokers through desktop terminals"* (Arner et all, 2015). In 1967, Barclays bank introduced the first automated teller machine (A.T.M.), also called a "robot cashier," allowing customers to get cash at any time (Arner et all, 2015).

FinTech 2.0 (1968-2008)

Due to the further development of the internet and technology industry in the late 1960s and 1970s, electronic payment systems advanced rapidly. In 1973, the Society for Worldwide Interbank Financial Telecommunications (Swift) was found to solve the *"problem of communicating about cross-border payments"* (Arner et all, 2015). About 10 years later, in 1983 the online brokerage, E-Trade was found that *"executes the first electronic trade by an individual investor"* (Arner et all, 2015). Within the same year online banking was introduced in Britain by the Nottingham Building Society. In 1987, the stock market crash, also known as the "Black Monday" has *"consequences on markets around the world, showing how the markets are interlinked by technology"* (Arner et all, 2015). In 1991 the 'world wide web' was released to the general public on the Internet, which enabled the majority of the banks in the United States to set up first transactional websites for Internet banking, while the Internet and e-commerce business models started to flourish (Arner et all, 2015).

FinTech 3.0 (2008-present)

The financial crisis of 2008 can be considered as the turning point of Fintech, as it left the *"global financial system on the brink of systemic collapse*" (Arner et all, 2015). The image of major banks, especially in the United States and the United Kingdom (UK), was severely shaken and *"post-crisis regulation increased banks' compliance obligations and costs, and restricted credit"* (Arner et all, 2015). Especially, the *"new requirements to prepare recovery and resolution plans and conduct stress tests further added to bank costs*" (Arner et all, 2015). Following that, together with the overall advances in e-finance and mobile technologies for financial firms let FinTech innovation emerge and provided start-ups and technology firms with the unique opportunity to offer new services and products by "*combining e-finance, internet technologies, social networking services, social media, artificial intelligence, and big data analytics"*(Lee & Shin, 2018). Lee & Shin (2018) argue further that *"FinTech startups differentiated themselves from traditional financial firms with personalized niche services, data-driven solutions, an innovative culture, and an agile organization".* Among other technology and financial innovation, "*Version 0.1 of the cryptocurrency Bitcoin was released and included a generation system intended to create 21 million bitcoins through 2040*" (Arner et all, 2015). Google established Google Wallet that *"allowed consumers to use smartphones equipped with a near-field communication chip to make tap payments"* (Arner et all, 2015). In 2015, for the first time, more people used mobile banking than those who avail themselves of a physical branch and the Chinese e-commerce giant Alibaba, *"announces "smile to pay,"*

which enabled consumers to authenticate mobile payments by scanning their face with a smartphone" (Arner et all, 2015).

According to Arner et all (2015), the critical difference in FinTech 3.0 lies within following two aspects: first, *"who is providing financial services, with startups and technology firms supplanting banks in providing niche services to the public, business and the banks themselves"* and second, *"in many markets there has been a shift in customer mindset as to who has the resources and legitimacy to provide financial services, combined with an entirely new speed of evolution, particularly in emerging markets*" (Arner et all, 2015).

FinTech 3.0 is ongoing and the next section gives an overview over the most prominent business models that FinTech companies and traditional financial institutions are currently using.

6. FinTech Business Models

Since 2015 "*financial institutions have invested more than US$ 27 billion in fintech and digital innovations"* (Kpmg, 2017). According to experts this is because "*financial institutions see startup financial technology firms as a major part off the digital future"* and at the same time are convinced that it will revolutionize the ways in which people save, spend, borrow, store, invest, transfer, and protect money.

The following five business models or service types are typically offered: (1) Payment, (2) lending, (3) wealth management, (4) capital markets (5) insurance services (Lee & Shin, 2018).

While financial products and services can be extremely complex, payments are relatively simple. The market for consumer and retail payments has gone through a stage of development, as it provides clients with *"mobile wallets, peer-to-peer (P2P) mobile payments, foreign bank transfers, real-time payments, and digital currency solutions"* (BNY Mellon, 2015). Especially peer-to-peer (P2P) mobile payments, where users are able to reimburse each other by using applications such as WeChat, (China's most popular messaging app), have become a popular business model. This service has especially improved the experience for customers who were looking for a *"streamlined payments experience in terms of speed, convenience, and multi-channel accessibility"* (Lee & Shin, 2018). Among other techniques, near field communication (NFC) - used in contactless payment systems, barcode or QR code, a credit card on mobile websites, and a mobile phone card reader have become popular and widely used approaches to enable mobile payments. According to Lee & Shin (2018), payments is one of the fastest growing business model, while the innovation and adoption of new payment capabilities has enabled FinTech payment firms to acquire customers rapidly at a lower cost.

The second business model is lending - P2P consumer lending and P2P business lending. The basic idea behind P2P lending is to allow *"individuals and businesses to lend and borrow between each other"* (Lee & Shin, 2018). This lending process is accelerated via a peer-to-peer lending platform where investors are directly matched with borrowers (Figure 4)

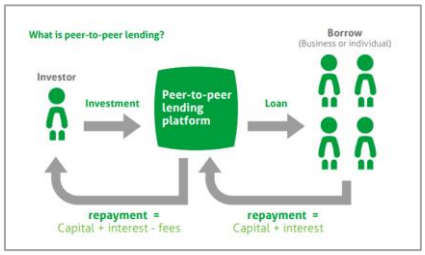

Figure 4: P2P Lending Process

Although P2P lending boosts returns for individuals who supply capital and reduces interest rates for those who use it, it entails more risk because unlike banks peer-to-peer lenders are not backed by the Financial Services Compensation Scheme (FSCS). However, P2P lenders have taken steps to mitigate this by offering an insurance which protects lenders from borrower defaults, along with other threats such as fraud, cybercrime and in the worst case a major economic downturn.

The third business model is wealth management. Here, the automated wealth managers (robo-advisors) that provide financial advice for a fraction of the price of a real-life adviser are at the forefront of the business model (The Economist, 2015). These automated wealth managers use algorithms to suggest a mix of assets to invest in, based on the unique investment preferences and characteristics of the individual investor (The Economist, 2015). Especially the transparent fee structure and the lower minimum investment limits attract skeptical younger investors, says Adam Nash, Wealthfront's CEO (The Economist, 2015). He explains further, that around "*60% of its clients are under 35 years old and that the average account size is slightly under US$100,000, an amount that would be uneconomic for a Merrill Lynch or Morgan Stanley broker to handle"* (The Economist, 2015).

The next business model is capital markets. According to Lee & Shin (2018) new FinTech business models hold on to a wide spectrum of capital market areas, such as investment, foreign exchange, trading, risk management, and research. However, one of the most promising is trading, whereby trading FinTechs *"allow investors and traders to connect with each other to discuss and share knowledge, place orders to buy and sell commodities and stocks, and monitor risks in real time"* (Lee & Shin, 2018). Another area at the forefront of capital market FinTech business models is foreign currency transactions, a service dominated by financial institutions. (Lee & Shin, 2018). However, FinTechs have influenced this service substantially as they have lowered the *"barriers and costs for individuals and SMEs engaging in foreign currency transactions all around the world"* (Lee & Shin, 2018). Users of these services are now able to *"to see live pricing and send/receive funds in various currencies securely in real time, all via their mobile devices"* (Lee & Shin, 2018).

The last business model comprises insurance services. FinTechs operating within this field aim to enable a more direct relationship between the insurer (traditional insurance providers) and the customer (Lee & Shin, 2018). In order to do so, they use "*data analytics to calculate and match risk, and as the pool of potential customers broadens, customers are offered products to meet their needs (e.g., car, life, health-care, or causality insurance)"* (Lee, Shin, 2018). The

technology will also allow *"insurers to expand their data collection to non-traditional sources to supplement their traditional models"* (Lee & Shin, 2018), improving their risk analysis of clients. While FinTechs contribute to improved services offered by traditional insurance companies, *"regulatory and capital barriers to enter the insurance industry limit the impact of 'standalone' FinTechs"* (PwC Fintech Insurance Report, 2016) within the insurance industry.

After having explained the most prominent business models within the FinTech industry, the next section starts with the analysis of the FinTech industry emergence in China.

7. FinTech in China

For a long time China was considered as one of the countries *"whose financial system was underdeveloped and suffering from a poor institutional system"* (Shim & Shin, 2015). However, in recent years the *"traditional Chinese financial system has been gradually transforming into a cutting-edge system"* (Shim & Shin, 2015), letting China become the *"undoubted center of global FinTech innovation and adaption"* (E&Y and DBS, 2016). According to experts this transformation can be mainly divided into two different stages (PwC, 2018). The initial phase (1.0) is the "*scenario-based financial services revolution*" where financial products and services were created from different scenarios and the main driving forces were internet companies. The subsequent phase (2.0 – current stage) is the technology-driven revolution, whereby *"emerging technologies are used to change channels, products and operations of financial institutions, strengthen the financial supplies and connect closely with demand. The main driving forces are traditional financial institutions and internet companies"* (PwC, 2018).

In order to understand the overall transformation process the next section discusses first the initial phase (stage 1.0) of this transformation and how China's underdeveloped financial market system and payment system was influenced by internet giants, leading ultimately to the raise of the FinTech industry in China.

7.1 Stage 1 - China's Financial Market System and Payment System

Historically *"China's financial industry is characterized by its high level of state ownership and control"* (Shim & Shin, 2015). Since 1983 the People's Bank of China (PBC) which is fully state owned, functioned as the central bank and played the central role in formulating guidelines within the banking sector in China**.** During the planned-economy age, *"the unitary national bank credits monopolized all the payments, commercial credits were restricted and even cancelled, and currency circulations were organized and regulated by the state"* (Union Pay, 2018). Furthermore, China was a strong cash society with cash – on – delivery (COD) being a common payment method and also reluctant to make transactions online (Shim & Shin, 2015).This was especially, since the *"credit system was just not mature enough yet, and credit cards were not widely used or even accepted in China"* (Wang, 2014). What has also caused difficulties within the Chinese payment system was that Union Pay – established by the Chinese government - was the only bank card association handling interbank payments in China and also held a monopoly on electronic payments (Shim & Shin, 2015).

However, in the mid-1980s the government started opening up the banking system and allowed four state owned specialized banks to accept deposits and conduct banking business. These four specialized banks were the Industrial & Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC) and Agricultural Bank of China (ABC) (Shim & Shin, 2015). After China reached full connectivity to the internet in 1994, the Chinese government launched the 'Golden Card Project' in 1995. This system was *"designed to create a nationwide credit card system to facilitate the widespread use of credit and debit cards for the successful development of e-commerce in China"* (Lovelock &Ure, 2002). The project can be traced back to a speech given by President Jiang Zemin in 1993 *"calling for the creation of a nationwide credit card system, which could be used by people throughout China. China's fragmented banking system has traditionally made it extremely difficult to clear transactions, and this has been recognized as a major barrier to commerce"* (Lovelock &Ure, 2002).

Since the opening to the outside world to *"adapt the requirements of reforms and developments of economic and financial systems, China's payment system experienced a series of reforms"* (Union Pay, 2018). One of them being inter-bank liquidation systems, that allowed a few professional banks to establish their own inter-bank systems in order to *"permit mutual and cross-bank transfers of foreign exchanges of professional banks"* (Union Pay, 2018). Furthermore, in 1996, the Bank of China extended its business to the Internet. China Merchants Bank was the first bank to launch an Internet payment system in 1997, after which Internet banking and telephone banking systems spread rapidly throughout the entire country (Arner et all, 2015).

Nevertheless, the Chinese financial industry was still lagging behind those of many other countries, ultimately harming China's e-commerce development. Only local companies launched various e-commerce related businesses (Shim & Shin, 2015) since they had to operate in a land of *"insufficient transport and communication networks, deal with banks that cannot process transactions from one branch to another, and of restrictions on services such as insurance and distribution"* (Lovelock &Ure, 2002). In addition, e-commerce enterprises had to work under the *"constant control of the Chinese government and subject to sudden and arbitrary restrictions, as the establishment and operation of online businesses required several levels of authorization and support from the government"* (Lovelock &Ure, 2002). Furthermore, *"small and medium-sized enterprises could get hardly access to the bank transaction system"* (Shim & Shin, 2015).

What has caused further difficulties was that *"China's technical capability with regard to information technology (IT) was low, and the key hardware and software used in major banking systems and e-commerce applications came mostly from foreign companies"* (Jianlong, Meiqing, & Yu,2003). Furthermore, the Renminbi at that time was also not "*a fully convertible currency, and the purchase and sale of foreign currencies was heavily regulated, thus restricting individuals from remitting foreign exchange abroad"* (Lovelock &Ure, 2002).

Among all these difficulties, the payment system was the most challenging because in order for e-commerce to prosper and to be *"viable in any jurisdiction, payment mechanisms must be secure, convenient and reliable"* (Lovelock &Ure, 2002). Consumers must also trust the *"confidentiality of information transmitted online, such as credit card and other financial or personal information"* (Lovelock &Ure, 2002.

These problems and inefficiencies gave rise to two of the most successful Chinese internet giants, Tencent and Alibaba. While Tencent, founded in 1998 started to address some of the challenges by starting its business in the field of value-added software and system integration services, Alibaba, founded in 1999 addressed other inefficiencies by developing a credit authentication method, 'Trust Pass', *"aiming to help buyers and sellers transact without fraud and deceit"*(Shim & Shin, 2015). This method was highly rewarded, as it improved the payment system for e-commerce, making it more secure and reliable. A few years later, in 2003, Alibaba founded its online shopping website 'Taobao' marketplace, which *"operated under the same business model as eBay, providing an online market place, payment solutions, and a technological infrastructure to match buyers and sellers"*(Shim & Shin, 2015).

However, Taobao was not initially as successful as eBay. Nevertheless, Alibaba followed an aggressive strategy to compete with eBay, by constantly investing into Taobao (Shim & Shin, 2015). Taobao also announced that it would not charge any transaction fees for the first three years, while eBay did (Barboza & Stone, 2016). Within the same year Taobao introduced 'Aliwangwang', *"an instant messaging tool, to enable buyers to deal with sellers to determine an affordable price"* (Gao & Zhang, 2011). *"Given that bargaining is part of the trust- building process between sellers and buyers in the Chinese culture* (Shim & Shin, 2015), Aliwangwang played a key role in establishing confidence among its customers. In order to respond to Alibaba's aggressive strategy, eBay *"injected another $100 million to build its China operation, now renamed "eBay EachNet," and was spreading its ads on buses, subway platforms, and everywhere else*" (Wang, 2014).

However, *"Taobao's listings appeared to be more customer-centric while eBay's listings more product-centric"*(Wang, 2014). While Taobao's listings were organized into several categories, such as "Men," "Women," eBay EachNet organized its categories in its global platform by grouping users into "Buyers" and "Sellers." At that time, *"China had about three hundred million cell phone users versus ninety million Internet users"* (Wang, 2014). This was understood by Alibaba so that Taobao *"offered instant messaging and voice mail to mobile phones for buyers and sellers because Chinese users were cell-phone savvy rather than computer savvy*" (Wang, 2014). From that it became clear, that *"Taobao had an upper hand against its global counterpart because it really understood Chinese customers" (Wang, 2014).*

However, during the *"battle between ebay and Alibaba"* (Shim & Shin, 2015) one of the key issues of e-commerce in China was still the payment system. While in the 2000s *"wiring money between bank accounts was common"* (Shim & Shin, 2015), in 2005 Alibaba introduced its online escrow payment system (third party online payment solution -TPP), AliPay (Ant Financial), that *"allowed buyers to wire money from their bank accounts to Alibaba, which held the money in escrow until the products were satisfactorily delivered by sellers"* (Wang, 2014). With this AliPay achieved the following two crucial things: "it s*olved the settlement risk by ensuring that goods were delivered and payments were made between sellers and buyers and most incredibly, AliPay increased the liquidity in Taobao's marketplace, since it acted like a temporary bank between buyers and sellers" (Wang, 2014).* Overall, Alipay was a key driver for the exceptional growth of Alibabas marketplace Taobao (Wang, 2014). Within less than a year, Taobao *"outpaced eBay EachNet and became the leader in China's consumer-to-consumer (C2C) market, with 67 percent market share in terms of users, while eBay EachNet had only 29 percent market share" (Wang, 2014).*

Following that success, Alibaba continued its expansion and "*formed alliances with banks, insurance companies, funds and security companies"* (Ying & Kuanhai, 2012). Subsequently, and during the 11th Fife-Year-Plan (2005-2010), "*China's e-commerce sales increased by an average of 250%, reaching 4.5 trillion yuan, while the amount of money transferred through third-party payment services increased 60-fold, ultimately reaching 1.01 trillion yuan"* (Yannan, 2012). Furthermore, Alibaba launched a specialized company serving the SMEs lending segment, *"given that 85% of all loans went to other state-owned enterprises (SOEs), leaving little for private companies and particularly SMEs"* (Marr, 2015).

Following Alibaba, Tencent, Baidu and Sina entered the market by releasing similar products. In 2011, the People's Bank of China (PBC) started issuing licenses to *"qualified third- party*

online payment platforms to conduct electronic payments" (Shim & Shin, 2015). These licenses included mostly internet payments and mobile phone payments. Mobile phone payments were rapidly increasing as Chinese consumers were more and more connected and equipped with mobile devices (Shim & Shin, 2015). Besides of the internet giants offering these services, Telecom companies showed interest. 'Best Pay', launched by China Telecom become increasingly popular by *"partnering with about 40.000 merchants, including insurance and lottery companies"* (Luk, 2014). Overall, mobile phone payments continued to grow, leaving Alibaba with 800 million subscribers and astonishing revenue (Shim & Shin, 2015). Tencent's WeChat payment system continued to flourish as well, and became one of the most powerful payment tool over the next years.

Along this transformation process (stage 1.0) various unique drivers played a key role, shaping the FinTech Industry in China. These drivers are fundamental and discussed in the next section.

7.1.1 Core Drivers

From the previous analysis and in line with industry experts, four factors can be considered as the main initial driving forces behind the first stage: unmet financial needs; exponential growth in digital connectivity; the explosion of e-commerce and a core of restless internet giants (E&Y and DBS, 2016).

While *"Small and medium-sized enterprises (SMEs) from China account for 60% of GDP, 80% of urban employment, and contributing to 50% of fiscal and tax revenues in China"* (E&Y and DBS, 2016) nowadays, State-owned banks have largely underserved SMEs and retail customer segments. In fact, 85% of all loans went to other state-owned enterprises (SOEs), leaving only little for private companies and SMEs (Marr, 2015). Until the end of the economic reforms, a majority of the Chinese population remained unbanked. Furthermore, despite of China's massive e-commerce growth, incumbent banks have been unable to capitalize on digital payments due to low credit card penetration rates. This had ultimately led to the demand of a renewed payment mechanism that was secure, convenient and reliable.

Overall the unfulfilled lending needs and missing payment systems coupled with traditional banks lack of customer-focus and innovation drove internet giants, such as Alibaba, to develop more comprehensive financial solutions. From 2005 onwards, Alibaba's Alipay became the most frequently used payment platform, greater than the use of credit cards, debit cards or even cash.

The second driver is China's increasing connectivity since the introduction of the first mobile phone service in 1987 and the internet in 1994. Due to the overall economic growth and population expansion in the past twenty five years, the Chinese mobile communication market has undergone tremendous growth, while the internet penetration and number of users has also increased substantially (E&Y and DBS, 2016).

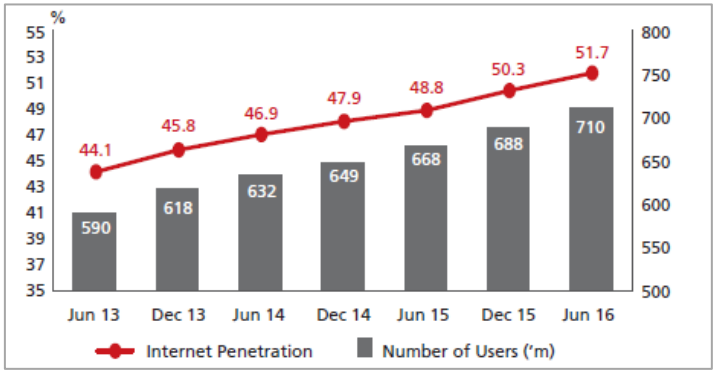

Figure 5: Internet users and Internet penetration rate in China

According to experts the smartphone is becoming the *"universal internet access device, especially driven by the development of 'Smart City' and 'Wireless City' public access wireless networks in China's major cities"* (E&Y and DBS, 2016). While smart phones are used for a variety of things, Chinese consumers use them more and more to conduct *"financial transactions primarily through Alibaba's Alipay or WeChat's payment service*" (E&Y and DBS, 2016). Although China may have much "*less extensive physical banking infrastructure compared to the US and Europe, its digital infrastructure is far more mature, with a population ready and able to use their smartphones for mobile banking"* (E&Y and DBS, 2016).

The third and last driver is the Chinese e-commerce scene together with its internet giant's driving innovation. Given the high level of internet and mobile penetration in China, it is not surprising that China has become the world's largest and most developed retail e-commerce market. While the payment systems were still highly underdeveloped in the early 2000s, "*Alibaba's Alipay is now the largest online payment gateway in China, accounting for half of Chinese third-party online payments (and 68.4% of the mobile payments market); Tencent's Tenpay currently commands another 10% (and 20.6% of the mobile payments market)* (E&Y and DBS, 2016).

According to experts, *"China's flourishing e-commerce market, and its adoption of internet and mobile payments can also be attributed in part to the presence of a massive domestic retail market in a closed digital economy which filtered out or blocked a significant amount of global*

internet competition" (E&Y and DBS, 2016).This drove the development of functionally equivalent, often even more advanced services from Alibaba, Tencent and Baidu. Also the dominant domestic online marketplaces for consumers such as Taobao from Alibaba, *"turned the country's under-developed traditional offline retail infrastructure into an advantage"* (E&Y and DBS, 2016).

Overall, the unmet financial needs, the increase in connectivity and the emergence and success of e-commerce firms can be seen as the trigger for the FinTech industry emergence in China. Especially the Internet giant Alibaba has inspired multiple technology but also financial service companies to enter the emerging industry. The next section describes the still ongoing emergence of the FinTech industry in China.

7.2 Stage 2.0 - Technology-driven Revolution

Since 2013/2014, the FinTech industry has entered a new stage where online payments and mobile payments are no longer the only services offered. The overall pace of FinTech innovation has been increasing and *"Internet-based private banking has become one of the major steps in China's financial reform, representing a serious challenge for traditional banks"* (Shim & Shin, 2015).

In 2013, the government approved the launch of Yu'e bao, Alibaba's new online market fund, where *"Alipay account holders can put money into a product to invest in funds"* (Shim & Shin, 2015). The success of Yu'e bao had an enormous impact on the financial institutions in the Chinese market, which ultimately led to the emergence of other similar money market funds. Inspired by Alibaba's success, Tencent launched a new investment platform on WeChat, Li Cai Tong. This platform was also an online money market fund similar to Alibaba's Yu'e bao, which allowed its users to *"transfer money directly to a fund run by China Asset Management"* (Swanson, 2014). Baidu and Sina also entered the market by releasing similar products in partnership with fund companies (Swanson, 2014). Furthermore, Union Pay, state owned offline card firm, also entered the market.

As the modernization of the overall financial industry went on, the State Council announced the approval of "*private companies to establish bank on a trial basis"* (Shim & Shin, 2015). This program was *"deeply connected to the Chinese government's efforts to reduce the monopoly power of state-owned banks and strengthen its ongoing financial reform"* (Shim & Shin, 2015).

As of 2015, five private banks started operating, while a joint venture (JV) by Tencent, WeBank became a *"frontrunner in China's emerging field of internet banking" (*Shim & Shin, 2015). Zhejiang Internet Commerce Bank, a subsidiary of Ant Financial Services Group, became WeBank's closest competitor *(*Shim & Shin, 2015).

As Alibaba, Tencent and other emerging FinTech's became more and more dominant within the market, traditional financial institutions, including large state-owned banks, were lagging behind and ultimately losing market share. Technology companies also started to exploit new opportunities within the finance market by *"providing alternative financial products and services that were otherwise provided by traditional banks"* (Barberis, 2014). According to experts *"technology companies have reacted much faster to the wave of fintech growth than traditional financial institutions"* (Oliver Wyman, 2017).

In response to the TPPs leading firms, such as Alibaba and Tencent, the state owned-banks started to invest in *"new market opportunities, instead of fighting for the existing business" (Reuter, 2015).* However, according to experts, *"in addition to working on their own FinTech innovation, commercial banks have also responded by collaborating with FinTech firms to launch digital initiatives"* (E&Y and DBS, 2016). Among others, the Postal Savings Bank of China (PSBC), *"China's largest lender by branch network with 40,000 branches, is deepening its cooperation with Ant Financial and Tencent in internet and mobile finance" (*Shim & Shin, 2015). Through this cooperation incumbents were able to acquire new customers, *"which would not have been possible without the user and merchant information, and the online banking capabilities of the large e-commerce players"* (E&Y and DBS, 2016). Another collaboration occurred between Dianrong.com, an online market place lending company, and the regional Bank of Suzhou in 2014 to set up a P2P loans platform targeting small enterprises.

Despite the overall growth within the emerging FinTech industry, *"in P2P lending, online financing suffered significant reputational damage after various incidents where customers lost their investments"* (E&Y and DBS, 2016). Ezubao, a peer-to-peer lending scheme, belongs to one of the most known cases which attracted investors *"with offers of double-digit annual returns on funds and became China's largest online financing platform in just 18 months" (*E&Y and DBS, 2016). The platform attracted *"US$7.6 billion from 900,000 users before being identified as a Ponzi scheme with more than 95% of borrowers for projects being fictional entities"* (E&Y and DBS, 2016). Overall, in the P2P sector almost *"one-third of all online financing platforms in China ran into financial difficulties by the end of 2015, while nearly 1,600 P2P lenders (around 40%) exited the market by April 2016"* (E&Y and DBS, 2016).

Following that crisis, the government imposed several rules and regulations in order to control the P2P lending and online payments segment in China. Among many others, the rules brought *"credit limits, and prohibited pooling and lending of funds by P2P platforms, while they also required a principal guarantee by the platform, and debt securitization to mitigate lenders' credit risks" (E&Y and DBS, 2016).* Furthermore, the National Internet Finance Association, monitored by China's central bank and other traditional financial and internet finance companies was found in order to regulate the Chinese FinTech Market and control risks in the new sector.

Nevertheless the government remained generally supportive. The Chinese Premier Li Keqiang even made multiple calls of support in the Report on the Work of the Government over 2014/15, stating that *"Internet-based finance has swiftly risen to prominence", with the imperative to encourage the healthy development of Internet banking in line with regulations"* (McKinsey, 2016).

This has attracted investors from all around the world to invest in this developing new market. According to a study by Oliver Wyman (2017), "*Venture capital investments in China fintech have grown at a staggering compound annual growth rate of 300 percent over the past three years"*. With $6.4 billion in 2016, *"China has overtaken the United States as the global leader in fintech venture capital activities and represents 47 percent of global fintech investments*" (Oliver Wyman, 2017).

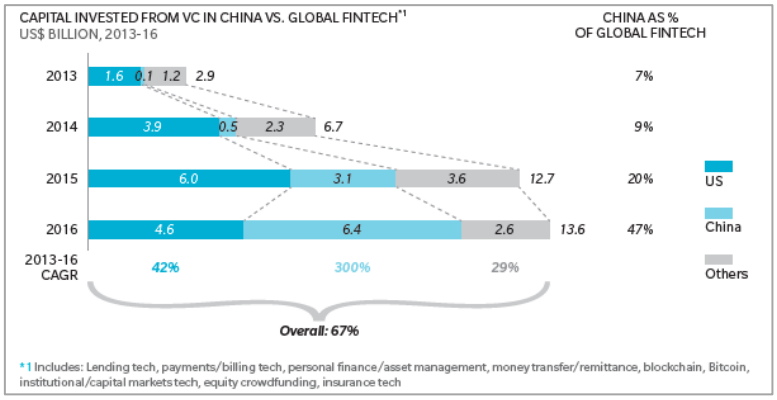

Figure 6: Capital market activities in the FinTech space

These investments into China have given rise to multiple FinTech unicorns, with Ant Financial being by far the largest unicorn globally (Oliver Wyman 2017). The company was valued at *"$60 billion in the second quarter of 2016, a valuation similar to that of major traditional financial institutions like the China Merchants Bank"* (Oliver Wyman, 2017). Similarly,

Lufax's valuation of $18.5 billion exceeds those of GuangFa Securities – commercial bank and Orient Securities – investment bank and brokerage firm (Oliver Wyman, 2017).

Figure 7: Valuations of FinTech unicorns in China

What all leading Chinese Fintech unicorns have in common is the tendency towards consumer-oriented business models, which can also be divided into seven key vertical markets: payments and e-wallets; supply chain and consumer finance; peer- to - peer (P2P) lending platforms; online funds, online insurance; personal finance management and online brokerage (E&Y and DBS, 2016).

The payments and e-wallets market includes mainly a mobile payment ecosystem facilitated by e-commerce and social media players. Alipay (Ant Financial) and Tenpay dominate this market (E&Y and DBS, 2016). The supply chain and consumer finance market and the P2P lending platforms are also led by e-commerce players "*that lend to underbanked or unbanked individuals and small medium enterprises (SMEs) by leveraging users' merchant data on the platform"* (E&Y and DBS, 2016). Key players in this market are Ant Financial and MyBank (Alibaba), WeBank with WeChat (Tencent) and JD Finance (JD.com). Another vertical market is online funds that are funds linked to payment platforms to offer *"ease of access and more competitive returns than the historically low deposit rates" (*E&Y and DBS, 2016). Leading players are Yu'e Bao of Ant Financial, Li Cai Tong (Tencent) and Baifa (Baidu). Online insurance is the next market, whereby *"e-insurance is sold through e-commerce and online wealth management (WM) platforms"* (E&Y and DBS, 2016). The most important players here are the People's Insurance Company of China (PICC), Ping An, and Zhong An.

Personal finance is a market where *"recently developed mobile-centric finance solutions are providing access to mutual funds though stock trading apps"* (E&Y and DBS, 2016). These

apps *"offer offline-to-online activity, with online brokers accounting for over 92% of new clients*" (E&Y and DBS, 2016). Leading players are Ant Financial (Alibaba), Li Cai Tong (Tencent) and Baifa (Baidu). The last market is online brokerage, where individual investors and traders buy and sell securities over an electronic network. This market is led by FinTech firms such as Snowball Finance, Xianrenzhang and Yiqiniu (E&Y and DBS, 2016).

These seven key markets have especially been developed through the increasing penetration of technology. Ubiquitous connectivity has further stimulated the overall growth of the FinTech industry. The Figure below provides a summary of product and services which have been offered by traditional banks vs. FinTech Firms.

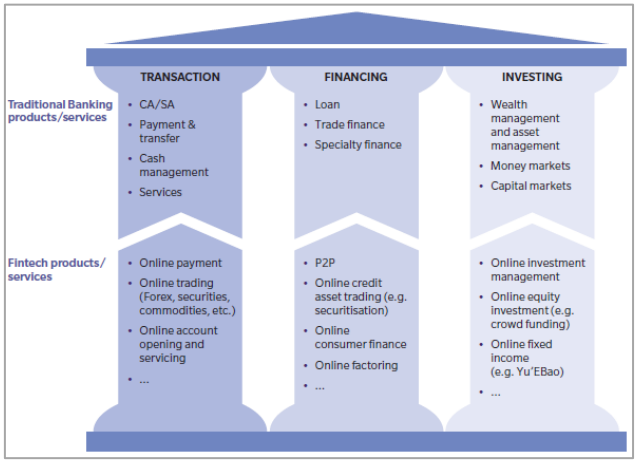

Figure 8: Financial products/services brought by FinTech

While the three core areas, transaction, financing and investing, are well developed, the Insurance segment is still lagging behind. This is because "*China's insurance industry is tightly regulated by the China Insurance Regulatory Commission and obtaining an insurance license is a complicated and challenging process"* (E&Y and DBS, 2016). Therefore, most of the *"FinTech firms seeking to penetrate the market have largely chosen to collaborate with existing carriers, rather than writing insurance contracts themselves"* (E&Y and DBS, 2016). In this way, FinTech firms do not only benefit from *"incumbents' guidance in navigating regulatory hurdles but also tap into risk assessment, pricing analytics and other technical know-how"* (E&Y and DBS, 2016).

Nevertheless, according to experts future FinTech leaders will differentiate themselves even more by pushing the frontiers of technological innovation further, in order to disrupt traditional financial services business models (Oliver Wyman, 2017). Ant Financial's CEO Eric Jing

"suggested that the company would be positioned as a "techfin" pioneer, with technology serving as the bedrock of the organization" (Oliver Wyman, 2017).

The next section discusses the most recent emerging technologies that are shaping the ongoing FinTech industry emergence in China.

7.2.1 Emerging Technologies

Artificial Intelligence (AI), Block chain, Cloud Computing and Big Data are at the forefront of revolutionizing the traditional financial service industry.

Artificial Intelligence widely known as the *"theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition or decision-making (investment decisions)"* (PwC, 2018) has been developing rapidly in China. Contributing to this ongoing development are not only investors from all around the world, but also the Chinese government. In May 2016, China's National Development and Reform Commission released a three-year implementation plan including Internet Plus and Artificial Intelligence (PwC, 2018). Six specific areas are included in this plan: funding, system standardization, intellectual property protection, human resources development, international cooperation and implementation arrangements. While AI is a "hot" topic in China, major improvements within *"basic theory, chip, system, ecology, hardware, software and project layout"* (PwC, 2018) still need to be done.

Blockchain *"uses a cryptographic network to provide a "single source of truth", enabling untrusting parties with common interests to co-create a permanent, unchangeable, and transparent record of exchange and processing without relying on a central authority"* (Oliver Wyman, 2017). While Blockchain *"serves as the technological base of Bitcoin trading and circulation, it can be used in a much bigger range of other sectors, while having a much greater potential than digital currency alone"* (McKinsey, 2016). Within financial services, Blockchain *"is applicable to payment and clearing, among other financial service scenarios"* (McKinsey, 2016).With a simple system according to industry experts (McKinsey, 2016), it can *"set up a direct process between payer and beneficiary, and help banks perform the core functions of value storage and asset transfer at a low cost but high speed"* (McKinsey, 2016). Furthermore, in financial trading *"blockchain enables point-to-point transactions and requires no clearing intermediary, thereby substantially reducing transaction time and cost* (McKinsey, 2016). However, there are still challenges which need to be overcome, such as difficulties in integrating Blockchain with current ecosystems; a lack of security protection for application

data, logic and operating environment; and issues around trust and protection of individuals' and business' privacy (E&Y and DBS, 2016). Nevertheless, in the future Blockchain is supposed to *"enhance the exchange of information by being the bedrock of a safer, faster transaction architecture for the financial industry"* (Oliver Wyman, 2017).

China's financial cloud market is also still in its early stages of development. In contrast to the *"traditional model where every financial institution builds and operates its own data/IT center on premise, financial cloud serves its customers (typically various financial/non-financial institutions, especially the smaller players) remotely based on demand, and customers pay for the usage"* (McKinsey, 2016). Cloud computing offers significant cost advantages and also a flexible infrastructure, which is *"particularly important for small players who need to quickly build IT capability to serve their explosively growing user base and fluctuating volume"* (McKinsey, 2016). While more and more of *"regional/rural banks and other non-financial players in China have formed a strong demand for cloud computing and storage"*, (McKinsey, 2016), IT companies such as Alibaba and IBM are *"already leveraging their technical expertise to provide cloud solutions and platform"* (McKinsey, 2016). Last but not least, the government is highly supporting the ongoing and further innovation of this emerging technology, as it seems to be contributing to overall modernization of China's financial industry and ultimately to China's overall economic development.

Big Data is the last category of emerging technologies to be taken into account. According to experts, *"Big data is now viewed as a strategic asset in Internet finance, pivotal to innovation of financial products and services, as well as risk management"* (McKinsey, 2016). Especially *"predicting how customers will behave and how that behavior will change"* (McKinsey, 2016) has become crucial, as it is highly relevant in the pricing process of the services and products offered. With Big Data, financial institutions are able *"to collect and analyze customer data, and thereby providing more tailored products and services through a personalized marketing experience"* (McKinsey, 2016). With respect to Risk Management, *"big data helps understand the correlation between factors and risks, based on both internal and external data, with advanced statistical models"* (McKinsey, 2016). Overall experts argue that *"financial institutions that master these data-driven advantages will enjoy increased operational efficiency and business performance"* (McKinsey, 2016). Following these advantages, Big Data has got remarkable attention from multiple players within the FinTech industry. More and more firms are now emerging and providing financial institutions with prompt solutions for *"lead generation, precision marketing, customer segmentation, risk management, post-loan*

management" (McKinsey, 2016) which they are not able to build in house. According to experts *"similar to cloud services, commercialized big data analytics services will greatly benefit thousands of small and medium players who cannot afford self-built data capability"* (McKinsey, 2016).

7.2.2 Core Drivers

While unmet financial needs, an exceptional growth in connectivity and e-commerce, driven by internet giants have been the main drivers for the first stage of the industry emergence, technology, especially emerging technology, the influence of the government and VC investments are driving the current stage of the overall FinTech industry emergence in China.

As discussed earlier, technology has always played a key role in shaping the FinTech industry worldwide. However, during the last years it has taken the lead in revolutionizing an entire industry.

The overall development of the internet and mobile phones, ultimately enabling internet finance and payments in the first stage, has shown multiple firms the potential behind technology and how it can impact an entire industry. Alibaba's success with Alipay has demonstrated how innovative technology can contribute to the modernization of the traditional financial industry, and at the same time change people's daily life. Alipay can also be considered as a "*representative example of the role of technology as a non-human actor shaping social and economic processes"* (Shim & Shin, 2015). Over time more and more firms have joined the FinTech industry shaping the overall industry landscape. But technology itself – is the driving force behind the ongoing change within the FinTech industry in China.

FinTech companies are putting their spotlight on emerging technologies. Not only the Chinese FinTech companies but also Chinese financial institutions are committed to invest in these technologies. According to experts, "*the application of these technologies will create significant disruption along value chains and bring about distinctive values for each of the four major areas of financial services*: *Financing, Investing, Transaction and Insurance"* (Oliver Wyman, 2017).

The development of technology/emerging technology has also been more and more supported by the Chinese government.

The Chinese government was highly interested in reducing the monopoly of state-owned banks. The launch of Webank, China's first private commercial bank, showed that the Chinese

government started to support more and more an internet-based private sector. Once TPPs market share increased rapidly only within a short period of time, leaving the traditional state-owned banks behind, the government started to realize that together with TPP companies, such as Aliababa, the overall financial industry in China could be modernized, leading ultimately to an increase in China's economic growth.

After the crisis within the P2P sector the government intervened and imposed several rules and regulations in order to control the P2P lending and online payments segment in China more, ultimately to encourage a further and healthy development of the overall industry.

In China's current 13th Five- year plan the government highlights, that it will give a *"central role to innovation in science and technology and a supporting role to the development of talent, closely integrating scientific and technological innovation with business startups and innovation by the general public in order to achieve leading-edge development that relies more on innovation as its driver and offers greater incentives for first innovators"* (China's 13th Five – year plan, 2016). Furthermore the government is convinced that *"that scientific and technological innovation leads the way in all areas of innovation"* (China's 13th Five – year plan, 2016).

The government aims to *"strengthen basic research, bolster primary innovation, innovation based on the integration of existing technologies, and innovation based on import and assimilation, and improve China's own capacity for innovation, so as to provide an inexhaustible driving force for economic and social development"* (China's 13th Five – year plan, 2016).

The last driver of the second stage of the FinTech industry emergence is VC- investments. Tech giants in China *"have become very active in FinTech, leading to significant large deals which tend to boost the FinTech sector"* (Kpmg, 2017). According to a study by Oliver Wyman (2017), *"Venture capital investments in China fintech have grown at a staggering compound annual growth rate of 300 percent over the past three years"*. Because investors have realized potential behind emerging technologies and how it can reduce costs, improve service quality, and promoting market liquidity and efficiency within the financial services industry (Wang & Huang, 2017). In terms of investments, experts argue that payments and wealth management will keep dominating the Asian fintech space. However, also key emerging technologies such as Big Data are *"set to be a focus of fintech investment in Asia, as the ability to access and analyze customer data has become an important enabler to the success of many fintech product offerings"* (Kpmg, 2017). Furthermore, the implementation of Blockchain technology could

"streamline the clearing and settlement of cash securities, saving capital markets USD $11-12 billion globally on an annual basis" (Goldman Sachs, 2016), ultimately motivating VCs to invest.

The analysis of the two stages has not only shown how the FinTech industry has emerged over time, but also how multiple players – partially unrelated to finance and technology – have contributed to the emergence and development of the FinTech industry in China. By combining all these players together, an ecosystem has been created and is explained in detail in the next section.

7.3 China's FinTech Ecosystem

The following section gives an overview over all players that contributed to the FinTech industry emergence in China.

7.3.1 Government/Regulators

The Chinese government and its regulators have always a played a key role in the *"processes of transitioning the Chinese economic system from one track to another over the past twenty years"* (Worden et all, 1987). While *"under China's socialist political and economic system the government was explicitly responsible for planning and managing the national economy*" (Worden et all, 1987), after China's Economic reforms, *"much of the system was in the process of changing, as the role of the central government in managing the economy was reduced and the role of both private initiative and market forces increased"* (Worden et all, 1987).

With the launch of the 'Golden Card Project' in 1995, which was *"designed to create a nationwide credit card system to facilitate the widespread use of credit and debit cards for the successful development of e-commerce in China"* (Lovelock &Ure, 2002), the government realized that it had to modernize its overall payment system, as this was a fundamental condition to build out its e-commerce scene. However, the government faced difficulties. Only through Alibaba's development of Alipay in 2005 the government realized the potential behind this new payment system. Not only it could positively affect e-commerce transaction but also revolutionize the overall payment system of the financial industry. In response to that, the government state owned banks started to collaborate with Alibaba and made an effort to modernize China's payment system. However, the TPP's service grew rapidly and the Chinese government had difficulties in keeping up with the changes, while seeing decreasing revenue of the state-owned banks. Following that development the government seemed to have a dual role. On the one hand, the government had *to "break up the monopoly of SOE in the domestic*

banking system in order to enhance China's economy further" (Shim & Shin, 2015). On the other hand there was the need to foster *a "business-friendly environment for the growth of the national economy" (*Shim & Shin, 2015). However, *"the government's attitude towards FinTech become progressively more complex, as risks piled up around P2P platforms and the number of underground fund raising and financing activities have grown"(Pwc, 2017).* While the ecosystem had been mainly unregulated in the past, more regulations were introduced now in order to ensure and foster the ongoing and healthy development of the FinTech industry.

7.3.2 Financial Institutions

China's traditional financial institutions have also undergone a significant transformation process since its economic reforms. The government both tried to reduce the monopoly power of state-owned banks and strengthen its ongoing financial reform. While initially UnionPay played a pivotal role in China's payment and card services, Alibaba, after its success with Alipay, became the leading force behind the modernization of China's payment system. Alibaba formed alliances with all of the leading banks and financial institutions in order to foster the online payment market. Given that Alibaba's online payment system supported "*nearly 200 bank's credit and debit cards, the government showed a favorable stance towards Alibaba"* (Shim & Shin, 2015). Alibaba also received the approval by the government to start its own banking branch, and from 2013 even more private companies were allowed to establish banks on trial basis. This has substantially reduced the monopoly power of state-owned banks, *"which have failed to build up their own actor network in the newly emerging Fintech industry"* (Shim & Shin, 2015). The four largest state- owned banks *"became less dominant in the retail banking segment, with their market share dropping from 78% in 2011 to 73% in 2014"* (Shim & Shin, 2015). However, this was in line with the government as, they *"shared common interest with TPP companies such as Alibaba"* (Shim & Shin, 2015), in order to foster the ongoing financial reforms of the traditional banking system. Since then traditional financial institutions are re-evaluating "*their existing business models and developing strategies" (Lee & Shin, 2018)* to keep up with FinTech innovation. While "*traditional financial institutions have competitive advantages in economies of scale and financial resources over fintech startups*" (Lee & Shin, 2018) they tend to put a much greater emphasis on *"bundled services, providing one-stop comprehensive financial products and services to consumers rather than unbundled specialized products and services"* (Lee & Shin, 2018). Over time traditional financial institutions have changed their view on the fast-growing FinTech companies. At first they were considered as a

threat but now viewed as a potential target for collaboration *"in order to stay on the forefront of technology"* (Lee & Shin, 2018).

Overall *"the reform of the financial sector deepened, financial institutions became more competitive, the development of financial markets was characterized by enhanced regulation and innovation, and the building of financial market infrastructure made further progress"* (13th Fife - year plan, 2016). This progress is also to be seen in the upcoming years as the government will *"foster a system of multilevel and differentiated banking institutions that offers extensive coverage, expand the amount of private capital entering the banking sector, and develop inclusive finance and a variety of forms of micro, small, and medium financial organizations, and finally develop a well- regulated internet-based financing"* (13th Five - year plan, 2016).

7.3.3 FinTech Startups

Among all players, FinTech startups are considered as the *"mostly entrepreneurial and have driven major innovations in the areas of payment, wealth management, lending, crowdfunding, capital market, and insurance by especially incurring lower operating costs, targeting more niche markets, and providing more personalized services than traditional financial firms"* (Shim & Shin, 2015). According to Walchek (2015) they are the driving force behind *"the phenomenon of unbundling financial services, which has been highly disruptive for banks".* This unbundling is considered as one of the major drivers of growth within FinTech, as *"traditional financial institutions are disadvantaged in this situation"* (Lee & Shin, 2018). A study by Kpmg (2017) also sees FinTech startups as the main driving force and expect that 72% of innovation over the next three years will come from start-ups. The study also highlights China's Leading FinTech 50, based on their innovation and technological development capacity, and shows the breakdown in various business sectors.

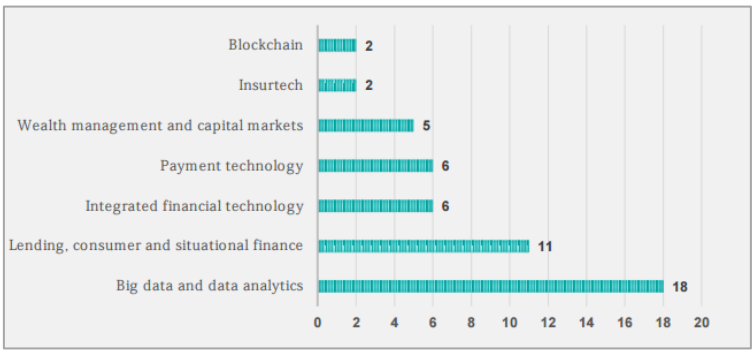

Figure 9: China Leading Fintech 50 companies

Interesting to see is that *"Big data and data analytics companies are the largest group, followed by lending, consumer and situational finance companies"* (Kpmg, 2017). However this comes as no surprise given that *"fintech's status as a critical developmental focus for the financial industry and most companies are focusing on advanced data technology application, research and development"* (Kpmg, 2017).This shows also the transformation from stage 1 of China's FinTech industry emergence to stage 2. While online payments and mobile payments were the leading services offered initially, emerging technologies, such as Big Data are now enabling FinTech firms to offer new products and services.

7.3.4 Internet Giants

Unlike in the US and Europe where FinTech has been mainly driven by startups, or in some cases financial services incumbents, China's internet giants have largely been the sources of capital for its FinTech firms. This is especially, since a *"high proportion of the population is either unbanked or don't use credit cards, so that the interrelated growth in mobile-led Internet access and e-commerce has ignited the growth of FinTech – not least in the payments and e-wallets sectors" (*Consumers International, 2017).

Alibaba, China's biggest online e- commerce company, has played a crucial role along the FinTech industry emergence in China. What is remarkable within this context is that Alibaba per se is neither a pure financial company nor a pure technology firm. However, it has been the key to the emergence of the FinTech industry in China. With its introduction of Alipay in 2005, Alibaba directly revolutionized the entire e-commerce scene but led also indirectly to the foundation of the FinTech industry. Alibaba's success inspired multiple firms to enter the technology and financial sector. While *"Alibaba's Alipay is now the largest online payment gateway in China, accounting for half of Chinese third-party online payments (and 68.4% of the mobile payments market19), Tencent's Tenpay currently commands another 10% (and 20.6% of the mobile payments market)"* (E&Y and DBS, 2016). A few years later, Alibaba used its Alipay platform to introduce its money market fund Yu'e Bao. This provided merchants and customers with the unique opportunity to *"easily park their excess cash in Yu'e Bao to earn an attractive interest that banks were unable to offer"* (E&Y and DBS, 2016). According to experts this *"natural extension of Alipay's services resulted in exponential growth"* (E&Y and DBS, 2016). Following the success of Yu'e Bao in 2015, Tencent expanded its presence further and decided to add an online payment system to its social media platform WeChat. Through this, users can *"transfer money between each other, as well as pay for services such as taxis, digital subscription, food delivery and restaurant bills"* (E&Y and DBS, 2016). Within only a short

time *"WeChat transformed itself into a payment platform in 2013 and launched a personal online investment fund in January 2014, which was followed by the launch of WeBank, China's first online bank a year later"*(E&Y and DBS, 2016). While emerging technologies are at the forefront of FinTech in China enabling other services and products within the financial service sector, *"mobile payments are still growing, and especially fuelled by QR (quick response) codes and, particularly online-to-offline (O2O) services"* (E&Y and DBS, 2016).

Figure 10: QR code Payment Process

According to industry experts, *"diverting from today's norm of acquiring customers online, a rising number of Chinese retailers (both bricks-and-mortar and e-commerce companies) have started using QR codes on billboards, posters and flyers to offer discounts and product information"* (E&Y and DBS, 2016). By only scanning the code the user can immediately process the transaction via the smartphone. While customers are acquired online in the O2O business, the final delivery of the product or service is done at a physical location. Alibaba has announced its ambition to enter into *"one million offline partner merchants globally within three years, a move that will allow 200 million Chinese users to pay with Alipay even when they are abroad"* (E&Y and DBS, 2016). Following that development the POBC started to make plans in order to regulate *"QR based payment technologies and has authorized the China Payment & Clearing Association to draft standards for mobile purchases linked to QR codes"* (E&Y and DBS, 2016). As the government sees great potential behind this development, the new regulation will be most likely to the advantage of the Chinese consumers and will support the *"development of virtual credit cards, providing further stimulus for FinTech firms focused on digital payments"* (E&Y and DBS, 2016).

7.3.5 Technology Developers /Tech Talent

Most breakthroughs in the FinTech industry have been ultimately achieved through technology and innovation. Emerging technologies, such as Big Data, machine learning (AI) Blockchain and Cloud computing, are at the forefront of the FinTech industry development in China. While *"precision marketing makes use of big data technology to identify clients' various needs by conducting multi-dimensional analysis on individual users*" (Kpmg, China Leading Fintech50, 2017), "*cloud computing may be used for cash-strapped fintech startups to deploy web-based services at a fraction of the cost of in-house infrastructure development"* (Lee & Shin, 2018). Lee & Shin (2018) explain further, that *"Algorithmic trading strategies can be used as the basis for robo advisor wealth management services at much lower fees than traditional wealth management services".* However, according to Kpmg's China Leading Fintech50 Report (2017), *"Big Data is the most commonly adopted technology by companies on the list".*

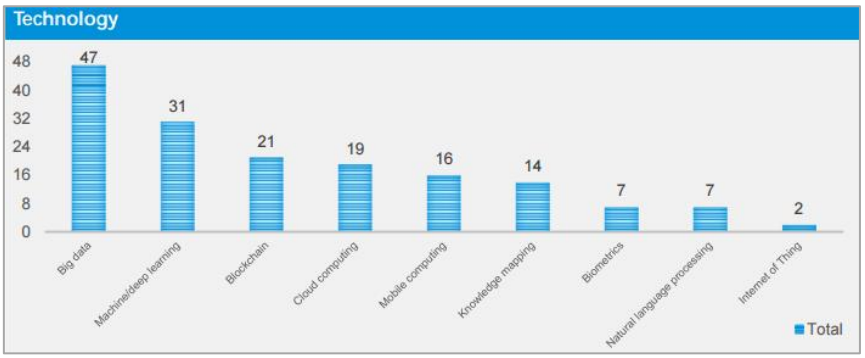

Figure 11: Emerging technologies driving FinTech in China

"Technological research, development and application is a key component of a company's core competitiveness" (E&Y and DBS, 2016) and requires therefore a highly skilled work force with an agile mind-set. In China the main hubs for such talent and financial innovation are: Beijing, Shenzhen province - near the financial center of Hong Kong, and Shanghai (E&Y and DBS, 2016). According to experts, these regions are *"continuously investing to nurture a conducive environment for FinTech firms in China"* (E&Y and DBS, 2016). Among Beijing, and Shanghai, Shenzhen *"spend about US$680 million in 2016 to attract global professionals and academics"*. FinTech firms also keep locating near *"some of the world's top-ranked universities for technology and engineering, such as Peking University and Tsinghua University that create an unparalleled and constant pool of new talent for the tech industry"* (E&Y and DBS, 2016).

7.3.6 FinTech Ready Generation

Financial customers (individuals and organizations) are the last player within the FinTech ecosystem. According to experts, the Chinese consumers are *"more than ready to embrace FinTech offerings, creating opportunities for both incumbent and new financial services providers"* (E&Y and DBS, 2016). According to Lee & Shin (2018), "*large organizations are important sources of revenue",* however *"the predominant revenue source for FinTech companies are individual customers and small and medium-sized enterprises (SMEs*) (Lee & Shin, 2018). Among the growing middle class *"is a disproportionately large presence of a new segment of digital savvy consumers – the Gen-Y and millennials– who account for 45% of consumption"* (E&Y and DBS, 2016). Industry experts argue further that these 'digital natives' are not only open more to new technologies but also *"exhibit a higher tolerance towards financial risks and greater propensity to spend than the older generations, while demonstrating more "individualized preferences, and demand real-time, hyper-connected, client-centric offerings"* (E&Y and DBS, 2016). Furthermore, these digital natives do not value brand, heritage or longevity of traditional financial institutions as high as other generations before them might did. EY's recent Bank Relevance Index, (created as part of the Global Consumer Banking Survey 2016) indicates "*that traditional Chinese banks are becoming less and less relevant to their customers"*.

Due to the ongoing reform within the financial service sector, Chinese consumer's preferences and expectations towards financial products and services have also changed. While in the past consumers hesitated to switch to other banks, nowadays they are more than willing to *"migrate away from banks to engage with digital disruptors that can better deliver to their financial needs with higher interest rates and fast, convenient services"* (E&Y and DBS, 2016). This development has led to a *"rising number of young Chinese consumers end up accessing financial services for the first time through FinTech-developed platforms, rather than incumbent banks"* (E&Y and DBS, 2016).While *"trust is still a key predictor of advocacy and, therefore, future business" (*E&Y and DBS, 2016), today it is less *"about customers' conviction that banks will keep their money physically secure, but rather whether they can trust banks to charge fair fees, and provide high-quality, unbiased advice, that place their interests and needs first"(*E&Y and DBS, 2016). Finally experts see this changing consumer attitude especially due to a several *"public relations disasters in recent years, such as the mis-selling of financial products and other industry scandals that have undermined consumers' trust in banks – in China and around the world"* (E&Y and DBS, 2016).

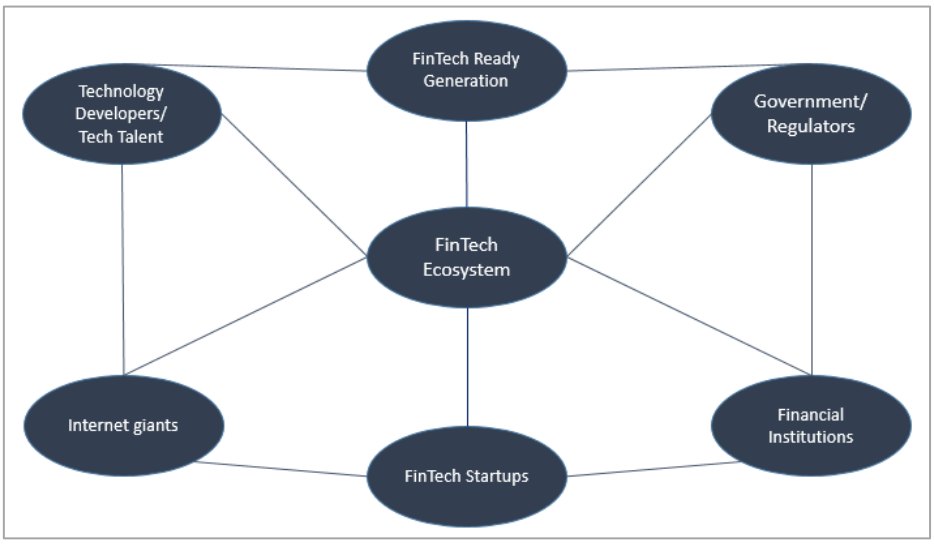

Figure 12: The FinTech Ecosystem

Overall, *"FinTech has evolved from startups that want to take on and beat incumbents, to a broader ecosystem of different businesses looking in many cases for partnerships" (PwC, 2017).* Especially *"financial Institutions have understood the importance of this ecosystem, as they have realized that adopting effective growth strategies and integrating with FinTech will be essential to partner for innovation"* (PwC, 2017). While the partnership with innovators will *"allow incumbents to outsource part of their R&D and brings solutions to the market quickly*" (PwC, 2017), FinTech firms will be able to develop *"new theories and models, based upon large data sets that incumbents already have"* (PwC, 2017). Experts argue further that these *"organizations are able to complement one another through strategic transformations based on market insights, capital allocation capabilities and innovative technologies"* (China Leading FinTech 50, 2017). However, the ongoing integration process will remain challenging for all players within the FinTech industry as long as differences in management and culture remain inherent and regulatory uncertainty persist.

The next section discusses the opportunities and challenges of the FinTech industry in China.

7.4 China's FinTech Industry Opportunities & Challenges

Building up on the overall analysis, the next section provides an overview of China's FinTech industry opportunities and challenges.

7.4.1 Opportunities

Over the last years, FinTech has emerged at a rapid pace and contributed to the modernization of the overall Chinese financial system. One of the most crucial advantage that the industry has brought is the financing for an entirely initially underserved SME and retail customer segment, led by internet giant Alibaba. Alibaba's idea to unlock the potential of SMEs by enhancing connectivity through-ecommerce has given multiple firms the opportunity to start their own business and to contribute not only to the emerging FinTech industry, but also to China's overall economic development. Especially the development of Alipay in 2005, providing Chinese consumers with a convenient, fast and reliable payment opportunity has given rise to multiple other innovations within the FinTech industry. Within this context, industry experts also argue that *"mobile payments and fund transfer solutions have become so convenient that cash and debit cards"* (PwC, 2017) are less necessary for daily transactions. Especially through technology, FinTechs were able to make a substantial improvement in efficiency, cost reductions and more effective risk management across all financial core sectors, Transaction, Financing, Investing and Insurance. FinTech companies have also developed a more customer oriented business model and improved user experience of financial services. According to experts, *"the low cost and more effective reach of FinTech"* (PwC, 2017) has made that possible. Additionally through a more innovative and agile business model FinTech's are now able to respond more quickly to their customer's needs with products and services tailor- made to them. Especially 24/7 accessibility, ease of use with intuitive product design and a faster service have become crucial to Chinese consumers.

Nevertheless, *"Banks, insurers and asset management companies have undertaken major transformation efforts – transitioning from complex legacy technology environments to more agile operations, and creating more efficient compliance processes that fully satisfy evolving global and jurisdictional regulations"* (Kpmg, 2017).

However, over the last two years there has been a *"distinct trend towards collaboration and partnership with respect to how financial institutions approach FinTech opportunities"* (Kpmg, 2017). This is because the "*partnership has brought a more rapid speed to market for FinTech solutions, while being less costly and resource intensive"* (Kpmg, 2017).

Furthermore, *"partnering creates an opportunity for collaboration and mutual reward"* (Kpmg, 2017). This can be seen from the example of *"alternative lending platforms that are partnering with banks and financial institutions in order to enjoy the benefits of cross-referral of clients"* (Kpmg, 2017). Experts stress the importance of collaboration further by arguing that *"for certain FinTech technologies to succeed, close collaboration across industries and between industries and regulators can be critical"*. Manoj Kashyap, Global FinTech Leader and Partner at PwC US supports this, as *"innovation is happening outside of the organization, with emergent technologies being leveraged by startups, and if financial institutions want to speed up their innovations they need to significantly increase their collaboration with FinTech companies"(PwC, 2017).*

Another opportunity comes from the biggest Chinese FinTech firms that are *"aggressively creating all-encompassing platforms"* (E&Y and DBS, 2016). The Ant Financial Services Group (Alipay) seeks to *"embed its services into customers' daily life to raise the percentage of users with multiple products, in the process boosting customer stickiness and generating ever more complete customer data"* (E&Y and DBS, 2016). Following that, Ant Financial is building up an ecosystem that *"goes beyond financial services to encompass transportation, dining, medical services, and much more"* (E&Y and DBS, 2016).

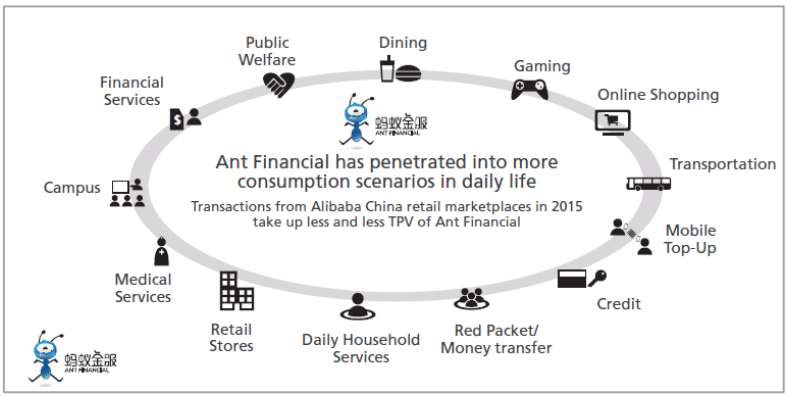

Figure 13: Ant Financial's Ecosystem beyond Financial Services

Tencent, Ant Financial's competitor has also started to test new tools for *"businesses to build sub-apps within WeChat that can make services even simpler to use while staying within WeChat"* (E&Y and DBS, 2016). This development could *"upgrade WeChat's app into an operating system within an operating system, letting WeChat become a one-stop app that replaces a number of existing apps and/or integrate new, innovative functions on its own platforms.* Following that, users would *"rarely have to leave the app for other mobile apps"* (E&Y and DBS, 2016).

7.4.2 Challenges

While the overall FinTech industry has brought many opportunities on one hand, it has also brought several challenges on the other hand.

One of the biggest challenges and crucial for the ongoing FinTech development is 'talent'. As technology is playing a *"significant role in transforming the financial service sector"* (Flanagan et all, 2017), FinTechs face increasing concerns related to attracting and retaining skilled talent that is "*necessary for their firms to sustain and grow now and into the future"* (Flanagan et all, 2017). This concern is also *"repeatedly expressed by stakeholders as one of the most prevalent contemporary challenges faced by FinTech companies"* (Digital Finance Institute, 2016). Within this context, Wolfe (2016) and Nordicity (2012) argue that *"one of the most challenging and underlying issues to address is whether a sufficient supply of graduates in general is interested and/or is pursuing education that will train them to work within digital technologies across the economy".* According to Stapleton (2017), the growth in the number of *"engineering students has been particularly explosive as part of the government's push to develop a technical workforce which can drive innovation"* (Stapleton, 2017). However, it seems that the Chinese companies are still not able to find the appropriate workforce. On the one hand, "*financial and digital skills are required to develop innovative and cost-efficient financial technology (FinTech) solutions"* (Flanagan et all, 2017), on the other hand *"soft skills such as strong communication, analytical and managerial skills are required"* (Stapleton, 2017). "*Fostering the innovation and closer customer engagement needed to compete within this fast-changing landscape demands people with fresh ideas and a broad array of experiences and capabilities*" (PwC, 2017).

The next challenge to be addressed is the Internationalization of the Chinese players within the FinTech industry. In theory, *"internationalization efforts should provide technologies for advanced transaction processing capabilities; open up the global settlement network; breakdown international payment barriers; and enhance opportunities for these Chinese tech companies to transform financial services to a lifestyle product for consumers"* (E&Y and DBS, 2016). However, succeeding in all these areas requires *"catering to the individual peculiarities of international markets and their consumers"* (E&Y and DBS, 2016). As in every industry, it is not possible to only replicate and export domestic business models to other countries, but it is rather necessary to understand local preferences and also adapt to norms and expectations. According to experts, FinTech firms also need to *"be aware of and manage cross-border cultural and language differences that could impact staff and customer communications – not*

to mention successful commercial collaborations" (E&Y and DBS, 2016). Furthermore, *"given certain trust issues with 'made-in-China' products, institutions must also focus on safety and security reassurance"* (E&Y and DBS, 2016).

According to experts, there are also *"multiple challenges in incorporating innovation into their organizations, including aligning innovation with strategic priorities, building capabilities to ensure agile development and prototyping, as well as commercializing solutions"* (PwC, 2017). Furthermore, in order to start *"seeing possible returns, Financial Institutions will need to streamline their innovation process from the idea generation phase through to commercialization"* (PwC Global FinTech Report, 2017). While partnerships and collaborations among traditional financial institutions and FinTechs have become increasingly popular in order to tackle those challenges, as organizations vary in terms of culture and mindset intra-organizational challenges might occur. According to the Global FinTech Report (2017), integration will not come easily, as "d*ifferences in management and culture, regulatory uncertainty and legacy technology limitations are identified by both as being major challenges to working together"*

Last but not least, Cybercrime is challenging all players within the FinTech industry. While digitalization plays a key role in the fight against payment fraud, even in this technologically advanced environment security threats persist (FinTech Futures, 2017). The most common risk faced today, *"is what is known as "social engineering", which involves a scammer working as a so-called "man in the middle" – deceiving staff employees to glean sensitive financial information, and manipulating them to unwittingly perform fraudulent transactions"* (FinTech Futures, 2017). Therefore, companies are required to take steps to *"ensure that human beings – as well as computers – are protected against crime"* (FinTech Futures, 2017). Despite all these challenges however, traditional financial institutions and FinTechs should keep focusing on *"finding the most executable and impactful opportunities and structuring the organization to encourage continued innovatio*n" (Kpmg, 2017) within the FinTech industry in China.

The next section discusses the FinTech industy emergence in China from an academic perspective.

8. Academic Perspective

This section applies the theoretical frameworks, Schumpeter Model and the emerging industry - life cycle introduced at the beginning of this thesis to the FinTech industry Emergence in China. While the first part discusses the Schumpeter Model, and how it applies to the case at hand, the second part focuses on the emerging industry life-cycle.

8.1 Schumpeter Model and FinTech Industry in China

Before relating the Schumpeter Model to the case at hand two aspects are important to re-mention: While the initial trigger of the overall FinTech industry emergence in China came through Alibaba's Alipay in 2005, multiple other players led to the development and raise of the FinTech industry in China.

Alibaba's innovation was not based upon a 'new' invention, because online payment systems such as PayPal (1998) existed already. However, the innovation of Alipay was new to Chinese consumers and represents therefore, a fundamental phenomenon that initiated the overall growth of the FinTech industry in China. However, Schumpeter also argues that *"the pure new idea is not adequate by itself to lead to implementation"* (Schumpeter, 1934), but must be rather initiated by a strong character, the entrepreneur and implemented through his influence. While multiple entrepreneurs led to the overall development of the FinTech industry in China, Alibaba can be considered as the key entrepreneur who initiated the overall development and inspired multiple other entrepreneurs to enter the emerging industry. In accordance with Schumpeter "*technological innovation often creates temporary monopolies, allowing abnormal profits that would soon be competed away by rivals and imitators. Nevertheless, these temporary monopolies were necessary to provide the incentive for firms to develop new products and processes"* (Pol & Carroll, 2006).

However, in contrast to Schumpeter's first 'Entrepreneurship Theory' that assumes that the entrepreneur is a single individual carrying out the innovation, Alibaba cannot be considered as a single individual but rather as an organization that carried out the innovation. Alipay's success was the result of the cooperation and interaction of multiple different actors and corresponds therefore to Schumpeter's second Entrepreneurship theory. Furthermore, Schumpeter argues that *"while the invention phase or basic innovation phase have less impact, the diffusion and imitation process have a much greater influence on the state of an economy, as imitators begin to realize the profitable potential of the new product or process and start to invest heavily in that technology"* (Schumpeter, 1934).

This does also correspond to the case at hand, as after Alibaba's success with Alipay, multiple traditional financial institutions and technology companies entered the market, ultimately contributing to the development and growth of the FinTech industry in China.

However, out of the analysis it became apparent that it was not only the contribution of multiple entrepreneurs - internet giants, traditional financial institutions, technology developers and FinTech companies - that led to the overall development of the industry, but also a FinTech ready generation, government and investors that influenced the overall emergence of the FinTech industry in China. The Schumpeter model does not take into account such factors, which is due to the fact the model was only developed in the early 1900s, while *"the increasing complication of modern economies causes the necessity of a higher rate of economic interaction"* (Sledzik, 2013). Furthermore, *"today's knowledge-based economies are dependent by a dynamic technological progress and the generation of innovation no longer depends on individual personalities"* (Sledzik, 2013).

What is also contradicting to Schumpeter's theory of economic development is that *"consumer preferences are already given and do not undergo spontaneously, and therefore cannot be cause of the economic development"*. However, the case at hand has shown that consumer preferences do change over time, and have influenced the overall development. Especially the increase in digital connectivity and improvement in technology has changed consumer's preferences to switch from cash based transactions to non- cash online transactions and other financial more convenient, reliable and secure services. Furthermore, and in contrast to the case at hand, the model assumes a perfectly competitive economy which is in a stationary equilibrium – circular flow, where economic activity produces itself continuously at a constant rate through time, while implying no destruction. However, according to Schumpeter this stationary equilibrium "*is only a theoretical abstraction and serves as a reference point"* (Schumpeter, 1928).

The next section applies the emerging industry-life cycle to the FinTech industry in China.

8.2 The emerging Industry-Life Cycle applied to the FinTech Industry in China

In accordance with the academic literature on the emerging industry life-cycle, the initial stage also defined as the *"pre-firm – take off stage or the pre-founding stage"* can be considered as the Stage 1.0 of the FinTech industry emergence in China. However, the Stage 1.0 contains characteristics that are also common in the second stage of the industry life-cycle, the 'co-evolutionary stage', so that there is no distinct boundary but rather a fluent passage between the two first stages of the industry life-cycle.

In 1995, the 'Golden Card Project' was *"designed to create a nationwide credit card system to facilitate the widespread use of credit and debit cards for the successful development of e-commerce in China"* (Lovelock &Ure, 2002). However, in order to develop a successful e-commerce scene the government had to modernize its payment system. In theoretical terms this represents the situation where *"the industrial change or development of the novel industry structure was not significantly developed yet"* (Gustaffsson et all, 2016). Only in 2005, the overall modernization was triggered by Alibaba's development of Alipay, an online escrow payment system that *"allowed buyers to wire money from their bank accounts to Alibaba, which held the money in escrow until the products were satisfactorily delivered by sellers"* (Wang, 2014). Fundamental to this development was technology, which is according to the literature on industry emergence also considered as one of the most prominent triggers within the first stage of the industry life-cycle (Gustaffsson et all, 2016), "*resulting in inventions, innovations and technologies that challenge an existing technology, product or service"*. Furthermore, the launch of Alipay represents not only a major step towards China's reform of the overall payment system, but contributed at the same time significantly to the growth of China's e-commerce sector, as it provided customers with a secure, convenient and reliable payment method for online transactions.

Moreover, Alibaba's success did not only inspire traditional financial institutions and multiple other finance and technology companies but also let them realize the potential behind the combination of technology and finance. In accordance with the literature, this represents the second sub-process, which describes the interplay of new technology and unsatisfied demand as market emergence. Following that among others, Tencent, Baidu and Sina entered the market by releasing similar products. This is also in accordance with Mezias & Kuperman (2001) and Sine & Lee (2009) who argue that often the initial stage is characterized by an "*increasing number of entrepreneurial opportunities, an increase in nascent entrepreneurial activities and an increase in the number of new firms that are established"*. However, Alibaba in order to

convince more and more parties of their technological achievement, continued its expansion and formed alliances with banks, insurance companies, funds and securities companies. This can also be considered as the first sub-process, 'establishment of a technological basis – in which especially for large firms it is important to collaborate with "*smaller counterparts with technological expertise, as this has shown to be strategically valuable during industry emergence"* (Zucker & Darby, 1997).

While the stage 1.0 was mainly trigged by Alibabas online payment system Alipay itself, unmet financial needs of the Chinese consumers and an exponential growth in digital connectivity were the driving forces behind Alibaba's development.

Over time also other institutions and companies started to imitate Alibaba's products and services. Alibaba's closest competitor 'Tencent' launched WeChat payments, which has become one of the most powerful payment tool in China. Furthermore, the PBC – fully state owned and functioning as the central bank - started to licenses to other third party online payment platforms to conduct electronic payments. Telecom companies such as China Telecom launched its mobile payment Best Pay, which became also increasingly popular over time. Following that development, online payments and mobile payments became increasingly common and offered among multiple players within the market. This development seems also reasonable according to the industry emergence literature as the overall transition from the initial phase to the co-evolutionary stage can be recognized from the *"emergence of a 'dominant category' that fulfils 'the need of stakeholders to communicate meaningfully with other stakeholders regarding their activities in the emerging industry"*" (Suarez et al. 2014). Furthermore, the "*emergence of organizational, technical, product and service innovations take place and during which rapid contagion and imitation accelerates the emergence of an industry"* (Mezias & Kuperman, 2001).

However, the overall development went on and online payments and mobile payments were no longer the only services offered. Alibaba's success with its online market fund, Yu'e bao also let other market funds emerge. Tencent, Baidu and Sina all entered the market, and Union Pay also saw potential behind the online market funds. While Alibaba, Tencent and other emerging FinTech companies became more and more dominant, the traditional financial institutions were losing market share. In response to that, the state-owned banks started to collaborate more and more with the TTPs leading firms. While the PSBC entered a collaboration with Ant Financial and Tencent in internet and mobile finance, the regional Bank of Suzhou entered a collaboration with Dianrong.com – an online market place lending company. According to Burr (2006) and

Van de Ven and Garud (1994) this is common, as *"throughout the co-evolutionary stage many companies collaborate with each other, in order develop product categories, innovation activities and engaging with consumers".* This represents also the third sub-process, emergence of activity networks, which are fundamental to the development of an emerging industry, *"as they create organizational forms and institutions in the new industry"* (Mezias & Kupermann, 2001). Moreover, "*technology and service development takes place, while industry structure, business models are actively developed along the value chains and competition between different technologies, technological designs, value chains and platforms" (Mezias & Kuperman (2001) and Gustafsson et all, 2016)* is enhanced.

Despite the overall growth, especially within the P2P lending, online financing suffered significant reputational damage after several incidents, so that the government, despite their overall positive and encouraging attitude of the Internet based finance imposed several rules and regulations in order to control the overall development of the emerging industry further.

As the industry is currently still emerging, Stage 2.0 is ongoing and especially emerging technologies, such as AI, Block chain, cloud market and Big Data are re-shaping the overall FinTech industry in China. According to the literature on industry emergence this is crucial, as the *"the disruption and reshaping of the industrial order represented by the initial and co-evolutionary stages have led to a permanent shift in the industry landscape"* (Gustafsson et all, 2016). While more and more firms have entered the emerging FinTech industry in China, ultimately leading to an increase in competition among the players, also investors have become aware of and interested in the potential behind the emerging field of FinTech in China. This represents the 4th sub-process, formation of industry identity, whereby firms actively "*construct the cognitive and socio-political legitimacy of their activities and the technology they are conferring and establish the identity of the emergent industry in order to attract resources, partners and customers*" (Aldrich & Fiol, 1994; Van de Ven & Garud, 1994; Hsu & Hannan, 2005). Especially VCs have entered the market and gave rise to several FinTech unicorns, while Ant Financial remains by far the largest unicorn globally. Furthermore, along the growth stage the FinTech industry has emerged around various business models such as, Payments and e-wallets; supply chain and consumer finance; peer- to - peer (P2P) lending platforms and online funds. Following that development the overall industry has become more and more profitable while at the same time also more complex and competitive. This development increases further the collaboration among several players, which is also in accordance with Gustafsson et all

(2016), who argue that strategic alliances between firms become common and *"central in the future development of the industry"*.

Overall emerging technologies, the role of the Chinese government and VC-investments have played a crucial role not only in the co-evolutionary stage but also especially in the growth stage and are also expected to play a key role for the ongoing and overall future development of the FinTech industry in China. Regarding the overall sub-processes it seems that sub-process 2, Market emergence has only played a crucial role at the beginning of the FinTech industry emergence in China, while all other process are still active and crucial for the ongoing development of the FinTech industry in China.

The next section presents the overall results of the thesis, combined with some recommendations for a potential future research on the topic under investigation.

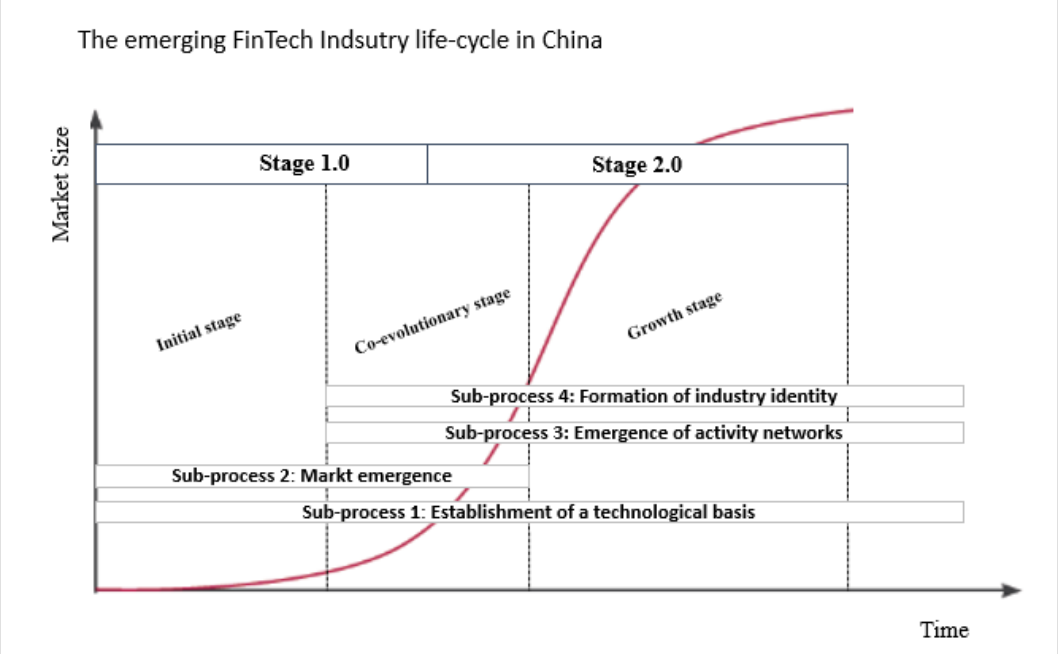

Figure 14: The emerging FinTech Industry Life-Cycle in China

9. Results & Future Research

The overall analysis has shown that the FinTech industry emergence in China is a complex phenomenon, ultimately caused by several factors.

One of the main findings of the analysis is that the FinTech Industry in China has developed out of the e-commerce sector back in 1995. At that time the government was planning on building up its ecommerce scene, however had to deal with a highly underdeveloped financial system and payment system. This however changed substantially after Alibaba realized the potential behind the internet and introduced Alipay in 2005. From that time onwards, Alipay became the most frequently used payment platform, greater than the use of credit cards, debit cards or even cash. Alibaba's success ultimately inspired not only traditional financial institutions but also multiple finance and technology firms to enter the emerging industry. Furthermore, Alibaba realized the potential behind SMEs, and launched a specialized company in order to serve an initially underserved SME and retail customer segment. Following that, financing was provided and SMEs were finally given the opportunity to start their own business, ultimately contributing not only to the emerging FinTech industry in China, but also to Chinas overall economic development.

While the early stage was mainly trigged by Alibabas' online payment system Alipay itself, unmet financial needs of the Chinese consumers and an exponential growth in digital connectivity drove the initial stage of the FinTech industry emergence in China further.

As the development went on, online payments and mobile payments were no longer the only services offered. Especially through emerging technologies, such as AI, Blockchain, cloud market and Big Data, the FinTech industry continued to grow while businesses started to offer more and more products and services, which highly disrupted the entire traditional financial service industry. This development was also highly supported by the government, and VC investors that saw great future potential behind the emerging industry, ultimately contributing to the overall modernization of the financial services industry in China.

All in all, it was not only the contribution of multiple entrepreneurs - internet giants, traditional financial institutions, technology developers and FinTech companies - that led to the overall development of the industry, but also a FinTech ready generation, the government and investors that influenced the overall emergence of the FinTech industry in China. Last but not least, it was China's transition from a planned economy to a socialist market economy that has been crucial for the development of the FinTech industry.

In terms of the literature applied, both the Schumpeter model and the industry life-cycle including the sub-processes contribute to the understanding of how the FinTech industry has emerged in China. While Schumpeter's model has showed how innovation, especially technology innovation and entrepreneurship are fundamental to economic growth, the industry life-cycle analysis has given insights into how the FinTech industry has emerged step by step, and how the transition from one stage to the other stage has taken place.

However, while the thesis has found that the FinTech industry in China has developed out of the e-commerce sector and that several players have caused the FinTech industry to emerge, the results do not explain how big the contribution of each player of the FinTech ecosystem was and whether each player has been equally important to the emergence of the industry.

Nevertheless in a potential future research on the topic of the FinTech industry emergence in China, these topics could be addressed. It would also be highly interesting to investigate, which of the players of the FinTech Ecosystem are most likely to contribute further in the future of the FinTech industry in China. This seems to be especially interesting, as some academics argue that "*economic prosperity depends above all on the inclusiveness of economic and political institutions, whereby institutions are "inclusive" when many people have a say in political decision-making, as opposed to cases where a small group of people control political institutions and are unwilling to change* (Acemoglu & Robinson, 2012). Acemoglu & Robinson (2012) argue further, that *"inclusive institutions promote economic prosperity because they provide an incentive structure that allows talents and creative ideas to be rewarded".* Following that, it would also be highly interesting to assess which of the challenges introduced in the thesis, are most likely to harm the overall development of the FinTech industry in China.

However, in order to investigate all these potential future research questions more data needs to be collected. Especially primary data, such as interviews with key executives of the players outlined in the thesis could increase already the overall understanding of how the FinTech industry has emerged in China. Moreover, a profound and even more extensive literature review on the topic under investigation is necessary, as the thesis has shown how complex the overall topic is, and that there is no single theory or model that can explain the FinTech industry emergence in China.

The next section is the last section of this thesis and provides a future outlook of the FinTech industry in China.

10. Conclusion

According to industry experts and also in line with the overall analysis it can be concluded that the Chinese FinTech industry is and has been evolving *"incredibly fast and at a pace that the rest of the world struggles to emulate" (*PwC, Global FinTech Report, 2017). Emerging technologies coupled with the unique circumstances of China's financial system will be one of the key drivers of *"value-chain disruption in an increasingly data-driven industry, whereby the emerging theme of technology-enabled disruption has distinct implications for the strategic focus of each type of player in the fintech space*" (Oliver Wyman, 2017).

However, according to a study by McKinsey (2016) *"the fast and furious growth will slow down to a more reasonable level, with more mature regulations and industry integration from intensified competition".* The winners of the future will be those *"that smartly orchestrate their advantages of customer experience, data capability, risk management and cost effectiveness"* (Mc Kinsey, 2016), while at the same time overcoming the key challenges.

While *"navigating through regulatory compliance, legacy IT issues, cybersecurity, or talent retention risks, innovation is key and needs to be embedded in all aspects rather than being treated as a separate initiative"* (PwC, Global FinTech Report, 2017). Six factors have been identified as crucial to each player for the future development of the FinTech industry in China: "*Evaluate emerging technologies; Take a partnership perspective*; *Integrate to innovate*; *Create an IT culture that will support innovation*; *Concentrate on the customer's voice and shift thinking to outside in and Foster a company culture that supports talent and innovation"* (PwC, Global FinTech Report, 2017). By focusing on these factors according to industry experts, *"companies will be able to fully leverage the current and future ecosystems that are being created by innovators"* (PwC, Global FinTech Report, 2017).

References

Academic Journals

Agarwal, R. & Bayus, B.L. (2002). "*The market evolution and sales takeoff of product innovations"*. Management Science, 48, pp. 1024–1041.

Aldrich, H.E. & Fiol, C.M. (1994). "*Fools rush in – the institutional context of industry creation"*. Academy of Management Review, 19, pp. 645–670.

Arner, W, D., Barberis, J. & Buckley, R. (2015). "*150 YEARS OF FINTECH: An evolutionary analysis"*. The Finsia Journal of Applied Finance ISSUE 3 2016.

Audretsch, D.B. (1995). "*Innovation, growth and survival*". International Journal of Industrial Organization 13, 441–457.

von Burg, U. & Kenney, M. (2000). *"Venture capital and the birth of the local area networking industry"*. Research Policy, 29, pp. 1135–1155.

Burr, T. (2006). "*Building community, legitimating consumption – creating the US bicycle market"*. Socio-Economic Review, 4, pp. 417–446.

Elliot, J, E. (1993). *"Schumpeter's Theory of Economic Development and Social Change: Exposition and Assessment".* International Journal of Social Economics 12(6/7):6-33.

Forbes, D.P. & Kirsch, D.A. (2011). "*The study of emerging industries: recognizing and responding to some central problems"*. Journal of Business Venturing, 26, pp. 589–602.

Geels, F.W. (2002). "*Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study"*. Research Policy, 31, pp. 1257–1274.

Gioia, D.A., Price, K.N., Hamilton, A.L. & Thomas, J.B. (2010). "*Forging an identity: an Insider – outsider study of processes involved in the formation of organizational identity*." Administrative Science Quarterly, 55, pp. 1–46.

Granovetter, M. & McGuire, P. (1998). "*The making of an industry: electricity in the United States"*. In Callon, M. (ed.), The Law of Markets. Oxford: Blackwell, pp. 147– 173.

Gustafsson, R., Jääskeläinen, M., Maula, M., & Uotila, J. (2016). "*Emergence of Industries: A Review and Future Directions".* International Journal of Management Reviews, Vol. 18, 28-50

Hargadon, A.B. & Douglas, Y. (2001). "*When innovations meet institutions: Edison and the design of the electric light".* Administrative Science Quarterly, 46, pp. 476–501.

Horii, R. (2012). "*Wants and past knowledge: growth cycles with emerging industries".* Journal of Economic Dynamics and Control, 36, pp. 220–238.

Hung, S.-C. & Chu, Y.-Y. (2006). „*Stimulating new industries from emerging technologies: challenges for the public sector".* Technovation, 26, pp. 104–110.

Hsu, G. and Hannan, M. (2005). "*Identities, genres, and organizational forms".* Organization Science, 16, pp. 474–490.

Jacobides, M.G. (2005). "*Industry change through vertical disintegration: how and why markets emerged in mortgage banking"*. Academy of Management Journal, 48, pp. 465– 498.

Kennedy, M.T. (2005).*"Behind the one-way mirror: refraction in the construction of product market categories".* Poetics, 33, pp. 201–226.

Kennedy, M.T. (2008). *Getting counted: markets, media, and reality.* American Sociological Review, 73, pp. 270–295.

Klepper, S. (1997). "*Industry life cycles".* Industrial and Corporate Change, 6, pp. 145–181.

Lamberti, L. & Lettieri, E. (2011). "*Gaining legitimacy in converging industries: evidence from the emerging market of functional food".* European Management Journal, 29, pp. 462–475.

Leblebici, H., Salancik, G.R., Copay, A. & King, T. (1991*). "Institutional change and the transformation of interorganizational fields: an organizational history of the united states radio broadcasting industry".* Administrative Science Quarterly, 36, pp. 333–363.

Lee, I & Shin, Y,J. (2018). *"Fintech: Ecosystem, business models, investment decisions, and challenges,"* Business Horizons, Elsevier, vol. 61(1), pages 35-46.

Lounsbury, M., Ventresca, M. & Hirsch, P.M. (2003). "*Social movements, field frames and industry emergence: a cultural-political perspective on US recycling"*. Socio-Economic Review, 1, pp. 71–104.

MacMillan, I. & Katz, J., 1992. "*Idiosyncratic milieus of entrepreneurial research: the need for comprehensive theories".* Journal of Business Venturing 7, 1–9.

Malerba, F., Nelson, R., Orsenigo, L. & Winter, S. (1999). *'History-friendly' models of industry evolution – the computer industry*". Industrial and Corporate Change, 8, pp. 3–40.

McKendrick, D.G. & Carroll, G.R. (2001). *"On the genesis of organizational forms: evidence from the market for disk arrays".* Organization Science, 12, pp. 661–682.

Mezias, S.J. & Kuperman, J.C. (2001). "*The community dynamics of entrepreneurship: the birth of the American film industry, 1895–1929".* Journal of Business Venturing, 16, pp. 209–233.

Munir, K.A. & Phillips, N. (2002). "*The concept of industry and the case of radical technological change"*. Journal of High Technology Management Research, 13, pp. 279–297.

Munir, K.A. & Phillips, N. (2005). "*The birth of the 'Kodak moment': institutional entrepreneurship and the adoption of new technologies".* Organization Studies, 26, pp. 1665– 1687.

Navis, C. & Glynn, M.A. (2010). *"How new market categories emerge: temporal dynamics of legitimacy, identity, and entrepreneurship in satellite radio, 1990–2005".* Administrative Science Quarterly, 55, pp. 439–471.

Petkova, A.P.,Wadhwa, A., Yao, X. & Jain, S. (2014). "*Reputation and decision making under ambiguity: a study of U.S. venture capital firms' investments in the emerging clean energy sector".* Academy of Management Journal, 57, pp. 422–448.

Phaal, R., O'Sullivan, E., Routley, M., Ford, S. & Probert, D. (2011). "*A framework for mapping industrial emergence"*. Technological Forecasting and Social Change, 78, pp. 217–230.

Pontikes, E.G. (2012). *"Two sides of the same coin: how ambiguous classification affects multiple audiences' evaluations".* Administrative Science Quarterly, 57, pp. 81–118.

Pontikes, E.G. & Barnett, W.P. (2014). "*When to be a nonconformist entrepreneur? Organizational responses to vital events."* SSRN Working Paper.

Rao, H. (2004). "*Institutional activism in the early American automobile industry"*. Journal of Business Venturing, 19, pp. 359–384.

Rice, J. & Galvin, P. (2006). *"Alliance patterns during industry life cycle emergence: the case of Ericsson and Nokia".* Technovation, 26, pp. 384–395.

Rosenkopf, L. & Tushman, M.L. (1998). „*The coevolution of community networks and technology: lessons from the flight simulation industry"*. Industrial and Corporate Change, 7, pp. 311–346.

Russo, M.V. (2003). "*The emergence of sustainable industries: building on natural capital"*. Strategic Management Journal, 24, pp. 317–331.

Santos, F.M. & Eisenhardt, K.M. (2009). „*Constructing markets and shaping boundaries – entrepreneurial agency in nascent fields".* Academy of Management Journal, 52, pp. 643–671.

Schumpeter, J.A. (1912). "*The theory of Economic Development"*. 10th printing, 2004, Transaction Publisher, New Brunswick, New Jersey.

Schumpeter, J.A. (1934). "*The theory of economic development. An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle"*. Harvard Economic Studies, Vol.46, Harvard College, Cambridge, MA.

Schultz, P.L., Marin, A. & Boal, K.B. (2013). *"The impact of media on the legitimacy of new market categories: the case of broadband internet."* Journal of Business Venturing, 29, pp. 34–54.

Shim,Y. & Shin,D,H. (2015). *"Analyzing China's FinTEch Indsutry from the Perspective of Actor- Network Theory".* Teleccommunications Policy 40,161-181.

Sine, W.D. & Lee, B.H. (2009*). "Tilting at windmills? The environmental movement and the emergence of the us wind energy sector".* Administrative Science Quarterly, 54, pp. 123–155.

Sledzik, K. (2013). *"Schumpeter's vie on Innovation and Entrepreneurship".* SRRN Electronic Journal.

Spencer, J.W., Murtha, T.P. & Lenway, S.A. (2005). "*How governments matter to new industry creation".* Academy of Management Review, 20, pp. 321–337.

Tushman, M.L. & Anderson, P. (1986). "*Technological discontinuities and organizational environments".* Administrative Science Quarterly, 31, pp. 439–465.

Van de Ven, A.H. & Garud, R. (1989). „*A framework for understanding the emergence of new industries".* In Rosenbloom, R.S. and Burgelman, R.A. (eds), Research on Technological Innovation, Management and Policy. Greenwich: JAI Press, pp. 195–226.

Van de Ven, A.H. & Garud, R. (1994). "*The coevolution of technical and institutional events in the development of an innovation".* In Baum, A.C. and Singh, J.V. (eds), Evolutionary Dynamics of Organizations. New York, NY: Oxford University Press, pp. 425–443.

Vasudeva, G. (2009). "*How national institutions influence technology policies and firms' knowledge building strategies: a study of fuel cell innovation across industrialized countries."* Research Policy, 38, pp. 1248–1259.

Walker, K., Schlosser, F. & Deephouse, D.L. (2014). "*Organizational ingenuity and the paradox of embedded agency: the case of the embryonic Ontario solar energy industry"*. Organization Studies, 35, pp. 613–634.

Zucker, L.G. & Darby, M. R. (1997). "*Present at the biotechnological revolution: transformation of technological identity for a large incumbent pharmaceutical firm".* Research Policy, 26, pp. 429–446.

Books

Acemoglu, D. & Robinson, J.A. (2012). *"The origins of Power, Prosperity and Poverty. Why nations fail"*. Retrieved from: http://norayr.am/collections/books/Why-Nations-Fail-Daron-Acemoglu.pdf [2018, June 9th].

Pol, E., & Carroll, P. (2006). *"An Introduction to Economics with Emphasis on Innovation"*. 2nd edition. South Melbourne: Thomson.

Porter, M,E. (1980). "*Competitive Strategy: Techniques for Analyzing Industries and Competitors"*. 1st Edition, Kindle Edition.

Rosenberg, N. (2004*). "Technological Innovation and Long Waves"*. In Exploring the Black Box: Technology, Economics, and History, 62–84. Cambridge, UK: Cambridge University Press, 1994.

Schumpeter, j.A. (1939). "*Business Cycles: A theoretical, historical and statistical analysis of the capitalist process"*. 2nd Vol, New York: McGraw-Hill.

Sekaran, U., & Bougie, R. (2013). *"Research Methods for Business. A skill - Building Approach*". Wiley. 6th edition

Worden, R, L., Savada, A, M. & Dolan, R, E. (1987). *"A Country Study"*. Washington: GPO for the Library of Congress.

Reports

Barberis, J. (2014)."*The rise of finTech: Getting Hong Kong to lead the digital financial transition in APAC"*. Fintech Report. Fintech HK.

E&Y & DBS (2016). *"The Rise of FinTech in China. Redefining Financial Services"*. Retrieved from: http://www.ey.com/Publication/vwLUAssets/ey-the-rise-of fintech-in-china/$FILE/ey-the-rise-of-fintech-in-china.pdf [2018, June 9th].

Kpmg (2017). *"Forging the future. How financial institutions are embracing fintech to evolve and grow*". Retrieved from: https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2017/10/forging-the-future-global-fintech-study.pdf [2018, June 9th].

Kpmg China Leading Fintech50 (2017). Retrieved from: https://assets.kpmg.com/content/dam/kpmg/cn/pdf/en/2018/03/2017-fintech-50.pdf [2018, June 9th].

McKinsey (2016). *"McKinsey Greater China FIG Practice. Disruption and Connection: Cracking the Myths of China Internet Finance Innovation"*. Retrieved from: https://www.mckinsey.com/~/media/mckinsey/industries/financial%20services/our%20insights/whats%20next%20for%20chinas%20booming%20fintech%20sector/disruption-and-connection-cracking-the-myths-of-china-internet-finance-innovation.ashx [2018, June 9th].

Nordicity (2012). *"Labour Supply/Demand Dynamics of Canada's Information and Communications Technology (ICT) Sector".* Final Report. Prepared for Industry Canada - Information and Communications Technology (ICT) Branch.

Oliver Wyman (2017). *"FinTech in China. Hitting the moving target"*. Retrieved from: http://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2017/aug/Fintech_In_China_Hitting_The_Moving_Target.pdf [2018, June 9th].

PwC Global FinTech Report (2016). *"Blurred lines: How FinTech is shaping Financial Services"*. Global FinTech Report. Retrieved from: https://www.pwc.de/de/newsletter/finanzdienstleistung/assets/insurance-inside-ausgabe-4-maerz-2016.pdf [2018, June 9th].

PwC Fintech Insurance Report (2016). *"Opportunities await: How InsurTech is reshaping Insurance"*. Retrieved from: https://www.pwc.lu/en/fintech/docs/pwc-insurtech.pdf [2018, June 9th].

PwC (2017). *"Global FinTech Survey China Summary 2017"*. Retrieved from: https://www.pwccn.com/en/financial-services/publications/fintech/global-fintech-survey-china-summary-jun2017.pdf [2018, June 9th].

PwC Global FinTech Report (2017). *"Redrawing the lines: FinTech's growing influence on Financial Services"*. Retrieved from: https://www.pwc.com/jg/en/publications/pwc-global-fintech-report-17.3.17-final.pdf [2018, June 9th].

PwC (2018). *"How Fintech is Shaping China's Financial Services?"* Retrieved from: https://www.pwccn.com/en/research-and-insights/how-fintech-is-shaping-china-financial-services.pdf [2018, June 9th].

Wolfe, D (2016). *"A Policy Agenda for the Digital Economy Report*". Munk School of Global Affairs: University of Toronto

Online References

Barboza, D., & Stone, B. (2010).*"China, where U.S. Internet companies often fail. The NewYorkTimes".* Retrieved from: https://www.nytimes.com/2010/01/16/technology/16failure.html [2018, June 9th].

BNY Mellon. (2015). *"Innovation in Payments: The Future is Fintech".* Retrieved from: https://www.bnymellon.com/_global-assets/pdf/our-thinking/innovation-in-payments-the-future-is-fintech.pdf [2018, June 10th].

China's 13th Fife – year plan. (2016). *"For economic and social development of the people's republic of China".* Retrieved from: http://en.ndrc.gov.cn/policyrelease/201612/P020161207645766966662.pdf [2018, June 9th].

Consumers International. (2017*). "Banking onthe future: an exploration of FinTech and the consumer interest".* Retrieved from: https://www.consumersinternational.org/media/154710/banking-on-the-future-full-report.pdf [2018, June 9th].

Digital Finance Institute. (2016). *"FinTech in Canada: British Columbia Edition".* Retrieved from: http://www.digitalfinanceinstitute.org/wp-content/uploads/2016/09/Fintech-Report-2016-1.pdf [2018, June 9th].

FinTech Futures. (2017). *"Cybersecurity: computers or humans – where does the threat lie?"* Retrieved from: https://www.bankingtech.com/2017/02/cybersecurity-computers-or-humans-where-does-the-threat-lie/ [2018, June 9th].

Flanagan, C., Modjtahedi, A. & Coe, I. (2017). *"Investigating the Global FinTech Talent Shortage".* Retrieved from: https://www.ryerson.ca/content/dam/science/documents/Investigating%20the%20Global%20FinTech%20Talent%20Shortage%20-%20July%202017%20-%20Web%20Singles.pdf [2018, June 10th].

Gao, J., & Zhang, Z. (2011).*"User satisfaction of Ali Wangwang, an instant messenger tool".* Retrieved from: https://link.springer.com/chapter/10.1007/978-3-642-21708-1_47 [2018, June 9th].

Goldman Sachs. (2016). "*Profiles in Innovation: Blockchain: Putting Theory into Practice."* Retrieved from: https://msenterprise.global.ssl.fastly.net/wordpress/2017/07/Goldman-Sachs-Blockchain-putting-theory-to-practice.pdf [2018, June 9th]

Hart, C. (1998). "*Doing a Literature Review"*. Sage Publications, London. Retrieved from: https://pdfs.semanticscholar.org/a3e4/af4e75ddad4205b3764a8e38b70f014950d3.pdf [2018, June 9th]

Hwang, S.-S. (2014). *"What We Need in the Fintech Craze"*. Retrieved from: http://www.lgcnsblog.com/features/what-we-need-in-the-fintech-craze/#sthash.7hP2RJh6.dpbs [2018, June 9th].

Jianlong, Y., Meiqing, H, & Yu, L.(2003).*"Business for development: Implications for export strategy-makers China E-commerce development. ITC"*. Retrieved from: file:///C:/Users/Doo-Hun%20Choi/Downloads/China%20_E-CommerceDevelopment_EF2003.pdf. [2018, June 10th].

Lovelock, P., & Ure, J. (2002). *"E-Government in China"*. Retrieved from: http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan021473.pdf [2018, June 9th].

Luk, L. (2014, May). *"China Telecom ventures in to online investment products"*. Retrieved from: https://blogs.wsj.com/digits/2014/05/23/china-telecom-ventures-into-online-investment-products/ [2018, June 9th].

Marr, J. (2015). "*China's ebanks: ANewly regime GatewayHouse"*. Retrieved from: http://www.gatewayhouse.in/chinas-ebanks-a-new-regime/ [2018, June 9th].

Reuter. (2015). "*China to open bank card clearing market to foreign firms"*. Retrieved from: https://www.reuters.com/article/china-banking-services/update-2-china-to-open-bank-card-clearing-market-to-foreign-firms-from-june-idUSL4N0XJ28E20150422 [2018, June 9th].

South China Morning Post. (2017). *"China's mobile payment giants forcing incumbents to Innovate"*. Retrieved from: http://www.scmp.com/tech/china-tech/article/2124512/chinas-mobile-payment-giants-forcing-incumbents-innovate [2018, June 9th].

Stapleton, K. (2017). *"Inside the world's largest higher education boom"*. Retrieved from: http://theconversation.com/inside-the-worlds-largest-higher-education-boom-74789 [2018, June 9th].

Suarez, F.F., Grodal, S. and Gotsopoulos, A. (2014). "*Perfect timing? Dominant category, dominant design, and the window of opportunity for firm entry*." Strategic Management Journal, doi: 10.1002/smj.2225.

Swanson, A. (2014). "*Internet Finance in China:Will it disrupt Traditional Banking?"* Retrieved from: https://www.chinabusinessreview.com/internet-finance-in-china-will-it-disrupt-traditional-banking/ [2018, June 9th].

The Economist. (2015). *"Ask the algorithm".* Special Report: Money Management. Retrieved from: https://www.economist.com/special-report/2015/05/09/ask-the-algorithm [2018, June 10th].

UnionPay. (2018). *"Brief Review on the Development of China's Payment System"*. Retrieved from: http://en.unionpay.com/merchantService/knowledge/file_4420451.html [2018, June 9th].

Walchek, S. (2015). "*The Unbundling Of Finance"*. Retrieved from: https://techcrunch.com/2015/05/29/the-unbundling-of-finance/ [2018, June 9th].

Wang, H.H. (2014). "*Alibaba saga IV: A crocodile in the Yangtze River"*. Forbes. Retrieved from: https://www.forbes.com/sites/helenwang/2014/08/07/alibaba-saga-iv-a-crocodile-in-the-yangtze-river/#66cde2878f89 [2018, June 9th].

Wang, X., & Huang, R. (2017). *"FinTech in China's Capital Market"*. NOMURA JOURNAL OF ASIAN CAPITAL MARKETS. Vol 2. No 1. Retrieved from: https://www.nomurafoundation.or.jp/wordpress/wp-content/uploads/2017/09/NJACM2-1AU17-03_CHINA.pdf [2018, June 9th].

Yannan, T. (2012)."*E-commerce to make even bigger gains. China Daily*". Retrieved from: http://usa.chinadaily.com.cn/business/2012-03/28/content_14928955.htm [2018, June 9th].

Ying, W., & Kuanhai, Z. (2012)."*Ontologies for C2C online payment services"*. Advances in Information Sciences Service Science, 4, 386. Retrieved from: https://www.holaportal.com/publication/ontologies-for-c2c-online-payment-services-89255/ [2018, June 9th].